THE FARMER'S MAGAZINE.

VOLUME THE TWENTIETH.

(SECOND SERIES.)

JULY TO DECEMBER, MDCCCXLIX.

LONDON:

OFFICE, 24, NORFOLK STREET, STRAND.

MAY BE HAD BY ORDER THROUGH ALL BOOKSELLERS.

LONDON:

Printed by Joseph Rogerson 24, Norfolk-street, Strand.

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(SECOND SERIES.)

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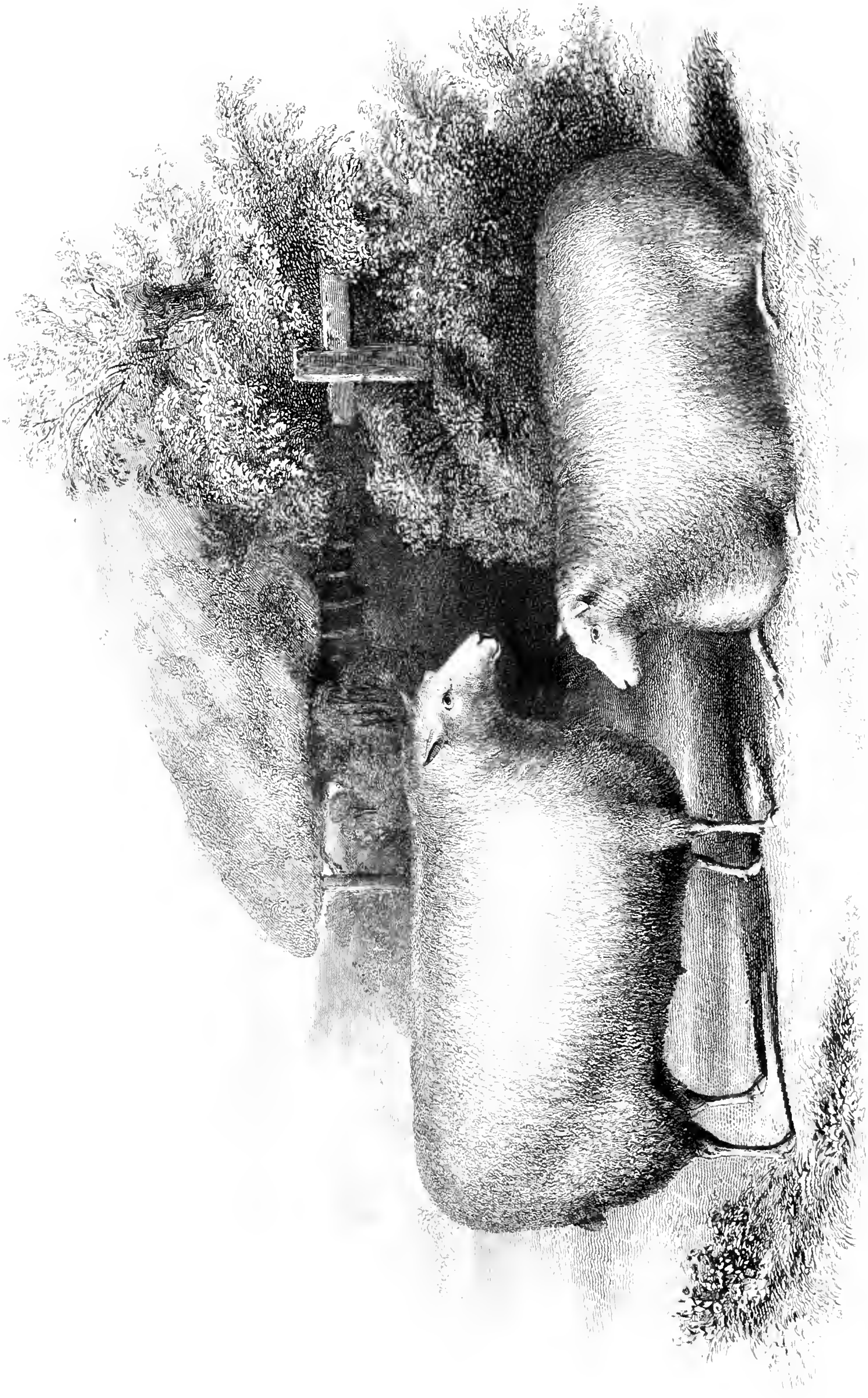


THE FARMER'S MAGAZINE.

JULY, 1849.

No. 1.—Vol. XX.] [Second Series.

PLATE I.

PORTRAIT OF THE RIGHT HON. THE EARL OF YARBOROUGH.

ENGRAVED BY J. B. HUNT, FROM A PHOTOGRAPH BY M. CLAUDET

PLATE II.

TWO LEICESTER SHEEP.

The subject of this plate (two Leicester Sheep) obtained the first prizes of Thirty Sovereigns each, in the first and second classes of Leicester Sheep. They were bred by, and the property of, Mr. John Borton, of Barton-le-street, near Malton, Yorkshire. The local prize of Fifteen Sovereigns was also awarded to that gentleman for one of them, as being the best Shearling Ram in class 1.

THE RIGHT HONOURABLE THE EARL OF YARBOROUGH.

"After a day of eight hours on horseback, in which the even uniform cultivation of vast farms, the size of the farm buildings, the number and excellence of the sheep and horned stock, the neatness of the fences, gates, and general cultivation, excited my constant admiration, my greatest source of surprise lay in the farmers themselves. Like every other traveller in this county I wondered where the race came from; a fishing question on this point brought out from an apple-cheeked farmer of 70, in scarlet, on a stout cob, a story which others may have heard before—I have not.

"When Dr. Buckland was visiting the present Lord Yarborough (then Lord Worsley), after seeing the specimens of Wold farming, the same query fermented in his head; so at a dinner of farmers, his lordship presiding, in the course of an awful pause, the Dr. exclaimed, 'My Lord, the farming here is splendid; but what I want to know is, where do you get your tenants from?' Before Lord Yarborough could answer this puzzling question, a patriarch, from the other end of the table, roared out, 'I'll tell you, Doctor; his lordship breeds 'em.'"*

Seldom, indeed, could we introduce a portrait to the patrons of the *Farmer's Magazine* with a better grace than the above anecdote allows us. Already have we numbered in our Gallery agriculturists eminent in many different spheres for the perseverance and success with which they have pursued some especial branch of the science; for such now we presume we may venture to term it. Amongst others we have included Jonas Webb, celebrated for his breed of Sheep; Hugh Watson, as justly known for his breed of Scotch cattle; with others equally famous in various ways, while here we are permitted to pay our tribute of respect to one as worthily exalted for, as those of his own rearing proudly proclaim it, his "breed of tenants."

* From "Letters on the Railways and Agriculture of Lincolnshire," which appeared about twelve months since in *The Gardener's Chronicle.*

The wide-spread celebrity of the Brocklesby property, as an estate really brought to the perfection of management, will so stay us from repeating, at any great length, that detail and arrangement which have so repeatedly been held up as a model for others. In comparatively a very few years has a vast tract of wild, unprofitable heath land been brought into the highest and most remunerative state of cultivation; in this short period have the tenants, by the exercise of due spirit and judgment, reached an opulence that has reflected itself again in quite as great a degree on the owner. Tracing back to the fountain head of a good liberal landlord, do we find the tide of fortune flowing on to all who are in any way connected with the district through which it runs.

However great the individual worth of the present holder of the title, the "character" and excellence of the Pelham family is still more or less hereditary. The "breed" of Lord Yarborough himself being equally good in his station as that of his tenantry is so generally confessed to be for theirs. In evidence of this we offer the following brief summary from the chronicles of the house:—

Charles Anderson Worsley, second Earl of Yarborough, and third representative of that peerage, was born on the 12th of April, 1809; married the 19th of December, 1831, the Honourable Adelaide Maude, daughter of Lord Hawarden, by whom he has issue, and succeeded to the title at the decease of his father, in 1846.

This family derives maternally from William Pelham (third son of Sir William Pelham, of Laughton, in Sussex, by his second wife, Mary, daughter of William, Lord Sands, of the Vine), one of the most eminent military commanders of the reign of Elizabeth. This gentleman, in addition to some very signal services in France, was also employed in Ireland, where he was knighted, and on his return to England, sworn of the Privy Council, appointed Master of the Ordnance, and eventually constituted Field Marshal.

Tracing down four generations from Sir William, we come to Mary, eldest sister of Charles Pelham, Esq., who died without surviving issue. This lady married Francis Anderson, Esq., of Manby, in the county of Lincoln—great great grandson of Sir Edmund Anderson, Lord Chief Justice in the reign of Elizabeth; and her grandson, Charles Anderson, Esq., assumed the surname and arms of Pelham upon inheriting the estates of his great uncle—Charles Pelham of Brocklesby, just named as leaving no direct heir. In the year 1794, this same representative of the family was elevated to the peerage by the title of Baron Yarborough, of Yarborough, which was subsequently raised to an earldom in the time of his son, the father of the present Earl.

In addition to the estates and two seats, Brocklesby and Manby, in Lincolnshire, in which county, we believe, his lordship is the largest landed proprietor, Lord Yarborough has also a very fine property in the Isle of Wight, which he inherits from his mother, second daughter of the Honourable Bridgman Simpson, and heiress to her maternal uncle, Sir Richard Worsley, Bart.

The memoirs of the heroes of peace and advancing civilization afford few "points" for the pen of the biographer. Their progress, perhaps, is marked more as useful than brilliant, and their successes attained rather by continued application and energy, than by any "lucky hit" that the accident or hazard of the occasion may open to them. The career of Lord Yarborough has been eminently that of a Hero of Peace; but in every position to which his talents or station have called him, he has invariably brought the same valuable and serviceable qualifications. As a landlord we give his portrait here *par excellence*; but in many other capacities he has proved himself as true a friend to the proper interests of all. In the House of Commons, when Lord Worsley, his abilities as a legislator were considered of a very superior order; and he had, if we remember rightly, the conducting of two or three measures of much importance—amongst others of "the Commons Bill Inclosure Bill," despite some considerable opposition to which the measure was subjected. His lordship was first returned, at the earliest legal age, for Newtown, in the Isle of Wight; in the short Parliament immediately preceeding the passing of the Reform Bill he represented North Lincolnshire, for which division of the county he continued to sit, until his removal to the Upper House. The fact of his lordship having received a most valuable piece of plate, purchased by the subscriptions of upwards of two thousand of his constituents of all parties, is the best proof of the estimation in which his services were held.

In another public capacity we feel confident we have only to remind our friends of Lord Yarborough's year of office as President of the Royal Agricultural Society, to have his worth and good stewardship there at once allowed. We have no hesitation in saying that none of the many noblemen and gentlemen who have accepted the office ever did more towards the real advancement of the society than the business-like habits and unceasing attention with which Lord Yarborough signalised his performance of its duties. He lent not merely his name or presence to the council, but was ready at all times to share and aid them in their labours for a cause to whose progress he had already contributed so much. There was good promise, however, for this, from the character and importance his lordship has given to, from his position as President of "the Lincolnshire Agricultural Society."

As Chairman of the railway—" the Manchester, Sheffield, and Lincolnshire," connecting the inland with the Grimsby Docks—Lord Yarborough's talents are as fully appreciated; while as a master of hounds and true sportsman, his character will always rank well with his lordship's other merits as a man of business. His own breed of farmer, in fact, it would seem, is ever remarkable for his attachment to and prowess in the national sport of this country—that of fox-hunting. Take, in example, this capital and graphic description of a Lincolnshire yeoman, that we borrow from the same pleasant writer and attentive observer we have to thank for our opening anecdote :—

" Our first halt was to breakfast with the gentleman who was to take me off my guide's hands and up to the cover side; my first guide being on other thoughts intent than hunting. Our breakfast host met us at the door; and he, his dwelling, his farm buildings, and his farm, were all fair specimens of what is to be found on the Wolds. He was a tall, portly, powerful man, nearly six feet in height, and about fifteen stone in weight; with rosy, well-cut, small features, a bald forehead, curly grizly hair, with a big arm and a small hand; and gay, jovial expression of countenance, welcoming the stranger as if he had known him and liked him before. The house, a brick villa, with a garden of a couple of acres well stocked with fruit trees, overlooking huge, bare, ploughed fields; just the style of house that near a large town would let for £100 a-year. Divided from the house by an occupation-road were the farm buildings; a compact three-sided parallelogram. I counted forty young beasts in one yard; there may have been more. There was first-rate stabling for about half-a-dozen horses. My new friend was one of the crack horsemen, and horse-sellers too, in the district. That was to be seen in the accustomed style of his boots, white cords, scarlet waistcoat and coat, with the button of the Brocklesby hunt. In the breakfast-room the table displayed, with its array of hot and cold meats, a picture not to be beaten by the Café de l'Europe before the Revolution. A gold-mounted whip on the chimney-piece, with an inscription showing that it was presented by Lord Yarborough to the owner of the best three-year-old hunting colt, and some sporting prints, gave a hint of the prevailing tastes of the owner; just as the pictures of prize bulls, sheep, and pigs, bred by my friend Torr, and hung round his room, show his preference. In a word, host, hostess, house, furniture, everything, was thoroughly English; and the reception worthy of that English hospitality which in towns has been too often replaced by second-hand gentility. The farm is about 1,100 acres; nine-tenths arable, and almost all reclaimed by the present owner from moorland, having been let or given (as they term it) to him by the late earl in a wild state some thirty years ago; because he seemed a hard young fellow, and it would give him 'something to do.'

" After breakfast, to which my preparatory gallop afforded an admirable sauce, we adjourned to the stable; where a horse, kindly lent by a gentleman whom I had not then had the pleasure of knowing (where else should I have found such kindness?), awaited me. As the letter in which Mr. N. announced his politeness spoke of 'my father's horse,' I expected, as a matter of course, some fat old screw. My surprise and pleasure were equal on seeing a fine well-bred mare, nearly sixteen hands high; with an eye that looked like going, and she did not disappoint me.

" Breeding, size, and power, distinguish the Lincolnshire hunters. They are chiefly bought at three and four years, from Yorkshire and other breeders, and paired by those of the Wold farmers who have sporting tastes; that is to say, almost all. The want of pasture prevents much breeding. If circumstances should lower the price of horse-keep concurrently with the opening of the Lincolnshire railways, the trade in horses must, in the presence of the limitless demand, take a great development. My host showed me, before starting, three hunters, for size, power, beauty, and breeding not to be easily matched."

The above would be hard to beat any where as a specimen of true comfort and real English feeling and character; while, we fear, in too many counties, it would be difficult to parallel. That the sportsman, however, is not the chief or only distinguishing mark of the Yarborough breed of yeomen — learn again from our entertaining tourist :—

" During several days, in which I passed over the country in every direction, I was much impressed by the generally high tone of intelligence pervading among the farmers; who seem to hold feelings much the reverse of the same class in most counties. I had a good opportunity of hearing many opinions as I followed the Brocklesby hounds on several cold-scenting days; and talked to every one, according to my custom. In many counties the farmer who purchases new implements, tries new manures, or ventures on new experiments, is looked upon with pity, not unmixed with contempt. These sort of speculations are considered only proper for landlords indifferent to profit and fond of agricultural fame. Such is not the case in the districts round Grimsby and Brocklesby: an account even from a stranger of any recent invention, or seed importation, bearing upon agriculture, is listened to with attention; and the tenant-farmers most noted among the scientific agricultural world for their ingenious investigations, are also the most highly esteemed among their Lincolnshire neighbours."

And then we come to the *sine quâ non* that backs, or rather perhaps prompts, this readiness to make improvements. Our traveller scarcely brings it as much to the fore as we ever have, and shall; but he still cannot help recognizing and acknowledging the "Tenant-right" flag he finds floating over the Brocklesby territory:—

"At starting from Brocklesby, riding for nearly forty miles towards the south, you pass an unbroken succession of large farms; composed, with exceptions I will presently describe, entirely of arable land, farmed by men of large capital, under a customary tenancy at-will. There are in this great district no small farmers; and I believe I may add, improvidence apart, no poor farmers. There seems to be some difficulty in ascertaining who first imported turnip culture and bone manure into Lincolnshire. When Arthur Young made his first tour in the county this great improvement had already taken root; although it was then but slowly extending itself. Under its influence the rental of the Brocklesby estates (as I am informed) has risen many thousands a-year in rent from farms not under £300 a-year. The rental of other proprietors of lands on the Wolds has risen in like proportion: the rise having been from 2s. an acre for the waste pasture, to 25s. an acre after a series of turnip culture and sheep feeding. In this instance a customary agreement to pay for improvements, and reliance upon the honour of an old family, stand in the place of a lease. No one would venture on mere verbal terms to lay out capital in reclaiming waste land the property of a stranger capitalist."

But one word more in testimony to the content and happiness this system brings to all classes who come under its influence; and we conclude our extracts from an article, whose unaffected easiness of style and truthful power of observation add to and confirm the authority we take it for:—

"According to the doctrine of some political economists, large farms should result in a miserable labouring class: so far from that being the case, I never saw a better looking, more contented race; the villages are pleasant sights, so clean and comfortable, and the women very pretty."

It might be urged that in writing a notice of a nobleman who has so successfully carried out the great principle long advocated in the pages of this work, a proper spirit of impartiality could scarcely be expected in estimating his character. For this reason above all others, we feel particularly grateful for the opportunity we have had of introducing into our sketch the unbiassed opinions and experience of another. From him, previously an utter stranger in the county, as no less from those in the district he quotes, we learn Lord Yarborough's repute and worth—an English landlord who has done more than any other to place the English tenant-farmer in his proper position; and whose pride and care it has become to keep him there.

ON SEWAGE FLUID IRRIGATION.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

An advertisement from the Commissioners of the Metropolitan Sewers has very lately announced a great, and far too long delayed effort, alike beneficial to the public health and to agriculture. My readers will remember that the good beginning thus made by the Metropolitan Commissioners will speedily be felt in other places. Towns of a much smaller extent will soon gladly avail themselves of the experience and the practical knowledge acquired by the Court of Greek-street: other streams of fertilizing matter will be diffused over the soil: the contents of town sewers, diverted from adjacent rivers, will be dispersed over and add fertility to lands, whose riches they now direct towards the sea. Before I proceed to examine several important facts relating to the use of sewer fluid, which are not nearly so generally understood by the landowners of England as for their own sakes, as well as for the interest of agriculture, is very desirable, I will give a portion of the very descriptive advertisement to which I have alluded. The Commissioners there remark—that, "proposing by means of powerful steam engines and appropriate pipes or channels to convey to a considerable distance from the metropolis all the sewage of that district, and being now engaged in various preparatory surveys and trials, and intending also that this large amount of sewage shall be so delivered as to be most conveniently and permanently employed for the purpose of irrigating arable soils and meads; they are now desirous of receiving proposals from the owners or occupiers of lands situated within, say 50 miles of London, who are willing to contract for a supply of the liquid sewage, say in quantities per acre, if for water meadows, equal to 250 tons for each irrigation, and at the rate of 18 irrigations per annum: at this rate of supply it is calculated that the sewage of the Metropolitan districts is fully equal to the irrigation of 15,000 acres of water meads. It is proposed to give the preference to those districts where (as in the neighbourhood of Newmarket, or the valley of the river Crouch, in Essex, or that of the river Darenth, in Kent, or of that of the river Itchen, in Hampshire), the population is widely dispersed, and the natural drainage, if into the Thames, falls into it below London."

I earnestly entreat the great landowners, whose lands are situated within the circle to which this important advertisement alludes, to promptly examine the question, and to as quickly direct their conditional offers to the Commissioners. It may afford material assistance to them if they carefully peruse a recent statement from Dr. Stark, of Edinburgh, printed as an appendix to Mr. E. Chadwick's valuable paper on Sewer Manure, in the course of which he gives the following graphic and practical statement. Feeling the importance of showing the amount of the supply needed for grass land in sewer irrigation, he remarks, p. 48—

"To enable you to have some guess as to what number of acres may be advantageously watered by a certain amount of sewer water, I have taken much trouble to ascertain the existing number of acres (Scots measurement) watered by the foul burn or sewerage water of drains. This drainage, proceeding chiefly from the Old Town, is not half so great in amount as it would be had these old tenements a supply of water and of water-closets; yet it waters abundantly at the present moment one hundred and seventy-two (Scots) acres of land, and it is proposed to bring in fifty more acres this year—the utmost the present supply could irrigate.

"The first thing done is to level and thorough-drain the land, and divide it by proper ditches into small portions of about half-an-acre each. The land being all ready, or the last cutting being taken the 30th or so of October, the watering for the next season's crop commences the first week of November; the water is laid on a fresh portion of the divided meadow every other or every third day, so that some portions are always watering while the others are drying. The whole sewer water is thus constantly used—none being allowed to run waste. Those who have a small extent of meadow to water, and more than an abundant supply, continue the watering of each portion for several days at a time, then intermit for a fortnight, and lay on the water again. Those who have a larger extent of meadow to irrigate, and of course a smaller proportional supply of sewer water, only irrigate each lot or division once every fortnight; the watering being continued to each division during the space of one day, and night also, if practicable. That no water may ever be allowed to run waste, the small half-acre divisions are classed into fourteen or sixteen larger divisions, and the whole supply of sewer water is laid on each of these larger portions *seriatim* once every fourteen or fifteen days; so that by the time the whole divisions have been once watered it is time to bring back the water to the first watered lot. The more water each portion receives the larger is the crop raised on it, and the higher the price got for that crop in the market; so that while the lots which are watered only once in the fortnight in general bring only from £23 to £30 per acre annually, those which receive a larger supply let for from £28 to £50 each per acre. The above watering is continued uninterruptedly at the same intervals of time to each portion during the whole year; so that it will be apparent that though the whole meadow is not under water at the same moment, but only its 14th or 16th part, still the whole sewer water is used for watering one or other portion of the divided meadow. This water is never kept in tanks or ponds for the purposes of irrigation, as it is found to deposit a considerable proportion of solid matters, which are worth from 2s. 6d. to 5s. per ton as a manure for gardens; but such tanks and ponds are a constant source of sickness, and ought never to be allowed in any circumstances. During heavy falls of rain, when thick mud is carried down with the sewer water, the whole is allowed to flow direct into the sea; experience having shown that such water cannot be used for the purposes of irrigation, excepting during the winter season, when there is no growth. If by chance used during summer it destroys the next cutting, rendering it so sandy and tainted that the cattle refuse to eat it. The best meadows yield from four to five cuttings annually; the poorest three cuttings only. If allowed to stand too long on the ground the crop rots at the root; its excessive weight causing it to fall over and heat, just like laid white crops. To come to exact particulars —Craigentinny meadows, consisting of 144 acres, 1 rood, 9½ falls (Scots measurement), are divided into 249 lots or divisions; with a few exceptions, averaging abo half an acre each. About 15 of these lots are watered on the self-same day; a fresh number being every successive day irrigated, till the whole number is gone over. This is continued uninterruptedly during the whole year; but it sometimes happens that a day or two longer elapses between one watering and another from the crop being ready for cutting, or other causes. The following is extracted from the 'Meadow Book,' kindly furnished me for this purpose by the Messrs. Stewart, agents for W. H. Miller, Esq., of Craigentinny; showing the exact days on which the same series of lots was watered during a period of 18 months:—Lot 1 of Craigentinny meadow was watered May 3, 1845; May 14; June 3; June 20; July 7; July 24; August 15; August 31; October 8; October 29; November 24; December 31; January 30, 1846; February 18; March 5; March 22; April 2; April 13; May 10; May 28; June 14; June 30; July 14; August 5; August 19; September 17; October 12; November 1. In 1845 only day waterings were given, and three cuttings obtained; in 1846 the waterings were continued day and night, and four cuttings were obtained. During frost the waterings are discontinued. The first cutting is usually taken the last week in March."

In a printed report of the Sewage Disposal Committee of the Commissioners of Metropolitan Sewers, other interesting and practical facts are contained. It was upon the result of some of the examination contained in the paper, combined with other researches, that the committee arrived at the conclusion, that on the average description of soils in the average state of their moisture, an irrigation of sewer fluid equal to 250 tons per acre would suffice for the ample saturation of the soil. In fact, there is abundant evidence that much smaller proportions of sewage fluids even when much diluted with spring water, produces very powerful effects on grass land. One of the most recent reports on this head, is contained in a letter, dated June 6th, 1849, from Mr. Roe, the late surveyor to one of the Metropolitan directors of sewers, to Mr. E. Chadwick; a letter I find in a late report of the Sewage-disposal Committee of the Metropolitan Commissioners of Sewers, in thus speaking of his experiments in Middlesex—"My land (meadow) is drained to a depth of two feet, and the outlet for the drains is into a tank from whence I again pump the water for use a second time (the tank has an overflow drain). Soon after the irrigation commences I find the water in my drains run freely, and the water still exceedingly good. The tank need not be very large if the water is pumped out as it flows in. This land has an understratum of clay, having a depth of 18 inches of alluvial soil on the top. I cut my crop in April and the beginning of May, and began cutting my second crop the last week in May. Last year I cut five crops, and left a good feed after. A quarter of an acre kept my horse 30 weeks, with only two trusses of hay in addition. I have not the least doubt but that I shall cut seven crops this year, worth to cowkeepers at least from £6 to £7 per acre each crop. The quantity of water I used to each irrigation last year was 50 cwt. to each four poles of ground, or 100 tons to one acre. This spring I have used at the rate of 200 tons, and the result has been on that portion, that in one month after the first cutting the grass is what is termed lodged. I have only irrigated twice in the winter and once immediately after each cutting. The water I use passes partly through the dung pit; the contents of a water closet used by three people, and the urine from one horse, pass to the tank, so that sewer water (unmixed with rain water), is much stronger than the water I use."

Such are a few of the important facts already ascertained with regard to sewage irrigation. They are such, even in periods like these, as no one who wishes well to his country will deem otherwise than of the highest value. In whichever way they are regarded, whether as adding to the supply of earlier grass for stock farms, or as adding to the fertility of every farm over whose meads it is diffused, or as saving the rivers of England from pollution—in whatever way, I say, the question is viewed, it will hardly fail to cheer every true friend of agriculture, and of improved public health.

ON THE MEANS OF IMPROVING THE QUALITY AND INCREASING THE QUANTITY OF THE DIFFERENT VARIETIES OF BARLEY.

BY M. M. M.

Within a recent period the cultivation of barley has become a staple branch of the employment of the farmer. When wheat was the leading product, and when the process of wheat-growing upon clays was the principal object of attention, the barley was neglected as a secondary and inferior object. The adoption of the alternate system of husbandry gave a considerable impetus to the growth of barley; while the extension of the comforts of life amongst all classes of the community, has produced a greater demand for it, and especially for the finer qualities, and thus given an impetus to the production of that grain.

In districts where the soil admits of the alternate or four-course rotation, the invariable preparation for the barley is the turnip crop fed off; and convenience, as well as success, alike indicate that this is the proper place in the rotation for the growth of the barley.

As civilization extends and population increases, the cultivation of barley becomes a more decided object of profitable employment, and the quantity malted annually exceeds twenty-nine millions of bushels. The peculiar circumstances attending malting of a legal character, improper to specify here, render economical the malting of those samples only which yield a large quantity of saccharine matter. Experience has decided that those samples of barley which when broken exhibit a free mealy surface, are those which attain these objects the most completely; while those, on the other hand, which exhibit when crushed a solid, entire, and brittle mass, are denominated "flinty," and are found deficient in those principles which the maltster finds necessary to the production of that article which answers his purpose.

The object of the barley-grower is essentially different from that of the wheat-grower. The last effort of the plant, after the seed is matured, and before it is shed from its parent stem, is the formation of the outer coat—the bran—to shield it from the action of the elements, and to protect its vital principle from their agency in its new circumstances. Hence fully ripe wheat obtains a thick dull-coloured coat of bran, at the expense, in some degree, of the starch-cells of the grain; but if the connection between the ear and the root be broken before the entire maturation of the seed, the formation of the outer coat is arrested—it is thin, plump, and shining, and this is, *cœteris paribus,* always preferred by the miller. He has the bran to separate, and sell at a lower price, and hence he wants as small a proportion of this as possible to the ratio of the more valuable flour. Whatever effects this may have on the germination, it is quite certain that the maltster requires a state of the grain different from the miller; and a shrivelled coat, a state indicative of its germinating freely, and being productive of saccharine matter, in a great degree is an object sought for by the practical malt-maker. On the other hand, if the skin of the barley is smooth and stretched over the grain, it is equally indicative of a brittle, solid interior, fit only to be remuneratively employed for grinding purposes. Different kinds of barley as well as soils possess this capability irrespective of the degree of maturity of the grain, and the well-known technical terms of "flinty" are applied to the character of the barley unfit for malting, and "sloamy" in its look; while the term "free" is applied to the best malting description, and "curly" in the same way describes its appearance.

1. *Soil and Adaptation to different Varieties.*

The varieties of barley, though very numerous, are restricted as far as extensive cultivation is concerned, to a comparatively few, and these are severally adapted to a small class of soils.

The tendency of plants to throw out new varieties is very remarkable, and has the appearance of being accidental. In an ordinary barley-field some ears will be found far superior to the rest; these, if selected and sown, and the best of their produce again carefully chosen, the same effects may be produced upon them as cultivation produces on our garden vegetables; but this will not constitute a distinct variety. They do not, however, originate in chance, unseen, and often untraceable in field cultivation; a process of hybridisation is carried on by hundreds of natural operations. If the microscope were used by an observing person, varieties and sub-varieties might be collected of greater or less value. Thus Mr. Chevalier obtained his variety from an ear of peculiar size and plumpness. This he preserved and cultivated, and it has spread over the whole of the country on the class of soils to which it is suitable, and for which it possesses a degree of adaptation which is very remarkable. The natural soil for the growth of barley is that which is neither too light nor too heavy, which is sufficiently dry to bear the consumption of the turnips on the land by sheep, and yet sufficiently retentive of moisture to prevent its being burnt up in summer. On light sands and sandy peats, it is apt to be stunted and "flinty:" on strong clays it is weak in the straw, coarse in the grain, and, strange to say, also "flinty" in character; and hence the ordinary varieties on these soils rarely grow to that perfection which is requisite to constitute them a sample suitable to the manufacturer. The Chevalier is unsuitable to the clayey or strong soils, because of the weakness of the straw; it appears as if the corn-producing power of the plant impairs its energies for the production of straw, hence on strong soils it lodges long before the ears are formed, and the produce is unfit for malting. On the loose sands and sandy peats, however, the action of the Chevalier is the very reverse; naturally they seem unadapted to the perfection of common barley—it grows coarse and imperfect, whatever may be the quantity of straw. The corn-producing propensity of the Chevalier, however, overcomes the tendency in the soil to grow shrivelled and imperfect grain; and some of the most viewly and favourable samples of the Chevalier barley may be grown on these light, inferior, and unproductive soils. The peculiarity of the Chevalier over all others is its particular formation. The ordinary kinds are of a character of the four below :

while the Chevalier is rounder and smaller at the ends, and more usually this form

It usually also weighs better, because there is a less portion of husk at both the ends of the grain, and it therefore contains a larger proportion of starch. It also possesses much earlier maturity.

In like manner the Annat barley was discovered by a very careful observer in Scotland—Wm. Gourie, of Annat-gardens, Perthshire, in 1830; and he selected three ears, which, like the Chevalier, produced grain round, bright, and fine in quality, stiffer in the straw, and possessing much of the early maturity of the Chevalier, while it is both productive and hardy, and has not the objection of premature lodging; however it is favourable for high lying and stronger soils, and it seems, to a certain extent, to remedy the difficulties of the strong land cultivation of barley.

The Battledore is an old variety of barley, grown successfully in all descriptions of soils of a secondary quality. It is short in the ear, the grains small and indistinctly marked, and growing out in two rows, at nearly right angles from the straw. It is invariably productive, but is an inferior description of barley, scarcely fit for the maltster from the smallness of the grain, and consequent large proportion of husk; and as it germinates at times different from the newer varieties, it is generally discarded by the maltster.

The Black barley is a peculiar variety little cultivated, late in ripening, and coarse in quality; adapted only for situations where finer and more delicate varieties will not grow successfully, and is cultivated on strong lands for the purposes of grinding.

The Bere or Bigg is a hardy kind, suited to the severities of mountain situations, and where all attempts to grow the more valuable kinds will be found quite ineffectual. Not only are its powers of resisting wet and cold very great, but it also possesses a disposition to ripen early, and is therefore an acquisition to climates and situations where any other kind would be totally unproductive. Nor is a state of soil of any peculiar richness necessary to its development, as it can be produced when other kinds need not be attempted. The grains are small, and contain a large proportion of loose husk, and its use is absolutely confined to grinding.

The above, with the ordinary English barley, are the generally prevalent varieties; but there are, in various parts of the country, persons who cultivate varieties and sub-varieties, either imported from foreign countries, or originating from and named after individuals. Amongst the former are Siberian barley, Pomeranian, Cape of Good Hope, Italian, &c.; and the latter, Brown's, Black's, Potter's, Lord Western's, &c., &c.

2. *Preparation of the Land.*

The preparation of the land varies exactly in the degree of its being more or less removed from a strong or a light texture. In the former the process is one of entirely breaking down the adhesiveness of the soil, so as to render it free from clods, and in the state of the greatest friability of which it is capable. At the best, its defect appears to be that of over adhesiveness, which it seems to acquire before the maturation of the grain in most seasons, and hence there is an imperfect sample. On this soil the preparation commences by a thorough fallowing in the month of May, cross ploughing, breaking up, and the general paraphernalia of a summer fallow are considered necessary; the whole of the large clods must be reduced to the greatest degree of comminution of which they are capable; the manure must then be applied, and the whole ploughed up for winter, when the action of the frost still further reduces the particles of earth, and at sowing time the soil is as intimately broken as it is capable of being.

In cases where a summer fallow is considered objectionable, and where the most is done by the draining of the soil and mechanical appliances that can be, an early crop is taken off, be it tares, or even grain. The scarifiers, of which there are now an endless and valuable variety in all localities, are set to work as soon as the crop is removed. These break up the soil, and place it in the exact position it would be, or even more favourable as regards pulverisation, than it was by fallowing and cross-ploughing, performed in May. The only extra work required is the clearing of any weeds which the scarifying process will only bring to the surface. There is not time afforded by this course to admit of the alternate state of wet and dry, which breaks down the texture of the soil during a summer's exposure; but when once the clods become dried through, the Crosskill's clod-crusher will effect all these objects, and thus a sort of fallow, partly natural and partly mechanical, is produced. Thus cleared, manured, ridged up, and exposed through the winter, the frosts of which effect any pulverisation the implements have not produced, is rendered as favourable a seed-bed for the barley as such soil can be.

On light soils the preparatory process is precisely the reverse of that on strong; for where the one is to break down and render fine and powdery, the other is to consolidate and make cohesive. While the barley requires a finely comminuted superstructure for its successful growth, it requires one also which will enable the roots to take a firm hold. As an instance of the truth of this, nothing makes it more strikingly evident than any attempt to work a light soil for barley after a corn crop. The soil in this case is loose and unadhesive as it is possible to conceive; and how much soever the land may be manured, the barley is generally indifferent, and always a bad sample—coarse and deficient; indeed the manure applied directly to barley seldom succeeds in effecting the same beneficial object as when it is applied by the more gradual deposition from the fleece, the lungs, and the tail of the animals; neither will lime, nor any application, completely remedy the defect, and too light soil gives off the moisture too rapidly, or the roots cannot bear an over supply of oxygen.

After sheep-treading the soil is always firm, and to a certain extent cohesive, and this requires to be ploughed after the sheep as soon as possible. In the counties of Norfolk and Suffolk, where barley is most successfully cultivated, great importance is attached to the plough rapidly following the sheep; if it is not so there is too much evaporation of the manure left by the animals. This ploughing is by the deepest cultivators performed extremely thin; three inches, or at most four, is the great desideratum, and the land is allowed to remain until a period when it is desirable to prepare for the sowing. We have seen instances where the scarifier was in this case substituted for the plough, but the success of the plan was not such as to encourage its repetition. The effect of ploughing is to turn the surface upon the firm sole left by the plough. Evaporation is thus prevented, and the sole is enriched, which is not the case when the scarifier is used, as that implement merely stirs and loosens the surface, and does not turn it over. Before sowing, either another ploughing is given to thoroughly intermix the broken soil, or a drag is passed across the ridges, and the harrows assiduously used until their crust of loosened soil is thoroughly and intimately broken.

3. *Seed and Sowing.*

In what condition soever the soil may be, or what variety of seed soever may be used, a change is indispensable at least every two years. On all soils, and in all situations, there is a continual necessity of sustaining the energies of the plant by mutation; so that not only a change of soil, but a change of climate also appears to be necessary to keep up the finest samples, especially in districts where the climate is not very favourable; for though in Essex, Kent, and Norfolk, the samples are easier sustained of prime quality than in Yorkshire and Cumberland, still it is necessary, even in the former, to have recourse to carefully selected seed, to keep up its character for vigour and quality. The finest samples introduced into the northern counties will in a few years deteriorate, and be undistinguishable from the ordinary seed corn of the district; but by introducing seed from the best quarters of a selected kind, and sown one year from the produce of this, procuring new seed every year, in small quantities; by this means the produce of the poorest soils is assimilated with that from those of a better quality, and it is one of the greatest triumphs of skill in cultivation.

The Quantity of Seed, though modified by season, aspect, elevation, and climate, is not liable to the extreme variations to which the wheat plant is subject, nor are there many advocates for the very thin sowing of barley. From the extreme point of four bushels, to the minimum of nine pecks, with an average of three bushels, as influenced by the modifications before referred to, is the point arrived at by the best and most successful cultivators. Thus, if the season be cold and wet, some of the feeblest plants will not germinate, and hence a larger quantity of seed is necessary in a season of this description. If the seed be very plump and bold, a larger quantity is necessary than when it is smaller, because in the former case there are fewer plants than in the latter, and a difference of one peck per acre may be increased or diminished accordingly. If the season be late, also, this is another reason for increasing the quantity of seed, because the weakest grains will not have sufficient vigour to come to maturity; and in a very dry season, also, the same rule will have to be applied. Thus, whatever may be considered the ordinary and proper quantity of seed, any circumstances unfavourable to the full development of the plant will require an additional modicum to run the risks attending its growth.

The time of sowing commences in the southern counties as early as February when the season is favourable, and in Essex and Kent the seed time is quite general in that month. In the midland counties, the middle of March, and in the northern, the last week in March to the 6th of April—beyond this it is never safe to go; and so remarkably is that season indicated that if the sowing be delayed beyond that period a loss of one or two quarters of produce per acre is the result. The only objection to early sowing, even in the northern counties, is the danger of frost, which has a very destructive effect on the young barley.

There are some parties who *steep* the *barley* before sowing, and allege that it is an advantageous process. The steeps adopted are sulphate of soda, and nitrate of soda, dissolved in water; but there is but little evidence that the steep is any decided advantage. In a very dry season, when there is little native moisture in the soil, and the season is far advanced, it is sometimes so far an object of importance to promote early germination, or induce that process altogether, that the barley is steeped in lukewarm water until the germ begins to swell; it is then sown, and will be above ground in a few hours.

The broadcast mode of sowing possesses too many disadvantages not to be nearly discarded. In the first place from two to three pecks per acre of seed is sacrificed by the process—some is buried too deep, some not covered; and a far greater disadvantage is, that if there be any little clods of earth, they are thrown by the plough into the seam into which the seed necessarily drops, and which is an objection to the broadcast system which cannot be overcome. Broadcast also implies generally hand-sowing, and as this depends entirely on the skill of the operator, there is no security for the regular deposition of the seed; and as various implements are now used to supersede hand-sowing, the practised broadcast sowers are daily becoming fewer. A bad sower has more to do with a deficient crop and a bad sample than is generally imagined. The accompanying little sketch will explain the meaning

of this. While some plants are clustered and crowded in tufts, stunted for want of the necessary air and space for expansion, and the same injury affects the roots, other spaces are left deficient, and thus at harvest time the tufts will have small straw and ears, and defective corn, and will ripen irregularly. In

some cases the presser passes between the plough seams, and crushes any clods which may be there deposited by the action of the plough turning the furrow. There is a serious objection to pressing, however, in a wet season, for there is this decided difference between the production of barley and that of wheat, that while the former is often the most successful when deposited in a cohesive state, and when the soil will adhere closely to the grain; the latter requires the earth to fall lightly upon it, so that the plumulæ may be pushed through it without difficulty. The too great openness of the soil is, as was before stated, an objection equally fatal, and in these cases pressing is a decided advantage, if the presser be followed by a drill; if not, the same objections may be raised to hand-sowing of pressed furrows as to the ordinary broadcast method.

The *drill*, especially the steerage drill, which distributes the seed with mathematical accuracy, is by far the best implement in use for depositing the seed, inasmuch as the distance between the rows can be regulated to a fraction, the seed deposited at regular distances, and the quantity regulated to a pint, or at most a *quart* per acre. The distance between barley rows is much smaller than for other grain; and where a distance of nine to eleven inches between the rows in wheat is quite common, that between barley is seldom more than four or five; the reason is obvious, every corn has as much space as the surface will admit, and it is a practice usefully adopted by some, to drill one half of the quantity of seed one way in the field, and the remainder at right angles; this allows a still further area for each plant to grow in; and as barley is generally sown with seeds, and never requires hoeing, there is no difficulty attending the practice.

MANURES.—As has been stated, the preparation of turnips fed on by sheep, is the best generally for the barley, and is preferable to the direct application of manure of any description. Occasionally, the seed ley may with advantage be occupied with the barley crop, and the principal objection to it is that the prospects of the turnip crop, which generally succeeds, are more favourable after a wheat crop than after the barley.

Occasionally, when a large proportion of the turnips are pulled off, an application of manure direct is absolutely necessary. In all cases, however, it is far preferable to give to the stock consuming the remainder of the turnips, a small quantity of linseed cake, as a substitute for that often used as a direct application, the rape cake dust, which is often a failure in a dry spring. The quantity should be twelve to sixteen bushels per acre, according to the necessities of the soil.

Nitrate of Soda may be applied with advantage to the barley, and it is best sown broadcast after the drill and before the harrowings. It thus falls into the seams left by the latter, and the rains gradually dissolve it into the soil, and thus supply the wants of the young plants gradually. In a dry season this is also of far less efficacy than in one that is wet.

Salt is of great utility, not only for its direct fertilizing character to inland soils, but from its tendency to absorb moisture, and supply that moisture throughout a dry season, in which the barley suffers the most.

Guano, though useful to this crop amongst others, may, with greater advantage, be applied to the turnips or green crops, and thus be of use in a secondary degree.

Turnips manured with dissolved bones are specially favourable to the development of the barley crop.

Farm-yard manure on light soils, and lime applied direct to barley, are done to considerable disadvantage; the best mode is to apply either to the previous crop. Fresh ploughed up, or virgin soil, is not decidedly favourable for the growth of barley; the straw is large and soft, and the sample coarse and unfit for malting.

4. After attention to the Growing Crop. The barley is one of the most delicate and difficult of corn-crops to cultivate. It is liable to suffer much from adverse circumstances, and from none more than a dry season setting in in April or early in May. If this is so it grows sickly, stunted, and yellow, and the ears begin to shoot small and feeble; and in many cases on the sands in Nottinghamshire, the high-lying light soils of West Norfolk and Suffolk, and the Wolds of Yorkshire in some seasons, the barley has not been able to shoot from this cause alone. Sometimes it does not even germinate. In some springs which are very open, and the capabilities of the turnip crop exceed the calculations made of them, the barley sowing is necessarily delayed till they are consumed. In a dry season the land becomes so hard that it requires much breaking up, and in this process the little moisture in the soil will become wasted and lost, and the germination of the seed will be impossible. It is in seasons like this that powerful implements, like Crosskill's clod-crusher, accomplish instantaneously, and more perfectly, all that is required, and make a friable seed-bed in so little time, that the moisture is all retained. The ordinary modes of breaking up hard drought-baked soil, are just the modes, of all others, most likely to dissipate the moisture. First it is ploughed, then it is dragged, rolled, harrowed, dragged and rolled again; much time is thus wasted; new surface after surface exposed to the evaporating effects of the atmosphere, and thus the ground is often too dry to germinate the seed, even if the precaution of steeping is adopted. The steeping at all requires the exercise of judgment: if there be moisture in the soil to sustain the plant, it is very desirable; but if there is not, it will only make it into malt—excite germination, and leave it to perish in the soil. If sown dry, and there is not sufficient moisture to excite germination, it will lie until a shower of rain supplies it; but this often comes too late to be of use, and it is only harvested as inferior or grinding corn. An implement like Crosskill's roller, will, in such a season, far more than repay its cost.

The *frost* is one of the serious enemies of barley, and it not unfrequently happens that an April or even May frost will bleach and wither it, so as to render a growth from the root again necessary. This enfeebles the plant very considerably, and it is with a view to avoid the consequences of this, that the cultivators in the north delay the sowing; for, as a general rule, the sample is finer the earlier the corn is sown.

The wind in light soils is sometimes a very serious hindrance to the progress of the barley plant. A West, South-West, or North-West will, if the previous weather is drying, blow a mirage of sand until the plants are sometimes entirely cut off. Nor are there, on light sands, many remedies for this disadvantage. An application of clay will, to a certain extent, prevent this; but the best remedy is to leave the soil in a state the reverse of level. If the roller follows the sowing on such soils, and a wind succeeds, the loose sand is blown in an uninterrupted blast across whole fields together. Excessive wet, though seldom on the porous soils where barley is grown quite destructive, is often injurious to the plant, as by it it is turned yellow and is stunted in growth; and the surface-soil, when again dried, sometimes forms a crust not easily broken by the plant as it grows, and needs further room for expansion. The barley plant, in its early stages, is extremely tender and brittle; and as no harrow can be safely passed over it, the hoe will be the only means available for increasing the evaporation by stirring the surface, and so admitting the drying action of the air.

The seed being buried two to three inches deep by the drill, a harrowing follows first in the direction of the drill, and then either diagonal or across; and where no blowing is apprehended, the roller will seal in the moisture, and leave a fine surface, which is always essential to the complete development of the plant. If this rolling is deferred until the barley is grown up, it will be necessary to allow the blade to become perfectly flexible and elastic, before it is attempted. In this case it can be done without injury. Besides the hand weeding, the next operation is the

Harvesting. — As was previously stated, barley requires to be riper than wheat before it ought to be cut; and while the latter will be ready for cutting while it appears even quite green, the former will look yellow several days before it will be ready to cut. Care must nevertheless be taken to have it cut before the ears begin to curl and break down, or loss will accrue in the act of cutting, and the bands for the sheaves will be obtained with difficulty. The barley crop should be invariably mown outwards—that is, the mower cuts the barley and deposits it in swathes *from* the standing corn, and not laying *upon it*. How muchsoever the barley may be lodged, it is unnecessary to employ the sickle, as the straw is so soft and pliant that it will not admit of being so much shortened as it is when cut by the sickle.

If, as is generally the case, the barley contains much clover, it will be necessary to allow the swathes to lay, if the weather can be definitely depended on, one, two, or three days; in a wet season, this must not be, on any account, attempted.

There is a custom in the South and South-West of England, of securing the barley, or rather of allowing it to secure itself, which cannot be too much reprehended. It consists in turning the barley swathes day after day, until it is dry, then forking up three rows of the swathes into one of heap, and then carting it out of the heaps. A more risking, tedious, and slovenly practice it is not easy to conceive. In rainy seasons it lays on the ground, and is thus kept continually wet, so that sprouting is very easily excited, compared with what it is when the ears are exposed to the action of the sun and air. When so laid, there is also great waste by the turning, and the trouble, expense, and difficulty of carting and stacking; and the great waste attending these, are objections even more insuperable to the practice than the slovenliness itself.

It is difficult to compare the expense of the two modes precisely, but it may be taken as follows per acre:—

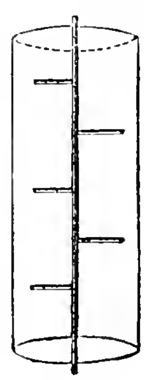
Shearing.	Per acre. s.	d.	Gathering the Swathes.	Per acre. s.	d.
Cutting	2	0	Cutting	2	0
Band making	0	6	Turning twice....	0	6
Laying in sheaf ..	0	9	Gathering	1	6
Binding	0	9	Raking..........	0	3
Stooking	0	3	Carting	6	0
Carting	5	0			
				10	3
	9	3			

Thus, although the first expenses of binding, stooking, &c., may be somewhat greater than those of turning, the subsequent one of carting is more expensive; and as the gathering in of the harvest is the operation for which the whole labour of the year is incurred, nothing can justify an improper prolongation of this process.

5. Thrashing and Preparing for Market. The former of these operations is almost now invariably performed by the machine; but of all grain the most difficult to thrash is the barley, and the grain most frequently left thrashed imperfectly.

If the corn and straw are mixed indiscriminately, as is the case of rakings, and with the corn harvested without being tied, it is almost impossible to get it thrashed thoroughly clean, because the danger of breaking the grain in thrashing is so great, if the machine is set too close, and the injury to the sample in the eyes of the maltster is so serious, that the risk is often necessary of allowing a few grains to be left in the straw, in preference to running the risk of crushing the grain in thrashing. The operation of hummelling, or breaking off the awns, is one which is peculiar to barley, but requires to be performed with caution; and a machine worked with the elasticity which the hand gives it, is far preferable in this respect to any unyielding machine. The former often breaks off the ends of the barley so close, as to damage the germs, and injure the malting quality.

The machine hummeller consists of a spiked axle, revolving with great rapidity in a cylinder as indicated by the annexed sketch. This is propelled either by direct horse power, or attached to the thrashing machine.



The winnowing requires a screen to allow the small and imperfect grains to fall through with the small seeds; and it is always desirable to exclude as many of these as possible. The weight per bushel is or ought to be 56 lbs., and the produce per acre should be from five to seven quarters, or from forty to fifty-six bushels per acre.

Though care and judgment are required in the cultivation of barley, there is nothing which attention and perseverance may not overcome.

Sowerby, near Thirsk, June 1849.

MR. GEORGE TURNER'S RAM SALE.—This now celebrated annual event came off on Saturday se'nnight, at Barton, near Exeter. Mr. Turner's sale is a sort of agricultural fête, resorted to by farmers from far and near. At one o'clock, a capital dinner was partaken of, after which many loyal toasts were drunk, and divers speeches made, which lasted until about four o'clock. The company then adjourned to the green lane behind the farm, a chair being placed under a shady elm tree for the auctioneer. On the present occasion 40 three-years-old, two-years old, and hoggs were offered either to be let or sold. The conditions of sale having been read, among which was one reserving to Mr. Turner the right to take any of the rams which might be let, to the meeting of the Royal Agricultural Society, at Norwich, in July next, the business of the day commenced. The first animal put up was a prime three-year-old (No. 40), the winner of the prize at the last exhibition of the Society. This ram was to be let for the season, and after a short contest it was knocked down to Mr. Luxton, of Winkleigh, for 25 guineas for the season. No. 39 was then put up—a three-year-old—also to be let for the season, and was knocked down to Mr. Sanders, hind to J. W. Buller, for 15 guineas. No. 38 was a two-year-old, which Mr. Turner said was one of the best he had ever bred in his life. Mr. Parsons bid 16 guineas—Mr. N. Tuckett offered £17, but the auctioneer declining, in accordance with the conditions, to take less than a half guinea bidding, Mr. Parsons, of Lifton, was declared the taker. No. 37, a splendid two-year-old, worked last year on Mr. Buller's farm, was, after an animated competition, let to Mr. Fursden, for 21 guineas. Good prices were obtained.

THE LONDON FARMERS' CLUB.—MONTHLY DISCUSSION.

The last monthly meeting of the season was held at the Club House, Bridge-street, on Monday evening, June 4, when the attendance comprised a great number of the most active members of the Club. The subject appointed for discussion was, "The uses of machinery as applied to agriculture, and the advantages which would follow from its more general adoption." In the unavoidable absence of Mr. Smith, the Chairman for the current year, the chair was taken by Mr. J. Pain, of Felmersham.

The Chairman having briefly opened the meeting,

Mr. James Thomas, of Lidlington Park, Bedfordshire, spoke as follows:—In rising to introduce to your notice, and to invite your discussion on the subject of which notice has been given, namely—"The uses of machinery as applied to agriculture, and the advantages which would follow from its more general adoption"—I have to claim your indulgeuce and forbearance in thus undertaking, for the first time, so prominent a place in your monthly discussions. No overweening vanity on my part has induced me to undertake it; nor can I suppose for one moment that I shall be able to invest a subject somewhat abstruse with that peculiar interest which has attached to so many of the agreeable debates which have taken place within these walls. I may, however, succeed in calling forth the remarks and eliciting the experience of many who may have had greater opportunities than myself, and who may already have struck the balance between their theory and their practice. It was, Sir, the extraordinary, and, I may add, the perilous state to which modern legislation has reduced the agricultural interest, the knowledge of the danger to which it is still exposed, and of the only alternatives which now exist, should the present commercial code remain the law of the land, either to produce our corn, even at a lower rate than can be done on the continents of either Europe or America, or to abandon that pursuit in which most of us are engaged, and to which we fondly cling either in ruin or despair, that made me anxious to call your attention to this subject. Every British agriculturist must well know how deep an inroad into his capital the legislation of the last few years has already made, and if from the discussion of this evening we may gather from one another some hints by which the remnant may yet be preserved, and the British agriculturist may be enabled, without return to restrictive duties, successfully to compete with his foreign rivals, surely then we, Sir, shall not have met in vain: that such may be the case I am scarcely sanguine enough to hope, but still I am willing to try. Exertion and economy in its strictest sense may often carry an enterprising tradesman through difficult eddies, and land him at last safe in the desired port; and in our profession, economy of time, economy of labour, and, I believe, a much more extensive introduction of machinery, may do much. Every doctor has his favourite remedy, and many have been prescribed for the present diseased state of British agriculture. Those who are ignorant of its practice or of its details tell you to buy more cake, to import more guano, to dissolve more coprolites, and thus to obtain greater crops. Sir, where all these resources prove remunerative none can be more willing to apply to them than ourselves; but we all know that where the amount which is raised by such extraneous expenditure does not cover the outlay, such expenditure cannot continue; besides, were we to take a lesson from those who profess to be our guides—I mean the manufacturers—we shall find them, whenever the market is so glutted with their ware as to cause stagnation in their trade, not doing as they recommend us to do, work double time and produce more than ever, but prudently work short time until the market is relieved from its superfluous burden. But what, Sir, has given these enterprising men such extraordinary success, which has enabled them to stock the markets of almost every country and city of this habitable globe, has been the wonderful economy which they have been able to introduce into their mills and their workshops by the ingenuity of their machinery, and by the cheap power of steam as applied to it; and so continuous is this thirst for improvement in this essential point that every day leads to some new invention by which manual labour is saved, and the article produced at a yet lower rate. So far let us see whether we cannot copy from them alike in ingenuity and economy. The rare skill which the last twenty years has drawn forth from the makers of agricultural implements must be alike a source of admiration and congratulation to all who have witnessed it. The stubborn clay receives the tilth of turnip land under the persuasive power of a Crosskill's roller; and the wild sands of Norfolk and Lincoln heath find their enormous esculent crops under the influence of the manure drill and the cleansing of the horse hoe. The science of mechanism amongst us is still making rapid strides: we no longer see in the best cultivated districts the tedious, wasteful, and laborious mode of separating the corn from the straw by the use of the flail, a mode attended with every disadvantage, subject at least to constant pilfering, and liable by lying long on the floor to become raw to the touch and musty to the smell; added to which, however honest and industrious the labourer might be, it was impossible for him to extract all the corn. By the abandonment of this tedious process and the substitution of the thrashing mill, one great piece of economy was achieved. The work was better and more speedily performed, the sample was drier, advantage could be taken of the markets, and that drudgery which was once the fate of the labourer performed far better, either by horse or water power. Trusting, Sir, that you will agree with me upon the utility of the machine, it becomes our duty to see what disadvantages arise from the application of horse power for driving it, and to enquire whether in such places as will afford of no water being applied for the purpose, another and more economical substitute cannot be found? The work of driving thrashing mills has always been proved to be most severe and injurious to the animal, the motion conveyed to the machine generally irregular, and another great and obvious objection is the frequent abstraction of the teams from the cultivation of the soil at a time when much wanted, the farmer hesitating whether to forego the advantage of selling his corn at a favourable opportunity, or to do so at the expense of neglecting his cultivation. All these objections are removed by the introduction of steam power; and at the present time, when engines adapted for farm purposes are procurable on such low terms, and worked and kept in repair at so small a cost, it is indeed marvellous that their erection does not increase faster in England than it does at present. In turning towards Holland, where every energy of the farmers appears to be concentrated in the endeavour to obtain the greatest possible produce at the lowest possible cost, we perceive that the great advantage to be derived from this source is not overlooked; and in the corn-producing counties of that country you can scarce pass a homestead but you see, indicated by the tall chimney, the presence of this valuable aid to the occupier's industry. This remark, of course, does not apply to those spots where the cheaper power, water, can be obtained. How cheaply, by the means mentioned, can thrashing be performed let the following statements show:—

STEAM THRASHING MACHINES.

TO THE EDITOR OF BELL'S WEEKLY MESSENGER.

Ury, N. B., Nov. 20, 1848.

Sir,—Observing in your *Messenger* of the 15th, that a Derbyshire farmer is puzzled to understand how grain can be thrashed with steam power at 6d, 9d., or 1s. per quarter, I beg to give him the following statement, taking a rick of 20 qrs. of barley, as proposed by him, although he has fixed upon the most tedious grain to thrash. I have had two steam power thrashing mills on my farm for some years, of nominally six-horse power, but in reality they are far beyond such nominal power. I have also on a farm a thrashing mill worked by six horses. The inclosed is drawn up by my bailiff, who has had long experience of thrashing mills, and all agricultural operations. By this it appears, which I have no doubt is correct, that grain of every description can be thrashed by steam power at something less than 6d. per quarter, being one-third only of the cost by horse power, to say nothing of the tear and wear of horses—for no work on a farm is so severe for them. My men receive 10s. per week, with a free cottage and garden, besides many other little advantages of fuel, milk, &c.; the women 5s. per week. The day's work is calculated at 10 hours, including an hour for breakfast, and another for dinner—of course, when the thrashing is finished they go to other work; as regards the horses, the eight hours are a *quantum sufficit* for that day. Water power is no doubt the cheapest, but few homesteads or farm steadings, as we call them, are placed in situations to have command of sufficient water.—I am, &c.,

R. BARCLAY ALLARDICE.

P S. I have no doubt my steam power, if pushed, would thrash 10 quarters per hour. The enclosed is the usual rate of speed.

Note of expenses in thrashing 20 quarters of grain by steam, one man employed as fireman, engaged one hour and a half before the steam is up, and three hours to complete the 20 quarters:—

	s.	d.
Fireman, engaged 4½ hours	1	6
One man engaged feeding, 3 hours	0	6
Two men forking the straw, 3 hours	1	0
Three women handing the sheaves, 3 hours	0	9
Two women riddling the grain, 3 hours	0	6
One woman tramping the straw, 3 hours	0	3
Six cwt. coals at 10d. per cwt.	5	0

Leaving the total cost only 9s. 6d. for thrashing out 20 quarters of barley. I should add that since Capt. Barclay wrote this letter he had added to his machinery the winnowing machines and the separaters, by which the whole expense of winnowing is saved, and the cost of thrashing barley is reduced to about 4½d. per quarter. The following is also added to the letter:—

Note of expenses in thrashing the above quantity with horses: Three pairs of horses, 8 hours to thrash 20 quarters:—

	£	s.	d.
At the rate of 1s. per hour for each pair	1	4	0
One man, 8 hours driving	0	1	4
One man feeding, 8 hours	0	1	4
One man forking the straw, 8 hours	0	1	4
One woman riddling the straw, 8 hours	0	0	8
One woman tramping the straw, 8 hours	0	0	8
Two women handing the sheaves to the feeder ...	0	1	4
Total	1	10	8

During an interesting visit which I paid a short time since to a talented member of this club (I mean Mr. G. P.), I learned that in one day of about ten hours he succeeded, in the presence of many friends, by means of his engine and machinery, in thrashing and perfectly winnowing, screening and sacking, at one and the same time, 112 sacks of best wheat, 14 sacks of tail, and passed through the machine upwards of 16 tons of straw. This was effected with but few hands, and a consumption of about 11 cwt. of coal, making the expense even less than that named by Capt. Barclay. To those who feel interested in the examination of machinery I would strongly recommend a visit to that at Lambrook, and I am confident that its hospitable proprietor would not only allow of its inspection, but cheerfully afford any information which might further be required. It is only justice to add that the whole of this splendid machinery has been erected by the indefatigable Mr. C., of U. Not less interesting, though on a much smaller scale, is the machinery of another valuable member of our Club, who, I regret to say, is prevented by indisposition from now being present—(I mean Mr. L., of C.) The operations of thrashing, winnowing, screening, and sacking are, as at Mr. P.'s, all done at the same time; and a little engine which would scarce fill a chimney corner quietly prepares for market its 30 qrs. of corn per diem, *tenable*. Such examples might be multiplied to a great length, but I trust, Sir, that I have already proved the first proposition which I wish to establish, that steam or water power is far cheaper as applied to thrashing than that of horses—that that of horses is cheaper than that of man: and, I can come to no other conclusion than, that as each of these powers may be made with profit to supersede each other, so should they be applied. It now remains, sir, for me to allude to those difficulties and discouragements which a skilful and reflecting agriculturist has to contend with in the introduction of those improvements in his general machinery, which the force of circumstances, the desire for progress, and the proper attention to economy in time and capital points out to him, not only as correct, but as indispensable. The great prejudices which obtain amongst farm labourers against all improvements are known to most of us, and have existed since their first introduction: any invention of a rival district has always been looked upon by them with both dislike and suspicion. About the year 1765 a friend of Mr. Culley's sent a winnowing machine to Mr. Bakewell, at that great man's request. Two or three years afterwards Mr. Culley happened to accompany that friend to Dishley, where they observed them dressing barley with their own old-fashioned fanners. On being asked what had become of the winnowing machine, one of them pointed to the roof of the immense barn, where it was suspended as an useless implement. Yet from that time how rapid has been the introduction of that machine, and many, many others of our most useful implements have met with the same opposition, but at length have triumphed most successfully. Perseverance on the part of the employers, combined with kindness and explanation to his men, will soon remove their prejudices; and when education shall have placed the means of research within their grasp, I trust that they may no longer be an obstacle to the way of judicious improvement. But among many of the uneducated and standstill (if I may so call them) class of farmers, prejudice and ignorance prevail even more than with their men. Upon these I will not dwell, because I feel as confident, as confident I can be, that in the present state of rivalry, in which we are competing in our own markets with the farmers of all the world, they can have but one of two alternatives—either to improve their pace, or, losing their all, be banished from the stage. Another difficulty arises from the idea which is entertained by many well disposed and charitable persons, who perhaps have never taken the trouble carefully to consider the matter, that the introduction of machinery is tantamount to displacing an equal amount of hand labour, not recollecting that its object is simply to diminish labour in the *specific* work accomplished by the machine, and that the result is the *increase* of human labour in general, and a more profitable application of it. Did you wish in agriculture for examples, examine the state of cultivation of those farmers where machinery is most extensively used; survey the beautiful state of Mr. Lawrence's land at Cirencester, or the adjoining farms at the college; admire the unsurpassable cultivation of Mr. Hudson, at Castle Acre, where there are two steam engines; ride over the farms in the Lothians and Roxburghshire; and in one and all you will learn, from their superior state, how beneficial has been the introduction of machinery, and how, by having freed the labourer from the constant drudges of the barn, you have placed him at liberty to attend to that all-important matter the proper tillage of the soil, and the cultivation of its crops. The remarks and feelings of those who erroneously imagine that machinery supersedes labour in the aggregate, must apply with equal force to mills of all kinds, and machinery of every description, as well as to what may be employed in agriculture; but would these fastidious parties recommend a return to those times when the inventor of the stocking frame, in the reign of Queen Elizabeth, was pelted as an enemy through the streets of Leicester? or would they crush that powerful implement of improvement and civilization, I mean the printing press, and return to those days when books could only be circulated as fast as they were written by hand, and the ingenious inventor of printing was universally believed to be in league with the devil? If not, let them not clamour against the introduction of machinery to agriculture. Machinery has raised this country and her manufactures to an eminence which, without it, they could never have attained. And are not we to share in such a triumph, and participate in such advantages? Believing, sir, as I do, that its greater introduction into agriculture would increase employment instead of diminishing it, I will yet say that, if in some rare cases the latter should be the result, it must not be allowed to act as an impediment. I speak now as a man of business, and I cannot connect eleemosynary aid with business—I am willing to keep two purses; the one shall open only to the proper, legitimate, and economical calls of business; the strings of the other shall be loosed for the purposes of charity: but I will never consent to connect the two. The principle I am now stating may be illustrated by a conversation which I had a few weeks ago in a railway train, with a gentleman who happened to be a Manchester manufacturer. I found it difficult to make that gentleman comprehend that a farmer ever took a person into his employ for the sake of charity (Hear, hear). He said—"I employ about 600 pairs of hands in my manufactory; but if, through my own skill, or that of my machine-maker, I could make 400 pairs of hands do the same amount of work, 200 would immediately have notice to quit; and why," he added, "don't you act in the same manner?" I pointed out the difficulties under which we laboured in respect of the poor-rate: he replied that the same evil existed to a certain extent in Manchester; but although distress might exist for a time in consequence of the course described being pursued, yet the saving of capital effected by doing with 200 hands less would facilitate the erection of a new engine, and parties dismissed under such circumstances often found superior employment elsewhere (Hear, hear). I am very unwilling to introduce politics for a single moment; I must, however, call your attention to the fact, that our position has been seriously altered within the last three years; and that so long as the British farmers will, for the gratification of good natured and charitable feelings, resort to a coarse mode of agriculture, or a coarse mode of separating the corn from the chaff, so long will the present law of settlement remain in operation, and the farmer exclusively have the burden of supporting the poor (Hear, hear). I have already said that I cannot connect charity with business: let each flow in its proper level. I think you will find that continuance in the obsolete modes of separating your grain will only end in disappointment and loss. And now, sir, I have to apologize to you for having detained this meeting and yourself so long. I feel—I know, that late legislation has reduced the farming interest of this country to a most critical point, one from which many wiser and older men than myself think it cannot recover. For myself, I am not without hope: I have again trimmed my boat, and, if I may be excused the expression, set out once more on the varying voyage of agriculture. Storms must be expected, cross currents will annoy; but energy, perseverance, and above all, economy and the aid of those resources which I have so freely alluded to, may still carry myself and others safely through. Without them we must make shipwrecks; and I trust that none of us may have to exclaim with the Mantuan shepherd—

> "Nos patriæ fines, et dulcia linquimus arva;
> Nos patriam faximus."

I will now, sir, read the resolution which I have prepared, and leave it in the hands of the meeting either for alteration or adoption—(cheers)—and beg of you all to remember the old French proverb, "*Aide-toi, et le ciel t'aidera;*" which I translate: "Exert all your energies, and a kind Providence will be your aid." —"That this meeting is of opinion that steam-power may be introduced to a much greater extent than it is at present, with much advantage, into the operations of agriculture in England; that such introduction of steam-power would not eventually displace any amount of manual labour now employed in agriculture, but divert it into a more profitable channel; and that steam-power is far more economical than horse-power."

Mr. MECHI said—If I venture to trouble you with a few remarks, it is because my experience of the use of the steam-engine justifies me in so doing. I am not one of those who think that the effect of using the steam-engine is to displace labour, for nearly the whole expense is expense of labour. If we consider the iron as taken from the mine, the coal employed in working the engine, and all the other processes which attend its completion, we cannot doubt that when a man has expended £500 in the erection of a steam-engine, and in providing its necessary accompaniments, the greater part of the amount has been expended in human labour. I am quite sure that the application of steam to agriculture is a profitable application, and I shall endeavour to give you a few facts in connection with the matter which may be useful to those who may read this discussion, and who being possessed of steam-engines are interested in their cost and management. But before I do so, allow me to say that I have but faint hopes of the use of steam extensively in agriculture, unless very great change be made in the system of letting farms in this kingdom (Hear, hear). Our friend Mr. Thomas has alluded to Scotland. Gentlemen, why is it that steam-engines are found there almost invariably? Because the tenants have 19 years' leases. It is quite impossible that any man can safely erect machinery involving a very large expenditure unless he has either a tenant-right, enabling him to remove what he has constructed, or a long term of occupation on sure grounds, so as to be capable of remunerating himself for his outlay. If it be true that three-fourths, if not more, of the land of the United Kingdom, or of England in particular, is held by tenants-at-will, who are liable to removal through a change of temper, through accident, or through the death of other persons, I do say that under such circumstances there can be no difficulty in understanding why we are comparatively so backward in our agriculture. I feel strongly on this point. It comes home to the man who, while employing his capital on his own land, looks around him and feels that his neighbours cannot imitate his example with their present tenancies, without evincing an utter disregard for the welfare of themselves and their families (Hear, hear). Gentlemen, my steam-engine, which is of six-horse power, has cost me £150. There is then an expense of £40 for fixing; there are also required a pair of mill-stones, a linseed-crusher, pumps, a thrashing-machine, a dressing and winnowing machine, chaff-cutters, and all the apparatus incidental to the working. You cannot safely calculate the whole expense at less than £500. I have known instances—for example, there is the case of Mr. Bateson, of Hertfordshire—in which the cost has not exceeded £400; but from £400 to £600 is the average amount invested in the engine. Now, gentlemen, to come to the working or daily expenses. And here let me observe, that however much I may have been laughed at as rather romantic than practical in agriculture, I am exceedingly particular with regard to the pounds, shillings, and pence (laughter). I find in practice that 5 cwt. of coals per day is the average consumption of ten hours' working; and that is confirmed by the statement of our friend Mr. Thomas. That gentleman says that 6 cwt. will do in his part of the country with the best sort of boiler and flue–5 cwt. is amply sufficient for ordinary work; and with the price of coals in Essex at 20s. per ton, including cartage, that is 5s. a day for coals. Then you have a man to pay. I call him an engineer, a worker, and a stoker, or all three. (Laughter.) The fact is, I have a young man to whom I pay 14s. a week—but I have taken 15s. as a general average; that is half-a-crown a day for a man. I have a boy at 6d. per day. I allow 1s., which is more than an ample allowance, for wear and tear and deterioration. I also allow 1s. a day, and four per cent. as interest of money; for, if I allow for deterioration, I do not consider that I have any right to charge more than one per cent. more for my investment than I should obtain in the funds. I have the profit in addition. The total expense of working the engine, for ten hours, is 10s. per day. Now, gentlemen, what will the engine do? or, rather, what does she do? I will tell you. She will grind, as the minimum quantity, her ten sacks of corn per day; if I said fifteen I should not be stating an impossibility. We pay, in our neighbourhood, 1s. 6d. a sack for grinding, or 3s. a quarter; she therefore earns 15s. a day in grinding. But in addition to which grinding she will cut up any quantity of chaff that I may require; she will drive a chaff-cutter, which required, under the old system, three horses; and at the same time pump water for the requirements of two-hundred head of stock in the yard, pigs, and bullocks; crush the linseed, and work the sack tackling; and as I purchase two-thousand sacks of corn annually for the consumption of my stock, it is essential that the engine should be made to take that up to the second floor without any cost for labour. I have a strong opinion, that in addition to what she is now doing, I could render her exceedingly available for the irrigation of land. Looking at the statistics which have appeared recently in the *Mark Lane Express*, and the evidence which we have as to the profitable employment of engines in the fens, which has rendered productive land which was previously a waste, I feel quite sure that we shall ultimately see the application of steam-power to the irrigation of our pastures, and to those esculent crops which require moisture in dry weather. I am also convinced that we shall see steam power applied in the irrigation of land with liquid manure. I have not yet thus applied it, but I contemplate doing so. When I first had my steam-engine I encountered what may be called the miseries of such an engine. We started remarkably well; and proceeded well so long as the flues were new and clear, wondering how it was that we had so much power; but in less than three weeks we found that more coals were required, that more stoking was necessary to keep up the proper power; and that even with these it was impossible to obtain the power which was requisite. How was this? The chimney smoke poisoned the whole neighbourhood (Hear, hear). The coals, instead of being converted into gas, were converted into smoke. I had been told that steam shafts always cleared themselves and required no sweeping; but even when the boiler is placed in the best possible way—supposing it to be a flue boiler, which is the most economical, producing a given amount of steam with the least amount of coals—a volume from the fire, passing under the boiler, returns through the middle of it, goes round the sides of the boiler, returns again over a portion of the boiler, and ultimately goes up the chimney. I opened the back of the breast work, supposing that there was something wrong, where I found two barrowfuls of fine, but very heavy, material like sand; it was, in fact, the metallic particles of the coal which had been carried along by the draught until they came to a corner, where they were deposited, and the consequence was that they obstructed the free action of the chimney. I would recommend all who have engines to pay a bricklayer 2s. 6d. a month to have the bricks removed from the back of the furnace, and all foreign matters taken away, so that there may be a perfectly free draught. More especially is this desirable in the inland districts, where coals are dear, and where it is on that account the more desirable that they should all be converted into gas. I also consider it important that the drums or riggers, over which the driving straps work, should have turned or smooth surfaces. When smooth they prevent the strap from slipping with hard work; whereas, when rough from the mould and unturned, the strap will not bind upon them. I suffered much inconvenience from this cause, until I had the rough surfaces turned smooth and rather convex. One of the objections in detail has reference to the water-gauge. We were constantly breaking our water-gauges from the expansion of the gas and the metal; but by an exceedingly simple contrivance, that of introducing a vulcanised India-rubber ring between the gauges and the metal, we surmounted that difficulty; and not the slightest difficulty of that kind now impedes the working of the engine. This invention is registered by Mr. How, of Sandwich. Mr. Thomas, in his able paper, has shown you that steam-power is much more economical than horse-power. That is borne out by my own experience. I employed horse-power before I had formed any opinion as to the engine. I now find that the engine will do more work in ten hours, at a cost of 10s., than two relays of nine horses will acccomplish during the same period. Eighteen horses could scarcely be kept at mill-work for 2s. a day each; and we now perform the whole operation for 10s. a day. I must say I do not think that corn can be thrashed quite so cheaply as Mr. Thomas has stated that it can, for a continuance. I think you might safely calculate that of reaped straw, supposing you had a quick and good feeder, an engine would thrash from 30 to 40 quarters a day; but if the straw be long and reedy, you will find but few men who will succeed in passing through more than 30 quarters a day. If you put on an additional feeder to supply the engine, a larger quantity may be done; but you may, at any rate, safely estimate the cost of thrashing, including dressing and all the ultimate details, at less than 1s. per qr. I believe the present price is 3s. or 3s. 6d.

A Member: 2s. 6d. or 2s. 8d.

Mr. Mechi: At all events, an immense saving can be effected. Another difficulty which we experienced was, that we melted the bars occasionally in our grates; and when you have melted bars, you always get a quantity of what are called hards. But that evil may be cured. It is essential to have a cast-iron pan, with water, under the furnace-bars, to keep them cool by evaporation. This prevents them from warping, burning, and melting, and at the same time prevents that formation of hards or clinkers, which is alike inconvenient and unprofitable. I would strongly recommend that Silvester's sliding doors should be used for the furnace. Being lined with stone, those doors prevent the radiation of heat into the room, and with them you can also regulate the draught according to the state of the fire and the wind. I need not tell you how exceedingly desirable it is to have just as much draught as will keep your coals in a perfect state of ignition. If you have more than the requisite draught, the heat is blown up the chimney, and, instead of generating steam, is carried off. These are matters of detail which, though apparently trivial in themselves, have in the result been to me a subject of great comfort. Until you get your engine into perfect order, you will be amazingly annoyed by the want of this kind of knowledge. Another requisite is that the cold-water pipe should form a coil in the steam-box of the engine, so that the cold water, being pumped through, becomes into a boiling state before it actually enters the boiler; and this arrangement, like others which I have mentioned, is one of economy. There is another very useful thing. We discharge a gun, loaded with gunpowder, into the flue twice a day; and it is astonishing how this practice promotes the draught, and prevents the accumulation of obstructive matter. I am now speaking of flues which circulate round the boiler before they enter the chimney.

Mr. C. J. Nesbit: Steam would have the same effect.

The Chairman: In that case you would not require a gun?

Mr. Mechi: I thank you for the hint (laughter). I am quite sure that the question of employing steam is merely a question of the investment of capital in the soil. We are already suffering from an insufficiency of capital.

The Chairman: Can you give us any more details as to the number of persons employed? (Hear, hear). We have only heard yet of one man and a boy. You do not mean to say that you accomplish it with only that amount of assistance?

Mr. Mechi: I speak now of the working of the engines and of the grinding stones, not of the thrashing. In thrashing you can seldom do with less than eight or ten people. You would have three or four men, and sundry women and boys; and I include them in the cost.

A Member: That is about the same as in the case of a thrashing-machine.

Mr. Mechi: If you thrash out 30 quarters a day with a machine it will cost you 30s., whilst the engine will cost only 10s. You have not merely to consider what the engine will do; there is a difficulty in getting the straw into the cylinders fast enough for the engine to operate upon it. I thank the meeting for the attention which it has paid to my rather lengthened remarks, and I shall be happy to give any further information of which I am possessed.

Mr. Garrett (of Leiston, Suffolk) said he had listened to the observations made by Mr. Mechi with very great satisfaction. He agreed with that gentleman that the water should be warm before it was forced into the boiler. Water was frequently forced into the engine cold; but if they coiled a pipe round the chimney-flue, or some part where it would have the effect of boiling the water, or at least of heating it, so much the better. In the case of portable engines the great difficulty was the regulation of the draught. The difficulty in this case was to secure enough; for, while they could always check a draught, it was not so easy to make one. It was easy to construct a ventilator in the flue which would check a draught, but the difficulty was to create one (Hear, hear). The best plan of proceeding was to conduct the steam as soon as possible, after it came from the cylinder, into the atmosphere; not leaving the steam to travel far before it left the cylinder, until it got into the chimney. That would have the same effect as gunpowder, and would at the same time materially increase the draught. It was the best means that he knew of accomplishing the object. He perceived that the subject for discussion, as stated on the card, was "The uses of machinery as applied to agriculture, and the advantages which would follow from its general adoption." Mr. Mechi had hit upon the very thing which, in his (Mr. Garrett's) opinion, was of great advantage to agriculture, namely, the use of steam machinery. As regarded the question of the employment of labour, he would ask, What was the production of steam itself, but an effect of manual labour? He had found, from his own experience, that the great difficulty which stood in the way of the introduction of machinery, was the apprehension that it would issue in the displacement of manual labour. When he introduced the horse-saw, he had found a feeling of opposition to it prevailing amongst employers and labourers, because both apprehended that it would displace manual labour. Now, he contended that steam, instead of displacing, eventually increased manual labour. Horse-power decreased, but the employment of manual labour was augmented. Every material of which the steam-engine itself was made was produced by manual labour. Steam itself was the result of manual labour; it was made out of coal, dug up by manual labour, and brought to those who employed it by ships and carts. Artisans were employed to construct the engine; in short, the whole was the production, to a certain extent, of manual labour. He contended that it was the interest of every member of society in this country to encourage steam power, and he was convinced that the employment of such power would not displace manual labour.

Mr. Mechi: Do you agree with what I said about turned cylinders for the driving straps?

Mr. Garrett replied that if he found a strap slip on a pulley in his works, he concluded that there was something wrong in the size of the pulley—that it was not wide enough to receive the strap. He would observe that he had lately adopted gutta percha, instead of leather, and he had found it to answer very much the best.

Mr. Mechi: It does not answer in a warm engine room.

Mr. Garrett: No; but it served for all agricultural purposes, and it would work in wet and rainy weather. In the case of which he was speaking, they are not so much exposed to the warmth of an engine-room as to change of weather, and he therefore preferred gutta percha. He had also found the round bands preferable to the flat. There being a pulley in the strap, the letter V, for it to run on, it had a better hold, and was prevented from running off; the round band, in that shape, would always keep in its place. The disadvantage connected with a round band was, that it would not allow them to have a fast and loose pulley; if they wanted to stop and start a machine, they ought to have a fast and loose pulley upon it, and there was a little difficulty in getting the round band out of the groove, and placing it in another groove.

Mr. J. C. Nesbit said he perceived that the discussion had taken a turn which would justify him in making a few observations. There could be no doubt that machinery, or rather steam power, would, as Mr. Thomas had predicted, supersede horse power. The expense incurred in supplying it would provide a much greater force than could be obtained for the same amount in any other form. They had had water power and electro-magnetism, and other things of that kind; but even water power, with few exceptions, was not so cheap as steam power. He knew that in the north of England immense sums of money were paid to keep up reservoirs to pour down in dry weather a certain amount of water; and on looking at the subject as a whole, he was convinced that steam power was the power which could be applied to such a purpose in the cheapest manner. (Hear, hear.) In the construction of furnaces there were two things to be considered. There might either be too much air going through the furnace, so as to cool it, or so much coal as to deaden the heat in another way. The great point was to check the in-draught of air under the stove: it was very important not to put in too much fuel at once. Having resided in Manchester, he was in a position to state that there was annually kept there, in the furnace bottoms of large engines, scarcely more than a depth of two and two-and-a-half or three inches of fuel. It was well known that the greatest amount of heat was produced in a furnace when the coals were two-and-a-half or three inches above the grate. Any amount of fuel beyond that was injurious; and those who knew how to conduct their engines and to manage their engine fires well, laid their fuel in loosely and kept it very low—not more than two-and-a-half inches in depth. Many engines had been made for the regulation of the amount of fuel, and some ingenious methods had been adopted, by which, according to the pressure of the steam, was the extent of the fuel put on the fire. With one of these inventions—Stenning's—all that was necessary was to fill a couple of buffers with coals, and whenever the pressure of the steam had got from 15lbs. down to 14lbs. or 13lbs., the mercury gauge fell; a weight also fell at the same time, and some wheels were immediately set in motion; and by these means the floor was always kept covered with finely-ground coal. In this report the same improvements as had been carried out in the manufacturing districts, were available in the application of steam power to agriculture. If, however, careful men were employed, the ordinary stirring of the furnace, and proper attention to the bars, would enable them to do without the aid of such improvements to any great extent. In the case of engines used for agricultural operations, if they took care to have a good door to the ash-pit, and also to the furnace itself, and also the means of stopping the draught in the chimney, they would be able to increase or diminish the heat of the furnace to any extent they pleased. He was also anxious to impress on the minds of those present that the greatest amount of heat generated under the boiler did not always produce the greatest quantity of steam. It did not follow that the higher the temperature was the quicker would be the boiling of the water. A good, wholesome, well-regulated air was what they should seek to secure. With regard to straps and bands, he would observe that they could never see in the manufacturing districts unturned or rough cylinders for the straps to go in. In conclusion, he would simply express his opinion that the sooner machinery was introduced more extensively into farming operations, the sooner would they be able to grow corn at a cheaper rate. (Hear, hear.)

Mr. Smith, of Deanston, said he had listened with great pleasure to what had been said that evening on the important subject of the application of mechanism to agriculture; and he was happy to find that farmers were beginning to investigate the subject (Hear, hear). They were beginning at the right end in investigating the minutiæ, and it would afford him great pleasure if he could assist them in their inquiries. He had had a good deal of experience with regard to improvements in the machinery employed in manufactures during the last 40 years. He had taken a lead in the introduction of many of those improvements; and during that period he and others had had the same difficulties to encounter with regard to the introduction of new machinery among manufacturers as were now encountered by those who sought to introduce improved machinery amongst agriculturists. He had always heard a great deal said about the displacement of manual labour, and had found it difficult to induce people to lend a hand in effecting improvements, because they thought that improvements would injure their fellow-men. But all such impediments, in the case of manufactures, had been removed; and, if they went properly to work in seeking to introduce improvements, they would always find a few leading people who were ready to aid them in their progress. Let them now take such people along with them, give them all the encouragement they could, and pay no heed to those who hung back; they could not punish their opponents more effectually, or do anything more likely to bring them to their assistance, than by taking no notice of them (laughter). Allusion had been made to the competition which this country had entered into with foreign countries. He was sure every intelligent farmer would admit that it had become more and more his duty—that, in fact, he was bound by necessity—to introduce machinery by every means in his power, in order to cheapen the articles which he had to sell (laughter and cries of "No, no.")

Mr. Boddington: They are cheap enough now without the use of machinery (Hear, hear).

Mr. Smith continued: They were not cheap enough yet; they would be produced a great deal cheaper than they were then. When he began his speculation with the cotton manufacture, it cost a guinea to produce that which, through the introduction of improvements in machinery, could now be produced for a shilling (Hear, hear). When they come to increase their knowledge, and to apply it properly, they will find themselves able to reduce the cost of production to a much greater extent than they had ever conceived. If he were to tell them all that he thought with regard to that question they would set him down in their minds as a madman (laughter). He recollected that when George Stephenson was examined in the House of Commons with regard to the locomotive engine, he was asked if he thought it would go 20 miles an hour. He replied, in his own peculiar way, that "perhaps it might come to that;" but he whispered to a friend who stood near him that he should be as little afraid of doing 50 miles an hour as 20, but that if he was to say so there he would be set down as a madman, and the bill would be lost. In like manner, he (Mr. Smith) would not venture to say what he anticipated with regard to the cost of agricultural production through the employment of machinery in agriculture. He was quite sure, however, that they would find a strong arm in their favour in the proper application of machinery.

Mr. Mechi: Including ploughing?

Mr. Smith: Yes, even in ploughing. He might be taken for a rash man, or even a madman; but to him it was perfectly evident that, for a small sum of money, properly expended, a good steam plough might be set to work: that was as evident as that they could now plough with two horses where five or six were employed formerly (Hear, hear.)

Mr. Mechi: It is being done at this moment (Hear, hear.)

Mr. Smith said he should be glad to see it in general operation. There was a great struggle before them, and they might depend upon it, that they must call mechanism to their aid. A better arrangement of farms was necessary; but even under the present arrangement it was in their power to make great use of machinery (Hear, hear). It might be employed very beneficially in pumping out manure—a subject which, though new perhaps to some present, was certainly not new to himself. He had studied and worked hard for a good many years, and the result of his experience was, a firm conviction that not many years would elapse before all the good farmers in the country would, by means of machinery, send out the whole of their manure in a liquid form. He believed that at a future period there would be no solid manure put on the ground. He could demonstrate that one-half of the manure put on the land in a solid state was lost, in consequence of being used in that form; and that, if it were brought to a fluid state, and in that condition applied to the land, it would produce double its present effect; and while the manure itself would produce a greater effect on the land, of course a smaller proportion would be lost. The steam-engine might be applied in that way with great advantage. The same engine that was used for thrashing, chaff-cutting, and other agricultural operations, might be advantageously employed in pumping out manure. But this involved the question of a new arrangement of farming. Instead of being placed on a hill, as had hitherto been the case, the farmstead ought to be placed on the lowest point; so that, as regarded the carrying out of manure, they need not mind its being situated on the lowest part of the farm. When the farmstead was thus situated, their grain crops might be improved, and they might expect to be able to compete with foreigners. Another point of importance, but which he could only touch upon cursorily, was this: if they placed the farmstead at the lowest point, they ought to have there an extensive reservoir to receive all the water which was drained from the farm. That water would remain by their side till the day of need, and in weather in which the farm was apt to suffer from drought, they might make use of it by means of the steam-engine. He had calculated to his own satisfaction, and to the satisfaction of many experienced and judicious agriculturists, that it would well pay a farmer to lay down pipes and have a steam-engine, if for no other purpose than that of watering the crops in dry seasons, altogether independently of the advantages which it would afford in distributing manures.

A Member: What crops?

Mr. Smith: All crops. There was not a single crop which did not require water.

A Member: I disagree with you altogether.

Mr. Smith: Perhaps you may; I am accustomed to that (a laugh). The cost (continued Mr. Smith) was about £2 an acre. To lay down pipes enough, and have a steam-engine sufficient for the purpose, would not involve a greater expense. The application would not exceed a few shillings an acre, but of course the previous cost would depend on the number of times that the application was made. In a dry season they had their hay coming forward, while here they had the hay at hand, and gave the land a drenching with water. In like manner, on the springing of the corn, supposing the weather were too dry, here were a pump and a pond. The water in the pond, on being stirred up, would be found to contain a great deal of manure which had formerly been applied to the land; and by this means it was taken back and applied to the land again. The water was there, and the manure mixed with it. He would be glad if the gentleman who had insinuated that there were crops which would not be benefited, would mention an example.

The Member: To any crop but pasturage it would be an injury.

Mr. Smith: Do you never see oats in a condition in which they require a shower of rain?

The Member: Yes; and in such a case it might be beneficial if you were to follow it up for three or four days.

Mr. Smith: The gardener took care to water his land, and surely they might do so too. When the water was applied at night, it had to penetrate into the soil before the sun rose. When the sun had risen, a little might evaporate from the surface; still there was moisture below. If they gave the land a thorough drenching, there was no crop which would not be benefited by it in the dry season.

The Member doubted that, unless it could be followed up, and it could not be so to a very great extent.

Mr. Smith said, that having had the privilege or misfortune of introducing a great many new things into this world, he had found that the great difficulty to be encountered was that of trampling down the barriers raised by prejudice when any improvement was first suggested. He had learnt patience from experience; he had again and again witnessed what he saw then; frequently had he seen intelligent men objecting to things which he felt confident they would not object to ten years later; and he felt sure, that if he lived to meet the objectors on the point under consideration ten years hence, they would acknowledge to him that they had been wrong. (Cheers and laughter). They all knew that heat and moisture were the great elements that promoted growth. Heat and moisture they must have; and as regarded the latter, it mattered not how it was obtained.

A MEMBER: Is it not best to get it from a shower of rain?

Mr. SMITH said, he admitted that if a shower of rain came, that would be best, because then the atmosphere itself would be humid. In the extensive meadow lands made by the Duke of Portland the soil was sandy. The sod was only an inch or an inch and a quarter thick. The sand was of a loose kind, which they could turn with their finger as they pleased, and not impervious; and yet with this one and a quarter inch of sod, it was the monthly practice of that nobleman to give the land a good drenching with water after each cutting of the grass; the water was put on for twenty-four hours, and no longer. It was then withdrawn, and the land was left to take its chance.

A MEMBER: Where does he get the water from?

Mr. SMITH: From a brook on the moor.

The MEMBER: Then he irrigates.

Mr. MECHI: What is the difference between irrigating and using the engine?

Mr. SMITH: It was a question of expense, that was all. The pumping of this water for the nourishment of the plants, and the supplying them with a moisture, was a subject which deserved more attention perhaps on the part of the agriculturists of Great Britain than almost any other; and he felt sure that, if properly managed, the operation would do more even to raise the rent of land than anything else. ("Oh! oh!" and laughter.) He wanted to encourage proprietors as well as farmers, (Hear, hear); and he felt confident that the introduction of machinery in agriculture, and its proper application, would at the same time raise the rent of the proprietor, increase the profits of the farmer, and give better and more constant employment to the labourer. Let them look at the history of manufactures, and learn from it what awaited themselves. Let them look at the manufactories, and then ask themselves where was it that the greatest amount of labour was employed. They must all admit that the greatest amount of labour was employed in that part of the country where would be found in operation the greatest quantity of machinery. (Hear, hear). There was more machinery in Great Britain than in any other country in the world; and at the same time there was in connection with it more employment of the people, and better wages. Take the case of Lancashire for example. There was more machinery employed there than in any other county in England, and there was also more employment for the people there than in any other county.

A MEMBER: That is very doubtful.

Mr. SMITH proceeded: He had already observed how much was required to be done in improving this arrangement of farmsteads. He had there a plan of a farmstead which he had drawn up for a Scotch gentleman, who foreseeing what was coming, was making preparations for it. (Hear, and laughter). He was going to erect a house for 768 bullocks—a house which was to be heated and ventilated in the most perfect manner (Hear, hear). He was laying down pipes over the whole of a farm of 700 acres, and he intended to raise nothing but food for the cattle on those acres which were near to him. He might, perhaps, take an occasional crop of grain when the land was getting too strong; but after making careful and minute calculations, he expected to be able to feed at least two bullocks per acre upon that ground, and to manure the whole of the land with the liquid and solid manure which came from the animals. The bullocks were to be tied up in the usual way, not placed in boxes, and were to leave no litter. The whole of the litter was, in fact, to be cut up and passed through the animal. In the passage through the animal nature took up what good matter there was in the straw; and if there were none at all that was good, why in that case they had the best cutting machine in the animal itself, which thus converted the straw into manure in the best possible way for the land. They then let both the liquid and the solid manure go into the tank, and, after stirring it up, by means of the steam engine, the whole would be sent to the land, liquid and solid together; and thus they had the best manure that they could possibly desire. This was not a new thing; it was done in Belgium and perhaps in London. Another peculiarity of the plan to which he referred was an enclosed square, arched over without windows; a tunnel was brought into the bottom between the heads of every row of animals, and a wall, two inches in diameter, came up to the nose of each bullock, and gave him at all times a plentiful supply of fresh air.

Mr. BENNETT: In the event of a wet harvest, when the straw is not fit for food in any shape, how could you make it pass through the animal?

Mr. SMITH: A small quantity might be destroyed in that way, but the difficulty is one that might be remedied by steaming and washing.

Mr. BODDINGTON, on rising to speak to the question, said, he presumed that the gentleman who had just been addressing them belonged rather to the manufacturing part of the community than the agricultural.

Mr. MECHI: No, no.

Mr. BODDINGTON presumed that Mr. Smith was not a farmer.

Mr. SMITH: Yes, I am.

Mr. MECHI: Yes, and a large farmer.

Mr. BODDINGTON must say, then, that Mr. Smith had exhibited a vast fund of practical knowledge, both of manufactures and agriculture (Hear, hear). With respect to the remarks on the consumption of straw and the reduction of all fodder to the state of liquid manure, he must say that he thought the proposition was a most startling one. The theory was, he confessed, a pretty one, but he did not see how the object was to be accomplished (Hear, hear). The question was well put by Mr. Bennett, "When they had a quantity of damaged fodder, hay, or straw, on which the cattle would not feed, how was that fodder to be converted into manure (Hear, hear)? It might be said that that could be remedied by steaming and salting such food so as to make it palatable to the animal. With respect to the application of machinery to agriculture, he thought that some of the speakers were rather led away by their preconceived ideas on the subject of machinery in factories. The machinery used in factories was under cover, and was always within the space of about 100 yards; whereas the machinery of a farm was scattered, and had reference to many operations. In a factory where a machine had been once fitted up for a particular purpose, there was no variation. The other day he had seen about 200 machines in a factory, all doing the same thing; in farming there was one machine required for drilling, another for thrashing, another for winnowing, another for ploughing, and so on. He did not mean to deny that steam-engines, if properly worked, on farms would prove very useful; but he considered it questionable whether the use of them would be more economical than that of horse power. Having himself tried steam-engines, he had found an objection on the part of the fire insurance offices to the employment of them, and he had, in fact, understood that an insurance could not be effected in such cases. Considering the present position of the farmer, it was not reasonable to expect him to lay out £500 for a steam-engine; a large capital was required to carry out such ideas as had been expressed, and, so far as labour was concerned, he believed the effect would be to diminish, instead of increase, the employment of it. With regard to manure, perhaps he must observe that he had known persons who, after setting them up, and after having experienced their working, had abandoned them on account of the comparative smallness of the advantage derived from their use. He thought the most useful improvements in machinery were those which had been made in drills. The depositing of the seed in an equable manner all over the field, and on the same level, was a point of vast importance in farming. They now had drills of all sorts and sizes, to drill for almost anything, except the light seeds, such as carrots and mangel wurzel; and a drill applicable to the exceptional cases mentioned would be very beneficial. As for the statement that agriculturists had scarcely any machinery, so far from that being correct, the machinery employed in agriculture was a hundred-fold more extensive than that employed in manufactures (cries of "Oh"). Why, the farmer had scores of machines—(Hear, hear, and laughter)—and it was a mistake to suppose that farming was now carried on without the aid of machinery. He did not apprehend that they were called upon to conduct the agriculture of the country in the same manner with a population of thirty millions as they would be if the population were forty millions. Agriculture was a progressive pursuit, and it had certainly kept pace with the progress of the population. If there had been drawbacks, they had not arisen from any want of intelligence or of energy on the part of the farmer, however some persons in the House of Commons might have been in the habit of attributing them to such causes. The drawbacks had arisen from the fact that the legislature of the country had not taken care of the interests of the country. With regard to Scotland, he would like to know whether the use of steam power was general in that country.

Mr. Smith: Yes, it is general.

Mr. Thomas: It is universal in all the corn-producing counties of Scotland; for example, in the Lothians, Roxburghshire, and Berwickshire.

Mr. Boddington said he was in company with a Lincolnshire gentleman a short time ago, who told him that he had no steam power, and that there was nothing of the kind in his neighbourhood. That gentleman was, too, a tenant of Lord Yarborough.

Mr. Mechi wished to observe that though he had a steam engine and was insured, he paid no additional premium for the insurance on account of the engine. His buildings were bricked and slated.

The Chairman remarked that Mr. Mechi would be required to do so if he had a portable engine.

Mr. Cheetham remarked that he knew an unfortunate farmer who had had a steam-engine on his farm. The premises were insured without the existence of the steam-engine being mentioned. A fire occurred; on account of the engine the office refused to make good the loss, and the result was that the party was reduced to the greatest extremity.

Mr. Shaw (of the Strand): Allow me to congratulate the club on the very able introduction of this subject by Mr. Thomas, and also on the good effect which that circumstance is likely to produce, inasmuch as he is a practical farmer on an extensive scale. (Hear, hear.) I feel persuaded that this club, as well as other bodies of a similar nature, will promote inquiry and spread information among farmers, just in proportion to the extent to which subjects bearing on their interests—many of them, perhaps, of a somewhat novel character—are introduced and discussed by men who are practically acquainted with and engaged in the va ied operations of agriculture. (Hear, hear.) Allow me also to congratulate you on the tone and temper in which this question has been discussed. I recollect that three years ago—although I had not the pleasure of being present, as I was suffering at the time from severe illness, but I was made acquainted with what occurred—when the subject of agricultural machinery was under discussion, there was considerable difficulty in getting the club to agree to a resolution that it was desirable to employ machinery extensively in agriculture. (Hear, hear.) An apprehension existed that it might go forth to the world that the club had negatived the proposition that an extension of the application of machinery to agriculture would be beneficial. And recollecting the state of feeling which existed at that period, when I observe the manner in which the question has been received this evening, and anticipating, as I do, that there will be an unanimous vote in favour of the employment of machinery, I cannot but regard this as marking great advancement and evidencing the march of intelligence. I trust you will not consider this observation disrespectful, inasmuch as I think we have all something to learn, and that if we keep our eyes open, we shall, in fact, be gaining knowledge every day. This club is, I think, progressing in a course which is calculated greatly to increase its utility; and although propositions may sometimes be advocated which savour of chimera, when we find what is taking place in the sciences and the arts, however much we may doubt, we should rather be prepared to entertain new propositions calmly and coolly, than to cast ridicule on notions which, in a short space of time, we may wonder we were ever disposed to question (Hear, hear). The advances made in the sciences within the last few years have been such as ought to humble every one of us, and induce us to keep our minds open to the consideration of every proposition which may be submitted to us. The main point on which the discussion has turned to-night has reference to machinery in its application to agriculture. Some statements have been made with regard to the cost of thrashing by steam. Let me add my testimony, founded on information obtained from a practical farmer, as to the cost of thrashing by means of steam power. About two years ago I visited the farm of Mr. Morton, at Whitfield, which was originally the model farm of Lord Ducie. Mr. Morton has a stack-yard at the back of the barn, and a wooden tram road running into it for the conveyance of stacks of corn, which are ranged on each side of it, into the barn. He stated to me that the whole cost of taking the corn into the barn, thrashing it out, winnowing it, separating it (he has one of Clayburn's separating machines), and running it into the sacks ready to be sent out, was 8½d. per quarter, exclusive of the charge for the capital invested in the machinery itself. That approaches very near to what has been stated to-night, and I name it in order to confirm what has been said this evening as to the cost of thrashing by steam. As we all have our hobbies, so I cannot forget what has long been, to a certain extent, a hobby with me. Pardon me, then, for stating that probably at this very moment the Tenant Right Bill, which contains a clause empowering the tenant to remove any buildings which he may have erected, or machinery which he may have placed on the premises in his occupation, is now undergoing the second reading in the House of Lords. It may be that it has now been read a second time, if, indeed, it have escaped the fangs of the law lords in the upper House of Parliament. I name this because I feel that the giving security to the tenant, the giving him the power either of removing or requiring payment for such buildings as he may have erected during his occupation, will be a great boon to him; and I feel that the enjoyment of such a power on the part of the tenant will tend very much to increase the use of agricultural machinery (Hear, hear). It has been stated this evening that a vast deal more machinery is employed already in agriculture than in manufactures. I join issue with my friend Mr. Boddington on that point; though I am not prepared to state what is the actual amount of steam power used for other purposes than agricultural ones in this country, yet I know it is enormous. I cannot trust myself to say what is the extent of the steam power employed in the various manufactures and mines of the kingdom; but as regards the amount of steam employed respectively in agriculture and in manufactures, there can be no earthly comparison, the former immeasurably exceeding the latter. (Hear, hear). Mr. Boddington says that the variety of agricultural machinery far exceeds the variety of manufacturing machinery. I do not know whether he has ever been in Sharp and Roberts' machine manufactory, at Manchester. If he has he must have seen there a vast variety of machines.

Mr. Boddington: I have been at the annual cattle show in Baker-street, and have seen the exhibition there.

Mr. Shaw: I know it is difficult to avoid touching on questions which do not bear exactly upon the subject immediately before us. In all these discussions, it is, and I think must be, taken for granted, that, by some means or other, agriculture will be carried on profitably to the tenant farmer; for I am certain that this country can never progress or maintain its position and reputation among nations unless its agriculture does go on prosperously (Hear, hear). I entirely concur in the remark of Mr. Boddington that agriculture has kept pace with the increase of population. Farmers cannot counteract the effects of adverse seasons. Seasons will occur in which there must unavoidably be deficiencies; but any person who has watched the advance which has been made in the growth of grain of every description per acre now as compared with the production of 25 or 30 years ago, must, I am sure, come to the conclusion that it has, on the whole, kept pace with the increase of population.

Mr. Mechi: It has not kept pace with manufactures.

Mr. Shaw: Mr. Boddington stated that there is no machinery used in Lincolnshire. Now, I can tell him that the manufacture of portable steam-engines in that county is proceeding rapidly (Hear, hear). In Lincolnshire there are two manufactories, which turn out several per week; one is at Boston, the other at Grantham.

Mr. Boddington: I did not say that there were no portable steam-engines; I have employed them myself.

Mr. Shaw: I understood you to say that steam-engines are not used in Lincolnshire. I know that in one part of that county they are used on a most extensive scale; and I should have considered it a blot on Lincolnshire if it could have gone forth from this room, without contradiction, that steam-engines are not used there. I take this opportunity of seconding the resolution proposed by Mr. Thomas, and I trust the meeting will admit, by the adoption of that resolution, that the introduction of steam machinery for agricultural purposes does not lessen the employment of labour.

Mr. Boddington explained that what he had intended was, that in Lincolnshire steam-engines were not put down and fixed.

Mr. Bennett: I wish to direct attention for a few moments to the latter part of the resolution moved by Mr. Thomas. It may be perfectly true that by the use of steam-engines you do not materially lessen the employment of manual labour, looking at the country as a whole; but the prejudices of labourers on the subject are not always groundless, and they are generally better acquainted with such matters than they are supposed to be. Taking into account the manufacture of machines, the getting up of the coals, and so on, I have no doubt that there is in many cases an increased employment of labour through the use of steam-power; but when once an engine is fixed, there is so far an end of the labour bestowed upon it, and I do not see how it is possible to employ so much manual labour when wheat is thrashed at the rate which has been stated this evening. I would strongly recommend to those who have talked so much of the extent to which thrashing can be cheapened an observation made to me by a noble lord, when I was going to be examined before the House of Lords—" Be sure," said he, " that you do not state the case too strongly, because that will subject you to a severe cross-examination, and in attempting to prove too much you will prove nothing at all." In like manner I think the case of the steam-engine has been put too strongly. Within the last year and a half, an offer has been made to me to erect a building for a steam-engine on my farm. I am satisfied that you would require a higher paid man than is supposed to be necessary, to take the management of the steam-engine; and if the estimate of 1s. a day applies only to the days that the engine is at work, it is far below the mark. Who does not know the cost of getting a parcel of millwrights and persons of that description about him? To talk of keeping your tackle complete and in good order for a shilling a day, appears to me exceedingly wild. Every person who has had much to do with machinery must know that there is a great expense connected with it, an expense which often runs up to nearly one-third of its original cost. I admit that the steam-engine may be used with advantage on a fair-sized farm, where the labour is not dense. I have considerable doubts as to its affording great benefit to the agricultural districts generally. I cannot for a moment entertain or tolerate the idea that it does not displace a great quantity of manual labour. If you can get a national rate, and throw the support of the poor on the entire property of the country, then you may be right in carrying machinery to the fullest extent; but under the present system, which compels you either to employ the poor or keep them in the workhouse, anything which tends to lessen their employment in their own neighbourhood is to a certain extent an evil, and such an evil I consider machinery. I am of opinion that machinery would be a great benefit if the burden of supporting the poor rested on the whole of the property in the kingdom; but that is not the case at present. It has not been shown that there is not a displacement of manual labour arising from the use of steam-engines. The application of steam is no doubt in many cases useful; but I think the point is put a little too strongly in the latter part of the resolution, where it is delared that it will not eventually displace manual labour.

Mr. Mechi: Allow me to say that within the recollection of the present bailiff £2 per week is the amount which has been paid for wages on my farm; at present, with steam power, the payment for wages amounts to £8 per week (Hear, hear).

Mr. Turner said he happened to have very good water-power for the thrashing of corn; and as for the statement that wheat might be thrashed for 8d. a quarter, he had no hesitation in saying that the thing could not be done for three times that sum. If it could not be done by water-power, it certainly could not by steam.

The Chairman: Then I presume you are of opinion that you can work your machinery cheaper with water than with steam?

Mr. Turner: Nothing, I consider, can surpass water, when you have it in a good state.

Mr. Mechi: I beg to say that I over-estimated the cost of thrashing, dressing, and sacking wheat when I stated it at 1s. per quarter. I desire not to misstate the case either way; but it certainly cannot be more than 1s. per quarter.

Mr. Garrett said they must not forget the smallness of the power of the engine required. In the case of a six or eight horse power engine, he would be happy to do the repairing for 1s. a day, or about £18 a year. He had a small high-pressure engine on his premises, which he first erected for the novelty of the thing. That engine had been working for ten years, and had cost him scarcely anything for repairs. Engines of that class involve scarcely any expense for repairs. The great advantage of using steam rather than water-power was, that you could shake your straw after threshing much better than by the handfork.

Mr. Thomas then replied. In opening the subject he had endeavoured to keep as closely as possible to the subject specified on the card. He did not enter into the interesting details introduced by Mr. Mechi, because his object was to lay down a broad principle. With regard to the difficulty of inducing farmers to lay out their money in improvements, under the present uncertain tenancies, he conceived that agriculture must now take such a rapid stride that the tenantry must become more secure; and co-equal with the increase of security would be the rate at which machinery was introduced into agriculture. For his own part he would observe that on his requiring the erection of buildings for a complete set of machinery, his landlord (the Duke of Bedford) agreed that they should be erected on the condition that either at the expiration of his lease, or before, if anything happened to cause him to leave before, the whole should be taken off his hands at a fair valuation (Hear, hear). With regard to the employment of labour on farms, whenever he had made enquiries on that subject, he had invariably found that the rate of labour employed was much larger after than before the introduction of steam-engines. The reason was obvious. If a farm were brought into an improved state of cultivation, there was in consequence room for the more profitable employment of capital. He was now speaking not theoretically, but practically (Hear, hear). Mr. Boddington could not have pitched upon any one county where machinery was being more resorted to than in Lincolnshire, or where the flail was more rapidly giving way. On his questioning an agricultural friend from Lincolnshire on this subject, the reply was, that it would be difficult to mention a farmer who did not use engines. At the same time, wages were higher there than in most other parts of England. As regarded the prejudices alluded to by Mr. Bennett, he had gone so fully into the matter in opening the subject that he would not again dwell upon it. He would say, however, that they should not allow the prejudices of unlearned men to over-rule them, and thus to prevent the introduction of machinery, which only on the first blush appeared to interfere with the employment of labour. In a letter which he had received from Mr. Lawrence, of Cirencester, that gentleman assured him that the labour employed on his farm since the use of machinery was three times as great in amount as it had been previously. On the subject of the law of settlement he would observe, that in a parish of 200 acres, in Hertfordshire—Baldock—there were from two to three thousand inhabitants; in a neighbouring parish—Bigmore—on 100 acres there were only ten individuals; while in Letchworth, consisting of 1,200 acres, the population was only fifteen hundred. Was it not clear that Baldock could not employ the labouring population within it to the same advantage as the other parishes (Hear, hear)? The faster they introduced machinery throughout England the sooner would they compel the State to make some alteration in the law of settlement. The resolution which he had proposed clearly expressed his own opinions; he was happy to find that it also expressed those of Mr. Shaw; and he would be extremely pleased to see it adopted, because its adoption would show that farmers were progressing rapidly in the right direction (Hear, hear). He concluded by again reading the resolution given at the close of his introductory address.

Mr. Smith, of Deanston, observed, that it was very common in Scotland, where the farming was good, for the ploughman to manage the engine; and it was generally found that it was as easy to manage that as the plough.

Mr. Thomas was very glad that that point had been introduced. Amongst the inquiries which he made previously to introducing a steam-engine, was the question whether it would be necessary to employ an engineer? He was laughed at, and told that nothing of the kind was necessary; that all that was necessary was to take care that the boilers were well filled, and that everything was regularly kept in good order. Engines of four or six horse power did not, he believed, require so much care as the old thrashing machines. He was thoroughly confirmed in his opinion that the cost of thrashing did not exceed 6d. a quarter; and he could not help thinking that there must be something faulty in Mr. Turner's engine if his thrashing cost him 2s. per qr. while that of other persons cost them only 6d. (laughter).

A desultory discussion ensued with regard to the terms of the resolution, more especially in relation to the question of the employment of manual labour.

Mr. Bennett proposed as an amendment to omit all the words going directly to that point, so that the resolution should read as follows:—

"That this meeting is of opinion that steam-power may be introduced to a much greater extent than it is at present, with much advantage, into the operations of agriculture in England; and that steam-power is far more economical than horse-power."

He was by no means convinced that one immediate effect of introducing machinery for agricultural purposes was not the displacement of labour.

Mr. Mechi would be glad to have an example.

Mr. Bennett said his object was to prevent the club from committing itself to a declaration that there was no displacement or diminution of labour.

Mr. Trethewy suggested that the word "machinery" should be introduced instead of "steam-engine." The introduction of machinery in general would certainly not displace labour so much as the general introduction of the steam-engine.

Several gentlemen appealed to Mr. Thomas to alter the terms of his resolution, but that gentleman said that as it expressed his real and conscientious opinion, he would not consent to any alteration.

The club then divided on the question, and the Chairman declared the amendment to have been carried.

A vote of thanks to the Chairman and to Mr. Thomas terminated the proceedings.

CHEAP MANURING.—SUBSTITUTE DUNG HEAP.

Sir,—Although long hindered, by a variety of interruptions, this subject has never been forgotten by me; and I avail of the first leisure, to draw it towards a termination.

No. 8 concluded with promising a cheap substitute for the dung heap, and suggestions for green manuring.

In No. 1 was shown how the dung heap may be tripled, so as to get 27 tons from an acre. But this produce appears to be exceeded, in practice, on a Scotch farm, of which the account is just printed. This farm consists of 260 acres, all arable, and all but 65 acres poor land. On this are kept, 5 dairy cows, 130 feeding cattle, 150 sheep, and 15 horses! Eighteen acres of clover and rye grass, and 1½ acre of turnips (19½ acres), fed 67 cattle and 10 horses 5 months, from May to October; except the oats and straw allowed to the horses, and 280 bushels of beans, boiled with chaff, for the cattle. In the whole there are 105 acres in wheat and potatoes; and 30 acres in oats, of which one half may be consumed on the land: thus growing 120 acres for the market: and leaving 140 for the stock, to make manure. To this we must add, £270 per annum laid out in linseed, beans, &c.; say 40 tons, capable of producing 120 tons of manure: and 500 loads of sea-weed are brought up from the beach. With these additions the 140 acres produce 5,000 loads of mixed dung yearly; under cover, so as to be free from rain soaking; and independent of what is dropped in the fields, at pasture; against which, however, may be set the chaff and straw given with the cooked food and oats. Hence deducting the 500 loads of sea-weed, and 180 loads (the 120 tons) produced from the purchased food, we have 4320 loads, or in round numbers 2,900 tons (taking a load at ⅔ ton) from 140 acres: besides urine, enough to water the greater part of 55 acres of rye, grass, and clover, 4 times a year. The quantity per acre is not stated; but if we set it down at 500 gallons, 4 times a year, will be 2,000 gallons; and take 50 acres (as there was not quite enough for the 55) this gives 100,000 gallons or 1,000,000 lbs. of urine, which would soak $\frac{1}{3}$ its weight of litter, say 333,000 lbs., making 1,333,000 lbs., or nearly 600 tons. This, added to the 2,900 above, amounts to 3,500 tons, from 140 acres, (or 25 tons per acre) of very rich manure; containing only 2,000 loads, or less than $\frac{1}{2}$, peat; and if $\frac{2}{3}$ had been added (as suggested in my No. 1) would have made more than 40 tons per acre.

Thus my estimate is exceeded, from a practical authority, which appears well worth the farmer's attention; the pamphlet being clear and concise, and not costly. Titie "High Farming under liberal covenants the best substitute for protection," by James Caird, Farmer, Baldoon; published by Blackwood and Co., price 1s. I only wish I could see, with him, any prospect of British agriculture flourishing without protection; but better times appear to be coming, if farmers are firm to their own interests.

But while such effects are produced, as farmers will hardly believe, by a good proportion of green crops and economizing the essence of the manure, instead of allowing it to run waste, and be washed out by the rain, still dung is heavy carriage; and there are out-lying distant fields, hilly and rough roads, and a variety of other cases, where it would be convenient to the farmer to have a cheap compost, made on the spot, capable of answering the purposes of the dung-heap, without the charge of carting from the homestead, and of helping it out where deficient.

1. The basis of such a compost must of course be vegetables collected on the ground; but, as vegetables ferment sour, there must be lime to correct the acid; and, as there will be roots and seeds of weeds, they must be killed by salt.

2. Sods and turf, from hedges, ditches, and headlands, will also carry in vermin; but they and their eggs will be killed by the salt and lime.

3. The potass and salts required for vegetable growth will be well supplied in the vegetable matter; but the phosphates, for encouraging seeding and bulbing, will be deficient, and must be supplied by bones, either in the compost, or at the time of sowing.

4. And while the substance of the heap is constructed of these materials; ammonia, or nitrogen in some form, is necessary, to give it the activity of good dung: and the great point is to effect this by the cheapest and readiest means.

1. Of the vegetable matters, to form the basis, it may not be altogether superfluous to remind the farmer of roots harrowed up, hedge clippings, fallen leaves, weeds, fern, heath, moss, rushes, vegetables growing in, and on the banks of, pools and streams; and sea weed when at hand; in fine, every sort of vegetable substance, leaves, stalks or roots; burning none, except in extraordinary cases.

2. Then sods and turf from hedges, ditches, and headlands, and paring of the soil; sawdust, spent bark from the tan pit, peat turf and bog earth, mud from ponds, ditches, cess-pools, rivers or the sea, and even way soil where at hand; coal tar in small quantity (say three or four gallons to a ton) has been found useful in vegetable compost; and may be mixed with coal ashes or sawdust, for loose cartage (where not too far), or carried out in tar barrels, and mixed with sawdust, leaves, spent bark, or any of the ingredients on the spot, or even with earth, to disperse it through the heap, and prevents its closing together.

4. If refuse fish is to be had cheap (say 1s. to 2s. per ton), it is the cheapest and readiest supply of ammonia; and carrion, or any animal offal, is little inferior. Or if a gas-work is at hand, the gas liquor is excellent for the purpose, and may be carried in casks, or loose, absorbed in saw-dust; and next to these are woollen rags, which are light carriage, but work slowly unless steeped in urine or night-soil. And if ammonia is still deficient, it may be made up at any time by sulphate of ammonia or nitrate of soda, dissolved and sprinkled in when turning over the heap.

3. When there is plenty of fish the phosphates will be sufficient without bone, but whenever bone is required it will generally be better applied to the soil at the time of sowing.

The compost should be made in a part of the ground the most sheltered by trees or walls from both rain and sun, and a bed of earth, a foot or more deep, laid down; upon this a layer of green vegetables and sea-weed (1), dusted with slaked lime (say $\frac{1}{2}$ cwt. to a ton); then a layer of stalks, roots, spent bark, saw-dust sods, turf, and mud (2), with salt (also about $\frac{1}{2}$ cwt. to the ton, less rather than more); and so on limed vegetables; and salted stalks, roots, sods, &c., until as high as convenient, say 4 or 5 feet.

The heap can be made up by degrees as the materials are procurable; and the thickness of the layers must depend, more or less, upon the abundance of each kind; perhaps 6 to 9 inches for the green layer, and 3 to 5 inches for that of roofs, turf, and mud, &c., would be about the best for equal fermentation. The fish, woollen rags, gas tar, or gas liquor, soaked in saw-dust (4), should be applied in thin layers between the others, but always covered by the turf and mud to save the ammonia. The heap will need turning over a few times to finish the fermentation, and made it alike all through, and may then be used as dung; with the addition of nitrate of soda or sulphate of ammonia, as above said, if needed. But perhaps a still easier and cheaper method of enriching outlying lands is green manuring, of which more in our next.

J. PRIDEAUX.

THE FALKIRK TRYST.

Having carried our readers to the Highlands, we must, at the risk of being somewhat episodical, request that on their return south they will accompany us to Falkirk Moor on the second Monday or Tuesday in either September or October. They will there witness a scene to which certainly Great Britain, perhaps even the whole world, does not afford a parallel. On the Monday morning they will see the arrival on this flat and open moor of flock after flock, to perhaps the average number of 1000 in each, of sheep—some black-faced with horns, some white-faced and polled—the individuals of each flock being, however, remarkably uniform in size and character. They will probably observe that the flocks arrive in pairs, the first being a draft of wethers, and the second of ewes from the same farm. Each flock will be attended by two or three men, and at least as many dogs. They take up their respective stations on the moor without confusion, and stand in perfect quietude in little round clumps, which are separated from each other by only a few yards. The dogs are the main guardians, and though they are generally lying down and licking their travel-worn feet, no unruly animal who breaks the ranks escapes their vigilance, but is instantly recovered. Among the shepherds friendly recognitions are taking place; the hand and the mull are freely offered and accepted, and the news from Ben Nevis, Dunvegan, Brahan, Jura, John o'Groat's, and the Lewis is communicated in a singularly soft language, strange to southern ears. We doubt whether we do not much underrate the whole number of sheep thus collected at 100,000. Mr. Paterson, Mr. Seliers, Mr. Kennedy, and Mr. Cameron, of Corachoilie, will each have several thousands on the ground. We have heard that this last patriarch has 50,000 head of cattle and sheep on his several farms. The greater part of the sheep are in the hands of their respective breeders, though no inconsiderable number have been purchased without being seen at the Inverness wool fair, by dealers who are perfectly acquainted with the qualities of every large flock. Soon after the groups have been collected in the manner which we have described, a large number of agricultural-looking gentlemen on horseback and on foot begin to move among them; these are partly southern dealers, but more generally the large turnip-growers from the east coast of Scotland and from the northern and eastern counties of England. The merits of each flock are so accurately known by those who have an interest in frequenting Falkirk, that a cursory inspection suffices. No stranger accustomed to the bustle and the crowd, the handling and the haggling of an English fair, would suspect that transactions of a magnitude to which Barnet, St. Faith's, and Wey Hill afford no parallel, were on the eve of taking place. The owners are seldom with their flocks, but their whereabout is easily ascertained by those who want them. "What are ye seeking for the Gordon Bush ewes, or for the Invercashley wethers this year?" says the purchaser; and if the parties are well known to each other, a price is named within 1s. or perhaps 6d. a head of what the vender means to accept. A few words pass about the abatement of the odd shilling or sixpence, and, with a half-jocose complaint that the vender was shabby with his luck-penny last year, several thousand sheep have changed hands. The news of the price at which the best lots are sold spreads through the fair, and, within a very trifling per centage, the value of every other lot is at once ascertained. A large proportion of the lots pass from year to year into the same hands. No purchaser of a smaller number than 500 must expect to get sheep at first hand from any of the standard flocks; indeed these magnates generally decline to divide their lots at all. On the outskirts of the fair will be found small, mixed, and inferior lots, where the buyer may have haggling for 1d. a head to his heart's content. The settling at Falkirk is as peculiar as the dealing.

No man brings money, *i. e.* currency, with him to Falkirk. On a portion of the moor adjoining the sheep ground, and adjoining also to long lines of booths, a wooden penthouse about five feet square announces itself by exterior placard to be "The Royal Bank of Scotland;" the British Linen Company, the Commercial Bank, and every other banking company north of Tweed, appear there also by similar wooden representatives. The purchasers come to the fair provided with letters of credit, and, stepping into the tabernacle to which they are accredited, bring out in large notes the amount required; these are handed to the vender in an adjoining booth, and are probably within a very few minutes at his credit with the issuer or with one of his rivals; for a Scotchman, dealing with a banker who is very reasonable in his charges, and who is to be found in every village in the land, always throws on him the responsibility of keeping his money. The bankers in the aggregate carry from the ground the same notes which they brought in the morning, a few scratches of the pen in their books having sufficed to balance all these large transactions. The clearing of the ground is as orderly as the other proceedings of the day, and, under the superintendence of the best herds and the best dogs in existence, the immense fleecy mass moves off, with almost military precision, on its southern and eastern journey.

What shall we say of the gathering of the morrow? Every isle and holm which opposes its rugged crags to the fury of the Western Ocean between Islay and the Orkneys; every mainland glen from the Mull of Cantyre to Cape Wrath, pours in its pigmy droves, shaggy and black, or relieved only, as to colour, by a sprinkling of reds, and of duns graduating from mouse to cream colour. From Northern and Eastern Sutherland, Caithness, Ross, and Inverness they come in longer on the leg, smooth, and vulgar. From central Argyle, Perth, and from some of the islands, come the carefully-bred West Highlanders; these are the flower of the show, engage every one's talk, and attract every one's attention; every individual of them is a delight to the eye of a connoisseur. Aberdeen and Forfar send in droves of large and bony, but useful bullocks. A few Ayrshire cows and heifers for the dairy, some miscellaneous lots, and a few Irish, make up the account. We do not know the numbers; we have heard of 30,000, and again of 60,000. The October show is the most imposing. The almost universal colour is black; the moor is in appearance one black mass. You may be accommodated with every size, from that of a Newfoundland dog to a bullock of 100 stones. The cattle are mostly in the hands of dealers, having been bought up at the northern and western markets; many, however, of the best West Highlanders are brought to the tryst by their breeders, and you may see a kilted laird from the Hebrides standing, like Rob Roy, at the tails of his own bonny stots and queys............The proceedings are as orderly and the dealings on as large a scale as those of the preceding day. A few small lots of a score each may be found, but generally they run from 50 to 300 and upwards. A purchaser of less than the whole of one of these large lots gets his number, not by a selection, but by a cut: a drover passes through the black mass and cuts off by estimation the number; they are then counted and made up to the required figure by alternate selections on the part of the buyer and seller. A third day follows, but it is not of much account. The cattle are for the most part miscellaneous lots, and what a Scotchman calls his shots, and an Englishman his culls. We have been somewhat minute in describing these proceedings, because they are on a scale of magnitude quite unknown to southern agriculturists. We can assure our readers that the men who carry them on are quite equal to the occasion. We always considered our annual intercourse with them to be both a privilege and a pleasure. No trading class can furnish more intelligent men than the Scotch stock farmers—perhaps, indeed, than the Scotch agriculturists generally; men well educated, of courteous and simple manners, of great intelligence and much general information, enterprising, and keenly alive to every reported improvement. —Quarterly Review.

ON THE MODE BY WHICH THE PHOSPHATE AND CARBONATE OF LIME ENTER THE ORGANS OF PLANTS, AND ON THE INFLUENCE WHICH THESE SUBSTANCES EXERT ON GERMINATION AND VEGETATION.

BY M. LASSAIGNE.

It has been long known that plants derive from the soil on which they grow the different alkaline and earthy salts which are found in their ashes; it is also known that manures furnish plants with the substances necessary for a vigorous vegetation. The presence of water is indispensable; for the various substances which the plants draw from the soil must always be in a state of solution, for which purpose a certain quantity of water is absolutely requisite. This moisture, which the soil retains more or less powerfully according to its composition, is derived from rain, and from dew condensed on the surface: it dissolves the soluble salts present in the soil, to be pumped up by means of the roots, and conducted into the various parts of the plants. Saussure has demonstrated, by an interesting series of experiments, that a great number of neutral, alkaline, earthy and metallic salts, when dissolved in water, are absorbed by the roots in unequal proportions. Now, as the soil contains many soluble neutral salts, the manner in which they are conveyed into the plant is easily understood. As for the *insoluble* inorganic substances, which are also present in plants, they must also have been rendered *soluble* by some means. Before admitting this assertion as a principle, the means by which these insoluble substances have found their way into plants must be ascertained.

A great number of facts have established the important influence which phosphoric acid has on the development of the cereals, and according to Liebig these plants cannot arrive at maturity without it. This assertion is now admitted; for, according to the most distinguished French agricultural writer of the day, Gasparin, phosphoric acid is present in all soils where cereals are cultivated. The employment of animal manures tends to restore every year the portion of phosphoric acid carried away by the food of man and animals, and of which it is perhaps the most important ingredient, as it is always found both in the solids and fluids of all animals. The action of phosphoric acid on vegetation explains the effect which bones have on our crops. The well-known value of these substances as a manure is attested by their almost universal use. It is of importance to ascertain by what means these insoluble phosphates find their way into vegetables; different hypotheses have been started, and it is for the purpose of settling this matter that the following experiments have been tried.

With the view of arriving at a solution of this question, we commenced by inquiring—

1st. If phosphate of lime, such as is found in bones, can be dissolved in water containing carbonic acid.

2nd. In what quantity it can be so dissolved.

3rd. If this solution can or cannot favour the germination and vegetation of cereals.

4th. Lastly, if in different parts of the fully grown plant we could detect a certain quantity of this same phosphate.

First Experiment.

The phosphate of lime (as found in bones) is soluble in water saturated with carbonic acid, at ordinary pressure and temperature. This proposition, which we have deduced from experiments, has been by Dumas and Gasparin asserted without proof experimental. It is in this state of things that in 1846 we announced to the academy of sciences, that water saturated with carbonic acid, at the temperature of 50°, and at the mean pressure of the atmosphere, dissolves of the phosphate of lime of bones $\frac{75}{10000}$ parts or $\frac{1}{1333}$ part of its weight. We stated that this solution is decomposed by heat, and that the phosphate is also thrown down by adding potash or ammonia to the solution so as to saturate the carbonic acid. We also found that water containing carbonate of lime in solution by carbonic acid had, likewise, the power of dissolving small quantities of the bone phosphate. After settling these points we tried several experiments on fresh bones, and on bones which had lain in the earth for some time. The result is that the latter, when reduced to the size of a nut, and brought into contact with water saturated with carbonic acid, yielded, at the end of eight or ten hours, a certain quantity of the inorganic bases, that is to say of the carbonate and phosphate of lime. This quantity we find to be increased by reducing the bones to powder. An experiment to ascertain the relative proportion in which the phosphate and carbonate of lime are dissolved gave results differing but little from those obtained by Berzelius. Our results may therefore be considered to have established the fact that the salts of lime of the same chemical composition as bones, after being allowed to decompose for some time in the soil, can be dissolved in rain-water in consequence of the carbonic acid it contains in solution.

Second Experiment.

The preceding experiments naturally lead us to inquire what effect this solution of phosphate and carbonate of lime could produce on vegetation. Before studying this question, which is interesting both in an agricultural and physiological view, we thought it advisable to place ourselves in the most favourable situation to answer it correctly.

1st, we sowed four grains of wheat in two glass vessels of the capacity of about 25 cubic inches, each containing about 4000 grains (?) of sand, purified by washing with muriatic acid. Each vessel was watered so as to render the sand moist, the one with (1) *water containing carbonic acid alone,* and the other with (2) *the same water also holding in solution* the phosphate and carbonate of lime.

2nd. The two vessels were then placed on a porcelain plate, and covered with a large bell glass, in order to preserve them from contact with any dust floating in the air. This apparatus was so placed on a wooden stand that it might be placed in the sunshine: the temperature of the room kept as nearly as possible at the 50°. The wheat all vegetated in ten days, the plumule was developed as usual, and gave two leaves to each plant, of the most beautiful green colour. After this the development of the two sets of plants were as follows:—The growth of the grains of wheat watered with a solution of carbonic acid, and phosphate and carbonate of lime, was much more rapid than those watered with the solution of carbonic acid alone: the leaves furnished by the former grains were generally larger, stronger, and of a deeper green. But 25 days after germination the vegetation of the plants, placed in such abnormal conditions, languished, the leaves assumed a yellow colour at their extremity, and this alteration was gradually propagated through the whole plant. At this epoch the height of the leaves produced by plants watered by carbonic acid alone was from $2\frac{1}{4}$ to $2\frac{3}{4}$ inches in height, whilst the leaves produced by the grains grown in the sand watered with the solution of bone earth were from three to four inches high. The plants were drawn out of the sand as soon as ever they appeared to lose their vigour, and after being well washed with water they were dried to ascertain the quantity of dry matter they contained. The leaves grown with the solution of bone-earth contained 0·193 grammes, whilst those from the other experiment contained only 0·153 grammes of dry matter. Thus giving in both cases the advantage to the experiment with the bone-earth.

Third Experiment.

The results of this agreed with the preceding. The vegetation caused by the solution of bone-earth again exceeded that caused by the carbonic acid alone, in the proportion of 12 to 8. The development of the roots of each lot of plants was also in the same proportion. It was not sufficient to have shown by these direct experiments the stimulating effect of the solution of phosphate and carbonate of lime: it was also requisite to ascertain whether these substances had been absorbed during vegetation. To ascertain this we burnt off the dry leaves in a platina crucible, and obtained from the leaves of the wheat grown with the solution of bone-earth *four or five times as much inorganic matter* as from those grown from the solution of carbonic acid alone. And the further analysis of these ashes has shown the presence of phosphate and carbonate of lime in much larger quantities than in the other experiment. These results, by positively demonstrating the special influence of these salts of lime, also enable us to explain the action of certain manures. Besides the gaseous and ammoniacal products which are yielded by the decomposition of animal matters, the phosphates and carbonates of lime which they contain must also perform an important part in the assimilation of vegetables. Certain species of these latter require for their perfect development certain mineral substances which decomposing animal matters can supply, and which the plants obtain from them by assorting them in a state of solution.

There is one very important conclusion to be drawn from this experiment which the author has overlooked. It was not to be wondered that the plants watered by carbonic acid refused or were unable to come to perfection, *but the fact that even bones were not able to mature the plants of wheat* is rather startling, and we refer to it here as another corroboration of the view advocated by one of the parties in a recent discussion "on the composition of manures," which has been carried on in this magazine for some time past. Notwithstanding the acknowledged importance of phosphate of lime, it would seem, both from the above discussion and these experiments by Lassaigne, that it is not sufficient of itself to bring the plant to maturity. If this be established as a fact, it ought to influence farmers in the purchase of their manures, of which it would appear that those only can be of permanent benefit to his farm which contain many other ingredients equally essential to vegetation.

These experiments have also shown that bones are only soluble after having been decomposed for some time in the soil. The reason of this is not very clear, but we apprehend it to be because the animal matter which is present in fresh bones preserves the phosphates from the solvent action of the carbonic acid. As the process of decomposition removes the animal matter in the same way that boiling does, are we to infer (what we believe to be the case) that boiled bones are quicker in their action than unboiled, and consequently better fitted for the turnip crop? The difference in price, namely £4 for unboiled and £5 for boiled, supplies to the farmer the important ingredient, phosphoric acid, at very nearly the same price, on account of the large quantity of animal matter which the former contains, and which, if the preceding experiments be correct, only tend to retard the operation of the bones. The lower-priced article is therefore the least advantageous.—TRANSLATOR.

STORRINGTON FARMERS' CLUB.

The quarterly meeting of the Storrington Farmers' Club was held at the usual place on Thursday, 7th June—Mr. E. F. Upperton, in the chair. Owing to the haymaking season and to other local causes, the meeting was not very numerous; but among those present we observed Messrs. Ayres, W. Battcock (Storrington), Bird, Browne, W. Botting (Thakeham), R. Chatfield (Greatham), R. Emery (Hurston), G. Hammond, H. Hardwick, C. Lear, — Mudd (Storrington), E. Upperton, &c.

The subject for discussion was—"The best method of managing a Southdown Flock for breeding purposes."

Mr. R. EMERY (Hurston House), to whom the task of introducing the subject was confided, observed that, having at the last meeting been solicited to bring forward the subject of this day, viz., the best way of managing a flock, and having undertaken to do so, and there being so many details, and fearing lest he might forget some of them, he had made a few notes. All would agree with him that there was no subject of greater importance, nor one that should occupy the attention of flockmasters more, than to try and ascertain the best mode of managing a flock and improving the breed. Before he proceeded any farther, he was desirous of calling the attention of the meeting to an error which, he conceived, many farmers and shepherds had of late fallen into, from misapplying the words "bad luck," instead of shepherds considering that the injury which their masters had experienced might have arisen from bad management (Hear, hear). He hoped that gentlemen would not misunderstand him on this point, as it was his wish to shew that it almost amounted to a science, properly to manage a flock of ewes from the time they were half gone until they were "lambed down," where artificial feeding was used. No one could arrive at the bottom of it without having studied considerably, and endeavoured to trace out the cause, why in some years farmers should have a lamb to every ewe, and perhaps a hundred pair of twins; while in another year he should have 200 lambs short of his number of ewes, besides losing several in lambing. If farmers were hastily to jump to conclusions, and say, "Oh! these things cannot be accounted for," it would preclude all investigation, and prevent their arriving at the real truth of the matter. He was disposed to believe that there was a greater art and nicety required in feeding sheep than any one at first sight supposed, and that oftentimes a large flockmaster lost several hundreds of pounds in one season from his ewes having been allowed to eat two much rape, turnips, or any other artificial food at a time, and also having been permitted to drink too much water with hay. "If," continued Mr. Emery, "I can make this presently plain to you, you will then perceive how wrong it is for masters to be so over credulous as to allow inexperienced shepherds to gull them by saying, 'Ah! master, the sheep will die, and no one can't help it.'" Mr. Emery then proceeded to discuss the subject of the day, explaining the system adopted by himself, and detailing the views which the experience of more than thirty years had taught him. He divided his remarks under four heads, proposing to consider,

1st, The best manner of improving the breed of sheep.

2nd, The best way of feeding and managing a flock up to lambing.

3rd, The best way of treating a flock after lambing up to the time of weaning.

4th, The time of weaning lambs and keeping them afterwards.

He had put the question of breeding first, because the first thing was to learn how to breed good sheep. In scanning the various flocks that fell under his observation, he was sorry to say that he often perceived ewes that were anything but a good model—narrow backed, ewe-necked animals, completely "slipped down" behind—in fact, with what he called "gridiron" backs (laughter). The impression frequently existed that these ewes would produce as good lambs as better animals; to this he could not agree. Neither did he like buying tups that were in bad condition; people thought that this was of no consequence, as they would improve their stock. True, some would; but there were some that never would get good stock. Now, if a farmer bought them in a good condition, he was quite certain that they would get kindly stock if properly kept. It was very important to look to shape and constitution, for it was only natural that sheep should get lambs like themselves. One great point in a flock was to obtain uniformity and evenness, and this might be done by strict attention and crossing the different characters of the flock. Thus, if you had ewes too black in the face, the plan would be to select a light faced ram; or, if some were too coarse, then put them to rams that were fine—if flat sided, to rams of an opposite character. Constitution and quality were great points to look to; but while this was done, it was also most material to pay attention to size. With respect to tupping, Michaelmas was the time. He considered that every flockmaster should keep his ewes as well as he could up to that time—in fact, they could not live too well while the tups were out. They should continue to live as well and to get as fat as he could afford to let them until they were "half-gone." Up to that time he (Mr. Emery) did not care what they had, or how well they lived, but after that period if they continued to be fed without restraint or without judgment *then* came the mischief, for then the lambs became alive; and if over-stuffing ensued from the use of artificial food, it would direcly cause the ewes to "slip," and then would be heard the shepherd's old reason that it was all from "ill luck." The proper food for ewes, at this stage, he considered to be one-third grass, one-third turnips, rape, or swedes, and one-third hay; and this line of feeding should be continued up to lambing, taking care that the ewes should not have more in a day than they could eat in 20 minutes. If as much more was given of artificial food as they could eat in another ten minutes, it would be sufficient to kill half the lambs in the flock by slipping, and then there would be the old story of ill-luck again. He would qualify this observation by saying that he should allow thirty minutes while they were on the swedes, as they could not eat them so fast as rape or white-rounds. As to hay feeding before lambing, the greatest caution was necessary, especially if it was rich hay grown on good land. If the ewes had a full quantity of such hay, and were deprived of grass, more particularly if allowed much water, such feeding would kill every lamb. He considered that the hay produced feverishness; in fact, the more they eat the more they drank, and *vice versa;* and that system would kill all the lambs in the country. Directly the lambs began to suck, the milk would give them fever and kill them. Hay without water, and grass, would not however produce that effect if they had a few turnips.

Mr. Upperton.—Then you do not attribute the evil to the hay by itself, but to the hay with much water?

Mr. Emery thought that the water inclined to make the sheep eat more—this made them feverish and thirsty, and caused them to drink more still. He believed that grass feeding at lambing was a safe system, and alluded to an instance in which he had known that course pursued, and a great many twins had been lambed. He preferred lambing down on grass, and thought there was not half the danger of lambing down on the Downs as on dry and artificial food. As to lambing, when lambs were first lambed, warmth was one great thing to be observed. The ewes should then be well fed; he did not care how much rape, turnips, or hay they had after the lands were once a week old; no high keep would hurt a lamb after that time. As he had said, warmth was the great thing for the first week. With regard to feeding ewes after the lambs were a week or ten days old, most flockmasters reserved their swedes to finish with, as white rounds would not last beyond the beginning of April. If the swedes were found too drying, as was often the case, then let the ewes go into grass, and let them have half a bellyful of grass and half swedes during the month. Bents and trefoil were good things during the first half of May, and a good piece of tares to follow—which all good farmers had by that time. Then turn them into grattens in the morning, and give them a pitch of tares in the afternoon, and fold them up to the time of weaning. With regard to lambs, he had omitted to mention that he should recommend lambs to be docked and cut when they were three weeks old. He liked "drawing" better than their being "seared."

Mr. UPPERTON concurred in this opinion.

Mr. EMERY continued—The proper time for weaning lambs was four months old—never before —if it was meant to sell them at 30s. (laughter). The best things to wean upon was ruin-grass about three weeks old, and a nice bit of second cut clover or summer tares (not folded); and a flockmaster who took a pride in his flock would never be without such things. This plan should be pursued till the ershes got clear; then get the lambs on wheat, oat, or barley ershes, and the oftener they were changed the better—even if changed twice a day it would do no harm. He never knew anything finish a lamb off three weeks before fair, like this. The constant change kept them in good order and always free from "stench." The next point to be considered was to take out the old ewes for sale. The flock should be drafted as soon as the lambs were weaned. As to feeding, his plan was to let the old ewes go behind the lambs and pick up what they left behind. The ewes a flockmaster intended for keeping must learn to bear hardship, and ought to follow behind the sale ewes. It was a great thing to get good strong constitutions, as it enabled sheep to bear hard living. For this reason he did not object to buy a fat ram—it showed constitution—and if that could be got in a flock they could not be starved when food was short.

Mr. R. CHATFIELD quite agreed with Mr. Emery as to buying fat rams if the animals were naturally fat, but not if it was merely the effect of artificial feeding.

Mr. EMERY considered that that was understood; he spoke of a ram being constitutionally fat. He was not aware that he could offer any further remarks on the question before the meeting. He had undertaken to introduce this highly important subject at the request of the Society; and although he had said that "this should be done, and that should be done," he did not presume to know better than his neighbours. On the contrary, he should be glad to be corrected by them, and should be obliged to any one who would stand up and convince him that he was wrong on any point. In conclusion, Mr. Emery expressed his thanks for the kind and attentive hearing which had been granted to him; he would only further observe, that if any remarks he had made should be productive hereafter, of any benefit either to members present, or to any of his brother farmers, he should be extremely glad. It would much gratify him to know that he had been of any service to them (cheers).

Mr. BATTCOCK complimented Mr. Emery on the able remarks which he had addressed to them, and on the straightforward manner in which he had given the opinions suggested by his valuable experience. Mr. Emery's flock was in itself a pretty good evidence that he practically understood the subject on which he had been speaking, for they carried a very good share of wool on their backs, as well as of fat inside. Mr. Battcock returned his best thanks to Mr. Emery, with whose observations on the subject of that day he mainly concurred.

Mr. H. HARDWICK considered the matter before the meeting to be of great importance and peculiarly interesting. He had paid great attention to what had fallen from Mr. Emery, whose remarks shewed him to be well acquainted with his subject. He trusted that it would not, however, be considered presumptuous in him to differ with Mr. Emery. With that gentleman's introduction he concurred, but not with his remarks as to not allowing sheep to drink too much. He (Mr. Hardwick) thought they never would drink to much, unless improperly fed. Sheep would go to water to drink "little and often," if they had the opportunity; the evil was in keeping them too long without water; then the ewes would certainly go and overdrink themselves, and that would be productive of evil consequences. As to the strong rich hay alluded to by Mr. Emery, he thought the food would be much more serious in its effect, if the sheep did not get the water. He did not object to such hay, and only wished he could grow it (laughter). It was not the quality of the food that hurt the sheep, but the quantity. He would much rather they should have 1lb. of good hay than distend their stomachs with 3lbs. of trash. He held that the idea of sheep drinking too much was an error, and might mislead young farmers.

Mr. UPPERTON asked if Mr. Hardwick did not consider heated hay produced fever.

Mr. HARDWICK thought that in some hay there were seeds and herbs which were unwholesome and apt to produce heat and fever; mayweed or mag-weed, as it was termed, was highly injurious—in fact, poisonous. Some flockmasters only fed on seed hay, having no brooks, and were not sufficiently careful as to what it was. For instance, trefoil, kept till too old before mown—more fit for seed than hay—was sometimes given; that would often disagree with sheep; it was this sort of feeding with improper food that produced fever, and tended to create thirst. The first caution needful, was not to give improper food so as to induce sheep to drink too much.

Mr. EMERY explained, that in his observations he had referred to underhill farms, where the hay was of the character described by Mr. Hardwick.

Mr. Hardwick resumed—As to crossing flocks to obtain that point which all persons aimed at, viz., a general character, he could not agree in the plan recommended by Mr. Emery, of crossing a white with a black faced sheep. If any young man were to adopt that principle, he feared he would become an old one before he got an uniform or regular flock. He (Mr. Hardwick) thought a flock-master should first consider what was the best colour; then select ewes of that character, and endeavour to find rams to match, this was in his opinion far better than wide crosses. As to wool, that was an important thing, although perhaps the quality was not now regarded to the same extent as formerly. The same means of obtaining similarity in the fleece might be adopted as he had recommended in the case of the colour. If a ewe had wool of a long texture it would be injudicious to select a ram with short wool. The effect of such a cross would be, that some would follow the ewe and some the ram.

Mr. Emery explained that in the observations he had made, he had assumed that he was not addressing farmers who had to establish a flock, but those who had already got flocks. He merely spoke of remedying the defects in a flock already got together. He agreed with Mr. Hardwick as to the impolicy of wide crosses—which was not what he had recommended.

Mr. Hardwick always had been led to understand that wide crosses were not the nearest way to the desired object. With regard to feeding a breeding flock he could not agree with Mr. Emery. He very much doubted whether it was judicious to feed breeding ewes so high as that gentleman had recommended. For his part he should much prefer to keep his ewes well and even, in point of feeding, all the year round. He did not like a sudden change when ewes were half gone with lamb, though he agreed that they might advantageously have more food of a certain description after that period than previous to it. Sudden changes from high to low feeding, or *vice versâ*, were bad. To show his feeling on the point, he need only mention that, when removing his flock from one end of the farm to the other, he had himself had hay carried, although he had plenty on the spot, rather than have a total change in the character of the food. He agreed with Mr. Emery as to the management of lambs. It was highly desirable to change them every day at least, and twice a day if they had the convenience, but unfortunately few farmers had. Lambs would, like all sheep, go every night to the same spot to lie. They should, therefore, not be put in the same field at night, as they would become stenched, and the value of their manure, from not being regularly distributed, lost. As to the most profitable way of making up lambs for sale, if he wanted a horse to work he should not give £5 more for it because it was fat; so with lambs, if he wanted lambs to "work" he would not give 5s. more for them because they were fat. He thought if farmers consulted their true interests they would make their flocks, generally speaking, fold and work. A great flockmaster had compared his flock to "a walking dunghill," and all farmers knew that it was from the fold tail of their flock that they derived great advantage. As to making lambs fat for sale, the question was, whether more was not lost by thus indulging them than by the other system; and it must be remembered it was not all customers who wanted these fat lambs. As to buying and working fat rams, he must confess he had a great objection to these fat animals. He was fond of examining and admiring the different points of an animal, and in an anatomical point of view, it was impossible to say whether these points were good or symmetrical if the animal was fat. He believed that serious evils and losses accrued from persons not considering what they were about when they gave great prices for fat rams. Rams might be compared to stallions, made fat for the purpose of disguise and in order to deceive those who were not judges of the real points of an animal, and he, Mr. Hardwick, must entirely change his mind before he ever bought a fat ram (laughter). He wished to make one remark to shew that he by no means intended to disparage the observations made by Mr. Emery, viz., that Mr. Emery's flock did him a very great deal of credit—they were very useful sheep, and he had gone the way to work to bring out rams not only useful to himself but to the county of Sussex (Hear, hear). The flocks in this county were mainly composed of sheep small in size, though of good symmetry and appearance. He (Mr. Hardwick) thought that the breeders in that neighbourhood were generally beginning, however, to look for rams of an increased size, and that the rams offering for sale recently were of that description. He instanced Mr. Rigden's rams as being of that character—they were strong sheep, possessing all the characteristics of the South-downs, combined with size and such other qualities as are wanted. Mr. Hardwick then directed his remarks to the subject of the epidemic, or foot rot amongst sheep. This disease had been, and still was, a serious evil to flockmasters; and he felt it was the duty of all farmers to do all in their power to eradicate it, and not to give way to the absurd notion that nothing could cure it. The plan he had pursued was to catch the sheep as often as occasion required, and to pare the foot down to the bottom of the cavity formed by the disease, and to apply a dressing which he had had from Mr. Wolferstan, of Steyning. He had tried this plan in a flock of 350 sheep, out of which 250 were totally unable to stand, but were obliged to lie down to eat. He had found it a most efficacious remedy; indeed, he believed that by proper attention the disease might be cured in 19 cases out of twenty. Poultices of linseed-meal tied in a bag round the feet were also applied with good effect. The epidemic was a serious matter in a breeding flock; as a proof of which he might mention that in 350 ewes put to ram, he had 130 lambs short of what he ought to have had, besides losing 17 ewes. He was glad to say, however, that he had not now, owing to the care and attention paid, a single lame sheep on his farm. Mr. Hardwick concluded by urging the necessity of all farmers making a general effort to effect a cure, as from the necessity of sheep being so much mixed up together in going to markets and fairs, &c., it was otherwise almost impossible to eradicate the disease.

Mr. LEAR, in compliance with a generally expressed wish of the members present, would be happy to make some few remarks on the question before the meeting. With reference to the epidemic, he considered it to be a matter not only of great importance but of great interest to all farmers. Last year he had bought a few ewes of Mr. Emery. They were perfectly sound in all respects; still shortly after he had them they were attacked with the epidemic. The treatment he had adopted totally differed with that recommended by Mr. Hardwick. He (Mr. Lear) did not like the plan of catching sheep and paring their feet and so forth; indeed he believed that to be all wrong. When he had first observed the lameness in his sheep it had all the appearance of rheumatism, at least that was the only thing to which he could compare it. At the time his ewes were attacked they had been with the ram, and were, indeed, beginning to get heavy. Not having an experienced shepherd, he did not like mauling them about, fearing to injure them; he therefore determined to wait patiently and try to cure them by simpler means. He numbered them all as they became lame, so as to watch exactly the the progress of the disease. His plan was to put them in a dry meadow, so as to keep them free from wet and dirt underfoot, and in time all of them got well. This plan he believed to be a good one where it could be carried out. His own strong opinion was, that the disorder was not in the feet but in the system, and that over moisture and dirt had a good deal to do with it. As was the case with the thrush in a horse, if you applied local treatment you might get rid of the thrush from the feet, but then you drove it into the system, and greater evils ensued. As to feeding, when he first had the sheep alluded to, they were bare in condition; one had died from over eating; the other 23 were put into a dry meadow during the day and had hay in a hovel (but no water) at night. They improved greatly; indeed, he had feared they would get too lusty. Out of these 23 ewes 13 had twins and one had three lambs, and, after losing one or two lambs and giving some away, he was left with 33 "clear." As to the condition of lambs when made up for market, it was all very well to inculcate the not producing an artificial condition on the ground of the interests of the buyer, but the fact was that lambs in good condition were those which nineteen buyers out of twenty would pitch upon, and to sellers this was after all the main thing. It might be injudicious to purchase "made-up" animals, but sellers found by experience that whether it was a fat old horse or a fat young lamb, condition was one of the best means of attracting purchasers (Hear, hear).

Mr. EMERY had had the epidemic in his flock half a dozen times, but had more trouble in curing it during the last year than he ever had before. Indeed he believed that the disease existing this year was different to that which had previously prevailed. He agreed with Mr. Lear, that dry clean fields were the best for sheep under this disease. He had had forty ram lambs in capital condition, indulged in any way they liked best. But they were in a meadow of long dewy grass, so that their feet were always wet, and they had all fallen lame.

Mr. R. CHATFIELD had unfortunately had experience of the epidemic; his ewes, he might venture to say, had had it as bad as any. But he never did anything to them; he let the disease settle in the extremities, and he then put them where there was no friction excited by going from field to field, but let them lie as quiet as possible. Under this treatment he found most of them got better. After the disease he found that they all shed their hoofs: he did not attempt to pare the hoof down as some advised, but merely cut off a small piece. Nearly all his sheep had got quite perfect under this system. He had tried in one or two cases some of the "hot stuff" recommended by some farmers, but he thought it threw the disease back into the system: in one instance the sheep was completely "drawn up" by it. As to feeding lambs after weaning, his plan was to endeavour to find a place that would agree with them well, and then to change it as little as possible. While they did well he was satisfied to let them go on, and moved them as seldom as possible. At this time of the year he always folded the ewes on fallows, taking care however to give the lambs the same opportunity of walking out when they liked.

The discussion being concluded, the chairman said that the subject before the meeting had been most ably and thoroughly discussed; he for one had paid the greatest attention to what had passed, and could not but express the obligation he felt to Mr. Emery for having so ably introduced it, and to the other gentlemen who had followed him. He (Mr. Upperton) was no flockmaster, but as a grazier he would take the liberty of strongly recommending breeders of southdowns, to pay somewhat less of attention to faces and more to size. Graziers and butchers did not look so much to the colour of a sheep's face as to the size of the leg of mutton (Hear, hear). As to the general subject he was sure that he was only carrying out the feeling of all present in expressing warm thanks to the gentlemen who had taken part in the interesting, and he must add, useful discussion which had just terminated (Hear, hear).

The next meeting of the Club was then fixed for Thursday, October 25th, the subject being, "On the breeding of horses and their general management," Mr. H. Hardwick kindly undertaking to introduce it.

ON PLOUGHING UNDER GREEN CROPS FOR MANURE.

The ploughing down and covering in the land of the crops of green juicy plants to act as a manure, is a practice of the ancient Romans, and is yet followed in Italy and other parts of Europe. This mode of fertilizing suits warm countries, where vegetation is rapid and very luxuriant; in our colder latitude, where culmiferous productions are more the object of cultivation, the advantage of the practice has not yet appeared. The plants that are used for that purpose are the leguminous kinds, as tares, vetches, clovers, peas, buckwheat, and spurry; and in Italy the harvest is early, and the produce is removed in time sufficient to allow the maturity of the green plants. Our climate does not allow such successions, and a crop of any kind must be unprofitable that yields in return only what is extracted, and leaves the land as before in point of fertility. In order to apply the practice profitably, a very full crop must be supposed, and land that will yield a full crop of these substances will produce crops of a more valuable kind. On poor lands a scanty crop will be expected, which will be of very little service for that purpose, and almost invariably fills the land with weeds. Rape is reckoned to be very good for the purpose, as it is oily and mucilaginous. Sorrel has been recommended to be cultivated and ploughed down with lime, in order to produce a chemical combination; but few soils will grow sorrels in abundance, and the chemical result may be too uncertain to justify the process.

The decomposition of vegetable matter below or in the soil has been put forth in favour of this practice, as producing soluble matter and also mould, by continued decomposition. The gradual decay of substances above or below ground is certain—the formation of those that may be useful in promoting the growth of vegetables is a very different question. Fermentation is a sensible internal motion of the constituent particles of a fluid, moist, or mixed compound body, by which they are removed from their present situation and combination, and are again joined together in a new or different arrangement, forming new compounds with very different qualities from the original body or substance. It results from the combined action of air, heat, and moisture; and the first agent is oxygen, afforded either by the atmosphere, or by the decomposition of the included water—oxygen gas being absorbed and caloric separated during the process. Carbonic acid is one of the results, and fermentation is the natural process for reducing vegetables to a simple state of combination. The first change is the vinous or saccharine fermentation, the conversion of the insipid matter of stems and weeds into a saccharine substance, in which process the presence of water and saccharum are indispensable, and some other things must be added. The gramineous and herbaceous plants are generally stored with saccharum, and the acetous fermentation follows, which is succeeded by the putrid, or last stage of the process. This last stage is always certain, though the regular gradation of the others may be interrupted. During putrefaction vegetables emit ammonia, phosphuretted hydrogen gas, and constantly carbonic acid gas, and hydrogen gas impregnated with unknown vegetable matters. The colour changes to dark brown—the body swells and becomes heated, and is reduced to an earthy mass.

The constituents enter into new combinations—the hydrogen unites with the oxygen, and is either volatized in water or separated in a gaseous form, and carries with it a portion of carbon. A part of this principle unites with the azote in those plants that contain it—a part remains in the putrid mass, giving to it the odour and colour. A portion of carbon remains on the magma, and a part unites with the hydrogen, and a part with the oxygen, forming with the latter carbonic acid. The brown mass or earthy residue contains the primitive earths, metals, oils, and salts, which are found in vegetables—forms vegetable mould, and constitutes the chief means by which the earth receives back the principles it loses by the support it affords to vegetable life. In this process air, heat, and moisture are indispensable, and a quantity of the substances laid together. Green or dry vegetables ploughed into the land will lie in too small quantities to generate heat—air and moisture will be nearly excluded, and no active fermentation will happen to afford ceriform matters in the soil, as may be daily seen in the case of stubble and other dry substances. The conversion to mould by a gradual decay is undeniable; but activity for present benefit is wanting, unless an incipient fermentation has been effected before the application, to break the texture by a disintegration of the fibrous structure. It may be very justly reckoned a wasteful practice to apply for manure any substance that can be used as food for animals, and thus effect a double purpose. The second crop of clover and of tares have been ploughed under for manure; and in that case the first crops must be cut early to allow a second crop to attain a bulk of plants for the intended purpose.

If any of these succulent plants be used as a manure for wheat, the bastard fallowing will dissipate the enriching matter, and if it be covered by the last furrow, the land will be in an unwrought state, and it can only be reckoned a catch crop. The only plausible case of application is on places that have failed to receive the due portion of farmyard manure; but the season being occupied in bringing forward a crop for the benefit of the land, as dung, wholly excludes any effectual working of the soil, and in any case such unmanured grounds may be partly wrought down and sown with crops that will afford food to animals and also to the land, by the subsequent application of the excrementitious matter. The use of green crops as manures will not fail to form very foul farming, and though a successful isolated case may occur, an extension of the practice will not be expected. The green crops may be harrowed and rolled before ploughing, which will render them more convenient for being covered; and a compost of lime and earth has been added, which will also aid the covering of them in the land, and tend to promote putrefaction. It may be supposed that in the countries where the practice is said to be so very beneficial, the soils may be more loose and friable, the vegetation more rapid and luxuriant, and the plants more juicy and succulent, and consequently more tender and easier of decomposition than in our country—and that a variety of circumstances may combine in rendering the practice very useful in some countries and inapplicable in others. The plants may be ploughed under when in full blossom, and, if possible, in moist warm weather; and the latter circumstance may form an advantage in favour of the custom in the warm countries where it prevails.—Chester Farmers' Herald.

EUROPEAN AGRICULTURE.

No. III.

GERMANY, BAVARIA, AND PRUSSIA.

Having in two previous numbers described the state of agriculture in France, we now purpose directing attention to the other European countries, as fast as trustworthy sources of information can be obtained. This has just been furnished for Germany, Bavaria, and Prussia, by a work published under the auspices of the French government.* This work, the result of a semi-official inspection of the countries described, was published about the close of last year; and, besides the information which we derive from it respecting agriculture, it also possesses no little interest from the information which it contains respecting the German system of education, said to be the most perfect in Europe.

The central part of Europe, both from its situation, the want of extensive beds of coals, and for various other reasons, must, for years to come, continue to be an agricultural district. Its inhabitants must depend upon the soil for employment, and upon the sale of what they can raise from it beyond their own wants, for the supply of foreign luxuries. In this view agriculture becomes of paramount importance; and one of the first duties of government must undoubtedly be to encourage it by every means in their power. With this object in view, the governments of Germany, Bavaria, and the other central European kingdoms, have spared no efforts to spread education, by founding agricultural colleges and agricultural schools.

We fear there has been one fundamental error in the establishment of these schools and colleges, as it does not appear to have occurred to the founders of them how very few of the deductions of scientific

* German Agriculture, &c.; by Mr. Royer (Paris).

agriculture are, as yet, applicable to general use. They seem to have taken too readily for granted that properly prepared teachers and equally properly prepared scholars could be found without difficulty. They have also too highly estimated the influence which the pupils will have on the general practice of agriculture after leaving the schools or colleges.

The teachers or professors will, unless regularly brought up to farming as a business, have but a superficial and the reverse of a practical knowledge of the subject they profess to teach. Even suppose a practical man can be found, who is willing to undertake the laborious task: it is by no means certain that his own previous education is such as to fit him for the undertaking. Men who combine these two requisites for teaching agriculture are exceedingly rare; and, as a farm requires a large capital, it is hardly to be expected that men of wealth, who give us proof of their skill and the possession of a sound practical knowledge by making money on their farms, will give up their situations to accept a professorship of agriculture or the directorship of an agricultural institution.

But suppose these previous conditions be fulfilled, in order that the pupil may profit by the instructions which he would receive in an agricultural college, a great number of conditions are requisite and difficult to unite. His previous education should be good and sound, as it appears to us to be a sad waste of time to have to study the elements of arithmetic or geometry in an agricultural college, which should always have been previously mastered. The studies of the pupils ought also to last for several years, as the seasons are so variable that it can only be by long experience that practical knowledge of any value can be obtained. And, if even these important previous requisites can be combined, the pupil must still view his school information with considerable distrust: the management of servants—the purchase and sale of stock—the rise and fall of markets, can only be properly learnt under the care of a parent, or some one who will take more interest in the welfare of a pupil than the head of a public school can be expected to do.

To meet these acknowledged difficulties Royer suggests the appointment by government of teachers for limited localities, with the understanding that they were each to make their own district the special object of study.

The first agricultural school in Germany was founded by Thaër, at Moegelina, in 1806. In 1819 the government undertook to pay the salaries of the teachers, leaving to the descendants of the founder the profits, if any, from the ground under experimental cultivation. This was an unfortunate arrangement; as every species of cultivation which did not promise immediate profit was at once dropt. The farm of this once celebrated school did not survive the founder.

Notwithstanding this signal failure, all the superior schools in Prussia are founded on this principle. The advantages and disadvantages of the system being, however, duly appreciated by Schwerz, and when the organization of the excellent institution at Hohenheim was confided to him, he did his utmost to avoid the one and adopt the other. This celebrated school is situated on a royal estate, and all experiments are carried on at the risk of the public treasury. It has consequently far surpassed all similar institutions which preceded it; and by the judicious management of the land under its care, together with the pupils' fees, the annual receipts only fall short of the expenditure by about £45. This school was speedily imitated in various parts of the country, though none of its offspring have come up to it in reputation.

With the exception of certain schools, which are established for the study of a special branch of rural economy, as the farm schools (of which we shall hereafter speak) and the Prussian horticultural schools, the general system of education in the German agricultural colleges is too theoretical. The heavy fees, and the number of years required to complete the course of study laid down, have also combined to render them available and useful to the wealthy alone. Besides these inconveniences, the advantages to be derived from the colleges are still further limited by a ridiculous *esprit du caste*, which is the very life-blood of German society, and absolutely separates the various classes from each other; besides all these evils the course of instruction is not at all applicable to the labourer, and but little more so to the small farmer. Those who study in the college at Hohenheim, to qualify themselves as farm bailiffs, are not at all liked for that purpose. Nor is this to be wondered at, when we know the plan of education pursued. It must be evident that an exclusive scientific education, conducted by men who have but a *book knowledge* of the subject they profess to teach, must be an indifferent preparation for enabling a man to make his way either as a farmer or anything else. To give an idea of the way in which a pupil is required to spend his time at one of these colleges, we select the following course, arranged for the agricultural college of Saxony for 1844-5, and which will bear out our previous remarks.

SUMMER SESSION.

HOURS.	MONDAY.	TUESDAY.	WEDNESDAY	THURSDAY.	FRIDAY.	SATURDAY.
6 to 7	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture	Agriculture, by working in the fields in sections, under the care of two of the professors
7 to 8	Botany * — Domes. econy.	Botany — Valuation	Botany — Valuation	Botany — Valuation	Botany — Valuation	
8 to 9	Vegetable Physiology	Veg. phys. — Forestry	Veg. phys. — Forestry	Veg. phys. — Forestry	Veg. phys. — Forestry	
9 to 10	Arithmetic —	Arithmetic — Forestry	Arithmetic — Forestry	Arithmetic — Forestry	Arithmetic — Forestry	
10 to 11	Physics — Surveying	Physics — Surveying	Physics — Surveying	Physics — Surveying	Physics — Surveying	
11 to 12	Soils — Forestry	Soils — Forestry	Soils	Soils	Agricultural technology	
2 to 3	—	Application of the science of mathematics to forestry	Designing and planning	Estimation of Forests		
3 to 4	Geography			Surveying, &c., &c.	Geography	
4 to 5	Botany applied to Forestry		Excursion for natural history		Botany applied to agriculture	

WINTER SESSION,—commencing 4th November.

HOURS.	MOMDAY.	TUESDAY.	WEDNESDAY	THURSDAY.	FRIDAY.	SATURDAY.
8 to 9	Productions of agriculture — Politcl, econy.	Work animals — Forestry	Work animals — Forestry	Cattle	Entomology	Entomology
9 to 10	Productions of agriculture — Politicl. econy. — Zoology	The same The same The same	.. .. ..	.. .. ..	Cattle — Entomology	Entomology
10 to 11	Chemistry — Forest laws	Chemistry — Forestry	Chemistry — Forestry	Chemistry — Forestry	Forestry — Mathematics	Chemistry — Jurisprudence
11 to 12	Forestry — Building stones	Forestry — Building stones	Forestry — Building stones	Forestry — Building stones	Buildg. stones — Forestry	Rocks — Jurisprudence
1 to 2	Cattle	Architectural drawing	Cattle	Architectural drawing	Cattle	Practical operation in the forest
2 to 3	Mathematics		Building		Mathematics	
		Review of studies	Mathematics — Forestry	Meetings for the study of natural history		

* Where two studies are placed opposite to one hour, the first is for the first year.

With regard to the above course of study the prominence which is given to every thing connected with the management of forests is rather singular. They must be of great importance to warrant so much study being bestowed upon them. The pupils pay about £13 for a course of study connected with forestry; £10 for that connected with agriculture, if natives, and a little more if strangers. This charge is low enough, and in 1844 they had 80 students.

The college is under 4 professors and 7 lecturers, who are liberally paid by the government. I cannot but agree with our author, who expresses the same opinion with regard to France, that, though no advocate for indiscriminate interference from this quarter, yet, if there is to be an agricultural college in England at all worthy of the country, it must be assisted, if not founded, by government. I do not think that any private speculation can ever *attract* and *keep* sufficient talent to make an agricultural college worthy of the name.

In order that the art of forestry may be properly taught, government has provided about 6,000 acres of forest; and a large tract of country, including a lofty mountain, at different heights of which are cultivated the trees most proper to the situation, is under the care of the college authorities.

For agriculture there is provided an experimental field, some irrigated grass land, and about 64 acres under cultivation. As exemplifying what is there considered the best possible rotation, we give the following view of their system:—

1st year, Potatoes, beet-root, turnips.
2nd ,, Barley, spring-rye, wheat, *sown very thick, to supply straw for straw hats.*
3rd ,, Clover and grass seeds.
4th ,, The same, once mown, pastured, and then half-manured or compost applied.
5th ,, Rye and bearded wheat.
6th ,, Peas, vetches, and such like.
7th ,, Winter rye.
8th ,, Oats.

That such a rotation should be taught at an agricultural college bears out what has already been said, that, however well qualified such a place may be to teach the science of agriculture, the professors are very ignorant of the practical part. The want of fallow-crops, and the utter impossibility of keeping the land clean, are defects in this rotation which must at once strike a farmer's eyes. No mention whatever is made of experiments with bones or artificial manures. The following stock is kept:—

4 draught-horses,
11 cows,
6 young cattle,
2 bulls, and a few pigs, but no sheep! The buildings are generally of an inferior character.

Besides these colleges, of which every German state contains one or more, the various governments have also established schools of a lower class for teaching horticulture, farriery, and the management of forests, together with model farm and farm-schools. Of these last we shall speak more particularly. Essentially practical, these schools are open to *all.* The pupils are admitted at 14 years of age, and the whole of their time (except two hours per day, which are devoted to study,) is occupied in out-door work. So that these farm schools are quite a contrast to what has been said respecting the colleges. The pupils are also admitted gratis, and prizes given in money and clothes.

Notwithstanding the show and appearance made by these schools, Royer says that they have made little or no impression upon the agricultural practice of the bulk of the country. Not that we would use this as an argument against the establishment of such schools, but we fear that the evil they seek to remove lies too deep to be so easily cured.

Most earnestly do we long to see some comprehensive scheme of education devised for our own country, though the multitude of opinions and violent party spirit which have hitherto been evoked by every mention of the subject, make us despair of ever seeing such a desirable state of affairs. In the meantime what has been done by every German state may well shame us.

For the nobility and aristocracy of our country such institutions as that in Saxony, above described, would be exceedingly valuable, as there, like any other college, they could have the benefit of lectures on agricultural technology, chemistry, &c. Such a course of study would certainly fit our country gentlemen for their peculiar duties much more effectually than the exclusive sort of studies many of them now follow at Cambridge or Oxford.

For the practical farmer other means of instruction must be provided. We look as yet with some hesitation at our agricultural colleges and schools. As already remarked, it is almost hopeless to expect that private enterprize can collect such *sterling* talent as to secure these institutions the place they ought to possess in public estimation. The arrangement recently made by the Highland Agricultural Society to confer honorary degrees on persons who may pass an examination in natural history, philosophy, &c., by leaving them to pursue these studies as they like, is a most commendable step in the right road ; and we certainly think that these sciences can be better learnt at one of our older colleges, such as Edinbro', London, or Glasgow, than at one of the newer institutions, where an exclusive agricultural education is attempted.

Besides the opportunities afforded by these colleges, the only other available source of education for our young farmers is the homely plan of placing them with a farmer of known skill for one or more years. We cannot refrain from remarking on the folly of those parents who expect that their sons can be taught such a business as a farmer's in such a short time; and, worse than all, if the parents can afford such an expense, the young man is provided with a horse; and, by *frequent* days after the fox-hounds, with *occasional* visits to the market, he flatters himself and his friends that he is learning his business and qualifying himself to commence a farm on his own account. The great defect of this plan is the entire want of discipline and control. For, unlike a surgeon, a solicitor, or an engineer, the farmer who takes pupils gains nothing from the labour or proficiency of those entrusted to his care; nor has he, like those professional men, the power conferred upon him over those committed to his charge by taking them as indentured apprentices.

To resume the subject of this paper after this, it is hoped, not uninteresting digression: The government of Wurtemburg, like that of Saxony, has provided an agricultural college at Hohenheim, of which Royer speaks in high terms. No stronger instance of the simplicity of society can be given than by saying that the government of Wurtemburg finds it necessary to render insurance against fire compulsory. The following picture of the manners of the agricultural population is interesting. Royer says—" There is not a peasant, whether male or female, who cannot read, write, and calculate. The working classes are respectful without servility, and show such skill and activity as we would gladly see nearer home. Their morality is superior to that of any other part of Germany: profane swearing is severely punished: domestic animals are kindly treated. The exertions made by government for the education of the people are much to be admired. The schoolhouse is generally the best house in the village, often the most elegant. Every one is compelled to attend until the age of 14. If any child absents himself, he is punished for the first and second offence; but for the third his parents are fined. Notwithstanding this, there seems little intellectual development, such as an universal system of education would produce in France or England." Though no reason is assigned for this apparent anomaly, we strongly suspect that the secret lies (and the present state of the Continent confirms the suspicion) in the form of government under which this part of Europe groans.

As a contrast to this favourable picture of general education, we are, however, informed that the consumption of "beer" is larger amongst the Germans than in any other country. As an example, it appears that one little town in Wurtemburg containing 2,300 inhabitants supports 8 breweries. As something in the way of palliation for this excess, it appears that the German beer is the best in the world. The duty which is levied upon it forms no inconsiderable item in the public revenue. Besides the sin of drunkenness, the only other "failing" laid to their charge by M. Royer is a sort of monomania for leaving home, once in every year, for a three months' lounging as far as possible from their usual place of residence. Nothing can be more curious than these emigrations, as every one above the rank of a labourer deserts the towns, and leaves public and private business to the winds as soon as the season comes round.

Such is a brief account of the system of education, both general and agricultural, established in this portion of Europe; we will now describe the system of agriculture pursued in the same district. On this latter head, however, M. Royer's description is not so perfect as the preceding one; in which he has disclosed the picture of a people with every facility for education, and yet making no progress.

To commence with Wurtemburg—the land pays a direct tax, equal to about one shilling per acre; besides this, barley pays, in the shape of malt tax, a duty of 3 francs 75 cents. per hectolitre. The enormous consumption of beer renders this a veritable capitation tax far out of proportion to the wealth of the inhabitants. The privilege of erecting a brewery is a feudal right retained by certain families. Near Stuttgart land is worth about £100 per acre, and at some distance from the town it is worth about £45 per acre.

In some parts of the country property is divided into freeholds of the smallest possible size, and brings its usual concomitants of extreme misery. There are also, says M. Royer, many feudal rights of exemption from taxation yet existing, in favour of the nobility, which are excessively injurious to agriculture.

In the Catholic country of the upper Souabe, the right of primogeniture is rigidly enforced, and every obstacle thrown in the way of selling land. The general agriculture of Wurtemburg consists of three kinds—the wine country around Stuttgart; the agriculture of the lower Souabe, a Lutheran district, which is under a three-course system of two white crops following one green crop; and that of the upper Souabe, of two white crops after bare fallow. In general, grapes are better cultivated than in France, and the appearance of everything else may be conceived from the above rotations. But, bad as matters are in Wurtemburg, they are still worse in

BAVARIA.

The more we read the work before us, the more are we astonished that so much of Europe should be in such a miserably uncultivated condition. It will scarcely be credited that it is possible to traverse the country, from the frontier of France to the centre of Bavaria, without seeing one field of clover, lucerne, sainfoin, vetches, or any other green crop whatever. There does not seem to be the slightest approach to a recognized rotation, "every man doing what is right in his own eyes." The land, in the neighbourhood of Ulm, is said to be "a frightful plain, the soil of which, though not bad in appearance, is more scratched than cultivated, by means of a wretched plough." Between this town and Augsburgh and Munich bad farming ceases to be the exception and becomes the rule. The only district which is spoken of in favourable terms is from Munich to Nuremburg and Hof; it is called the garden of Bavaria. Though even there the rotation is a triennial one; but of what character that can be, where green crops are so rare, it is unnecessary to say much. Turnips are only once mentioned as having been observed in the country, and they had been sown in the autumn after, the wheat crop was removed, and without manure. Potatoes are a good deal grown, both for eating and for the breweries.

In this state of affairs we need not be surprised that the breed of cattle is "execrable, their horns standing perpendicularly from their heads, and branching out like the horns of a lyre," which, however graceful in that instrument of music, is not what we admire in our cattle.

Rye is the principal grain that is grown, and is said to yield very poor crops.

This seems a strange state for the agriculture of a country to be in, especially when the government provides both an agricultural college and a school of practical agriculture. But, indeed, the government interferes with everything. M. Royer states that a society has recently been established under its auspices at Munich, for "improving the condition of the working classes by teaching them kindness to animals." The Crown Prince is the President, and has written and distributed 100,000 copies of a tract enforcing the views of the society; "to which tract," says M. Royer, "the king has himself taken every opportunity of directing public attention."

So careful is the government in this respect, that there are posts erected along the road-sides, on coming to which the post-boys are compelled to dismount and walk by the side of their horses until they come to the top or bottom of the hill, marked by another post, where they remount. "The punctuality with which they conform to this regulation is amusing, and at the same time tiresome, to a Frenchman, and would be altogether unbearable to an Englishman."

But little attention is paid by the large landed proprietors to their estates. And, as the magistrates often combine with that office the duty of collecting rents, there can be no hope for even-handed justice. As in Wurtemburg so also in Bavaria, the means of agricultural instruction is liberally provided at the public expense; and even agricultural shows are got up, arranged and paid for by the government.

(To be continued.)

BECCLES FARMERS' CLUB.—At the last monthly meeting of the members, an "Inquiry into the Condition of the Agricultural Labourer, and the best means of improving it," was the subject for discussion. The person introducing the question spoke of its great importance, and briefly alluded to the opinion held by some, that the agricultural labourer was retrograding rather than improving in his condition, and combated the assertion that this description of our population was worse off than any other. He first alluded to the habits of the people in the sixteenth century, and stated that not more than half the population at that period were consumers of wheaten bread. In some parts of that century wheat was at 25s. per quarter, while wages were not more than 4d. to 6d. per day, and from the manner in which lands were then cultivated, and the small quantity under tillage, years of scarcity were not unfrequent. Acorns were on these occasions mixed with flour to make bread. In mentioning the improved condition of the agricultural population, allusion was made to the better clothing, the superior manner in which their cottages were furnished, and, above all, their moral condition. In their relative condition with other classes, the want of education has perhaps been the means of keeping them in the background: and though much has been done by societies for rewarding good conduct and industrious habits among them, still much yet requires to be done to place the agricultural labourer in that relative position in society which he ought to hold. And first and foremost, a more general education will be found of great benefit. Let them be taught that we are in possession of colonies which require labour, and where their exertions would be better rewarded than at home. Next, the extinction of the law of settlement would be another great help to the improvement of the labouring population, who under the present system are tied down to one locality, and almost to the circumscribed limits of a parish. A more general improvement in the construction of cottages is also much wanted, and would tend in a great measure to increase the moral habits of the poor. Resolutions founded upon the above were submitted to the club and unanimously adopted.

NORTHIAM FARMERS' CLUB.

At the monthly meeting of the Northiam Farmers' Club, a discussion was entered into on the comparative advantages of breeding Sussex cattle, or of purchasing Runt Stock for fattening purposes. The result of the discussion is embodied in the annexed statement.

SUSSEX BULLOCK.	£	s.	d.
Estimated cost of calf at weaning......	3	10	0
Two years' keep at 2s. per week........	5	4	0
Keep from 1st March to the 15th May (the usual time of purchasing the runt stock), 10 weeks, at 1s. 6d. per week ..	0	15	0
Medical attendance and risk..........	0	6	0
Cost of Sussex bullock on 15th May	£9	15	0
Grazing from 15th May to 15th Oct., 22 weeks, at 2s. 6d. per week..........	2	15	0
Subsequently stall-fed, with 400 linseed cake	5	4	0
Total cost of Sussex bullock.......	£17	14	0
Estimated weight of the home-bred bullock when sent to market, 100 stone, at 4s. per stone	20	0	0

RUNT BULLOCK.	£	s.	d.
Average cost of runt about 15th May ..	7	10	0
Grazing from 15th May to 15th Oct., 22 weeks, at 2s. 6d. per week..........	2	15	0
Subsequently stall-fed with 400 linseed cake	5	4	0
Total cost of runt bullock	£15	9	0
Estimated weight of the runt bullock when sent to market 75 stone, at 4s. per stone	£15	0	0

SUMMARY.	£	s.	d.
Amount realized on the Sussex bullock	20	0	0
Total cost of ditto	17	14	0
Total profit	£2	6	0
Total cost of runt bullock	15	9	0
Amount realized on ditto	15	0	0
Total loss.....................	£0	9	0

The above calculation shows very much in favour of the Sussex bullock, but the members generally appeared satisfied that the result of the calculation was strictly in accordance with their own experience.

The manure in each case was taken as an equivalent for hay, straw, and attendance.

After the above question was disposed of, another discussion was raised, viz., as to the policy of purchasing a runt bullock in Nov.; yard feeding it through the winter; and fattening it on grass during the summer months; effecting the sale in the autumn. See the annexed statement.

	£.	s.	d.
Prime cost in November	6	0	0
Fed during the winter on hay and roots, 26 weeks at 1s. 6d. per week........	1	19	0
Grazing through the summer 20 weeks, at 2s. per week	2	0	0
Risk and attendance	0	2	0
	£10	1	0
Estimated weight of a runt at the time of sale, 55 stone, at 3s. 8d.............	10	1	8
Total Profit	0	0	8

3s. 8d. per stone was considered an average price for grass-fed stock.

HEREFORD FARMERS' CLUB.—The quarterly meeting of the Hereford Farmers' Club was held at the Green Dragon Hotel, Hereford, on Saturday se'nnight. The subject appointed for discussion was, "The best system of consuming green crops, and the most beneficial and economical mode of providing manure for a farm." The discussion was opened by Mr. Heaford, who after adverting to the advice which had lately been so often repeated to the farmers to redouble their exertions and avail themselves of every advantage which an improved state of agriculture had placed within their reach, complained of the bad construction of the farm-buildings in Herefordshire, and of the absence of that security which would justify the tenant in expending any large amount of capital in improvements or experiments; till these things were remedied, he thought it unfair to taunt the Herefordshire farmers with not making the most of natural and other advantages.—Other members expressed themselves of opinion that a great improvement was required in the farm-buildings, which gave rise to a discussion upon the best construction of the fold-yard, &c., for the preservation of liquid manure.—Mr. A. Rowan addressed the meeting upon this point, adducing much interesting matter bearing upon the subject; after which the following decision was arrived at:—"It is the opinion of this meeting that the best system of consuming green crops is by folding sheep upon the land where such crops are grown, and any portion of such crops to be consumed by cattle or horses to be given to them in yards or stables; that the production of green crops to as great an extent as possible is most essential and economical in producing manure for a farm; and that the fold-yards of this county are not in general well adapted for the purpose of making manure."—The meeting then separated.—Hereford Times.

THE WANT OF STEAM POWER IN AGRICULTURE.

Sir,—Having already given an outline of the construction and management of a steam plough, I shall now endeavour to raise the standard of opinion in its favour, by showing some of the advantages which it possesses over the present system.

To associate with our idea an innovation of importance on the practices and customs of our ancestors, we ought to view the change as progressive. It must, according to its magnitude, be a work of time. Experimental steam ploughing has been going on for years, and as one report succeeds another we see difficulties vanish, and the probability of ultimate success established. Yet we do not expect to see a steam plough in the hands of every farmer for the next twenty years. A machine, the prime cost of which must be from £300 to £500, although capable of conferring almost unparalleled advantages on agriculture, would not find in every market a ready purchaser.

If good and efficient steam ploughs could be procured, the most likely method of bringing them into general use would be to work them on the same plan as the Suffolk drilling machines, when first introduced into these counties, and as many of these machines still continue working, at a price per acre. If a spirited young agriculturist were to purchase a steam plough and work it in this way, in a fine flat tract of country, he would progressively reduce the value of horses in that neighbourhood.

The expense of working a steam plough may be estimated per month at—

Coke	£10
Four men	10
Four horses	8
Wear and tear	6
Oil and tallow	1
	£35

Four horses working alternately in pairs, walking two miles per hour, with a plough drag covering sixteen feet and a half, for nine hours per day, give 432 acres ploughed per month, which at 1s. 7½d. per acre is £35. This success will, of course, much depend on circumstances; large breadths cannot be thus rapidly run over where the fields are small and the surface uneven. Experience will, however, soon teach us to square our awkward fields. The improvement would give employment to labourers, and cause some landed property to change hands.

At it regards the expense of ploughing by horse power, no man can better judge than the farmer; and the rate of profits that must be added to the cost price of ploughing by steam, I wish to leave for the enterprising man who brings the first plough into Herefordshire to fix for himself. Enough, I trust, has been said, although perhaps not mathematically correct, to show that horses are kept at vast expense in comparison with a steam engine that eats only when it works.

The small occupier, then, sees the plan by which his farm is to be stirred by an expensive steam plough, and can form his own opinion of the sum he will have to pay per acre. The extensive agriculturist, who would reduce his horses to one-half their present number, may also calculate on the advantages to be derived when he shall be able to plough 432 acres of land for £35, and appropriate one-half his present horse keep to the rearing and feeding of cattle for the butcher. That an advantage will be conferred by possessing the power of ploughing and bringing land into a proper state of tilth in so short a time, when the season is most favourable, there cannot be a doubt.

Alderman Kell.

Ross, June 5th, 1849.

—Hereford Times.

AVELEY FARMERS' CLUB.—Mr. White, agricultural and consulting chemist, and late honorary secretary of the York Farmers' Club, has delivered two interesting lectures to the members of the Aveley club. The first on Thursday, the 10th inst., embracing the application of chemistry to agriculture, with an exposition of the elements of fertilization, and an examination into the chemical constitutions of soil, plants, and manures generally. The second lecture was delivered on the 17th inst., and was chiefly confined to the details of the chemical composition of the turnip, its varieties, and the soils and manures best adapted to its growth. Both lectures were illustrated by experiments and diagrams, and fully proved that the lecturer was thoroughly master of the subject in hand. The extreme attention and satisfaction manifested throughout and after the address by his numerous auditors, will, we trust, afford him an additional stimulus for the closing lecture of the course, which will be delivered on Tuesday, the 22nd inst., and the subject of which will be on the cultivation of the turnip.—Essex Herald.

THOMSON'S PATENT WHEELS.

We have recently had the pleasure of a drive in a carriage fitted with these wheels. Some improvements have been effected since we gave a description of them in a former number (1,233) which are of a very marked character. The leather case for the air tube has been replaced by a case made of a peculiar kind of canvas, manufactured expressly for the purpose; and on the outside of the canvas, where it is liable to wear from coming in contract with the ground, a band of vulcanized India rubber is placed. The behaviour of the India rubber under this treatment is extraordinary. Not only does it not wear thinner, but the original surface remains wholly undisturbed. A curious proof of this was presented to us, on comparing a piece of new vulcanized rubber with the surface of the rubber on a carriage wheel which had been constantly at work for about two months. The new rubber was marked on its surface by a clearly defined impression of fine cotton cloth (arising, we believe, from its being spread on cloth when in a soft state to form it into sheets), and this marking we found on the wheel as sharply defined as on the new rubber. On examining the two surfaces with a microscope, not the slightest difference could be detected between the new rubber and that which had been running through the wet grit and dirt of the London streets for two months. The markings on the surface of the rubber, although clearly defined, have no depth, so that if there had been the slightest wear they would have been at once defaced.

Despite the opinion most people would form, on first seeing the wheels, that the draught must be greatly increased by a soft and yielding tire, the draught is unquestionably very much lessened. We ourselves have tried a series of experiments on the draught by a dynamometer, and are perfectly satisfied of the fact. The following table shows the results of a great number of trials made with a dynamometer. The same carriage was tried with common and patent wheels over the same pieces of road, and with the same load in the carriage, and the conditions in all respects were, as nearly as possible, equal. The speed was nine miles per hour. The weight of the carriage with its load was fifteen cwt.

On paved streets the common wheels require a force of	48	lbs.
The patent wheels	28	„
On clean, smooth, hard Macadamized road the common wheels require a force of	40	„
The patent wheels	25	„
On broken granite newly laid down the common wheels require a force of	130	„
The patent wheels	40	„

These results are entirely due to the fact that the tires are perfectly *elastic* as well as soft. They do not sink into loose gravel or soft ground as common wheels do. Nor, on paved streets do they retard the carriage by receiving constant concussions from every paving stone or other obstacle they pass over—they yield to every inequality, permit the carriage to pass over it without rising up, and the elastic tire expanding as it passes from the obstruction, returns the force borrowed for a moment to compress the tire.

We entertain a confident expectation that these wheels will speedily come into general use. The perfect stillness with which they roll along, places them above any comparison with common spring carriages. The saving of horse flesh will more than repay their additional cost at first; and they can be renewed, we believe, at about the same expense as common wheels.—Mechanics' Magazine.

IMPORTANT TO FARMERS.—Last Tuesday morning, Mr. John Birchley, landlord of the Red Lion Inn, Euxton, went into his shippon to give a calf its breakfast, when it refused to touch it, and appeared unwell. He had heard of several calves being attacked with a disease known by the name of hion, or hian, which has caused a great destruction of late among young cattle; and he communicated his suspicions to one of his neighbours, of the name of Grime, who went with him to the shippon, and began to examine the calf, with the view, if possible, to ascertain where the diseased part lay, knowing that if some remedy were not quickly applied, the disease would prove fatal. In passing his hand rather heavily across its hinder quarter, it shrunk from the pressure as if it were hurt. He therefore thought that that must be the part attacked or affected, and he instantly got a sharp knife and flayed the skin from off the part, when underneath, for several inches in circumference, the flesh was black and putrid, from which arose an almost intolerable stench. After he had flayed the skin of the whole part affected, he took a quantity of common salt and rubbed it on the part, and then took another handful and put it on, sewing the skin over it again with the salt underneath. At night he went to visit the calf again, when he found it was so far recovered as to be well enough to take its supper, and at the present time the animal is doing quite well.—Preston Pilot.

CUMBERLAND ONE-HORSE CARTS.

I have heard it stated, but know not on what authority, that Cumberland is the original county of one-horse carts. Certain it is, that while waggons in England and two-horse carts in Scotland are either still common or only lately departed, the one-horse cart has existed in Cumberland "time whereof the memory of man knoweth not the contrary." A two-horse cart is a thing never seen among the hills, and the waggons of Warwickshire and Oxfordshire are totally unknown. The epithet "Scotch," as a generic appellation of the best single-horse carts, is not correct; the Scotch cart being in all probability derived from that of Cumberland, as it is really inferior in some essential qualities to the latter. If the single-horse cart is to bear any distinctive name, it should be called the Cumberland cart, both because it, in all probability, was first generally used there, and because the best forms of it are to be found in that county. Old persons recollect since all goods were brought to the markets of the mountain market towns, on pack horses—from the hill farms and cottages, that is; and since the first carts, merely a few flat boards on wheels without side pieces, brought the "poaks" over Whinlatter, Cartlings, and Ruise; so that, said an aged informant, if the sacks fall off, as often happened, they could easily be put on again—much, one would think, on the principle of the Irishman who considered the holes in his brogues useful for letting out the water. An old map of Whitehaven shows a string of pack-horses carrying the coals from the pits to the ships.

The reason why one-horse carts should be first and generally adopted, and therefore first brought to perfection in a hilly country, is very evident. With four wheels in the mountain roads of Cumberland it would be continually necessary to lock the hind wheel. Down hill the shaft horse does all the work, and with a moderate or one-horse load, there is less for a horse to do, and less danger in doing it, than in the case of the shaft horse of a double cart, with a heavier load, and a leader encumbering him with help. The single horse can recover himself better in case of a stumble, than the shaft horse in a two-horse cart, and in passing through and round the multitudinous sinuosities of the ancient lanes of Cumberland, in making their extraordinary entrances and exits into fields, fold-yards, and farms, and in passing over the great numbers of narrow bridges necessary in a country intersected by so many streams, the light "handy" one-horse cart is invaluable. The great numbers of "statesmen," each in the most patriarchal manner tilling his own little freehold or copyhold estate, and the almost universally small size of the farms, making sometimes even a single horse, as I have heard it said, "half a horse too much," are other reasons for the adoption of single-horse carts among the hills. From whatever cause, however, one-horse carts are, and have been, since the days of pack-horses, universally used in the Cumberland mountains; and as might be expected from the circumstances above mentioned, they have been brought to greater perfection there than anywhere else. This will appear a bold assertion to the admirers of Scotch carts, and to the prize givers and winners of premiums for single-horse carts at our great agricultural shows. A Cumberland single-horse cart has never been presented for competition, and yet if one of John Hogg of Keswick's, or John Postlethwaite of Portenscale's best make could be produced at Norwich in June next, I am greatly mistaken if it would not be acknowledged by the judges to be *facile princeps*.

The following remarks will perhaps bear out this opinion, with those who have not yet seen or heard of the Cumberland one-horse carts: In Feb. 28 (1847 or 1848), you recommend in Notices to Correspondents "a very good strong tilt cart 8½ or 9 cwts., such as shall carry a ton of roots, and, with suitable frame, a ton of straw well loaded." Mr. Allon, of Benton near Newcastle, in a very capital paper on one-horse carts, read at the Newcastle Farmers' Club, recommends the carts he himself uses, 8 cwt. each on the average. I observed in a report of the York meeting of the Royal Agricultural Society, that many of the members had expressed great surprise and gratification at the lightness of the prize carts—8 cwt. and upwards. So that the best are from 8 cwt. to 8½ or 9 cwt. Now, out of hundreds weighed at the small market towns of the Cumberland mountains, I am assured that a very small number reach 7 cwt. I enclose you a list of 30 carts weighed as they entered the town, chiefly with coals, the whole, 174 cwt., averaging 5 and 4-5th cwts. each; farmer's carts average 6 cwt., and seldom more than 6½ cwt. Very strong, clever, efficient, roomy carts, from 6 to 6½ cwt., will carry a ton, or on an emergency even 22 or 23 cwt. of coals or lime; and the light horses of the country not unfrequently draw a ton of lime 15 or 16 miles from the kiln. Doubtless this is not a common, but by no means an unusual load for one of these light carts and light horses. Fifteen cwt. of coals is the common load of carts weighing 5¾ cwt.; and of two carts just passing, one is 6, one 6½ cwt.; the horses are by no means heavy, and they have just returned with a ton of lime each, from a kiln 15 miles distant.

So much for their capacity; and with respect to durability, these two carts have been 12 and 15 years respectively on the farm, in daily use, and are in excellent preservation. A careful farming friend tells me "if kept dry they will last no end of time," that his best one, 10 years old, looks quite good, and will no doubt serve him 10 years more. The shafts are usually of ash, beams of oak, and the boards of birch or alder; some have larch boards, but they are said to be apt to take fire from the lime, the fibres of this wood being more apt to rise and present surfaces easily inflamed. I believe the choice specimens of the Cumberland one-horse carts are only to be found among the hills; even at Caldbeck, on the outside shoulder of Skiddaw, the carts are not considered equal to the genuine manufacture of the heart of the mountains; and so near as Penrith, the bulk, weight, and peculiar form of the Scotch cart are visible. A few workmen only, even in the district itself, are considered quite first-rate; but there are a few whose handiwork, little as this is imagined by the men themselves or the worthy agriculturists of the hills, would, unless I am greatly mistaken, carry off the palm from all England and Scotland.

I believe it would be a real boon to the agricultural interest if the merits of the Cumberland one-horse carts were generally known. A first rate specimen exhibited at Norwich in June, would be the readiest way to effect this. The Scotch carts, and the prize carts of the great shows, average from 8 to 9 cwt. each; those of Cumberland 6 to 6½ cwt. The heavy masses of wood and iron, called waggons, considered necessary in the days of bad roads, are in many parts of England still retained. The average weight of waggons on a farm will be very considerably more that if the same farm were furnished with the Scotch one-horse carts. Let us suppose then the whole of the farms of Great Britain supplied with that form of one-horse cart called Scotch, considered the best. As the estimated arable land in Great Britain is 19 millions of acres, and the pasture 27½ millions; by allowing three carts to every 100 acres of arable, and two to every 100 of pasture, we shall have 570,000 carts required for the arable, and 550,000 carts for the pasture land of the whole country. Taking each improved cart at the lowest average weight of 8 cwt., we have 8,960,000 cwts. of carts dragged about the roads of Great Britain. Were the equally efficient Cumberland cart of 6 cwt. universally adopted, 2,240,000 cwt. might be dispensed with; in other words about 200,000 horses in Great Britain are working in vain, for 112,000 tons weight of carts are at this moment dragged about our highways and byeways for no useful purpose whatever.

—Gardeners' Chronicle. L. V. R.

WAKEFIELD FARMERS' CLUB.

At the late meeting of the members of the above club, Mr. Forge read the following valuable paper

ON THE UTILITY OF AN EQUITABLE TENANT-RIGHT.

This subject has occupied much attention and discussion at the meetings of the Farmers' Clubs, particularly in the south, as also correspondence through the medium of the press by several of the most practical and eminent agriculturists of the present day. There can remain no doubt that it is a question of the greatest importance, and appears, perhaps from the insignificancy of the occupants' claims, to be but very imperfectly understood by a large majority of them. It may be construed into presumptive motives on the part of the members of this club to entertain a question of such paramount importance; however, whatever construction may be put upon our venturing to offer our opinion, I need, as a justification, scarcely refer to the diversity of tenancies under which the members of this club hold their farms, and the various tenant-rights to which they are subject—namely, from the most extravagant, to others so small that they literally are not worth the name of compensation. That we are in a situation and perfectly justified in discussing the question, inasmuch as additional light may be given, and thereby contribute something towards a desirable settlement of that very important question. It is evident to every person conversant with the nature of owner and occupier of the soil that the greatest unanimity must exist between them to secure their united interest, or both will seriously depreciate. It therefore becomes a duty on the part of the landlord to let the tenant have an equitable interest in the culture of the soil, otherwise he has no encouragement to use it beneficially for himself, and improve the landlord's interest therein. It is a duty equally incumbent upon the tenant that his requirements are reasonable, and the land intrusted to him shall be managed upon the most improved principle. The landlord to induce and secure —which should always be his object—a respectable and permanent tenant, should make or arrange for the completion of suitable and comfortable buildings for the occupancy of the land; he should drain the land where required, on the most effective and economical plan, charging a fair interest for capital thus expended. I would here remark, as regards the tenant under-draining, he has generally, from various circumstances, such as uncertainty of tenancy, want of experience, time to reimburse himself for outlay, together with want of confidence in the landlord or himself, to induce him to do it, or have it done on a plan of permanency and effect. You will find it frequently said that to grant leases would obviate the difficulties complained of; upon this question there is very considerable doubt. It may fairly be apprehended where a tenant has a lease for 21 years, having no prospect of a renewal thereof, he cannot be expected to entertain a lengthened prospective interest therein, and therefore the improvements he may have undertaken, particularly in under-draining, will not be so effectively done as to render them generally permanent. That the tillage, being the produce of last year's crop should, in every case, be the property of the tenant, including one-third the amount for linseed cake consumed by his feeding beasts and crew-yard beasts, also sheep sustained upon rapes, turnips (unless sown with wheat), and grass. During the summer and autumn previous to quitting, one-fifth the amount for linseed cake consumed by feeding beasts, and crew-yard beasts. The previous winter, presumed to be in the manure unspread and one-fourth the amount for linseed cake consumed upon grass the summer previous to the last, provided no crop had been mown. You are aware it is an approved practice of some, even practical farmers, whose standing as agriculturists stands unimpeached, to retain unspread upon their farms the manure from the previous year's crop, thereby having two years' manure unspread. This, with all deference to the most experienced, is deserving of condemnation, inasmuch as the person so managing is a very considerable loser—namely, by the escape of ammonia and liquid, which, together with the loss sustained from the want of an earlier application to the land, is equal to at least 30 per cent. to the occupier, besides the future evils arising therefrom. To better illustrate the earlier application of manure, for some years I have noticed in two instances where comparatively little or no artificial food has been used, and where the greatest part of the manure, being the last year's produce, has always been spread upon the land for turnips, and that portion made in the spring spread upon the young seeds as soon after harvest as convenient, thereby having no idle manure. Now in these instances the farms in question have had crops equal in every way to those upon similar land where the contrary practice has been pursued, thereby showing the great advantage that would accrue to the occupant of land, consuming a large quantity of linseed cake, &c., if an earlier application of the manure, of which it forms a part, were made, and before it becomes partly exhausted from extreme fermentation. The half tillages being the produce of the farm, I would abolish or extinguish (certainly not in the unjust way the corn-laws were wrenched from us by government, but) by purchase on the part of the landlord, which I apprehend would not be a difficult task; the tenant paying the landlord a fair interest for the outlay. My reason for recommending the abolition or extinction by purchase of the half tillage, the produce of the farm, is founded upon the utter impossibility on the part of the valuer, however experienced the agent or the in-coming tenant, generally to detect the deception and fraud frequently practised to increase the amount. This description of tenant-right being disposed of, the then tenant-right would be reduced to a more moderate compass. That various unpleasantnesses would be avoided—the process of valuing less tedious—the in-coming tenant less money to provide—and so far somewhat approaching to a more satisfactory, equally beneficial, and an equitable tenant-right established. Nevertheless, the outgoing tenant to be entitled to a fair proportion of the amount for linseed cake as half tillage on tillage land, and where one crop of hay had been taken, as also for all artificial tillages which shall not be exhausted—and for his small seed bill in proportion to the probable growth or prospect of the intended crop of seeds or clover. In again reverting to linseed cake, where consumed upon pasture land continuing to be grazed, I think in justice to the occupier he ought perhaps to have four years' interest in this description of tillage, commencing with half the bill. As to artificial tillages generally they are so unproductive that they can only be appreciated as in use they may prove. Where half inch bones have been used, the unexpired proportion of six years; for bone dust, four years; for ground slough, three years; and for dissolved bones, two years; for claying and marling land, where necessary and judiciously done, seven years; and for subsoiling upon suitable and approved land, four years; believing it to be beneficial and ere long will deservedly be in more general practice. That the following crop shall comprise one fourth the arable land and shall be sown upon bean, pea stubble, clover ley, and seeds; rapes and turnips eaten with sheep, including any land which may have been a regular summer fallow, so as to make the quantity stated. The object in including summer fallows is to secure their better management, it being manifest the tenant is entitled to his following crop would, if properly managed, generally receive a higher compensation than under the present system of fallow ground. The manure to be valued in the spring and the crops to be valued at the commencement of harvest. The price to be paid shall be the average price grain realized at the immediate neighbouring markets, between Michaelmas following and the subsequent May Day. The payments to be made by instalments, viz.,—at May Day when there are fallows, and otherwise at Michaelmas, Christmas, and May Day, subject to deductions for dilapidations in the buildings, gates, hedges, &c., and any depreciation the land may have sustained from mismanagement thereof. With regard to grass land and the particular extent to be attached to each farm, it varies so much with locality and quality that it is difficult to draw either an approved or equitable line. Where land can really be converted into grass it is desirable to have one third, even in turnip soils, where there is stamina, or can be supported with advantage to retain one fruitful herbage. In stronger land farms it is in most cases an acquisition to have a larger extent. But whatever the quantity or quality may be, it generally cannot be ploughed up without the consent of the proprietor to whom it belongs, otherwise the tenant subjects himself to a fine. In case of application to plough up grass land, the first consideration for the proprietors is, how far the property will be injured by such a step. I candidly confess in some instances to a serious extent. There are various ways to meet the depreciation the land may sustain. First, by taking a premium; second, by an increased rental. Now in either of these cases the property will ultimately reduce in value from the most of the grass land thus ploughed up and the additional tenant-right the farm is subject to. To obviate this difficulty, where parties are thus situated, it may in some measure be provided against by deducting the quantity thus ploughed up from the extent of the following crop, paying for seed and labour. Parties may object to this mode of settlement, but on reflection they will find the tenant has had great benefit for some years, if he so long remains, after ploughing up; therefore the landlord, it is conceived, is fairly entitled to the compensation named at the termination of the tenancy. He might thus possibly realize the same rent from the bonus he could then offer to the applicant. The object of further comment is not to give offence to either owner or occupier, but I cannot avoid expressing my conviction that grass land, to a very great extent is awfully mismanaged. The maxim that it ought to support itself is not only much too prevalent, but practised to a considerable extent. Every experienced grazier either does or ought to know that in very few cases, except first class land, there is not stamina to do so with benefit to the occupier. He is or ought equally to be aware of the importance of a small portion of linseed cake, (say £1 per acre in value) being given to sheep therein, and that it would not only facilitate their fattening, but the future herbage would be much earlier and fruitful, and by this discrimination would be in a state of productiveness and consequent profit that would be highly satisfactory, and in which case the applicants for ploughing up grass land would be reduced to comparative insignificancy. You will have gathered from the paper just read that the tenant right would undergo a change. The intention is to lessen the exorbitant tenant right so as to bring it into a more moderate compass. The at present non-compensating would be brought to the same scale, and by paying or receiving as the case might be, the custom would then be, a following crop as herein before stated. A full tillage, the produce of the last year's crop, a full proportion of linseed cake consumed upon the farm according to the circumstance named, and for unexhausted artificial tillages as they may deserve, for claying and marling an unexpired proportion for 7 years; for half inch bones 6 years; for bone dust 4 years; for ground sloughs 3 years; and for dissolved bones 2 years; for subsoiling, where necessary and judiciously done upon approved and suitable subsoils, 4 years, believing it to be exceedingly beneficial, and ere long will deservedly be in more general practice. The plan suggested for your consideration and discussion may fairly be deemed an improvement upon the present system, and one that I should gladly embrace where I either landlord or tenant, paying or receiving as the case might be. I would further suggest that the subject before you have a calm and deliberate consideration and discussion, and I shall be glad to hear any argument that may be an improvement upon this document with the single view to fully accomplish an equitable tenant-right.

In the course of a lengthy discussion Mr. Walker said that he fully coincided in the suggestions thrown out by Mr. Forge, as did also Mr. Wadsworth and a number of other members.

Mr. Johnson said he should like to know where it was that this new manure system referred to in the paper was so well carried out.

Mr. Forge said that he could name several. One was near to Mr. Johnson, viz., Mr. Richardson, of Woodthorpe, and also Mr. Ibbotson, both of whose farms were upon the same system of management, and he had not seen their management excelled even by their more opulent neighbours.

Mr. Johnson did not consider that he lost anything by keeping his manure in the farm-yard for some time. It was sometimes convenient and sometimes inconvenient to leave it until Candlemas, but he liked to keep his manure in the yard through the winter as it yielded warmth to the beasts. He took his manure out of the fold yard at Midsummer, into the field, mixed it with soil, but never turned it until the following winter, and spread it on the land when it would, as the saying went, neither fill with a shovel or fork. He admitted that by this plan there was a waste of half a year in getting the manure on the land, but he thought that the quality of the manure ultimately obtained was more than a compensation for all this. With respect to half tillages his own impression was that as a tenant entered so he ought to quit his farm, but he did not approve of Mr. Forge's mode of ploughing up grass land, as where tenants could be discharged at six months' notice, it would frequently happen, by the wire worm taking the crop, that for some time a tenant would get no profit at all. He thought the best plan would be to pay the tenant for his tillages.

Mr. Hunt in the main agreed with Mr. Forge as to the best mode of managing manure, although in Mr. Johnson's particular case a contrary mode might answer. It was, however, difficult to know when to plough up grass land, unless the whole of the local qualities of the land in question were at the same time under consideration. Some grass land would deteriorate by being ploughed up, while others would be improved by it.

Mr. Stringer concurred in the desirability of a new tenant right, as, in his opinion, a mode of fallows could not be carried out calculated to compensate the tenant for any permanent improvement. He suggested that security of possession for a term of years would answer the purpose, but at present valuations were all on one side, which might be obviated by the out-going tenant and the landlord having a valuer, who ought to allow the tenant one half of any permanent improvement made by him in his landlord's property.

Mr. Barratt regarded the inequality and disproportion existing between the different classes of the present tenant rights as a matter of great difficulty, and one calculated in a great measure to be removed by Mr. Forge. The first thing was to make it as simple and as clearly definable as possible. It should be that sort of tenant right which would encourage a spirited farmer to spend his money with the assurance that should he leave in one, two, three, or seven years he would not be a loser by the improvements he had made. If the tenant improved the land permanently he ought to have a permanent interest; and having expended £1000, and only got back £100, the tenant right should enable him to receive the remaining £900 on quitting the farm.

Mr. Brown did not think there was much objection to two years' manure, and thought as great an objection presented itself from the hurrying of manure. He led out his own manure just before harvest, placed it on a bed of quicks, or anything else. [Mr. Forge: I would not have a tenant who encouraged quicks. (Hear, hear.)]

Well, then, he would say stubble; and then led it off in a state fit for neither spade nor fork. He agreed in the main as to the use of cake, though he expressed his doubts as to the desirability of two years' seeds; but bad grass land put into tillage would make almost cent. per cent. more than if kept on as a grass land.

Mr. Briggs said that Mr. Forge seemed to think that landlords were generally the sufferers under the present system of tenant right; but, having acted in each capacity, he had himself been a sufferer in each. He thought it desirable to change bad grass land, but there was some grass land which would more than carry a bullock per acre during the summer months, which in his opinion it would be injurious to change, though he was aware that in Scotland some of the best pastures were those of an artificial seeding. Two years' seeds were sometimes desirable if kept clean. He also agreed with Mr. Brown that if a manure heap was formed on a bottom of twitch the moisture would be absorbed, and retained in the heap. He did not see any great argument for or against keeping it a year provided the land was ready for its reception. He recommended that those gentlemen, who complained of "wire worm" destroying their grass land, should freely use lime, which would kill it, provided it was freely used on the sod.

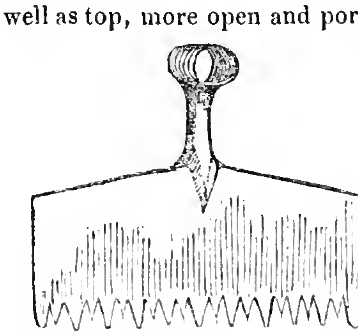
Mr. Charlesworth thought that the more liberal a tenant's lease was, the better state he might expect that a farm would be left in. He had farmed with and without a lease, and preferred farming with one; the better the condition in which he could get his land, the better, in his opinion, it was for himself, if not for his landlord. He felt firmly convinced that in second year seeds they got something they could not get by tillage. He also thought Mr. Forge had been very liberal in his allowance of cake, which ought just now to be charged to the tillage, for he felt certain that latterly cattle had been fattened without any profit at all (laughter).

Mr. Forge, in reply, said, with regard to the observations of Mr. Johnson, who was a man of standing as a practical agriculturist, if it was really necessary to have a large accumulation in the fold yard to yield warmth to the beasts, and, as extreme fermentation exhausted the manure of its best vegetable qualities, would not the loss sustained by the want of an earlier application of the manure, the produce of the previous year's crop, be ample, if repeated, to procure suitable apparatus to produce the required warmth? As regarded the grass land he considered it in general awfully managed, and that if a proper discrimination was made its state of productiveness and consequent profit to the occupier would be highly satisfactory, and the applicants for ploughing up grass land would be reduced to comparative insignificancy. Mr. Wadsworth had stated that he allowed his seeds to stand four years, and, of course, he found it answer, but that could not come under the denomination of grass land. One member had enquired where the money was to come from to enable the tenant to provide linseed cake for his sheep. Now, it was manifest that if money could not be found for that purpose it would be better that the tenant at once relinquish his farm. Tenant-rights generally were of an unsound character; and Mr. Stringer said all on one side, but that side being all in the landlord's favour. The object, however, of the plan laid down in this paper was with the view to effect a satisfactory settlement of the question. Mr. Brown and Mr. Briggs had said that the liquid from manure might be prevented from escaping by embedding the manure with quicks: but in his (Mr. Forge's) opinion, by a proper routine and change of crops quicks ought to be totally reduced, and the manure not allowed to lie so long unconsumed, so that the land might have the benefit of its valuable ingredients, which now, no doubt, in part escaped by over fermentation. Mr. Charlesworth's farm is of a quality and extent that at the expiration of his lease, he did not wonder at that gentleman's great anxiety for the renewal of it (laughter). With respect to his thinking of his own interest only, he should have thought, had he not known the man, that he was about to impoverish his farm. With regard to leases generally, he (Mr. Forge) thought nothing had been produced in the discussion to alter his original impression contained in the paper read, and adhered to his original doubts as to leases, which he considered borne out by the remarks of Mr. Charlesworth to the effect that he only thought of his own interest, and in doing so presumed his landlord did not suffer.

A vote of thanks was then awarded to Mr. Forge for his valuable paper, on the motion of Mr. Hurst, seconded by Mr. Moore, and at the suggestion of several gentlemen, it was resolved that the same should be printed for circulation amongst members of the club.

The proceedings then terminated.

THE "GARDEN COMB" HOE.—Herewith I take leave to hand you a new description of draw-hoe for your opinion. We have had four such hoes in use in this place for the last two or three weeks, and all of us are of opinion that they are decidedly superior to the common draw-hoe: for in weedy ground it pulls the weeds up by the roots, brings them better on the surface, and leaves the ground more level. In the absence of weeds, in dry weather, it will more effectually stir the ground amongst the crops. In earthing-up crops it also has the advantage, as well as in breaking the surface of the ground when it gets crusty after heavy falls of rain in summer; and in all operations it has the great advantage of leaving the ground, bottom as well as top, more open and porous.



I will only add that the hoe can be made of any size or consistence, so as to suit the different sorts of soil and purposes for which it might be found useful.—Charles Berry, *Brookland's Nursery, Battersea.*

HIGH-FARMING UNDER LIBERAL COVENANTS THE BEST SUBSTIUTE FOR PROTECTION.

Having uniformly exerted our humble abilities in inculcating the importance of adopting every practical and practicable improvement in our system of agriculture, we are unwilling that any remarks we should at any time have felt it our duty to make upon the "doings" of particular individuals should be construed into a desire to under-rate their merits or undervalue the system they advocate. Whilst, however, we are fully prepared to admit that half the land in the kingdom is not half farmed, we entertain a very strong aversion to the practice indulged in by some individuals, who, enjoying all the advantages which outlay of capital by the landlord and the possession of ample capital by the tenant can afford, with peculiar local advantages as regards their occupation to boot, assume, and would have the public believe, that every farm is capable of, and every farmer ought to be capable of, producing the like results. It is on this point that many of our shining amateur agriculturists err, and, as it seems to us, produce much mischief, by dissatisfying the landowners and disgusting the tenant farmers. Entertaining this opinion of a pamphlet which has made some stir in the agricultural world entitled "High-farming under liberal covenants the best substitute for protection," we offered some remarks upon it a few weeks since, and ventured to put a few questions to the author, for the purpose of eliciting information which we deemed calculated to place the real merits of the case more clearly before the public, and which on some points we considered to be essential to enable the reader to arrive at a sound conclusion upon the merits of the system. We took it for granted that Mr. Caird, the author of the pamphlet, was actuated by a desire to diffuse a knowledge of the excellence of the system of farming pursued at Auchness by Mr. M'Culloch, and our wish was to further that object, and not to question or criticise captiously. How far we have been met in a corresponding spirit our readers will be able to judge upon reading a communication from Mr. Caird, which will be found in another part of this paper. Our first question was, "Does not this farm possess peculiar advantages?" The reply is, "It has no other advantages than those which I have carefully enumerated." A very categorical answer, truly; but by no means evincing a desire to be explanatory. As, however, Mr. Caird does not choose to give an opinion as to whether "this farm possesses peculiar advantages" for the tenant in comparison with farms generally, we will note the points in which we are of opinion that it does.

First: The rent, including interest on the drainage, which has been done by the landlord, is but a fraction over a pound an acre, no tithes or rates.

Secondly: The land is described as 30 acres reclaimed moss, 40 acres black moorish soil, 125 acres light sandy soil, *better adapted for wheat* than for barley or oats, and 65 acres of *superior red turnip soil*. It is observed of the moss land, that it has been reclaimed from utter worthlessness, "and though the expense has been about £10 per acre, it has been *amply remunerative*, as *the potato crop on this land is comparatively exempt from disease*. Being heavily manured, it is very prolific, and, at the present high price of potatoes, yields a large money return."

Thirdly: "The landlord has carried out the tenant's views, both in draining and house accommodation, having erected an entirely new and convenient farmstead, affording every accommodation." A thrashing mill, driven by a water-wheel, which also works a turnip-cutter, and machine for bruising linseed, grain, &c., &c.; added to which there are "houses, at a different part of the farm, in which from 30 to 40 cattle can be tied up; and also a shed with courts sufficient for 30 young cattle." This has been effected at an outlay which induces the remark, that, after deducting the interest on drainage from the rent, "the balance is little more than a fair interest for *the landlord's expenditure in other improvements*."

Fourthly: The farm "is well fenced and watered, intersected by a public road, and sheltered from the prevailing winds by the woods surrounding the demesne of Logan. It has a warm southern exposure, and an elevation above the sea-level of from 10 to 70 feet. The winters are mild and moist, frost being very slight, and never of long continuance."

Fifthly: It is "about two miles from Port Logan, where produce can be shipped for Glasgow or Liverpool, and manure be imported"—a circumstance of some importance to the grower of such a bulky article as potatoes. From 55 to 70 acres were grown last year.

Sixthly: There is a command of sea-ware and peat-moss, as adjuncts to the ordinary sources of manure.

Seventhly: The tenant has a nineteen-year lease, the "covenants devised in a liberal spirit," and "not harassing the tenant by useless conditions."

Eighthly: "The tenant has leave to shoot over the farm, so that he has it in his power to prevent any undue increase of game." Now we will ask our readers whether they are of opinion that this occupation possesses advantages over farms generally, and whether it is fair to hold up the results of the system of farming adopted by Mr. M'Culloch as an illustration of what should be expected from farmers generally.

Mr. Caird thinks our remarks upon the effect of potato growing upon the labour account "obscure," and adds, "I never before heard that the employment of remunerative labour was a disadvantage to anybody, or could be otherwise than meritorious." We did not intend to express any such opinion. We believe, however, that it will be admitted that if sixty or seventy acres of potatoes are substituted for the same extent of ordinary cropping, the labour account will be materially increased; and inasmuch as the absence of facilities of carriage will prevent farmers generally from growing potatoes, the amount expended in labour under such peculiar circumstances can scarcely be held out as an example to farmers generally. Mr. Caird has furnished us with the "details of which the £2,518 are composed, and the prices at which the respective articles are charged." It appears we have not been singular in this respect, as he says, "Several eminent persons have also applied for them." In order to render the statement complete, we repeat the cropping and expenditure as given in our Paper of the 28th ult., and add the "detailed" account just received.

CROPS OF 1848.

55 acres in Italian rye grass.
30 do. in oats after clover, and old pasture.
25 do. in potatoes, also after clover, &c.
55 do. in turnips.
55 do. in wheat.
30 to 40 acres, reclaimed moss, in potatoes.

260

ITEMS OF EXPENDITURE FOR THE YEAR 1848.

Rent	£262	0	0
Labour account	417	3	8
Guano and bones	256	0	0
Hay, linseed, beans, and other feeding stuffs	270	0	0
	£1,205	3	8

DETAILED ACCOUNT OF PRODUCE.

Corn crops:						
1350 bushels of oats at 2s. 6d	£168	15	0			
1980 bushels of wheat at 6s.	594	0	0			
				762	15	0
Green crops and grass:						
378 tons potatoes at 40s.	756	0	0			
Difference of price paid and price received for 130 cattle, fed off during the year, at an average advance of £6 10s. each	845	0	0			
Produce of 5 cows	50	0	0			
150 sheep at 12s. each, for winter feeding	90	0	0			
3 young horses at £5 each per annum	15	0	0			
				1756	0	0
				£2518	15	0

We shall be much obliged to any of our readers who will take the trouble to peruse Mr. Caird's letter in conjunction with the above remarks, and favour us with their opinion thereon.—Mark Lane Express.

HIGH FARMING *versus* FREE TRADE.

SIR,—I shall reply, in the order you put them, to the queries in your leading article of 28th May, on my pamphlet on "High Farming."

"The first question," you say, "which suggests itself is, Does not this farm possess peculiar advantages?" It has no other advantages than those which I have carefully enumerated.

Your second question is, "Does Mr. Caird not consider that the situation of the farm, about two miles from Port Logan, where produce can be shipped for Glasgow or Liverpool, is a peculiar advantage?" Port Logan is a small fishing village with a harbour, distant 120 miles from Glasgow or Liverpool. The farm possesses no advantage in its proximity to this village, which is not shared by most farms within a few miles from the coast in any part of the island, and in this respect its situation is not to be compared with localities affording railway accommodation.

Your third question is, "How much the landlord's expenditure in improvements, other than drainage, has been?" The amount of that expenditure was about £900, laid out in the erection and improvement of farm buildings.

You next remark that "the amount expended upon labour and artificial manures by Mr. McCulloch, as compared with the outlay of the previous occupier, is vastly increased." You then add that you "do not notice this for the purpose of detracting from Mr. McCulloch's merit upon the point, but it must be observed that the circumstance of growing from 60 to 70 acres of potatoes must materially increase the labour account." The meaning of this remark is to me, I confess, rather obscure. I never before heard that the employment of remunerative labour was a disadvantage to anybody, or could be otherwise than meritorious.

You ask for the "details of which the £2,518 are composed, and the prices at which the respective articles are charged." As several eminent parties have also applied to me for these details, I have forwarded them to the publishers of the pamphlet for insertion in the 3rd edition, now passing through the press, the proof copy of which I now enclose to you.

You wish to know "the price given for the 130 cattle put up in October last, and the amount they realized when sold fat." It is stated in the pamphlet that the young cattle for feeding are purchased, not in October, but in "spring and summer, as occasion offers." And as Mr. McCulloch's system is to bring them forward in two lots, an early and a late one, it so happened that he got his early lot off in the month of January last, when prices were fairly remunerative, and his late one in the end of May, when prices had again improved; so that, on the whole, he has been more fortunate than many feeders last season, the reduction on his average profits for feeding amounting to only about one-third. It was merely a fortunate chance, you may say, that Mr. Mc Culloch sold at the right time. So it may have been; but the abundant supply of food which his system of farming produces, enables him to hold over his stock for an advantageous sale; while others, who have exhausted their keep, may be obliged to send theirs to a glutted market. Part of his stock he has now purchased for soiling (which will be the first lot for turning out fat in the beginning of next year), at prices in a corresponding degree lower with those which he has just sold. At all events, you cannot attribute the depressed state of the butcher market during the last spring to excessive supplies from abroad, consequent on the adoption of free trade; as, by your own market report, there appears at present a decrease of 1,200 to 1,300 head of foreign stock, weekly, as compared with either of the two preceding years during which prices were very remunerative.

I think I have now given all the explanations for which you have asked, and regret that they have not been given sooner. You did not send me a copy of the *Mark Lane Express* in which your strictures on my pamphlet appeared, and it was not for some time after they were published that they fell under my notice.

I am, sir, your obedient servant,

JAMES CAIRD.

Baldoon, Wigtown, June 12, 1849.

WETHERBY FARMERS' CLUB.

THE DRAINING OF LAND.

At the annual meeting of the Wetherby Farmers' Club, a very interesting lecture was delivered by Mr. John Hannam, North Deighton, on this subject.

Mr. HANNAM, after a few prefatory remarks, divided the subject into the three following questions:—1. Why it should be done. 2. By whom it should be done. 3. How it should be done. Upon the first, he exhibited first the practical evidence of advantage to production—of economy of working, and of improved rotations, arising from draining, as being clear answers to the question and proofs patent to every observer, and he also explained the *rationale* of land drainage in a very plain and satisfactory manner. He gave many experiments, showing how materially by evaporation and radiation the terrestrial temperature and climate were affected, and he showed that in adjacent fields, the difference in climate between land drained and land undrained, was equivalent, in some instances, to an elevation of 1000 feet. Mr. H. next pointed out how this change of condition, by removal of stagnant water, facilitated the mechanical operations of tillage, and encouraged proper alternations of crops. He treated the second question very fully, as a want of information upon it materially retarded the improvement. The permanent nature of the improvement made it naturally belong to the owner, but circumstances often did not permit or warrant the outlay. Mr. H. then pointed out the many modes of managing the outlay and their several evils: there were two, however, deserving some attention under cases where available capital was required by the owner. The simplest mode of raising capital was to allow such tenants as were willing to find it, security for such portion as were exhausted or unreturned at their removal, and to give them a tenant-right in the work. This was a simple means. The next was the government loan, and it was useful in the absence of the other. Mr. H., however, regarded it as impolitic, if not unjust, to compel the present owner who drains land, and thus increases the permanent income of his heir, to repay principal and interest out of his annual income, which is virtually done under the present system as the loan is repaid by the interest of 6½ per cent. in twenty-two years. He also considered that this high interest retarded many applications for the loan, and many works, as it was a heavy charge for the owner and occupier to bind themselves to, in the face of contingencies and the prospects of the times. Mr. H. considered that a public loan to the landowner was a public advantage, and necessity entailed upon us by the circumstances of civilization under which we live, inasmuch as unproductive soil was an injury to the country. That public loan, however, ought to be upon the most available terms, which this was not. Mr. H. thought as the work was really the source of future income to the holder of the land, the present owner or life tenant should not be compelled to provide for its repayment in the annual interest. He would have government issue a drainage stock, at a fair interest and no more, to parties wishing to drain; this debt should be a first charge upon the estate, and might be repaid at option. The first owner who had the means, would unquestionably clear off the debt. If government became responsible for the stock, the public would find the money, and the stock be as marketable as the consols. Who should do the work, was a part of this question as essential as who should find the capital. Draining was expensive and permanent, and ought to be done well. Mr. H. directed attention to the great want both of ability and care on this head. The man who held the plough was not thereby a drainer, any more than the man who quarried the stone was a sculptor. Yet the mason might become an artist, and the farmer a drainer, by the same means—study and inquiry. In a great extent of wet land which he had gone over in Scotland, Wales, and all parts of England, he found that a great number of wet fields had been drained, and that quite as many of these cases had failed of being of any benefit from the want of care, attention, and proper skill in executing the work, as in planning it. It should not, therefore, be forgotten, that in draining, like gaming on the principle of double or quits, a single error might possibly nullify every other success. One tile out of level, one pushed aside, one partially obstructed, limited the capacity of every tile in the drain to the same extent: and one failure, one false level, destroyed the utility of the whole outlay. For draining, then, of an estate, a proper survey by a competent person was one essential, and the appointment of a proper foreman to pass every man's work, overlook, and lay the tiles in every drain was the next, and not the least in importance. And for draining a field the same steps were requisite, to ascertain, where requisite by levelling, the proper fall, and, after laying out the drains, to superintend their execution. If the farmer would make himself acquainted with the principles of the art, and attend to the execution, no man was more capable of executing them usefully and economically than he was, after the landowner had laid out and executed the main ditches. In any case, however, it was essential to the person finding capital that the party carrying out the work should work upon a principle, and that a correct one. With the question, how it should be done? Mr. Hannam dealt fully. He dwelt with much emphasis upon the necessity for landowners paying attention to the arterial drains upon their estates, and pointed out the evils accruing from the imperfect and literally *superficial* draining which imperfect main drains often caused. He advised the farmer not to drain at all rather than to attempt to dry land by putting tiles immediately under the plough in order to run the water into shallow mains. A great injury was inflicted upon small owners and tenants whose land was intermixed with that of other owners, from the want of leading drains. He thought it would be very desirable to have some just and simple method of obtaining powers to cut through lands belonging to another person for the purpose of draining. An act of parliament was too expensive a means for most proprietors. If a method was devised of apportioning the charge of cutting an arterial drain upon such lands as were capable of being improved by it, it would be a very useful addition to the measure. In illustration of this Mr. H. called attention to a small estate, in detached portions, which he and his father had gone over for the purpose of a valuation, and which was naturally of first-rate quality, but being in a country where basin-like concavities and gravel mounds were numerous, it was injured to an immense extent b water, that could not be removed for want of powe to cut through other fields. In cutting these mains he directed attention to the importance of having them properly levelled, and working sections made. By doing this much expense might be avoided, as in going through a hill the workmen would be prevented from going an inch deeper than was necessary to remove the water in the valley beyond. Expensive bottom cutting was often wasted for want of this simple knowledge. By the same method it would be found, after a careful survey, that good mains might be obtained where common report declared that the water could not be got away. In levelling for a main drain upon his own farm, last year, he had found nearly ten feet of fall in three quarters of a mile, although a parochial jury in several instances had previously admitted the excuse that the water could not be removed. Had this survey not been made an immense amount of useless cutting would have been incurred in this leading drain, by bringing it from the very end deeper than was required in order to be sure. The levelling staff, however, told the depth required in each field. The drain was now cut—in several places four yards deep and six wide—and nearly eighty acres had been drained into it since last year, with a success that enabled him to ask the company of any member of the club who might be wishful to inspect his *doings* as well as to *hear* his sayings. With reference to the merits of the several systems of practice in draining Mr. H. entered into thorough detail.

Although he had inspected the drainage works of the most celebrated men in Scotland and England, and had superintended upon his own farm, and for others no inconsiderable amount; and although he had never been able to make his practice conform to any single and absolute system, or to conform to Smith, Parkes, or Elkington entirely, still it was an error to say, as was common for a man who had no reasons to justify or support his practice, *that there is no rule for draining*. There is certainly no rule for all circumstances, but there is certainly a rule, and an absolute one for all cases under the same circumstances. Mr. Hannam pointed out the peculiar features of the systems of draining advocated by Mr. Smith, Mr. Parkes, and that originated by Mr. Elkington many years ago. Mr. Elkington's deep-draining for the head of springs was highly useful. By deep cutting and tapping many lands had been greatly improved. Mr. H. instanced Mr. Maughan's operations for Lord Harewood upon Goldsborough Moor. The system, however, was one adapted to estate drainage, and was adjunct to, not a substitute for, thorough drainage. Mr. Smith's frequent two-and-a-half or three feet drains, though now termed shallow, Mr. H. stated were once considered deep; and when he (Mr. H.) first heard Mr. Smith lecture on the subject in Glasgow his arguments were directed against the evils of the shallow operations. As, however, Mr. Parkes has gone a foot or two below Mr. Smith, the latter, after demolishing the absurd and nonsensical system which was previously in vogue—that of draining at 18 inches deep—has had to turn round. His observation of the practice of Mr. Smith and Mr. Parkes, his own practice, and his general reasoning, based on all the facts within his knowledge, and upon all that theory can suggest, told him that upon soils with broken subsoil—upon those resting entirely upon sand—those upon gravel and sand—those having clay one or two feet superincumbent upon gravel and sand—it would be worse than folly to put in drains at the close distance and shallow depths of Mr. Smith. Here he would go three feet, four feet, or five feet, as the water was found, and would never hesitate on such soils to sink an extra foot for the purpose either of finding water or of getting a good bottom for the tile. This extra depth he was sure was compensated by the increased distance of the drains. On such soils the area of the side of a drain was the measure of its comparative drawing or drying powers, as drains on such did not act as in strong soils, by drying the ground in patches; but as the whole substratum was a drain having in it a current of water, as soon as it was removed from one point it flowed from the most remote, and the land was dried nearly uniformly. On the other hand, upon soils resting on a strong clay bottom for five or six feet, in the level districts where the subsoil is frequently uniform, it is wise to employ a more frequent system of cutting, and to place the drains nearer each other; not because water will not go into a four feet drain as easily as a two-and-a-half feet drain, the same laws of nature regulating the passage in both cases, but because the frequent system is requisite to effect the drying of the surface uniformly and speedily. And, therefore, the expense of going another foot deep may be avoided in cases where the water is found at a less depth, and where the subsoil is of uniform and strong texture. Before we determine which is our best plan we must dig trial-holes in several places, at several depths, and discover if there be any water in the subsoil, and what depth it is found at. If no bottom water be found, or no signs of it, then we cannot do better than adopt the safe and most economical practice, go as deep as is essential for permanence and efficiency of the drains for good and deep cultivation, and no further; say three feet, and regulate the distance from six to ten yards, according to the texture of the soil. Where the land undulates the stratification of the soil is, however, generally varied, and water is in existence below the surface; and although strong and deep beds of clay are often found, they must be cut through. They seldom are found except for short lengths, and act as dams to throw up the water to the surface. Here, then, we must find a bottom current of water and take it away by drains, at from three to four and five feet deep, and at distances varying from eight to sixteen yards from each other. Upon flat lands with sandy subsoil, usually inundated with water from adjacent hills, the same depths would serve, and frequently at greater distances. He had thoroughly dried land with deep drains at twenty-two yards apart, upon which, when the land was in open common, the village milk-maids, tradition said, had to carry flat pieces of board to step upon; and so completely was it effected, that it was the first land after the wet season to be ploughed for barley last year, and was dry sooner even than the magnesian limestone soil of the farm. From these observations it would be understood what his practice was. No man who drained to any extent could adopt one arbitrary depth or distance; or stick to the practice going under the name either of Mr. Parkes or Mr. Smith. He had found it economical and prudent even to adopt both in one field; and with both systems he did not fear success in any instance where requisite care in execution was regarded. He never yet saw one plan exclusively adopted with satisfaction. Success might be attained and economy not regarded; as he had seen land drained in Scotland at even a cost of £8 per acre on Smith's system, when £4 would have effected it by Mr. Parkes' mode; and on the other hand he had seen £4 per acre spent in the latter mode with only partial results, when £6 per acre would have been advantageously expended. Mr. H. next alluded to the system of drainage which formerly was practised in this district to a great extent, and upon which thousands of pounds have been wasted. He alluded to that which as no one had a valid reason to support it with, he would term the *superficial;* varying from sixteen to twenty inches in depth. Having no name, he trusted it would in this country no longer have a "habitation." Upon every estate great sums of money, both on the part of landlord and tenant, had been wasted. He referred to several facts—some connected with superficial draining on the farms of Mr. W. Burnam and Mr. Wright, both members of the Wetherby Farmers' Club—to show that there had been great expense incurred, but the drainage had proved ineffectual. He said that reason, as well as facts, condemned the plan of superficial drainage. We cannot draw off bottom water at the top. Nine-tenths of the evil is done by bottom water meeting top water, owing to the latter not having a dry substratum to run into. Even if the top be dry, the water is so near the roots of the plant, at eight or ten inches below the plough, as to effectually affect the temperature of the soil, and to injure vegetation. Many plants, like wheat and clover, can send their roots three to six feet deep. Where cold water is so near the top the roots creep near the surface, seeking the warmth of the sun; and the crop is diminished by many of them perishing, even if the water at the surface is taken away. Deep cultivation is also prevented by this system upon soils where it is most required. And, lastly, even could it accomplish the end, it *is not safe—it is not durable.* Wherever he had cut across these he had found them stopped up. The roots of trees, moles, cart-wheels, deep ploughing, the infiltration of the fine soil, owing to their contiguity to the surface, or some other cause, *operating to render them useless, in nearly all instances.* Failures there might be upon the other system, but they might be owing to errors or accidents of construction, and not of principle; inasmuch as for one failure he would point out ten instances of success, while the reverse was the case upon the old system. To point out the great value of having, when possible, a large bulk of dry and well-drained soil between the cultivated surface and the drains, he mentioned that as we only had about 30 inches of rain in twelve months, if we removed all the spring water by draining, the three or four feet of dry subsoil was capable of absorbing all the rain that fell in six months, without allowing any to remain upon the surface. This was the secret of the quick drying of deep-drained soils, and of its success. In proof of this he would give figures, facts, and assertion. For example, according to Professor Schübler's experiments on the physical properties of soils (Jour. Roy. Agr. Soc., vol. i., p. 188), arable soil is capable of absorbing water to the amount of 57 per cent. of its volume or bulk—hence every foot of dry earth over the drain will contain rather more than a fall of 6½ inches of rain, or four feet will hold 25 inches of rain; an amount more than equal to the rain that falls in a whole winter. The *fact* Mr. H. instanced in support of this calculation was, that in a field which he drained into a ditch liable to rise by backwater, the drains during last winter were frequently prevented delivering any water during several days. During the whole of that time, and after in some instances a week's rain, the surface of the land, owing to the absorbing power of the dry sandy subsoil, never exhibited the slightest sign of wetness. So confident was he of the truth of the argument, that the assertion he would make was that he would engage to *stop up the outlet* drains of five or ten acres of land so drained for a day or two during the heaviest rain that might happen, and would undertake not to open them until a week after the rain. In the meantime he would engage that in twenty-four hours after the rain the surface should exhibit no signs of stagnant water, but be as dry as the adjoining fields where the drains were open. Depth and distance being settled, Mr. Hannam explained at length the direction drains should take, which he recommended to be straight as possible up the incline, or at right angles to the main drains; which ought to run in the valleys or hollows. He then entered upon the other details of the operation—the materials of drains, straw, sticks, peat, stones, and tiles. He pointed out the advantage of tiles in economy; and, if properly made, durability. He advised great attention to particular points in the manufacture of tiles, and especially denounced a "penny-wise and pound-foolish" saving in the purchase of a machine for their manufacture. He had seen great cost in repairs, and imperfect work from such; from the clay not being forced with pressure enough through the moulds, or from being improperly severed. In justice, however, he must say that the work turned out by Mr. Charnock's machine was all that could be wished. The size of the tile, a disputed point in general practice, with him was not so. Being in the habit of personally conducting the operation, he knew how much care the workman had to use on ordinary occasions, and how his desire to make great wages induced carelessness and hurry at favourable opportunities; he would not, therefore, add to the dependence on the workman to such an extent as was required, when 1 inch or 1½ inches tiles were used. The extra cost of 2½ inch pipes only amounted to about 6s. or 8s. per acre, and it was not worth while to run the risk of imperfect execution for such a trifle. This risk, he knew by experience, was no slight one—in bottoms full of water, changing and varied in texture as they usually were, an inch of level might easily be lost when tiles were laid close up to the drainer, either in very flat or hilly land. In a field of 15 acres which he had just finished draining, it was impossible for any man to know by the "rack of the eye" which way the water ought to go. It was a field full of holes without hills, cup-like depressions of the surface that the eye could not measure. To the ordinary dangers and difficulties of the work he would not then add by endeavouring to carry into practice the 1 inch pipe system, which, however true in theory—for an inch pipe was fully adequate to carry away the water—was attended with disadvantages that he conceived warranted our deviation from it. The round pipe, having always a flat side to rest upon, Mr. H. recommended with collars for sandy subsoils. No common tile should in any place be used without soles. Mr. H. touched upon many other points of practice, which our limits do not permit us to follow—the filling up—in which he recommended a thin layer of straw, and the clay or fine earth upon the top, the straw preventing particles from falling through, and acting as a mould over which the clay forms an arch, capable of preventing the sand and the fine particles of the soil from being washed into the drain to the impoverishment of the soil, and the stoppage in some cases of the drain. Mr. H. also spoke of the usefulness of a layer of straw being placed below the sole upon sandy, shifting bottoms; the water in such cases arising through the straw, and by the sole pressing upon it, the sand became firm, while if the soles were placed without the straw, they would sink unequally: to the importance of securing each point and of putting in a tile of a larger size than ordinary at such points of junction; and recommended the letting the cutting of drains by foot deep per rood or acre, say 6d. or 8d. per foot deep per acre, by which at 3 feet deep an acre costs 2s. without filling. This plan had effectually corrected in his own practice the tendency to cut the drains shallower than they were intended, and satisfied both workman and master. In all works, however, he would have one man to lay the tiles, and he would not pass incorrect work if he knew his business. In cutting, a good practice was to have the bottom cut taken out narrow, so as to fit the tile exactly, and prevent it being thrust aside by lateral pressure. After some other observations, Mr. H. concluded his able address, which occupied upwards of two hours in the delivery, by thanking his audience for the attention with which he had been heard, which he attributed to their proper appreciation of the importance of the subject rather than of his imperfect observations, and announced his willingness to explain any point upon which he might have been misunderstood, or upon which, owing to extent of ground that he had had to travel over in one speech, he might have failed to adduce such evidence as was satisfactory.

After the lecture, the members of the club dined together, the chair being occupied by John Rhodes, Esq., the president elect. Out of 60 members about 40 were present at the dinner, and after the usual loyal and complimentary toasts had been drunk, the discussion was resumed by an excellent, practical speech by

Mr. J. H. Charnock, of York, who introduced to the notice of the company, the claims of the West of England Land Draining Company, which is empowered by act of parliament to lend money to owners of estates, entailed or otherwise, for the purposes of permanent improvement. This company undertakes the works, and executes them thoroughly when required so to do. Mr. Charnock also announced that as he had succeeded once in bringing out a tile machine which had met with the approval of the public, he might not be deemed over sanguine in expressing a hope that he had mastered the difficulties of producing a plough or machine capable of cutting drains at less than one-half the present cost. Many had tried, many were trying, and some must fail. It was probable, however, some would succeed; and he was one of the hopeful. Mr. Charnock would not attempt to travel over the ground gone over by Mr. Hannam, or attempt to strengthen the truth, or to embellish that which required no ornament. He was confident that before such assemblies as this, and by such discussions as these, difficulties must vanish like mists before the sun, and erroneous practices hide themselves from the observation of the public.

Other excellent practical speeches upon the subject were made by Mr. Hannam, Sen., and James Beaumont, Esq., Wetherby, the latter of whom stated that 20 years' experience justified the conclusions drawn by the lecturer. He had failed on the old system after 20 years' experience, and had succeeded in the first attempt upon the new and more rational mode. After his draining being twice done, it was at last well done.

Mr. James Powel, Harrogate, in the course of some very interesting observations, confirmatory of the remarks of the lecturer, mentioned the failure of the shallow draining upon Harrogate Stray, and perfectly agreed with the lecturer in not extending his advocacy of deep draining to the length advocated by some, who argued for inch pipes at 40 feet apart, on strong clay soil.

Mr. John Hannam replied that in most cases the deep system was valuable, but it would be strange if it were an uniform panacea. Such would, in fact, be contrary to the rule in every other practice, as in medicine for example, where discrimination was essential to derive advantage from the most valuable prescription. Draining then was to be done neither at 40 nor at 20 feet apart, nor at 3 nor 5 feet deep, but between these limits, as circumstances warranted; one rock only to be avoided—the exploded 18 inch practice, which experience proved to be worthless, inefficient in operation, and imperfect in durability.

After speeches from the Chairman and W. M. Lomas, Esq., who proposed in eloquent terms, a vote of thanks to Mr. John Hannam, for his lecture, the chairman vacated the chair, and the meeting separated at nine o'clock.—Leeds Intelligencer.

ABOLITION OF SMITHFIELD MARKET.

We invite attention to the Report of the Committee of the House of Commons in reference to the removal of Smithfield market. There is now no longer any doubt that this nuisance to the City, and serious injury to the graziers who send cattle to Smithfield, will be abated. We have reason to believe that it is not the intention of the Corporation of the City of London to offer any further opposition to the measure. The committee sat twenty-three days, and every means was had recourse to by the advocates of this convicted nuisance to secure its continuance, but without effect.

REPORT OF THE SELECT COMMITTEE OF THE HOUSE OF COMMONS.

"Resolved,—That it is the opinion of this committee that the continuance of a market for the sale of live stock in Smithfield is proved, by experience, to be attended with serious inconvenience and objection, and that it ought to be removed.

"Resolved,—That it is the opinion of this committee that these inconveniences and objections have been of late years in some degree mitigated by the care and attention of the Corporation of the city of London; but that, so long as the market continues to be held in its present situation, the inconvenience referred to will not admit of prevention.

"Resolved,—That it is the opinion of this committee that, in providing a market-accommodation for the sale of cattle, in substitution for Smithfield Market, due care should be taken to ensure sufficient space not only for the present, but also for the future wants of the metropolis.

"Resolved,—That it is the opinion of the committee that there has been great benefit to the health of the neighbouring inhabitants from the presence of a large open space such as Smithfield, in the midst of a densely-populated district. The committee, therefore, trusts that, in any contemplated alteration, the greater portion of the present open space may be retained.

"Resolved,—That it is the opinion of this committee that, in accordance with the tenor of the evidence, only one great metropolitan cattle market can exist, and that, therefore, in the selection of its site regard should be had to the position, to the railway termini, the place of disembarkation for Scotch, Irish, and foreign cattle—the bridges, especially Blackfriars—and to the density of the population in the neighbourhood of such site.

"Resolved,—That it is the opinion of this committee that in reference to the propriety of constructing abbatoirs, of placing slaughter-houses, both public and private under inspection, and the necessity of a more vigilant superintendence of the markets of both live and dead stock, to prevent the sale of meat unfit for human food, the alteration of the market-day from Monday to Tuesday, the establishment of lairs, sufficient supply of food and water for cattle, upon which the committee has incidentally received evidence, the committee forbear to express an opinion; but, looking at the immense importance of the supply of animal food to this vast and rapidly-increasing metropolis, and the variety and magnitude of the interests involved in the satisfactory settlement of this question, they desire to express an earnest hope that the government will take the whole matter into its early and serious consideration."

CATTLE EPIDEMIC.—A correspondent informs us that the epidemic has made its appearance among the cattle and sheep in the neighbourhood of Stone, near Aylesbury. The consequence is that the cows fall short of the supply of milk, and have very little appetite.

HINCKLEY FARMERS' CLUB.

LECTURE ON AGRICULTURAL CHEMISTRY, INCLUDING THE FUNCTIONS OF NUTRITION AND GROWTH IN THE VEGETABLE KINGDOM.

[*Delivered before the "Hinckley Agricultural Society,"* 4*th June*, 1849, *by John Ashford, Esq.*]

Mr. Richard Warner, of Weston Hill, was called to the Chair, and, having briefly stated the objects of the paper, introduced Mr. Ashford, who, after a few introductory remarks, proceeded as follows:—

I am no practical farmer. I do not pretend to tell you how to cultivate your lands; but my firm belief is, that most of you will live to see the vast advantages to be derived from a knowledge of *Agricultural Chemistry*, whereby you may obtain what is most useful at the cheapest rate, and that by this knowledge only will you be able to do it. Indeed, the human mind is constantly striving to the attainment of truth, although some will thwart an onward movement, and still affect to despise what they as yet do not know.

Nihil est agriculturâ melius, nihil dulcius, nihil homine libero dignius.—*Cic.*

The same laws which regulate the combination of the elements in Inorganic Chemistry (that is, the chemistry of the Mineral kingdom) likewise influence Organic compounds (that is, the chemistry of the Animal and Vegetable kingdoms). From the former are mainly derived the elements which contribute to the perpetuation of the different species, so that the science of chemistry in general is much interwoven with that which belongs to organic chemistry, or the chemistry connected with agriculture.

On the former occasion I told you "that there were four essential elements, *Oxygen*, *Nitrogen*, and *Hydrogen* gases, and *Carbon*, a simple body; that no living body has any element which does not also exist in inorganic matters."

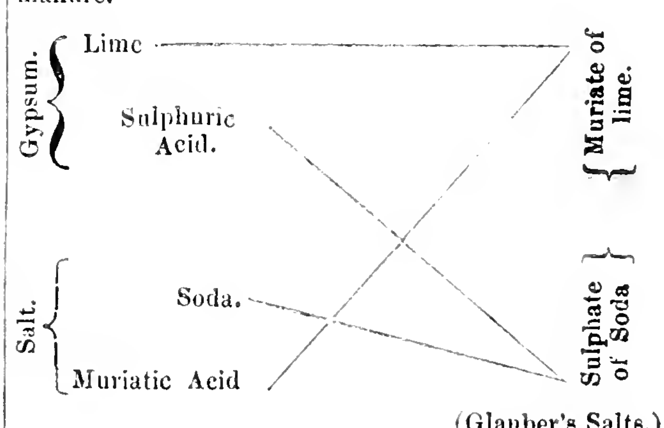
Affinity or Chemical Attraction is the basis on which the science of chemistry is founded, and is exerted between the minutest particles of different kinds of matter, so that when they combine, new bodies are endowed with new properties. By way of illustration, two or three simple instances will afford a notion of what it comprehends. Thus, water and sulphuric acid combine readily, while oil and water show but little disposition to unite. In the first, chemical attraction or affinity is shown; in the latter, there is a want of affinity in the different bodies. Again, we may use for example,

$$\text{S}\scriptstyle{\text{ULPHURIC}}\ \textstyle\text{A}\scriptstyle{\text{CID}}\ \textstyle\begin{cases}\text{Potass.}\\ \text{Soda.}\\ \text{Lime.}\\ \text{Ammonia.}\\ \text{Magnesia.}\end{cases}$$

In this table *Sulphuric Acid* has a greater affinity for those substances placed in the order they are, and may unite separately with each. Ammonia will separate Magnesia—Lime, Ammonia—and so on.

Then as to *Chemical Affinity*.—I think I scarce said enough before to make you understand this part of the subject. Let me now direct your attention to the chart or A B C of Agricultural Chemistry. Here you see *Chemical Affinity*, and observe the terms, Potash, Soda, Lime, Magnesia, and Ammonia, having as their indicator Sulphuric Acid on the left of these bracketted terms. Suppose you have some magnesia, and to it you add sulphuric acid (oil of vitriol), you then have Epsom salts. Add ammonia, and the sulphuric acid leaves the magnesia and goes to the ammonia. Again, add lime, the acid leaves the ammonia, and flies to the lime (gypsum). Add soda, the acid quits the lime and goes to the soda (Glauber's salts). Lastly, add potass, then again the acid leaves the soda and goes to the potass.

Or let us take the subjoined rude diagram. You often hear of a mixture of gypsum and salt as an application to soils. To explain what the result of this combination is chemically, namely, a double attraction or decomposition: The application of gypsum to dunghills is useful to absorb the ammonia, or to fix it. Sulphuric acid is used for the same purpose to liquid manure.



Thus, the *sulphuric acid* in the *gypsum* unites with the *soda*, and forms *Glauber's salts*. The *muriatic acid* in the *salt* attaches itself to the *lime*, and forms *muriate of lime*.

What this printed paper gives you is but a slight view as concerns the principles of chemistry, nor is it to be expected that you are to make all the analyses here spoken of; but yet it will be found useful to understand them; and it is essentially necessary that you should be acquainted with the properties of the elements, so that when you read of oxygen or hydrogen, you may comprehend their uses—or, when nitrogen and carbon are spoken of, you may at once see their properties and applications, or how they combine so as to produce their several effects. Further, you will bear in mind that the combinations I have just alluded to take place under certain laws, and that these ultimate particles or atoms, as they are called, always join with each other in fixed proportions, as 2 to 1, 3 to 1, 4 to 1, and so on. The credit of this discovery is due to our countryman, Dr. Dalton, of Manchester. Depend upon it, there is something more than cotton-spinning going on in that city.

In the inorganic world there are fifty-four elements; in the organic world but few. It is by chemical action, viz., heat, light, air, and moisture, that vegetable life is sustained. It is by these we ourselves exist; by these every part of our bodies is formed; and by these we are kept in constant health. There is, I believe, in every chemical change, electric action; and in proportion as heat is evolved, oxygen is absorbed. The metallic base of potassium, if dropped into water before the air has oxydized it, instantly ignites and burns with a brilliant flame.

Oxygen.—The air we breathe—vital air—has a powerful attraction for most simple substances, and so renders them capable of disintegration, in order that they may unite with other bodies so as to form various compounds. They may be classed as *Oxides, Acids,* and *Alkalies.* Take for examples the most familiar.—

The rust of iron .... as an oxide.

The expired air from the lungs, or the acidifiable bases, the sulphuric and nitric acids .... } as an acid.

The *vegetable acids* are all converted into carbonic acid and water, by the action of hot nitric acid. The salts of potassium and soda are the examples as alkalies. The *vegetable alkalies,* strictly speaking, are compounds of the four essential elements, carbon, hydrogen, nitrogen, and oxygen. Observe the mode of formation of the alkalies with the acids as given in the paper, and at the same time bear in mind that these alkalies have metallic bases. Oxygen unites with organic matter in substances which are passing into a state of putrefaction and decay, and which substances of course contain nitrogen. So with the union of oxygen a slow process of burning goes on, and the temperature most favourable to this process is from 60° to 100°. There is, however, no sensible increase of temperature. This process the chemists of the present day call "Eremacausis." You will, perhaps, say this is a crack-jaw word, but so they name it.

The mention of this process of burning leads me to speak of the *burning* or carbonizing of large quantities of rank or sterile soil, as is now much practised. Here chemistry tells you that the remains of animal and vegetable matter are quickly brought into a state fit for the food of plants—the otherwise dormant soil is by this process more easily powdered—that the salts or minerals in the soil are oxydized, and are thus in a state fit to be dissolved, so that the secretions of plants may be formed as growth goes on. So then, with the aid of atmospheric air, we have all the constituents necessary as in the case of other manures. Recollect what was before said concerning the formation of ammonia. Now the presence of oxygen is, you see, necessary to this taking place. "The slow burning" goes on; the organic matter passes into decay. Exclude the air, and putrefaction does not take place. Hence you see how ships' stores, portable soups, &c., are kept for an indefinite length of time. I have said that "this slow burning goes on without sensible increase of heat;" yet when energetic chemical action takes place, there is sensible increase of heat. I give you an example. With gun, powder, and shot, you kill your game: here the solid powder quickly assumes a gaseous state, so as to expand to at least 250 times its former volume. The oxygen of the nitrate of potass is transferred to the carbon, forming carbonic oxide; the sulphur combines with the potassium, and the nitrogen is set free.

Phosphates.—Now to speak of the Phosphates which concern you.—*Bone Earth*—that which constitutes the hardness of bones: *Phosphate of Lime*—the bones which fertilize your fields—(all due praise be given to Justus Liebig)—the crumbled remains of volcanic or trap rocks of bygone ages immensely remote, here in the soil, the best elaborator of that plant which forms the staple food of man. Found in the soil, it is taken up by the plant, which you eat, so to form the compact bones, again to be returned to the soil to do its work again; and still the best improver. Certainly, "nothing is lost." Liebig found that bones were dissolved by sulphuric acid: he inferred that the acid took from them a portion of their lime, and that a super-phosphatic salt was left behind. Pray think of the Phosphates, and you will tell me hereafter that Agricultural Chemistry is a something worth knowing. *Peat Ashes* will decompose bones, if moisture be afforded; nay, water alone.

Now another of the essential elements is called *Nitrogen,* the diluter of atmospheric air. It has been stated that a great source of this is from organic matter which has passed through the process of putrefaction and decay—that the elements of ammonia are hydrogen (3) and nitrogen (1). Bear in mind the importance of the first mentioned element, nitrogen. It is absolutely necessary in the nutrition of vegetables. By nitrogen the albumen and the gluten of plants are formed—the plastic elements as they are called, through which the digestion and development of the plant are effected—its alimentary qualities educed, and its life sustained. It is said that organic substances which contain nitrogen emit the odour of singed hair while burning. Again there are the substances of plants which do not contain nitrogen, viz., the starch and sugar. You are told that animals will not live upon substances which do not contain azote (nitrogen). The French chemists and physiologists tried numerous experiments relative to this, and they fancied for a time that they had disproved the fact, but it is now looked upon as settled. It is to be borne in mind that the proportions of oxygen and hydrogen in those vegetable substances which do not contain nitrogen are always such as to produce water—(there is but one exception, as far as I know)—and the proportion of carbon is uniform with the exception I have alluded to. Oils and fats are of this class, and from hence may be shown the qualities of fat as compared with fibrine, as regards their nutritive properties.—*Fibrine,* or muscular fibre. Fibrine, as solid in muscle, fluid in blood contains Nit., 15; Carb., 54; Hy., 6; Ox., 22; Fat contains, Carb., 66; Hy., 68; Ox., 5. Nitrogen then combines with oxygen, hydrogen, and carbon, and sometimes sulphur and phosphorus.

The constituents of *Vegetable Albumen* are (omitting the fractional parts) Carb., 55; Hy., 7; Nit., 15; Ox., 22; so closely are the two kingdoms chemically allied! And these are not so many hypotheses: they are the explanations of so many facts.

Now when by analysis the component parts of these four elements are—that the two first are high in proportion, viz., carbon and hydrogen, say 31 each in 100 parts, the two latter, viz., nitrogen 2, and oxygen 6, you may infer the plant to be unnutritive, and that it perhaps has deleterious qualities; so weak or unstable is nitrogen in its affinities. On the other hand, take the following examples; here we find that wheat, which is most nutritious, contains—

	Starch.	*Gluten.*
Wheat	70	23
Barley	79	6
Rye	61	5
Oats	59	6
Rice	85·7	3·60

In these the oxygen ranges between 30 and 40, as I before stated. It is a singular fact that *Oats* increase in nutritive qualities in proportion to the increase of latitude within certain limits, while *Wheat* follows an inverse law.

Further:—The oxygen of the atmosphere oxydizes the metals and salts in the soil; they are thereby rendered fit for solution. The rain descends, it filters through the soil; the salts are dissolved; the roots imbibe the fluid; it ascends the plant through the *common vessels* as sap, is afterwards taken up in part by the *proper* vessels, and in part eliminated; and during this the elements I have named are formed. So the process goes on—the root the stomach, the leaves the lungs.

In the soil are, 1st, those constituents which dissolve in water; 2ndly, other constituents which dissolve in the acids; and, 3rdly, those which are insoluble. You will perceive, then, how these produce the food necessary to the life and growth of the plant. You will comprehend how the necessary adjuncts to electricity, viz., heat and moisture, are afforded—and how the inorganic matters are taken up for future nourishment. The air is purified by the removal of carbonic acid, oxygen is emitted; in the dark, digestion is at a stand, and by the continued respiration of the plant carbonic acid accumulates.

Dew.—"The most copious deposit of dew takes place when the weather is clear and serene, and those substances that are covered with it are colder than the contiguous strata of air or those bodies on which dew is not deposited. In fact dew is a deposition of water previously existing in the air as vapour, and which loses its gaseous form only in consequence of being chilled by contact with colder bodies." *(Wells.)* It is well known how essentially necessary moisture is to plants; but Nature, ever mindful, has endowed them with the faculty of absorbing aqueous vapour directly from the atmosphere, and of lowering their heat by radiation during the night. Dew is deposited on the leaves, and is carried through the plant when moisture can no longer be obtained from the soil. Plants not only absorb moisture, but give it out also. The common sunflower is known to exude no less than 30 ounces of water during the day.

Soil consists but of two parts, viz., earthy matters, and the remains of animal and vegetable matter; and when either clay or lime prodominates, it is called clayey or calcareous. The relative value of soils is as to their permeability to water and their power of absorbing moisture. To ascertain the first, you put an equal weight of different soils in glass tubes of different diameter, pressing them so as they may occupy equal spaces but not filling the tubes. Then pour an equal quantity of water over each soil, and place them upright with cups under them. Examine which first has the surface dry, and how much water runs through in a given time. That which presents the dry surface while it holds the most water in its pores, is probably the best. To ascertain the comparative absorption of moisture, the soils are dried in pairs on a plate of metal heated by steam, or at a heat of 212 deg. to expel the moisture. They are then placed in equal quantities in similar flat cups or dishes, and placed in opposite scales of a balance, and poised. The apparatus is exposed to a moist atmosphere out of doors or in a cellar, and occasionally examined. That which is heaviest is in general most fertile. There are other modes, but I take these as the most simple.

I contend that all land valuers, and farmers themselves, should test the soils by some such methods as I have given. It is a complete farce as the valuers do it at the present day, by merely inquiring as to poor's rates, looking at the buildings, and walking over the fields at the rate of three guineas and upwards *per diem.* It should be the essence of their business to be able to say when soils are chemically and physically alike, that farmers may know such soils to be agriculturally equal. Viewing as I do the great importance and usefulness of a farmer's occupation, I think that the law should not allow any one to follow it (I mean the tenant farmer) without undergoing a test of his fitness and qualification, irrespective of the amount of money he may have at his command.

Although moisture is so necessary to vegetable life, yet water cannot yield to plants what it does not possess. The carbon and ammonia held in atmospheric air, together with the power of plants to absorb moisture, are alone sufficient to sustain life in several cases. I may mention the experiments of Dr. Graham. He suspended some species of the fig-tree for sixteen years, during which time they continued to send out shoots and leaves.

Again as to the *Air Plant.*—We find a plant cultivated amongst the Chinese and introduced among ourselves, termed the Air Plant, which by being merely suspended in the air increases in bulk and weight without even the application of water. This is one of the most simple forms of vegetable life, as the plant has nothing to feed on save the atmosphere, which however contains all the elements necessary for its growth—oxygen, vapour of water, carbonic acid, and ammonia or nitrogen in some form. But all these are gaseous bodies or vapours, while the air plant is solid; hence we infer that the plant is capable of reducing gases to the solid form, and of increasing in bulk and weight.

Guano.—I have before alluded in a cursory manner to guano, and I then said that it could easily be imitated by yourselves, and manufactured on your own premises. I am told that the present prices of this article are from £6 to £9 a ton. I feel certain you could make it at one-tenth of that cost. The substance *said* to be imported under the name of guano is of a brown colour, containing small portions of bone, earth, and masses of chrystalline matter, the residuum of liquid manure and salts of ammonia, soda, &c. It has a very offensive odour. This Peruvian guano (so called) is no doubt an excellent fertilizer, and so it ought to be at £9 a ton. Its rank smell tells me that much of what you get is as likely to come from the North Pole as from Peru, and that it is made as the occasion or demand requires. The valuable qualities of the manure depend mostly on the ammonia it contains, and so long as guano or bone dust will produce a good crop of turnips there is no fear of the soil being exhausted. In the manufacture of these manures, it is not the abundance of one particular salt that makes the soil as it were permanently productive, but the judicious combination of the several salts which plants are known to take up, because you thereby bring into action minerals and other compounds that would otherwise lie dormant in the soil. The experiments of Dr. Playfair, Mr. Herapath, of Bristol, and Mr. Prideaux, of Plymouth, clearly show this. Since I last met you, I have endeavoured to imitate this guano. The method of preparing it I have handed over to your Secretary. He, at all times ready to show his zeal for the good of your society, will deserive the formula.

Carburetted Hydrogen Gas.—Connected with the manufacture of coal gas are two or three substances which much concern the agriculturist, as they are known to be the best renovators of soils which have been over-worked or exhausted.—1st. As to the refuse-lime to be had at gas establishments, this is a valuable article. You know that amongst the simple elements found in small quantities in the soil is sulphur. You know, too, that carbon and ammonia are the results of decomposed organic matter both animal and vegetable. Well, in this refuse-lime are combined lime, ammonia. carbon, and sulphur, the ammonia being derived from the nitrogen which always exists in coal. Here, then, you have the precise constituents which make the best of manures, in a state easily soluble so as to be taken up by the plant; and here, again, the sulphuretted hydrygen is to be viewed as a very useful part of the substance, calculated as it is to defeat the ravages of insects and animalcules Such, then, are the properties (agriculturally considered) of refuse-lime, or, as the chemist would call it, hydro-sulphuret of lime. In fine, if I wanted a manure to produce a heavy crop from land (a loamy soil), which had already done great service, I should use this refuse-lime. Its effects would, I should say, be analogous to those where soot has been used, and I should apply the refuse-lime much after the same manner. The immediate good effects of soot are mainly attributable, 1st, to the ammonia it holds; and, 2nd, to the divided state in which it is applied; so that you manure the land without poisoning the plant.

Perhaps I shall be met with the objection that these gas establishments would not furnish one-hundredth of the quantity necessary? True, and this brings me to the burden of my song. Admitted these are good, then I want you to make them for yourselves, in any quantities you may require, all of which is easily done both with "small pains and at little cost"—viz., guano, hydro-sulphuret of lime, superphosphate of lime, nitrate of soda, urate, ammoniacal liquor.

As to *Ammoniacal Liquor.*—In order to deprive the gas of any ammonia it may contain, it is made to pass through the purifiers where the lime is; but previous to this the gas is freed by the *cooler* (which is water) from tar and ammoniacal liquor. These are condensed, and the latter is, *when properly diluted*, one of the best applications to grass lands, if so applied, as the plant can take it up while young. I have been told that it certainly increases the size of the blades of grass, but that the herbage is not so uniformly thick as in the case of common manure. I question this; but if it is so, I say it arises from the improper and indiscriminate use of the liquid, which should be about 1-8th to 7-8ths of water. The same proportions should be observed in the various forms of liquid manures which I have spoken of before. When you hear of what has been done by this ammoniacal liquor on the lands in the neighbourhood of some towns in Scotland, and of the price that this land brings, I think the objection is directly answered. Indeed, you must afford *ammonia* in order to elaborate *carbon*—the proper food of the plant.

Apropos to the mention just made of liquid manure. In the prize essay "On the Farming in the Weald of Kent," I read the following:—"Farmers are becoming more and more alive to the importance of liquid manure. I have been induced to make several tanks of brick-work, lined with cement, &c.; the expense was, I believe, repaid the first year."

You all know the history of the New River Head or Reservoir, projected by Sir Hugh Middleton, in the reign of Elizabeth. In this our day there is projected by Mr. Martin, a sewerage for conveying liquid manure as many miles into the country (from London) as the pure water is brought; and it is a design little inferior to the former one. A Mr. Chambers, of Queenborough, speaks decisively as to the advantages of liquid manure; and you will probably hear of the astonishing quantity of produce obtained by Mr. Coode by the same means.

Take it not amiss, then, gentlemen, while in honest purpose I express to you my firm conviction that you are on the eve of greater changes in agriculture, of more rapid advances, than you in your philsophy dream of. See you to it. "Heads as well as hands should work."

With regard to *Artificial Manures*, as they are called, it has been observed by many that for the most part they last but for a short time. This to a given extent is true. Recollect, we started with the proposition (1st lect.) that "you must return to the land what in the shape of crops you have taken away." You all know full well, if you grow corn, you must necessarily exhaust the soil quickly, but if green crops are grown you improve the soil.

Ammonia is to all intents and purposes chemically the same, whether evolved in the process of distillation, of making coal gas, or whether by the sal-ammoniac of commerce—the produce of putrefaction and decay in the animal and vegetable kingdoms, viz., the volatile air of Priestley, composed of nitrogen and hydrogen. Being the chief constituent in all manures, and being absolutely necessary to form the elements of vegetables, it has the same effects when applied to the soil from whatever sources obtained. The same may be said of *Phosphate of Lime*. Whether found in the soil, as the detritus of rocks, or whether applied by the agriculturist in the shape of crushed bones, it comes precisely to the same point. So also of the *Nitrate of Potass*, or the *Nitrate of Soda*: whether found in the soils of Asia or South America, or found in the laboratory at home, they are all as one.

Where, as I have said, the several saline substances are found in soils which experience has told us are most productive, and which salts analysis tell us exist in plants, then the inference is, that some portion of these several salts are the best means for keeping up the fertility of the ground; while we first take care that moisture is neither deficient nor in excess.

In connection with this, let me give what occurs to me as a familiar illustration of *theory* and *practice*. Suppose a field produces indifferent crops, and that this clearly arises from exhaustion, and that in the course of rotation crops you wish to grow wheat: you apply the manure or manures which contain the phosphates, and you reason thus,—"I know that this plant contains a great portion of phosphatic earth, and I also know that the proper food of all plants is carbon; that to fit this carbon for the plant ammonia or nitrogen must be afforded: that these substances are the results of decayed animal and vegetable matter. I therefore apply this manure, and I take especial care that it shall have a good proportion of phosphate or bone earth. I find my crop realizes my best expectations, and I infer that I have reasoned correctly. The previous sterility of the soil is the indicant or disease; the phosphate and the carbon are the indications or the mode of cure." *This is theory.* And now for the *practical man*, one who glories in the saying, "I hate theory; give me the practical man; he will beat your theorist into fits." This practical man (as he calls himself) has heard that Filch of Tulson, and Bishop of the Bog, both first year tenants, got excellent crops last year, and that they limed the land well. This practical man says to himself, "Mine is a light soil; I wonder whether lime would answer." At the same moment he resolves, "I'll lime it well." Now, without knowing whether the soil contains what besides is requisite, he limes it to his heart's content, when, alas! his crops are more deficient. Guess his disappointment, consider his loss, and all he has to say about lime,—when up comes Riddle of Swindlescote, and the following was the colloquy:—"Here's a precious humbug." "Ah," says Riddle, "I am in a fix; but, after all, Wilson's bone-ash is the thing. It has lately been patented by the executors of Swindlescote." "Why our doctor," says the practical man, "tells me they are regular Yankees,—something more that humbugs;" and thereby hangs a tale. "You must know (he goes on) that the doctor was detained by my missus, and in the meantime we had a chat about the bad crop of turnips in Sand-hill Close. I told the doctor what I had done to it the year before. 'Ah,' says the doctor, 'give it a good dose of sulphate of lime.' 'What's sulphate of lime?' 'Gypsum,' says the doctor. 'And what's gypsum?' 'Plaster of Paris,' quoth he. I had got my cue; so remembering the year after what the doctor had said, I put a good dressing of plaster of Paris on the clayey close—two bushels of turnips to the rood, no more nor less. Good bye to gypsum! And that was not all. I could not plough my land next winter: it was a regular stone quarry, by all that's hard and disagreeable. I'll use nothing but good fat stuff in future." So he goes on in this everlasting perversity of fatness. Why, gentlemen, nine out of every ten of us are too fat by one-half, and so would soil be in this way without other matters to mend it.

Lastly, I advise you that have sons to put into their hands such books as are likely to give them correct notions of the principles of Agricultural Chemistry—that most useful knowledge which pertains to the cultivator of the soil,—so that while they are acquiring practical experience, their minds may move with the age in which they live. Examine them occasionally, to satisfy yourselves that they understand what the books will teach. You improve your own knowledge at the same time. This plan is preferable to learning it as a task at school. Do not depend upon the schoolmaster altogether: there is a good deal of quackery amongst these men too. First I would say, give "Chambers's Introduction to the Sciences." This book costs but a shilling, and it is a most useful one. After this (say six months), "Solly's Rural Chemistry," "Johnson's Elements of Agriculture," "Gardener's Translation of Liebig's Letters" on the same subject,

&c., &c. These are sufficient while they are pupils. It is preposterous to place before them regular systematic and scientific treatises, as is often done in agricultural colleges. Such books are as unsuitable as they are needlessly expensive: they too often throw a damp over the unfolding minds of young men, and are generally put aside never again to be consulted. All the good they do is in the profit the schoolmaster or the principal (call him which you will) gets in pushing such books off. The books I have recommended cost but a few shillings: without these, or some such, your journals and periodicals are but as so much waste paper. Farmers should possess considerable information in chemistry, geology, mathematics, mechanics, natural history, botany, &c.,—in short, their every advantage lies in a knowledge of natural philosophy. A farmer entirely unacquainted with either of these, can scarcely estimate how much he loses, compared with the foresight of the man whose every operation is guided by the laws of nature and the axioms of truth.

John Bucknill, Esq., of Market Bosworth (who attended the meeting as a visitor), said he was highly pleased with what had fallen from Mr. Ashford, and he congratulated the society on possessing so able a lecturer; he was not a member of their society, but might be induced at some future time to join them; he could speak practically of the benefits of liquid manure; he had built a tank and thought the cost was nearly repaid in one year; wherever he had applied it, it had made a very visible improvement; but he fancied many used it in two diluted a state, in fact only *stained* water, whereas to do all the good required it ought to contain about half water only. Water was no doubt fertilizing, but when it was called liquid manure it ought to contain the essentials of manure. The colour of his hair would show he was no chicken, and it was rather late in the day for him to study agricultural chemistry, but he would strongly urge all young men to pay attention to it. Before sitting down he begged to propose a vote of thanks to Mr. Ashford for his able lecture.

Mr. Stamp Garrard (Surgeon), Hinckley, in seconding the motion, stated his convictions that the society was considerably indebted to Mr. Ashford for again responding to their wishes and in carrying out the subject so ably. (Carried with applause).

In acknowledging the vote of thanks, Mr. Ashford humorously remarked that the practice of some farmers reminded him of a patient of his, who was suffering from indigestion; he told him he would give him three grains of blue pill, and repeat the dose in two or three days, which cured the man. Well, when he was again troubled with the same complaint, he said, "I have no occasion for the doctor now, I know what to take;" so he took six grains instead of three, and every night instead of twice in the week; and the consequence was that the fellow had to send for him, and was twice as long in getting better as he would have been had he applied to him at first. Just so with farmers: they jump at conclusions, and because one kind of manure has succeeded in a certain instance, they suppose it must under all circumstances; but study, and a careful notice of the component parts of soils and manures, would teach them better.

After a vote of thanks to the Chairman the meeting separated.

It having been the rent audit of the Right Hon. Lady Noel Byron, many of her Ladyship's tenants availed themselves of the opportunity of attending the meeting as visitors.

NEWCASTLE FARMERS' CLUB.

The monthly meeting of this club was held May 5, 1849; Wm. Stephenson, Esq., Throckley House, presided; Ralph Brandling, of Low Gosforth, was elected a member.

Mr. William Shield, read the following paper:—

ON THE BARE SUMMER FALLOWING OF LAND.

In presenting myself before you to fulfil my engagement in essaying a lecture "On Bare Summer Fallows," I must own I do so with some degree of hesitation, as most of you already know that the operative part of husbandry so essential in the experience of the practical farmer has not hitherto been pursued by me. For some time, however, I have given attention to agriculture, with the idea of quitting my present occupation whenever a favourable opportunity offers, in order that the views I entertain on that subject may be effectually carried out on a farm under my own management.

I am not aware that I have any original suggestions to offer in the "Fallowing of Land." Any deviation from the opinions already entertained and expressed by this club, being, for the most part, supported by the successful practice and experience of others, recorded in the most approved works on that subject. I must acknowledge the service I have derived from the writings of Mr. Blacker, the Rev. A. Huxtable, Mr. Jackson, and various other authors of celebrity, from whom, as you will notice, I have drawn rather freely. I have only to observe, in concluding these prefatory remarks, that should you derive one-tenth of the pleasure and information in listening to the contents of this paper, that its preparation for your consideration has yielded me, I shall have to congratulate myself upon no ordinary amount of success, I now proceed to consider the subject itself, which I purpose dividing into the four following heads, viz :—

1st. The peculiar advantages supposed to be derived by land during a summer fallow.

2nd. Whether these have been proved to be advantageous, and whether they will bear the test of investigation.

3rd. Causes and effects of so much land lying under summer fallow.

4th. Suggestions for effectually working the land, and yet dispensing with the "Bare Summer Fallow," after the first year.

In considering the advantages peculiar to the summer fallowing of land, I shall briefly quote the opinions of some distinguished farmers in favour of it, in order that persons whose minds are not yet decided upon the point may judge for themselves, when testimonies from others of an opposite character are adduced. Mr. Brown, of Markle, was of opinion that, "Without summer fallows perfect husbandry was unattainable on all heavy or cold soils, and upon every variety on a close or retentive bottom." Sir John Sinclair, whose name is familiar to every intelligent agriculturist, says, "On such soils the universal opinion of experienced farmers is, that summer fallows cannot be dispensed with. They are accounted the foundation of their fertility." The following opinions are recorded by Sir John, in his "Husbandry of Scotland," from highly accredited persons: "Summer fallowing is undoubtedly the chief source of improvement in clay soils." "—and the point on which depends their culture in Scotland." "They rectify the texture of clay soils that have become hard and impervious to sun and air by being ploughed wet in winter." "They are advocated in consideration of little more than half the quantity of manure being required." "Land thereby being left in infinitely superior condition." "The crop of wheat being so much more abundant than after beans." "Because thereby the farmer can alone be enabled to pay a high rent." "And finally in consideration of naked fallows paying better than drilled crops," &c., &c. "Peculiar advantages are supposed to be afforded by exposure of every particle of soil to the influence of air, and to the heat of the sun. Also, by the destruction of weeds and insects." "The destruction of the poisonous properties of the excrements of plants." "By having the whole summer to cultivate, thereby rendering mechanical force unnecessary, and so forth." Professor Lowe says, "One reason for the adoption of summer fallow on stiff clays is, that it affords the best preparation for wheat, which is the most valuable of our cereal productions." The contents of Mr. Matthews' communication are expressive of the same views. But, gentlemen, notwithstanding all that has been brought forward in support of this long-established custom, I cannot think the arguments to establish their pre-eminence by any means conclusive; I shall therefore endeavour to show you, from the practice of approved husbandry, from my own observation, and from the light of science, that the "Bare Summer Fallow" is not the most advantageous method of preparing land for corn, and that it would be better laid aside altogether, in doing which I shall rest the basis of my argument upon the supposition that the great essentials of all good farming—*thorough draining and subsoil ploughing*—have been effectually carried out; and this leads me to consider, in the second place, *whether the supposed advantages of Bare Summer Fallowing will stand the test of investigation.*

In questioning the merits of the various opinions already alluded to, I shall not proceed in the regular order of their arrangement, but at once commence by asking the question, *Does the exposure of the bare soil to the action of the air and sun produce the beneficial results stated?* and then give you reasons for my deviation. I have no doubt that great advantage is derived by exposure of the soil to the influence of the frost, air, and rain, as I shall afterwards endeavour to show; but on the other hand I decidedly think the benefits arising from a scorching sun, during the summer months, extremely questionable. Professor Liebig says: "The careful and frequent working of fallow land will accelerate and increase its disintegration; but for the purpose of culture, it is quite the same whether the land is covered with weeds, or with a plant which does not extract the potash of the soil. The culture of potatoes or turnips will not impair the fertility, because they require no silica." If you refer to Rham's Dictionary of the Farm, you will find that, after an extraordinary thick crop of beans in Sussex, no less than five quarters of wheat per imperial acre were produced. Mr. Main, of Chelsea, advocated the shading of land from the heat of the sun in consideration of all the rich juices of the manure, or natural decomposing vegetable matter, being evaporated, and asks why it is that one good thick standing crop is always followed by another? Why lea wheat is better when the clover has been mowed twice than it is when depastured? And why the land is always found to be in better heart after a heavy green crop than after a white one? The answer is, because the soil has become completely shaded from the sun. If a heap of stones be suffered to lie on a bare fallow throughout the summer, and be not removed till seed time, the spot will not only be visible by a much stronger growth of corn in the first year, but for several years afterwards. And this must not be attributed to any chemical effect produced by the stones, for the very same effect was produced where inadvertently an old wooden door had been left upon a fallow during the summer. If you read Mr. Dudgeon's essay printed in the Royal English Agricultural Journal, you will find the following quotation :—" Wide drills, besides causing considerable waste of ground, prevent the land acquiring the benefit of that fertility which accrues from a close and complete covering." Mr. Jackson also, whose prize essays you have probably read, in speaking of the turnip as a fallow crop in cleansing the soil from weeds, says, "The leaves being large and spreading afford a shade which retains the moisture, and tends to decompose any vegetable matter in the ground." Now, gentlemen, when you remember that the moisture of the atmosphere and carbonic acid are two of the principal agents in causing the disintegration of the mineral properties of the soil, you will see that Mr. Jackson's assertion carries weight with it. Mr. Bailey, in his survey of Durham, thirty-six years ago, disputed the renewed fertility of dry soils by summer fallowing, alleging " that experience has proved they can bear a crop of turnips of considerable value, and after that a crop of wheat equal, *if not superior*, to what it would have been from naked summer fallow, *and the land left in an equal state of fertility*," and concludes by saying, " the restorative fertility must therefore be owing to another cause." And for a moment we shall consider what this cause is. The decreased fertility of soils arises from the alkaline salts and soluble silica being removed by plants, and the object of fallowing is to restore them. There are many of opinion that fallowing is to allow the land a rest; but it is not so. The land is more at rest when under a crop, than it is when under fallow; and, if you will allow me a familiar illustration, it may possibly appear to you in the same light. In winter the bees in a hive are comparatively at rest, because they are being nourished by the food laid up in store for them during the summer. And so it is with the soil. The time of fallow is the time mineral solutions are being formed and deposited for the supply of the future crop; the mineral constituents of the soil being the materials acted upon and subdued by the gases of the atmosphere. After which the soil rests, and is then the passive agent through which the nourishment is absorbed by the roots of the plants. The loosening of the soil by ploughing is not, as is generally supposed, beneficial as a mere mechanical means of fitting it for the growth of plants, but it extends the surface of the constituents of the soil, facilitating the production of soluble matter. The same effect is produced by lime, where its beneficial effects upon stiff clayey soils applied during winter are well known. Lime possesses the properties of decomposing the silicates of the soil, and thus assists in the production of the soluble saline constituents which are indispensable to vegetable life.

With permission I shall, with all possible deference, make an observation or two relative to some suggestions in the two papers already delivered to this club, upon the subject of fallows, and at the same time bring the successful practice of others to bear upon the respective points mentioned in them. So far as the first subject is concerned—the capabilities of clay soils after draining—I have not a word to add. We have a striking proof of what strong barren soils may be made capable of, by a proper application of manures, in the case of Mr. Huxtable, the land being so callous as to defy the application of both plough and spade, and, like the stubborn front of a flinty rock, could only be broken up by the pickaxe, and the result, as you will remember, was a magnificent crop. There is one fallow crop peculiarly adapted to clay soils, which appears to have been almost entirely lost sight of—I allude to the *cabbage*. Certain disadvantages are consequent upon the growth of this valuable plant, but they should be far more formidable before the farmer should decide upon their prohibition. Last summer, I saw some cabbages growing in a field in this neighbourhood, under the management, I was informed, of Mr. James, of Wylam. This is not a new crop. Excellent supplies were produced many years ago, as at Raby; but still, as a regular field crop, they do not make way. Chopped bean straw, well harvested, mixed with cabbages, or swedes, passed through the turnip slicer, has, by experience, been found most nourishing food for cows, oxen, and horses; and these are all fallow crops for strong land. The plan adopted by the Earl of Lovelace, of introducing a row betwixt the drills of beans, might be pursued, I fancy, with great advantage, particularly on small strong-land farms near large towns. The objection of the injury done to the land in carting off the turnip crop has also been brought to bear more powerfully against the cabbage: but I should grow the cabbage as an auxiliary crop, not looking to it at all when the land was wet, following the plan of storing the turnips, by which this evil would be remedied.

With respect to fallowing, as a relief to turnip soils, there is very much truth in what has been adduced relative to the exhaustion of the soil by the too frequent repetition of turnips and other crops; but whether fallowing be the best means of restoring fertility or not may be questioned. I shall call your attention to another method, which proved perfectly successful, and was practised on the farm of Saughton, three miles from Edinburgh. The system of farming upon it was of the most liberal description, and for a number of years Mr. Dods, the tenant, found the happiest results from his liberality. His farm being conducted on the four-shift rotation, at length gave way, and in spite of the most liberal manuring, became more and more unproductive. Attached to a system which had made his fortune, he thought of no change to cure the evil, and at the end of his tack, against the wish of the proprietor, he gave up his farm in disgust. Mr. Binnie, an opulent grazier, got the farm on lease, and with all expedition laid it down to pasture. Nothing could exceed the produce of grass, and when again broken up for tillage, all the fertility which his predecessor had experienced was fully realized.

I shall now make a passing observation respecting *bone earth*, as that subject has already been presented to your notice in connection with summer fallow. I must acknowledge, however, that I scarcely feel myself competent to touch upon chemistry in this paper, as I do not profess any knowledge of that delightful science: but as I have, upon a former occasion, borrowed my ideas from scientific men, I may, perhaps, be allowed the same privilege again, I believe it is allowed generally that phosphate of lime or bone earth is absolutely necessary to the formation of the seeds of all plants: consequently, that ingredient must be greatly in request for corn crops. It now remains to be considered which is the best way of restoring that ingredient to the ground for the production of grain? As already observed, it is not to be found in the droppings of sheep fed upon turnips alone: but if a supply of corn or oil-cake be given during the depasturation, the object will have been in some degree attained. Of corn, the inner part of the seed furnishes one per cent. of ash, of which more than 3-4ths consists of earthy phosphates. The bran or outer covering leaves from 7 to 8 per cent., which shows how rich it is in phosphates. On reference to Professor Liebig's classification of plants, we find that turnips are potass plants, and that wheat is a silica plant. This being the case, gentlemen, would it not have been a more advantageous practice for the farmer to have manured freely for his turnips with the dung of cows or pigs fed upon bran—mixed, if you like, sometime before, with crushed bones or guano—upon which the roots of the turnips would luxuriate, leaving at the same time nearly the whole of the soluble silicates in the soil for the nourishment of the succeeding wheat crops, than allowing the land to lie under naked fallow for a year? The waste of the liquid strength of the manure during winter is also prevented in this way.

I shall now touch cursorily upon the *culture of land of no decided character*. Mr. Ramsey pointed out a method for improving the soil so as to render it capable of producing good crops; therefore, I shall say little upon the subject, further than an allusion to a field of very poor land drained at Drayton, by Sir Robert Peel, some years ago, an account of which was furnished by the right honourable baronet in a letter to Mr. Pusey. This field, previous to draining and subsoiling, would produce nothing. In the opinion of Dr. Buckland, it very much resembled Mr. Smith's property at Deanston, prior to his improvements. I was in the neighbourhood, a few weeks ago, and went purposely to see it. It was as dry and friable as possible, although there had been rain a day or two before. The surface of this and the adjoining field is covered with loose stones, the same as in many parts of Scotland; it appeared in beautiful order for a crop, and no doubt will produce a good one. After this field was drained, Sir Robert was recommended to fallow it for wheat; but, following his better judgment, he grew turnips; and Mr. Wilson, the farm bailiff at Drayton, whose kindness (together with that of Mr. Grundy, the land agent) I should especially mention, told me the first crop of swedes produced 26 tons per imperial acre, and mangold wurzel 34 tons ditto. The turnips, however, have never since produced so luxuriantly, owing probably to bone manure never being applied. One acre of this field is now devoted to an experimental crop of pumpkins. You probably know, gentlemen, what miserable land there was in Norfolk, previous to the enterprising spirit of the late Earl of Leicester. When that nobleman first succeeded to the estates at Holkham, the rental was £2,200, but before his death, by improved culture and the introduction of green crops, it was increased to £22,000. The rental of the farms in the parish of Melrose, also, rose from £4,000 to £20,000 per annum, owing, I believe, to the same cause. In all cases, however, I am not willing to let the fault rest exclusively with the land, as in the case of those praiseworthy industrious farmers under consideration. I, of all others, ought to be slow to speak in such matters, but really I do think mismanagement is apparent in the preparation and sowing of their potato and turnip crops. There is such a thing as false economy in the culture of land, as in other things; and the farmer who does not keep men and horses enough for all necessary work, carries on his business in a very unprofitable manner. I was staying at Ryton, last autumn, and used to pay great attention to the systematic routine of operations going forward, on Mr. Stephenson's farm, at Throckley. The shearers were reaping in such numbers as I had rarely before seen, and you know, gentlemen, that in ordinary cases all gives way to harvesting; but it was not so here, for while every possible attention was being given to this all-important branch of rural economy, the full complement of ploughmen were steadily pursuing their work, in, what I conceived to be, the last ploughing of the summer fallow. In drawing the comparison between the two systems of management, I was forcibly reminded of what I had somewhere heard or read, "That a man ought to be judged of by the treatment of his summer fallow."

In strong clays, where the turnip cannot be cultivated to advantage, the bean and the cabbage can. Turnips are said to be the soul of the best husbandry, which, together with increased culture of tares, makes the arable farmer support as much stock as a grazier.

The advantage of tillage spoken of by Professor Johnston may, to my mind, be more applicable to the much greater benefit derived by land from exposure to the autumnal sun and the pulverising influence of a penetrating winter's atmosphere than to the summer's sun. Would not the parts of the soil be more effectually and minutely divided during a winter than a summer fallow? The best way to answer the question is to allow the soil to speak for itself. Expose a portion of a clay soil to the action of the weather for six or eight weeks in summer, and let the same description of soil be exposed for the same length of time in winter, and see whether that under the latter treatment does not become more friable and in a fitter state for the roots of plants, with *less mechanical power* to subdue it, than that which underwent the summer procees.

I shall now, as briefly as the subject will admit of, advert to one of the other advantages supposed to be derived by bare fallowing, namely—*The destruction of the poisonous properties of the excrements of plants.* If we admit this fact, as many do, and amongst others Professor Low, who takes exactly the view entertained by some of the members of this club, at first sight the benefits appear very great; but in dipping a little deeper, those benefits vanish, and instead of favouring the practice, it furnishes a material argument against it, for the following reasons :—In admitting the excretions of plants to be injurious to the growth of the same species of plant from which they have been emitted, we must also admit that those exudations, though poison to them, form the nutritive food of other crops—in support of which the following account is recorded of an experiment tried by some foreign naturalists, which may throw light upon our path, and possibly point out the necessity of *continued cropping* under judicious alternations. " When the soil has become much impregnated with the exudations of any particular vegetable, they are supposed to poison it—so far as to be injurious to the same species of plant, and the land is then said to have been over-cropped, though these exudations may assist the nourishment of other plants. The bean exists in clean water, which continues nearly clear, although it assumes a yellow tinge, occasioned, as was found, by the discharge from the plants of a gummy matter, and a little carbonate of lime. Fresh plants of beans did not live well in the same water; but in order to ascertain whether this was occasioned by the exuded matter, plants of wheat were put in the water, and they throve perfectly; the colour of the water became lighter, the sediment was reduced, and it was evident that the wheat plants had absorbed a portion of the matter discharged by the beans. From this it may be inferred that the experiment justifies the practice of sowing wheat after beans."

If this exudation be nutritive to alternate crops, the destruction of its fertilizing properties by summer fallowing must be an evil. But many scientific men do not agree in this theoretical view of humus. Liebig thinks it " untenable ; and it becomes evident, from most conclusive proofs, that humus *in the form in which it exists in the soil,* does not yield the smallest nourishment to plants ; it is a lasting source of carbonic acid, yielding food to the rootlets of seeds at a time when, being destitute of leaves, they cannot extract food from the air. During the decay of vegetable matter, carbonic acid and ammonia are evolved, and upon the completion of the process, and the entire dissolution and destruction of the humus, nothing remains behind but the inorganic matters, which the plants themselves would have left in the form of ashes had they been consumed by fire.

It is alleged that "land is left in infinitely better condition after summer fallow than after any other preparation ; that it is the best preparation for wheat, &c." But upon this point, as upon many others, farmers are at issue. It were natural to suppose that when the fallowing of land was carried to its greatest extent the wheat crop must have been very abundant, and that the land must have been kept remarkably clean ; but the Rev. Mr. Rham tells us a very different story. In his Dictionary of the Farm, you will find that "Four times the seed was a full average for corn crops, and the land was overrun with weeds after a single crop." Hence, it was not an uncommon practice to have fallow every other year, and this was considered a superior system. "Beans," said the late Mr. Young, "after clover, is most excellent husbandry, and preferable to sowing wheat *on the bare summer fallow,* which does better after beans, and also enables the farmer to get two profitable crops instead of one." Dr. Charles Stuart, near Edinburgh, during a period of fourteen years, never once had recourse to summer fallowing; he produced four crops of potatoes, three of beans, and seven of wheat. The wheat produced was from thirty-two to forty-one bushels per imperial acre. Mr. Woodward, in his speech at Drayton, "wished strongly to impress upon the company how very essential green crops were to the growth of corn. Another person of eminence in the agricultural world said, "By all means let us get as heavy crops as possible of green plants, for thus, most assuredly, shall we chiefly increase the permanent fertility of our lands." Mr. Young, whom I have already quoted, in speaking of the preparation of land for corn, said, "that the land may be cleaned under drilled beans as well as by a fallow, and the crop suceeded by corn; but if the soil be in such order that this culture is insufficient to cleanse it, then a second crop of drilled beans should succeed, which will be very profitable husbandry, and cannot fail to bring the land into order." So far as naked fallows paying better than drilled crops. I cannot see any reason why such should be the case. The same author, in his directions to young farmers, upwards of forty years ago, said, "If the spirited husbandman calculates the expense of a summer fallow, and also the account of a drilled bean crop, he will find the necessity of this culture." He calls, even in those days, fallowing for wheat an unprofitable practice; a practice the well-informed husbandman will, after his first year, but rarely have recourse to. Mr. Blacker, in his invaluable little treatise on small farms, says, "Green crops are more profitable than corn crops when consumed by cattle house-fed. Another reason assigned is: "that little more than half the quantity of manure is required."" The Rev. Mr. Huxtable is of opinion that farms should, as much as possible, be made self-supporting; and I think that gentleman has already done much to shew that they may be made so. Mr. Blacker shows very clearly that the ground required in pasture to feed a cow during the summer only, would, if under green crops, feed three the whole year round; and that the manure produced by one of these cows, house-fed and well bedded, would be fully equal to that produced by three cows pastured in summer, and fed in winter upon dry hay or straw; thus making it appear that, by breaking up a given quantity of pasture, and substituting green crops, nine times the amount of manure may be obtained. Is it, then, too much, gentlemen, to let the same rule bear upon the summer fallow, and place the subject in the shape of a rule-of-three question, thus:—If an acre of green crops produce nine times as much manure as an acre of pasture, how much manure will a bare summer fallow produce? The answer obviously is, None at all. Showing the great loss of manure consequent upon the fallow not being the productive nursery of manure for the farm.

The following are, what I conceive to be, a few of the causes of so much summer fallow.—One great cause, as already observed, is want of drainage, without which, I dare say, we are all agreed that summer fallows are indispensable. Another, want of capital, which precludes the purchase of a sufficient quantity of stock, thereby laying aside the necessity of green crops. A third, want of manure, consequent upon deficiency of stock. A fourth, want of disposition to deviate from an old custom; and a final cause is, where capital does exist, the want of its spirited application and judicious outlay in the most approved courses of culture. And this brings me to consider—

The effects consequent upon fallowing.—Want of profitable employment to a vast number of labourers is not the most unimportant. for if you will follow the various branches that shoot out from this root, you will be surprised how far and wide they spread. Increased employment for the labouring community might be obtained in rich abundance, with great profit to the landowner, by improving the estates in this favoured country. On Whitfield farm, the property of the Earl of Ducie, previous to improvement, only three men, two women, and one boy were employed. After the improvements, twelve men, nine women, and five boys. On the Rev. Mr. Huxtable's farm, after completion of improvements, the labourers constantly employed were increased fourfold. On these farms I fancy you will have some difficulty in finding a fallow field, for certainly the bare fallow affords no means for furthering the object under notice. Another consequent evil—insufficient stock to supply the demand of the people, followed by importations of foreign cattle. In the year 1847 there were imported into this country—27,811 bulls and oxen; 35,138 cows; 136,527 sheep. If you refer to pages 17 and 18 of Mr. Huxtable's lectures on manures, you will find a very ingenious calculation, the result of which is to show the comparative value of the dung of a cow for one year, with guano, or money—and it appears that £8 is the sum, provided everything be saved. But, in order that we may not over-rate the value, we shall put it down at £5 per head per annum, and take, in round numbers, ten sheep to a bullock. I have taken no notice of either pigs or calves, which properly ought to have appeared.

Cows, oxen, &c.	£62,949
Sheep, 10 to a bullock	13,652
Total	76,601
Or, adding the trifling fraction of	3,399 for pigs and calves,
Making the total	£80,000

for oxen, which at £5 per head for manure amounts to £400,000; making it appear that, in the year

1847, *at the lowest average*, that enormous sum was lost in manure alone, and turned to good account by the enterprising foreigner. Over and above this, in the same year, *nine millions* four hundred and thirty-six thousand six hundred and seventy-seven quarters of various kinds of corn were imported.

But I fear I shall be thought tedious. I must, therefore, with all convenient speed, bring forward the concluding subject of this address, viz. :—A few suggestions for effectually working the land, and yet entirely doing away with the summer fallow after the first year. The subsoil of land when properly drained may be compared to the drying floor of a malt kiln, the holes of which, whilst affording an outlet for superfluous moisture, admit a fresh and grateful current of heat and air, the advantage of which cannot well be over-rated in the culture of soils. Rain water, in flowing through these apertures, acts as a fertilizer, together with the atmospheric air, which is an indispensable element in their culture. When land has thus been effectually drained, much has been accomplished—the foundation of all improvements laid, and the great barrier to constant cropping removed. In Yorkshire, not far from Catterick, there are two distinguished farmers who have frequently received the prizes from the York Agricultural Society for the best managed farms in that district—I allude to Messrs. Outhwaite, of Bainessee—who have for many years been in the habit of applying very large quantities of salt in the preparation of their land for wheat, which preparation they make during the autumn and winter, by thoroughly working the soil and incorporating it with the salt. Now salt acts not only as a powerful enemy to the insects and weeds, but also as a friend, in the following ways :—It causes, in the first place, the rapid decomposition of the roots and fibres of plants, thereby adding humus to the soil. It is found valuable in land highly manured for wheat in preventing rankness in vegetation, and in stiffening and increasing the weight of straw, so as to bear the additional weight of the ear. When salt has been applied, the straw of wheat appears small, stiff, shiny, and wiry. And now to the point : if, immediately after harvest, the stubbles were pared with a paring plough, and led off to the fold-yard as litter, the land being then deeply ploughed, and allowed to remain till November, I fancy a better preparation would be made towards the following crop, and more advantages gained by the field than allowing it to remain as a useless stubble during the winter. After this exposure to the atmosphere, say in November, I should cause it to be deeply cross-ploughed, leaving the land lying as rough, and the clods as large as ever possible during the whole winter. Under this management I doubt not that the soil would be easily worked in the spring for any crop that might be required.

Gentlemen, I am aware that this is at variance with agricultural practice. I once mentioned the subject in this room, and Mr. Stephenson, with the majority present, disapproved of the system; but I am bold enough to bring it under your notice once more, as my opinion is in no way changed, and should of all things wish it to provoke discussion. It is done every year in gardens by the spade with great effect; and agriculture may very properly be viewed as horticulture on an enlarged scale, and the greater approximation to gardening in the culture of our fields, the nearer approach to perfection. I should certainly never attempt this course where the land was not drained. But when efficiently drained, in what can the difference consist between the management of the soil in a field and a garden? In both cases, as a matter of course, it would yield to the gases of the atmosphere. The surface being large, disintegration and decomposition would be promoted, and thereby the soil would become recharged, as it were, with the necessary constituents of vegetable fibre.

You may think it strange that I should have occupied your time so long upon this subject, without dwelling at some length upon the valuable properties of lime and burnt clay in the treatment of fallows. It is not because they have been disregarded, but because I think they are subjects of such paramount importance that they might be dwelt upon separately by some of the members of the club. It is now, however, quite time you were relieved from the tedious burthen I have imposed upon you by this prolonged dissertation on fallows. I must, therefore, draw to a close, in the expression of my very cordial acknowledgments for your polite and patient hearing of it.

After the reading of the paper, an animated discussion took place, in which Mr. Brown, Mr. Colbeck, Mr. Taylor, Mr. Weeks, Mr. Burnett, and the Chairman, took part. It was generally argued that it would be unsafe to do away with bare fallowing on many soils, particularly in this part of the country, and in the present state of agricultural knowledge.

On the motion of Mr. Taylor, seconded by Mr. Burnett, thanks were voted to Mr. Shield, for the interesting and valuable suggestions contained in his paper.

The meeting then broke up.

THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

A Weekly Council was held at the Society's House, in Hanover Square, on Tuesday, the 29th of May; present, Mr. Raymond Barker, Vice-President, in the Chair; Hon. Capt. Dudley Pelham, R.N.; Sir Matthew White Ridley, Bart.; Sir James Ramsay, Bart.; Mr. J. Alliston; Mr. F. Brown; Mr. D. Burton, jun.; Colonel Challoner; Mr. H. Colman; Mr. Capel Cure; Mr. G. Dyer; Rev. Philip Gurdon; Mr. Gurdon Rebow; Mr. Hillyard; Mr. Kinder; Mr. W. Matchett; Mr. Milward; Mr. C. E. Overman; Mr. Parkins; Mr. Chandos Pole; Professor Sewell; Mr. Tweed, and Professor Way. The Baron Hoeufft de Velsen, Secretary to the Royal Agricultural Society of Amsterdam, was present at this meeting, on an introduction from Sir William Jackson Hooker, of the Royal Gardens, at Kew.

Prize Essays.—Mr. Pusey, M.P., Chairman of the Journal Committee, reported the following awards made by the Judges of Essays:—

I. The Society's Prize of £50 for the best Essay on the construction of Labourers' Cottages, awarded to HENRY GODDARD, Architect and Surveyor, Lincoln.

II. The Society's Prize of £20 for the second-best Essay on the construction of Labourers' Cottages, awarded to JOHN YOUNG MACVICAR, of Barkwith House, Wragby, Lincolnshire.

Mr. Pusey also reported, that the Judges had *commended* the Essay, on the same subject, bearing the motto "Omega."

Communications on the Forty-day Maize and the vegetable fibre impeding the flow of drains, were received, and formed the subject of interesting discussion.

Sir James Ramsay presented a private copy of Professor Ramsay's article on the Agriculture of the Ancients, separately reprinted from the Dictionary of Classical Literature and Antiquities, published by Messrs. John Taylor and Co., publishers to University College, London.—Mr. Colman presented a copy of his European Agriculture.—Mr. Bullen, Sec. to the R. A. I. Society of Ireland, presented a copy of the volume of the Agr. and Industrial Journal of Ireland, for 1848.—Mr. Jephson Rowley, of Rowthorne, near Chesterfield, presented a copy of his Essay on the Farming of Derbyshire, to which the Prize of Mr. Thompson, President of the North Derbyshire Agr. Society, had been awarded.

The Council ordered their best thanks for the favour of these communications, and adjourned to Tuesday, June 5.

A Monthly Council was held at the Society's House, in Hanover Square, on Tuesday, the 5th of June; the following members of Council and Governors were present:—The Right Hon. Lord Portman, Trustee, in the chair; Lord Henniker; Hon. R. H. Clive, M.P.; Hon. Capt. Pelham, R.N.; Sir M. W. Ridley, Bart.; Sir C. Lemon, Bart., M.P.; Sir J. B. V. Johnstone, Bart., M.P.; Sir R. Price, Bart., M.P.; Colonel Austen; Mr. Raymond Barker; Mr. Barnett; Mr. H. Blanshard; Mr. Bramston, M.P.; Mr. Brandreth; Mr. Burke; Capt. Stanley Carr; Mr. F. C. Cherry; Mr. E. Denison, M.P.; Mr. Garrett; Mr. Brandreth Gibbs; Mr. Hillyard; Mr. Fisher Hobbs; Mr. Hudson (Castleacre); Mr. Lawes; Mr. Miles, M.P.; Mr. Milward; Mr. Pendarves, M.P.; Mr. Pusey, M.P.; Prof. Sewell; Mr. Shaw (London); Prof. Simonds; Mr. Stansfield, M.P.; Mr. G. Turner; Mr. T. Turner; and Mr. Henry Wilson.

Finances.—Mr. Raymond Barker presented to the Council the Report of the Finance Committee on the Accounts during the past month, from which it appeared that, on the 31st of May last, the current cash-balance in the hands of the Bankers was £1,743 (including the Norwich subscription, and life compositions for investment). This report, and the Report of the House Committee, transmitted by Colonel Challoner, were adopted by the Council.

Agricultural Chemistry.—Mr. Pusey, M.P., Chairman of the Chemical Committee, presented the following Report of that Committee, which was also adopted by the Council.

"The Chemical Committee have considered the charges for the different subjects of analysis, and have seen no reason for any material alteration in the scale, which stands as follows:—

"No. 1. An opinion as to the genuineness of a manure in the market.—7s. 6d. By this is meant such an opinion as could be formed by a scientific person, by inspection, with a few simple confirmatory experiments.—[It will protect from fraud, but is not calculated to assist materially in the choice of the *best* specimens, where all are *genuine;* it will inform the applicant whether a specimen of guano, or oilcake for instance, be adulterated or not; but will not touch the question of its relative value as a pure specimen. Such an opinion will only apply to ordinary market articles, as guano, oilcake, superphosphate of lime, sulphate of ammonia, gypsum, common salt, &c.] No. 2. Guano. A determination of the nitrogen (ammonia), and of the earthy phosphates, &c.—£1. No. 3. Limestone. The proportion of lime.—7s. 6d.; the proportion of magnesia.—10s.; the proportion of lime and magnesia.—15s. This analysis is sufficient for many purposes; but in most limestones the phosphate and sulphate of lime and magnesia are present, though in small proportions; and inasmuch as it is impossible to say how much of the effect may be due to other *minute* ingredients, it is recommended that their quantity should always be determined. No. 4. Limestone, or Marls, including carbonate, phosphate, and sulphate of lime, and magnesia, with sand and clay.—£1. No. 5. Partial analysis of a soil, including sand, clay, organic matter, and carbonate of lime.—£1. No. 6. Complete analysis of a soil, —£3. No. 7.—Letter, asking advice, *one* topic, 7s. 6d. On more than one topic, 10s. No. 8. Oilcake, or dung, or any animal products, nitrogen, and phosphoric acid.—£1. Oilcake, including nitrogen, oil, and phosphoric acid, 30s. They have also added a ninth subject, namely: No. 9. A determination of the quantity of carbonate and sulphate of lime in any specimen of water.—£1.

"They recommend a grant of £300 for the ensuing year, to be apportioned in the following manner :—

"1. A sum not exceeding £100 for an account of analyses of guano (a paper on which subject is nearly completed). 2. A sum not exceeding £100 for an account of analyses of oilcake and linseed, with reference to the nutritive qualities of different specimens. 3. A sum not exceeding £100 for an account of analyses of chalk and marls used in top-dressings.

"The Committee further recommend :—

"That when Mr. Way is applied to for an analysis, he shall inform the applicant of the cost of such analysis, together with the cost of carriage of any specimen sent up, and shall not be authorized to make such analysis until the amount due shall be sent to him.

"That a printed copy of this resolution be sent to every Member applying for an analysis."

Diseases of Cattle.—Mr. Raymond Barker, Chairman of the Veterinary Committee, presented the following Report of that Committee, which was adopted by the Council.

"The Veterinary Committee have had under their consideration the suggestion of the Hon. R. H. Clive, referred to them by the Council at their last monthly meeting, namely :—

"That a first-rate veterinary surgeon should be sent, on the part of the Society, into districts of the country where disease of any kind may prevail extensively among the live stock of farmers; with an instruction to such veterinary surgeon that he should report to the Council the result of his personal examination into the circumstances of such disease, and into the local cause of its occurrence or aggravation, as well as the measures he would recommend for arresting its progress, and preventing its further outbreak in other districts.

"The Committee have agreed to recommend to the Council the adoption of this measure so far, that a sum not exceeding £200 be placed at the disposal of the Committee, who shall carry out the proposed plan, after reporting, at a future meeting, the detail of their further proceedings for the confirmation of the Council."

Norwich Meeting.—The Chairman reported the satisfactory progress of the arrangements for the ensuing Country Meeting of the Society at Norwich, in the week commencing Monday, the 16th of July.

Judges.—The Chairman also reported the progress made by the Judges' Committee in their selection of Judges for the Norwich Meeting.

Implement Prizes.—The Council agreed to a preliminary arrangement of the Schedule of Prizes for Implements, to be offered by the Society for competition at the Exeter Meeting, in 1850; and ordered its final settlement to be made by the Council at their Monthly Meeting in August next, agreeably with their resolution of March, 1847. Mr. Garrett gave notice that, at the next Monthly Council in July, he should move the appointment of a committee, "to take into consideration the recommendation of implement-makers, generally, exhibiting at the annual meetings, as regards discontinuing the prizes for implements, and to determine whether an improved system of showing them to the public may not be adopted."

Exeter Meeting.—The following General Exeter Committee was appointed : Earl of Chichester (*Chairman*), Hr. Sillifant (*Vice-Chairman*), Mr. Raymond Barker, Mr. Brandreth, Mr. Shaw (London), Mr. Fisher Hobbs, Mr. Milward, Mr. G. Turner, Mr. Brandreth Gibbs, Mr. Fulford, Sir T. D. Acland, Bart., M.P., Colonel Challoner, Sir C. Lemon, Bart., M.P., Mr. Pendarves, M.P., Mr. W. Miles, M.P., Lord Portman, Hon. Capt. Pelham, and Mr. Buller, of Downes.

Committees.—The names of Mr. Burke and Mr. T. R. Tweed were added to the Farming Account Committee; and that of Mr. E. Denison, M.P., to the Veterinary Committee.

Draining.—Lord Portman, the Hon. R. H. Clive, Sir M. W. Ridley, and Mr. Milward, favoured the Council with their experience of the effects of water of different quality on turf and stone drains, and the cases in which the earthy matter impregnating the water in certain districts impeded, on deposition, the action of stone drains, while turf drains on Lord Portman's property under such circumstances had remained uninjured during a period of forty years, his stone drains having become completely stopped up. Mr. Clive's stone drains had remained perfectly free, and he would inform the Council of the quality of the water flowing through them. The complete details connected with Lord Portman's results would be given to the Members in the ensuing number of the Journal of the Society.

Tussac Grass.—The Hon. R. H. Clive apprised the Council that Capt. Moody, late Governor of the Falkland Islands, intended to be present at the Council weekly meeting on that day fortnight (June 19), for the purpose of giving to the Members his personal experience of the cultivation of the Tussac Grass in those islands.

Vegetable Fibre in Drains.—Sir M. W. Ridley, Bart., presented a copy of the Journal of the Northumberland Agricultural Society for the current year, containing information on the stoppage of drains by vegetable fibres.

The Council then adjourned to Tuesday, June 12.

A Weekly Council was held at the Society's House in Hanover Square, on Tuesday, the 12th of June. Present—The Earl of Chichester, President, in the chair ; Lord Camoys ; Hon. R. H. Clive, M.P. ; Hon. B. Lawley ; Sir M. W. Ridley, Bart. ; Sir Francis Lawley, Bart. ; Mr. Raymond Barker ; Mr. French Burke ; Mr. Burton, jun. ; Dr. Calvert ; Capt. Stanley Carr ; Colonel Challoner ; Mr. Copeman ; Mr. G. Dean ; Mr. Dyer ; Mr. Foley, M.P. ; Mr. Fuller, M.P. ; Mr. Brandreth Gibbs ; Mr. Hillyard ; Mr. Hyett ; Rev. C. E. Keene ; Mr. Kinder ; Mr. Marshall, M.P. ; Mr. Milward ; Mr. C. E. Overman ; Mr. Rodwell ; Professor Sewell ; Mr. Shelley ; Mr. Slaney, M.P. ; Mr. Stansfield, M.P. ; Mr. T. Turner ; Professor Way ; Mr. B. Webster ; and Mr. Woolryche Whitmore.

Wheat and Maize.—The Hon. H.W. Wilson, of Keythorpe Hall, Leicestershire, transmitted to the Council his gardener's report of the trial he had made of the last Australian Wheat, presented to the Society by Lady Franklin and Lieutenant Simpkinson. The Wheat was sown on the 21st of May in two seed-pans, and placed in a melon-house. They came up on the 25th, and were planted out on the 30th. The height of the plants was seven inches, and their number 478. One half of the seed was steeped in warm water, but did not come up so early as the unsteeped seed by a day. Mr. Rodwell had obtained most beautiful Wheat directly from Australia, and had cultivated it on his estate in Suffolk for two years with success; but he found it not to be adapted to our climate, but to be subject to gradual deterioration in quality.—Sir M. W. Ridley had grown Van Diemen's Land Wheat in Northumberland on strong flat clay land near the coast; and as the crops had proved fine ones, and the seed might be regarded in some measure as acclimatised, he would take an opportunity, at a future Council, of presenting a supply of it for distribution among the members.—Dr. Calvert had cultivated the Adelaide Wheat for two years in the North Riding of Yorkshire, but, although it came early to maturity, the ears were short, the crop was scanty, and the quality was found to become deteriorated, as in the case of Mr. Rodwell's.—Colonel Challoner had this year the finest crop of spring Talavera Wheat that he had ever seen, from seed which had been grown at the Horticultural Society's Gardens under treatment with sulphate of ammonia, and sown in the second week in February — Mr. Rodwell had been a cultivator of Talavera Wheat for 25 years; he had found the present season more favourable to spring Wheats than any former one within his experience, especially to the Talavera variety.—Mr. Slaney, M.P., took that opportunity of remarking, that all the instances he had heard of the trial of the Forty-day Maize, which formed the subject of discussion at a former meeting of the Council, were successful. The seed, in every case, was growing and doing well, and giving a fair promise of fulfilling what had been predicated of it. He particularly alluded to one of the trials made in St. James's Park.—Mr. Raymond Barker had planted his Forty-day Maize on the 22nd of May, on a chalk bank, and found that it vegetated almost immediately.—The Hon. R. H. Clive, M.P., thought the whole question of the successful cultivation of this variety of grain was one of economy, and that it was most essential to ascertain whether, if found susceptible of cultivation in this country, it would furnish a cheaper and better crop than other grain.—The Earl of Chichester had spent two summers in the valleys of the Pyrenees, in which this variety of Maize was stated to have been raised, and introduced from thence for trial in the southern districts of England. At the time of his sojourn in that part of the Continent, he was not aware that the variety of Maize in question was grown there, having been subsequently, he believed, cultivated by Mr. Keene, who had brought it under the notice of the Council. He had himself found the climate of the Pyrenees anything but a cold one, or similar to our own; and the soil, in all the valleys he had visited, was most fertile. Until the introduction of this Forty-day Maize, the Indian Corn of Cobbett was the variety with which his lordship was best acquainted; and he had never found any difficulty in ripening it, nor was there any trouble in making it do well in the garden; the difficulty he had found was to get soil on the farm that would prove sufficiently good for it.

American Ploughs.—Mr. Love, of Naseby Manor, Northamptonshire, transmitted to the Council the report of his trials of the American ploughs presented to the Society, in comparison with the best ploughs of our own country. On the motion of Mr. Shelley, the thanks of the Council were ordered to Mr. Love for the favour of this report; and Colonel Challoner, as Steward of the department of Field Implements at the Norwich meeting, was requested to take measures for the further trial of these ploughs on that occasion, provided proper shares could be found adapted to their use.

Potatoes.—Mr. Pentland, a member of the Society residing at Black Hall, Drogheda, Ireland, informed the Council that the crops in that district looked most promising, no potato disease having, at the date of his communication (June 8), made its appearance; but that a curious insect had attacked the Beech leaves.—The Earl of Chichester remarked that his Vines had become diseased in the same manner as in former years, previous to the occurrence of the Potato blight.—Prof. Way reported the opinion of Prof. Lindley that there was no doubt, from external premonitory evidences, that the Potato disease would again prevail this year.—Mr. Wolryche Whitmore, of Dudmaston, near Bridgenorth, Shropshire, related to the Council the success with which he had grown Potatoes on very poor light land, that had never under any management produced a good crop of corn. The first trial in 1847 was so decidedly successful, that in 1848 he was induced to plant 28 acres of the same land with Potatoes in the same way. The Potatoes were a mixture of various sorts, the small ones being planted whole, and the larger ones cut up into sets. They were planted about the end of February or the beginning of March, and manured in the drills with half-inch bone, applied in different doses to different parts of the land, the smallest quantity being at the rate of about three quarters per acre. The difference in the crop, in consequence of this difference in the application of bone-manure, was very striking; the highly manured land yielding 125 bags of Potatoes, the other portions only 80 bags. The tops of the Potato plants were affected in July with disease; but, upon taking up the crop, not above 5 per cent. were found to be seriously affected. The whole crop when sold realized £600. An opinion was entertained, that the light nature and poor quality of the soil, and the gradual manner in which the powerful bone-manure would be supplied to the tubers, were circumstances that might probably account for this successful mode of cultivation.—The Hon. R. H. Clive, M.P., was last autumn in Mr. Whitmore's neighbourhood when he inspected the crop of Potatoes to which he had referred, and he never saw a more luxuriant growth, or a finer produce, than on that occasion. That instance of successful cultivation on bad light soil, and the result of the example set, by the Guardians of the Poor near Mr. Whitmore's residence, of the industrial employment of the children of the poor in farming occupations, clearly proved to him, that there was no knowing to what an extent the poorest land of this country may be made to be productive when its cultivation is attempted under the influence of active industry and intelligence.

Industrial School Farms. — Mr. Whitmore had much pleasure in detailing to the Council the particulars of the industrial employment of children in farming occupations, to which the Hon. Mr. Clive had made reference. The school-farm is situate at Quatt, and belongs to the Bridgenorth Union, the children being separated from the workhouse at Bridgenorth. It is managed by a master, acting in the double capacity of master of the house and schoolmaster, and his wife is matron. Their united salary is £50, with rations. The house is capable of accommodating 49 children: there are now (March 25th, 1849) 32 boys and 17 girls; of these 19 boys are above 10, and 13 from 5 to 10; of the girls 5 only are above 10, and 12 under 10 years of age, many of them under 7 years. Of the 19 boys above 10, one is a cripple, and unable to use the spade. The school is industrial; the boys being employed in the cultivation of 4½ acres of land, and in the management of cows, pigs, and poultry. Three, and occasionally four, cows are kept, and from four to eight pigs. The girls are employed in the house and dairy work, in washing, ironing, and baking, together with sewing, knitting, and making their own clothes, &c., &c. The produce is disposed of—first, in supplying the inmates of the school with what skim milk and potatoes are required for their consumption, charged at market prices, and the rest, such as butter, pigs, and calves, are sold at Bridgenorth. The children, like all others in a workhouse, are clothed and fed by the union. Their time is usually thus employed: they rise at half-past 5 in the summer, and at a quarter before 7 in the winter; they work till 8; school from 9 till 12; dine at 1; and at 2 P.M. they go to their work—the boys to their field and garden, and the girls to their sewing, knitting, &c. They leave work at 5, and sup at 6, after which they play an hour or more, if the weather permit; and, as they sing in the church, they practise the psalms and chants for the following Sunday, and the day is closed with prayers. The profits of the farm are carried to the account of the union; they amount to from £60 to £70 per annum on an average, after paying rent and taxes, together with a per centage on the buildings, draining, &c. This profit is attributable chiefly to the labour being performed by the boys, and not charged, and from the abundance of liquid manure, arising from all the drainage of the house, cow-house, and pigsties, being preserved in a tank, and constantly applied to the land; sometimes to the growing vegetables. The crops grown are Carrots, Cabbage, Mangold Wurzel, Potatoes, Turnips, Rape, Italian Rye Grass, and Vetches; following in quick succession, so that the land is never allowed to lie idle, except in the dead of winter, at which time a plentiful supply of liquid manure is given to all the land not having a crop upon it, and being thus prepared it requires but little in the spring to enable it to bear the next crop. The implements used are the spade, fork, rake, hoe, liquid manure barrel, and cart; the two latter shift and go upon the same wheels.

The following is a copy of the ledger account for the year ending Lady Day, 1849:

QUATT SCHOOL FARM IN ACCOUNT WITH CASH.

Receipts from Lady-day, 1848, to Lady day, 1849

	£	s.	d.
To cash from sale of Potatoes	29	3	6
To cash from sale of Milk	49	13	8½
To cash from sale of Butter	41	4	6½
To cash from sale of Live Stock	90	1	6
To cash from sale of Cabbage Plants	0	7	0
To stock in hand on Lady-day, 1849 (as per valuation)	66	0	6
	£276	10	9

Expenditure from Lady-day, 1848, to Lady-day, 1849.

	£	s.	d.
By purchase of Food	36	9	10
By purchase of Seeds	4	15	5½
By purchase of Live Stock	61	11	7
By purchase of Tools, Implements, &c.	3	0	8½
By purchase of Manure	0	11	11
By purchase of Straw	6	0	0
By purchase of Sundries	2	9	11
By cash, a Year's Rent, including interest expended in the erection of Building, Draining, Rates, &c.	19	6	0
By Stock in hand on Lady-day, 1848 (as per valuation)	75	7	6
By Profit and Loss	67	17	10
	£276	10	9

Liquid Manure.—Mr. Slaney, M.P., in fully corroborating the statements made by Mr. Clive and Mr. Whitmore, on the successful working of the industrial schools attached to workhouses, dwelt on the peculiar connection between the plan by which their utility was evidenced, and the system of applying liquid manure to agricultural crops. Experiments were going on, under the superintendence of the Sanitary Commissioners, which would most satisfactorily prove the mutual advantage to be derived by all parties from the economical use of town sewerage. By such removal of the outcasts of towns, the fertility of the country round was increased, and a boon was created for the agriculturist, at the same time that the health of the people was promoted.—The Earl of Chichester regarded these instances of the successful employment of liquid manure, as confirming Mr. Chadwick's report, presented to the Council by his lordship (on the part of the Earl of Carlisle), at a former meeting.—Mr. Whitmore thought the greatest step that could be taken at the present time for the promotion of agriculture, would be the devising of means for the application of liquid manure, at all times, to crops, as occasion might require. He alluded to an instance in which Mr. Huxtable's plan had been adopted, of laying down wooden bored tubes for distributing liquid manure to a field of Italian rye-grass, by which a wonderful crop was obtained, computed to amount to 118 tons per acre. It had been cut five times in the course of the summer, and would have kept five cows during that period. These tubes could be laid down at from £2 to £3 per acre; and seeing the difficulty of managing the distribution of liquid manure by hose, inasmuch as they are very apt to get out of order, and not distribute evenly, he was inclined to believe that its distribution by tubes under ground, and water-carts, is the best mode of application. He did not depend solely on urine, but also on the solid manure mixed with it in the dissolving tank. This tank was separated from the lower tank by means of a perforated division, which acted as a percolator, seive, or grating, allowing the dissolved manure to pass through its interstices, as the solution proceeded into the lower tank, from which it was pumped as required, by means of a forcing pump, into an upright pipe (∩ similar in form to an arch, or inverted U), of which the top of the curve was somewhat above the highest level on which the manure would have to be applied to the land, and formed a kind of high level reservoir.—Colonel Challoner had found the liquid manure applied on a sunny day to burn the crop. He generally mixed his pig manure with three times its bulk of water. In the case of Italian Rye-Grass, he followed Mr. Dickenson's directions. In general he found it a safe practical rule to test the strength of his liquid manure by a previous trial on seeds in a garden-pot.—Mr. Rodwell thought that much depended on the nature of the soil in reference to adjusting the strength of liquid manure.—Sir Francis Lawly remarked that as no ordinary application to vegetable matter was more caustic than strong liquid manure, especially on a hot day, it was important that the proper strength, in all cases, should be duly attended to.—Mr. Whitmore adopted Mr. Huxtable's rule, which was, not to confine himself simply to the urine of his stock, but to dissolve in it all things in his farm of a manuring nature, and then so to adjust the strength of his liquid manure by dilution with water as to render it most suitable to the plant.—The Earl of Chichester had known the use of diluted gas-water turn a Clover crop brown, early in its growth, which afterwards proved most abundant and profitable. He always employed such manures in a highly diluted state.—Mr. Hillyard said his system was to have no liquid manure: he thought it best to have all the urine of the cattle absorbed by the straw. This year he had 74 oxen in the stall, and about 20 store-steers in his farm-yard, feeding on straw. He considered that all excess of rain-water ought to be conveyed away from the buildings by open conduits or gutters placed under the eaves; and that a portion of the yard ought to be made of a concave form. He allowed that liquid manure might answer to others, who bred cattle as well as fed them, though not to himself. His great object had been to make all the manure he possibly could on his farm. He applied the stall-feeding manure, when trodden down by the cattle in the yard, to his land; but that made near the barn-door, generally containing a quantity of seeds of weeds, he always had thrown up into a heap for the purpose of undergoing sufficient fermentation to destroy the vegetative power of such seed-weeds. He applied all the manure to his root-crops; and that part of them which he drew off for stall-feeding he sowed with Wheat.—Dr. Calvert, Mr. Whitmore, Mr. Milward, Mr. Brandreth Gibbs, Mr. Foley, M.P., Sir F. Lawley, Earl of Chichester, and Prof. Way, then discussed the questions of the exhausting nature of Italian Rye-Grass as a crop, the particular variety best adapted for culture, the proposal for sowing it with each Barley crop, and the substitution of a Swede Turnip for a Potato crop.—Prof. Way thought the great advantage of liquid manure was its constant readiness for use whenever required. The proper place for manure was in the soil, where no loss or deterioration could take place, whatever was the quantity so deposited.—Mr. Rodwell remarked that his own example in not having manure heaps on his farms had induced the greater part of his neighbours to adopt the same plan.—The Earl of Chichester observed that such management of the manure was part of the Holkham system.—Mr. Raymond Barker cited the authority of Arthur Young and Sir H. Davy for the practice of taking away the manure immediately.—Mr. Hyett thought it important that it should be clearly defined what was meant by "liquid manure," and whether it was assumed that liquid manure resulting from the treatment of the solid with the liquid excrements contained all the manuring elements originally present under those two forms. He would ask, for instance, whether any silica was returned to the soil in the state of urine?—Professor Way agreed that it was not, but that all manure, properly so called, might be applied in the liquid state.—Mr. Milward always mixed the dung and urine together in his tanks.—Dr. Calvert thought it advisable to have all tanks at a higher elevation than that of the green crops to which their contents were to be applied.—The Earl of Chichester remarked that if all manure can be reduced into a liquid state, assumed to contain the same ingredients, and be got on the land at a moderate expense, it would seem the most desirable course to employ only liquid manure on arable land. If his own tanks were 100 feet higher, he should certainly adopt that course—Colonel Challoner alluded to the operation pointed out to him by Lord Camoys, by which all the liquid manure on a farm was pumped into a reservoir 60 feet high.—Professor Way thought such simple elevation of the liquid manure was preferable to an arrangement in which the homestead was above the level of the farm; for, in such case, all the produce to be housed would have to come up-hill homeward.—Mr. Slaney, M.P., remarked that the cost of conveying liquid manure on the land was the main thing. Wooden pipes bored had been referred to, but earthenware pipes burnt, glazed and unglazed, were now made for the purpose, and at daily reduced prices. Earthenware conduits could now be made cheaper than brick drains, the pipes having lipped orifices, fitting each other accurately.—The Earl of Chichester thought there was no difficulty in getting cheap earthenware pipes, nor in employing them, if there was a sufficient fall from the level to carry away their contents. He doubted whether earthenware pipes would bear a high pressure. —Mr. Slaney replied that the subject was a most interesting one, and that experiments were in progress on the point referred to by his lordship.—Sir Francis Lawley suggested that a prize should be offered by the Society for an essay or report on the most advantageous modes of applying liquid manure under different circumstances.

Norwich Meeting.—Mr. Brandreth Gibbs, Director of the Show at the Norwich Meeting, reported that, having examined the certificates of stock entered for that Show, the number of animals equalled those entered for the Society's prizes at any former Meeting.

Mr. John Martin, K.L. (the celebrated artist), presented a series of his reports and plans on Metropolitan Improvements.—The Royal College of Chemistry, the first Volume of their Reports and Researches; Mr. Rodwell, a copy of Mr. Welton's Lecture on the Mutual Relation of Landlord and Tenant; Mr. Davies, a copy of the Regulations of the Ludlow Agricultural Society; Mr. Buller, a copy of the Premiums of the R.A.I. Society of Ireland.—Mr. Colchester, a copy of his Hints on the Employment of Agricultural Labourers. For all which the Council ordered their usual thanks.

The Council then adjourned to Tuesday, June 19.

A Weekly Council was held at the Society's House in Hanover-square, on Tuesday, the 19th of June: present—The Earl of Chichester, President, in the Chair; Marquis of Downshire; Lord Camoys; Hon. R. H. Clive, M.P.; Sir John V. B. Johnstone, Bart., M.P.; Sir Arthur B. de Capell Broke, Bart.; Sir Robert Price, Bart, M.P.; Sir John P. Boileau, Bart.; Mr. Alliston; Mr. Seymour Allen; Mr. John Baines; Mr. Raymond Barker; Mr. Barwell; Mr. Beale Brown; Mr. W. Burroughes; Mr. Burton; Dr. Calvert; Rev. T. Cator; Colonel Challoner; Mr. F. C. Cherry; Mr. Copeman; Mr. Capel Cure; Mr. Evelyn Denison, M.P.; Mr. Dyer; Mr. Brandreth Gibbs; Mr. Gurdon Rebow; Mr. Gooch, M.P.; Mr. B. Hall; Mr. Fisher Hobbs; Mr. Kinder; Mr. W. Miles, M.P.; Mr. Milward; Mr. C. E. Overman; Mr. Parkins; Mr. Chandos Pole; Captain Randolph, R.N.; Prof. Sewell; Mr. Shaw, of London; Prof. Simonds; Mr. Bridgman Simpson; Rev. T. P. Slapp; Mr. A. Smith; Mr. Spencer Stanhope; Mr. Stansfield, M.P.; Mr. Hampden Turner; Mr. Thos. Turner; Mr. T. R. Tweed; Prof. Way; Mr. Wolryche Whitmore; Mr. Thos. Williams; and Mr. Edmund Wodehouse, M.P. Captain Moody, R.E., late Governor of the Falkland Islands, was also present on the introduction of the Hon. Robert H. Clive, M.P.

Capt. Moody favoured the Council with a detail of his personal experience in the cultivation of the Tussac Grass of the Falkland Islands; and his Excellency Sir Harry Smith transmitted from the Cape of Good Hope a communication on the breeding of Horses.

NEW MEMBERS.

Lord William Pawlett, of Downham Hall, near Brandon, was elected a Governor of the Society.

Allen, B. Haigh, Longcrofts Hall, Lichfield Staffordshire
Barberie, John, Housedean Farm, Falmer, Lewes, Sussex
Bayes, T. H., Hope Farm, Iltringham, Aylsham, Norfolk
Belding, George, jun., Newmarket Road, Norwich
Belding, George, Newmarket Road, Norwich
Birkbeck, Henry, Norwich
Boileau, John Elliot, Ketteringham Park, Wymondham, Norf.
Box, Philip. Radcleive, Buckingham
Boyd, Thomas, Holt, Norfolk
Brandford, W. W., Godwick, Litcham, Norfolk
Buller, Sir John B. Yarde, Bart., M.P. Lupton, Torquay, Devon
Buller, John Yarde, Churston Court, Torquay, Devon
Bulwer, Rev. James, Aylsham, Norfolk
Campbell, Robert, Fakenham, Norf.
Cockell, Charles, Bridgham, East Harling, Norfolk
Copeman, Thomas, Aylsham, Norfolk
Copeman, Geo., Aylsham, Norfolk
Cottingham, Edmund, Chunb Farm, Cove-Hythe, Wrentham, Suff.
Culley, John, jun., Guton Hall, Norwich
Curl, Jacob, East Winch, Lynn Regis
Davy, Joseph, Kelling, Holt, Norfolk
De Winton, J. Jeffreys, Priory Hill, Brecon
Dewing, Augustus, Ash Wicken, Lynn Regis
Domett, Samuel, Westhay, Axminster, Devon
Ebbett's, John, Witchingham, Reepham, Norfolk
Fariell, Wm. Frederick, Bakeham House, Egham, Surrey
Fergusson, Archibald, Dunfallandy, Pitlochry, Perthshire
Freeman, W., Heigham Grove, Norwich
Fullford, Baldwin, Great Fulford, Exeter
Gall, John, New Buckenham, Norfolk
Gay, James, Thurning Hall, Norfolk
Golding, William, jun., Leavers, East Peckham, Kent
Gowing, George, Trowse, Norwich
Hardy, W. H. Cozens, Letheringsett Hall, Holt, Norfolk
Harvey, Sir Robert John, Moushold House, Norwich
Harvey, Robert John, Braeondale, Norwich
Haydon, Samuel, Guildford, Surrey
Hews, Richard Scott, Hoo Hall, Rivenhall, Witham, Essex
Holmes, Frederick, Tibbenham, Norfolk
Hole, William, Hannaford, Barnstaple, Devon
Hotson, John, Long Stratton, Norfolk
Hudson, John, jun., Lower Swell, Stow-on-the-Wold, Gloucester.
Hughes, Alfred, Stow Park, Bungay, Suffolk
Ingle, Thomas, M.D., Wood Hall, Hilgay, Norfolk
Izon, John, Sowe, Coventry, Warwickshire
Ling, Henry, Norwich
Long, Richard Penruddocke, Rood-Ashton, Trowbridge, Wilts
Loveband, John, Parsonage, Bishopsnympton, South Molton, Devon
Lovick, James J., Thorpe, Norwich.
Mann, John, Thornage, Dereham, Norfolk
Marryat, Frank, Langham Manor, Norfolk
Mayhew, Joshua, Holly Cottage, Ridge Road, Enfield, Middlesex
Morle, Thomas B., Cannington Park, Bridgwater, Somerset
Mercer, William, Grove House, Hunton, Maidstone, Kent.
Muskett, Alfred, Raynham, Fakenham
Newman, Matthew, Hayes Court, Uxbridge, Middlesex
Nunn, E. C., Diss, Norfolk
Paine, John Denton, Risby, Bury St. Edmund's.
Palmer, Arthur, Birmingham Lodge, East Dereham, Norf.
Parker, George, Bixley, Norwich
Parkinson, Thomas, Ley Fields, Newark, Notts
Parmeter, Robert William, Aylsham, Norfolk
Patchett, Rev. Wm. Henry, Dishforth, Thirsk, York.
Pitman, James S., Dunchidcock House, Exeter
Pellew, Hon. and Very Rev. George, D.D., Deanery, Norwich

Punchard, Charles, Blunt's Hall, Haverhill, Suffolk
Ridgway, Thomas, Lymm, Warrington, Lancashire
Sage, Edward, Furze House, Romford, Essex
Salisbury, Edward Dodson, Middleton Tower, Lancaster
Scott, J. B., Bungay, Suffolk
Sillifant, John, Coombe, Crediton, Devon
Smith, Richard, Kimberley, Norfolk
Spinks, Abraham, West Bilney, Lynn, Norfolk
Spurling, William, Grange Farm, Worlingworth, Suffolk
Steward, R., The Armoury, Southtown, Yarmouth, Norfolk
Tompsett, James, Hextall Court, East Peckham
Trethewy, Henry, Grampound, Cornwall
Trethewy, Henry, jun., Silsoe, Beds.
Vickers, Samuel, Sprotborough, Doncaster
Whistler, John, Brancaster, Norfolk
White, Thomas, Elly Hill, Houghton-le-Skern, Darlington, Durham
Winthrop, Rev. Benjamin, Clifton, Bristol
Witt, Edward, Fornham All-Saint's Hall, Bury St. Edmund's
Woodcock, John G., Briston, Dereham, Norfolk.

DEATH OF MATTHEW CULLEY, ESQ.

In our Obituary will be found a name familiar to all who have studied the rise and progress of British agriculture. About the middle of the last century, the three Mr. Culleys—Matthew, George, and James—left their paternal estate of Denton, in the southern border of the county of Durham, where the family had long ranked among the class known as the "squires of England," and, like the adventurous voyager, pushed onwards in the search of a new and more favourable land for the scene of their exertions. At that time, the now fertile and highly-cultivated district on Tweedside lay much as nature made it, and the ruthless raids of the Border warfare had left it; broom, whin, and low scrubby brushwood covered the beautiful hill sides; rank, coarse grass filled the rich bottom lands, and only round the small villages was found proof in the "croft lands" of its fertility, and adaptation to the pursuits of the industrious husbandman. The Messrs. Culley, with the "pilot's wary eye," saw, at a glance, the assurance of an unexhausted mine of wealth, and in the far distance a land "flowing with milk and honey." Having obtained a long lease of a portion of the yet trackless waste, they at once set to work with that indomitable perseverance for which Englishmen are so celebrated in all quarters of the globe. In a few short years, had an inhabitant of the Vale been absent and returned to his native home, he would have fancied that Aladdin and his genii had been there. The broom, whin, and scrub had disappeared; the wild waste was changed as by magic into smiling inclosures; trim hedges divided the corn from the grass; the stock, instead of wandering undisturbed over the downs, and denuded by the thorny brake of half their fleeces, now peaceably depastured in large enclosures, rich in green and luxuriant herbage, and filling the air with the perfume of the scented clover.

The example of the Culleys was soon followed, and hill and dale quickly changed their outward appearance, and the district, late so desolate, became the first in character in the agricultural world of England. Unshackled by prejudice, the Messrs. Culley travelled to wherever any portion of the country held out a prospect of improving their knowledge, or adding to their store of useful and practical information. Drill husbandry was introduced, the Bakewell breed of horses was imported, shorthorns and Leicester sheep became the general stock of the district, and the name of Culley became famous in the annals of the country.

In the year 1813, the last of the three brothers—George Culley—was called from the scene of his labours. He was succeeded in his estates of Fowberry and Denton, by his only son, Matthew Culley, whose name occurs in our obituary notice of this day. After passing the early portion of his life in active pursuits, Mr. Culley retired from business, and has resided for about 40 years at his beautiful seat of Fowberry Tower, purchased by his father, and which was once a portion of the princely estate of the Blakes. Mr. Culley applied himself to all the local interests of his neighbourhood, and as a magistrate was deservedly looked up to by all who knew him, combining strict unflinching justice, tempered with that attribute of all good men—pitying mercy.

After a life spent in intimate and endearing intimacy with all the neighbourhood, he has passed away without having made an enemy, and without leaving one acquaintance who will not grieve for his loss with heartfelt sorrow. Mr. Culley is succeeded in his estates by his nephew, George Darling, Esq., of Hetton House, who will assume the name of Culley—a name well known in the agricultural world. Mr. Darling was the first to point the attention of farmers to the necessity of changing the time of planting the potato. We well remember the astonishment evinced in the faces of those present at a meeting of the Northumberland Agricultural Society, held at Belford, when he introduced the subject, and stated that for several years he had been in the habit of planting potatoes in autumn. It seemed a startling fact, but it was immediately taken up by several of the party, and followed out successfully by Mr. Grey, of Dilston, Mr. Thompson, of Paston, Mr. Hunt, of Thornington, and others; and is now all but universal in well-cultivated districts.

The name of Culley is not likely to lose in the next generation its well-earned celebrity: George, the eldest son of Mr. Darling, gives promise of high talent. He is receiving his education under the guidance of Dr. Iliff, at Sunderland Grange, and is first boy in that well-known school, in the mathematical class; and, from the early promise of his youth, bids fair to add lustre to the name of his fathers.—Mark Lane Express.

DESTRUCTIVE HAILSTORMS.

On Tuesday, June 5th, this metropolis and its vicinity were visited by a severe and somewhat disastrous thunder-storm, which appeared to take a direction eastwards, doing considerable damage in its course both to tender out-door crops and the numerous glass structures which everywhere abound in the suburbs of London. We learn that this storm was severely felt, early on Tuesday morning, in the counties of Hants, Wilts, and the western part of the county of Surrey; and about two o'clock on Tuesday afternoon it reached the metropolis and passed over parts of Essex. About Turnham Green and Hammersmith the storm was accompanied with hail, and the market-gardeners at Starch Green had their crops and glass frames damaged. Baron Rothschild, at Gunnersbury House, had 3,940 squares of glass broken; Mr. Day, of Hammersmith, was also a sufferer from the same cause. In the gardens of the Royal Botanic Society, in the Regent's Park, irregular oblong pieces of ice fell, upwards of three inches in circumference, where a few panes of glass were also broken, and three or four squares of the 21 oz. glass in the large conservatory cracked. At the Clapton Nursery, Messrs. Lowe and Co. have had eight or nine thousand squares broken in the roofs of their stoves and green-houses, and much damage of the same kind done in that neighbourhood. Glass is cheap, but labour is dear; and while an appalling thunder-storm, accompanied by hail, may at any time demolish acres of glass, and, as in the case of fires, which occasionally consume ranges of houses, or, it may be, almost entire towns or cities—as, for instance, Hamburgh—and while, in the cases of cities or towns, palaces speedily rise in the place of huts, so also is it with glass-houses: large glass takes the place of small glass, and uniformity, order, neatness, and increased utility, take the place of roofs of patchwork: for an example of which we may refer to Mr. Chapman's vineries at Vauxhall now, as compared with what they were before the disastrous hail-storm which occurred three or four years ago. We say that, although in this instance, as in many others which experience forces upon us, ultimate good comes out of what appeared to be nothing but ruin and disaster; yet the price to be paid for this prospective, and it may be certain gain, is often more than those immediately concerned can at the time afford to pay; and therefore we say to all such persons, avail yourselves of the protection offered to you by insurance against damage by hail *(see advertisement of the Royal Farmers' Insurance Institution.)*

Brighton.—The weather on Sunday was excessively hot, the thermometer in the shade showing a temperature of 72, then the highest point of summer; and the night became very sultry. About five o'clock on Monday morning thunder began to growl, and the lightning was rather vivid; and this continued till between six and seven, when a hailstorm occurred similar to that which took place here fifteen years ago, when thousands of windows were broken. Many of the hailstones on Monday were larger than walnuts; and they fell in congealed masses of crystallized ice, committing great havoc among the green-houses at the western part of Brighton. Some of the pieces were 3½ inches in circumference. Mr. Parsons, florist, Western-road, has been one of the greatest sufferers. His hot-houses are opposite Montpelier-crescent, where the storm seems to have raged with the greatest violence. His extensive glass frames are completely riddled; and he estimates that upwards of 6,000 panes are broken. In many places hailstones cut large holes in the glasses, so that they must have fallen with great force. Such was the force of one of them that it perforated a pane of glass and knocked a flower-pot off the shelf below. Mr. Dobie, florist and seedsman in the market, has some houses opposite Western-cottages, which sustained almost as much damage as Mr. Parsons.' Baron Goldsmid, of the Wick, has some thousands of panes broken in his green and hot-houses. It was only a few days ago that the Baron entered into a contract for all his painting and glazing, to commence on Monday, the very day of the storm. The Rev. Mr. Rooper is also a considerable sufferer by the storm. Mr. Bright Smith, of Hove Villa, is a sufferer to the extent of 70 panes. Sir Ralph Darling's conservatory, and the green-houses of Mrs. Steere, of Silwood House, were very much shattered by the hail. Mr. Crunden, New-road, came in for a share of the pelting. The skylight of his furniture warehouse was extensively broken. Mr. Thompson, florist, Western-road, had a large number of panes broken in his green-houses; and Mr. Turrill's green-house at the back of Montpelier-road was riddled all over. The adage, "It's an ill wind that blows nobody good," was perhaps never more truly exemplified than on this occasion. A painter and glazier, out of work, applied to Mr. Walton, of the Norfolk Hotel, for a job on Saturday; and he was told that there was nothing to do on that day, but if he looked in again on Monday, perhaps he might find one. The hailstorm came, a great number of panes were broken in Mr. Walton's green-house, and the glazier was set to work. Just as the storm commenced the butchers were starting for Steyning market; and we have heard more than one or two of them say that the hailstones rattled down so suddenly, and with so much violence, that they fancied for a moment that they were being pelted with stones. One of the journeymen butchers, who invariably rides out without a hat, was sent that morning to the barracks, and he was caught in the midst of the storm. His pate presents a sorry spectacle. The skylights in a number of private houses are more or less shattered, and the hail fell with so much force in many instances as to break plate glass. The eastern part of Brighton escaped the ravages of the storm. The green-houses in Kemp Town have scarcely a pane broken. Mr. Spary, of the Queen's Graperies, in Park-street, lost only between 20 and 30 panes out of about 10,000 superficial feet of glass. The storm did not extend beyond Hove with violence. The largest quantity of hail fell near the Hassocks' Gate Station, but the stones were not larger than marbles. A small cottage below the public-house was completely flooded by the storm; and in several places hailstones might be taken up by bushels. Mr. Andrews's green-houses were much shattered, and a considerable quantity of vegetables and corn was greatly damaged. At Cuckfield the storm was felt, but not with much severity. The hailstones are described by our correspondent as being of the size of marbles. No mischief was done. At Hurstpierpoint the cottage gardens were much injured by the hail. Their appearance was described by one of the occupants to resemble what would be expected had a drove of beasts walked through them. The storm passed over the Dyke-Hill, but no hail fell there.—*Brighton Gazette.*

STAMFORD.—Early on Tuesday morning Stamford and the neighbourhood were visited by an awful thunderstorm. The atmosphere, on the previous evening, was oppressively close, but no other indications of a tempest—of a tempest so terrific and protracted—were noticeable. Soon after one o'clock the first peal of thunder rolled overhead, and in a moment the heavens appeared—nay, were—filled with one sheet of dazzling brightness. From that hour until seven o'clock, with two brief intervals, the storm raged with unabated fury: peal succeeded peal, flash followed flash, rain and hail descending at intervals in torrents. Few remember such a night—a storm so awful and enduring.—*Lincolnshire Chronicle.*

LYNN and its neighbourhood were visited by a heavy thunder-storm on the morning of Tuesday last, accompanied by a tremendous downfall of rain and hail. Eight sheep were killed by the lightning on the farm of Stephen Abbott, Esq., at Castleacre, and a quantity of glass was destroyed by the hail in some greenhouses at Tottenhill and Watlington. Fortunately the corn was not sufficiently advanced to sustain much injury. *Cambridge Independent Press.*

RUGBY.—Between one and three o'clock on Tuesday morning a violent storm passed over this town and neighbourhood. The thunder was unusually loud, and the lightning very vivid. Rain and hail fell in such torrents that the river Avon, which on Monday night was unusually low, in a few hours overflowed its banks, and presented the appearance of a lake. The meadow land, upon which promising crops of grass were growing, will suffer much from the flood.

BANBURY.—In this neighbourhood the storm was very violent, with hail, accompanied by unusually vivid lightning, which made the whole heavens appear one flame of fire. The storm extended in every direction round the town, to Gloucestershire, Warwickshire, and Northamptonshire, in some places lighter than in others. No material injury has, as we have yet heard, been sustained by the wheat crops, but the beans, peas, and potatoes were much beaten down in many places. Several gardens were also greatly injured, and thousands of panes of glass broken in hot-houses, greenhouses, and garden-frames, and several hundred panes in dwelling-houses in Banbury and Bloxham. In Constitution-row not a house escaped without broken windows. At Wroxton Abbey more than 900 squares of glass were broken, and at Messrs. Baughen's, in Banbury, more than 100.—*Northampton Herald.*

In the neighbourhood of Wardington and Culworth, on the Northamptonshire side of Banbury, considerable quantities of glass were broken, and much other damage done. Much injury was done to the wheat and bean crops, more particularly in the parishes of Drayton and Steventon. In the former parish the damage is estimated at about £1,000. Much injury was also done by the breaking of skylights, hot-bed frames, &c. At Bloxham, where the hail-storm seems to have spent its utmost fury, Mr. Hyde, Mr. Randle, Mr. Cother, Mrs. Trevethick, Mr. Willets, and many others, sustained considerable damage, and had numbers of panes of glass broken. The fields and gardens were also much injured. Throughout the neighbourhood considerable damage has been done to the crops, especially to the winter beans, which in some places are nearly destroyed. The potato and pea crops, and the gardens generally are much damaged. The seeds are beaten down as if rolled by a heavy roller, but we hope they are not seriously injured. The wheat and barley crops are generally uninjured. The hailstones were perfectly round when they fell, but soon assumed an oval shape, and many were of the size of a pigeon's egg.—*Oxford Journal.*

At Rugby, serious damage was done to the gardens, and many persons who chiefly depend upon the produce of their allotments are severe sufferers. West-leys and the neighbourhood of Queen-street and Dunchurch-road was one scene of devastation as regards the garden crops.

At Knapton, near Southam, very serious and extensive damage was done to the glass in the green-houses and dwelling-houses, hardly a whole pane being left in the village; the hail-stones, many of which were of great size, falling with such force as to shatter the glass.

NORWICH.—On Tuesday, about three o'clock, thunder was heard in the distance, and rain began to fall. The tempest soon worked up to the city, and vivid flashes of lightning were followed by loud claps of thunder, which rolled over us with appalling effect. During the storm Mr. Squires, of Mulbarton Hall, had a quantity of glass broken in his greenhouse, from a shower of ice, measuring from an inch to an inch and a half in circumference.—*Norfolk News.*

BARNARD CASTLE.—On Monday evening last, Barnard Castle and its immediate neighbourhood were visited with a heavy shower of hail, accompanied with rain and thunder. Several green-houses and skylight windows were broken by the hail, which varied in size from a pea to a large marble, while several were picked up that were near the size of a walnut, and angular in shape.—*Leeds Mercury.*

LEDBURY.—*(From our own Correspondent).*—On Monday evening last this town and neighbourhood were visited with a most terrific thunder-storm. The lightning was awful; and great damage has been done by the rain. On premises at Donnington, near this place, the property of Richard Webb, Esq., the water rose in the fold yard with such rapidity as to force away the walls of some of the buildings, wherein were poultry, of which nearly 100 head perished. A number of pigs (about 14) were also carried away by the flood, but they were afterwards found apparently uninjured.

ABINGDON.—SERIOUS DESTRUCTION OF CROPS BY HAIL.—On Tuesday morning last, about one o'clock, this neighbourhood was visited by a violent thunder-storm. The heat for several days previously had been most oppressive; and on Monday distant thunder was heard all day, which continued until about midnight, when the storm gathered around. The course it took can be traced by the total destruction of the crops where it fell; and we regret to record that Mr. Lyford, of Drayton, near this town, is particularly unfortunate, as the storm passed exactly over his farm—at least, that part where his wheat and beans were growing, which are totally destroyed, and were, we understand, most promising. By the storm he has about 40 acres of beans and as much wheat totally destroyed. Mr. Caudwell, of Drayton, is also a sufferer; but only a portion of his farm was affected by the storm, which appears to have been limited to a small tract, considering its violence. Mr. Humphries and Mr. Cheer, of Sutton Wick, will also sustain a partial loss of ten acres of beans each; but the storm evidently had abated when it reached that village. Its chief fury seems to have been expended upon the land occupied by Mr. Lyford, who, in addition to the injury now sustained, had a fire in his rick-yard last autumn, by which a great amount of property was destroyed.—*Reading Mercury.*

TERRIFIC HAIL-STORM IN BERKSHIRE.—(*From our own Correspondent*).—Abingdon and neighbourhood on Monday night were visited by one of the most terrific hail-storms that we have had for many years, accompanied with thunder and lightning. We regret to hear that a very great deal of injury was done to the corn standing in the fields, more particularly the beans in the parish of Drayton. It is supposed that nearly £1,000 worth of damage is done to the corn, beside the immense number of windows broken. The storm did not extend far, as in some of the neighbouring parishes but little or no damage is done.

The hailstorm on Tuesday was particularly violent in Kentish Town, where a vast number of windows and glass-frames were smashed, the lead on house-tops in several instances rolled up, and, we are sorry to say, the fine old elm tree in front of the assembly-house was broken off just below the branching of the principal limbs. This ancient ornament of the road-side appeared to have taken a fresh lease from its vigorous foliage, but the trunk is hollow to a considerable extent. The size of the hailstones excited universal astonishment, being from one to two inches in length, but elongated like crystals; no glass seemed capable of resisting its force, and the gust of wind that accompanied it was very powerful though of short duration.—*Observer.*

It will be seen by the subjoined extracts from the *Reading Mercury,* that in true English spirit, a subscription is about to be raised to reimburse Mr. Lyford for the serious loss he has sustained by the late severe hail-storm. It appears that the extent of crops destroyed belonging to several persons amount to 395 acres, valued at £2,000. These crops might have been protected by insurance at 6d. (or, at the most, 8d.) per acre (*See advertisement of Royal Farmers' Insurance Office*), and the owners would have received, as a matter of right, that which is now sought to be obtained in the shape of an eleemosynary contribution. It is impossible not to feel for the sufferers in such cases, at the same time it cannot fail to be a source of great regret that parties do not avail themselves of the protection offered, when it can be obtained at so trifling a cost.

HAIL-STORM AT DRAYTON. (*To the Editor of the Reading Mercury*). SIR,—Being a disinterested person, and a resident of the parish of Drayton, I beg to forward you a more correct statement of the dreadful hail-storm which occurred in this village on the 5th instant. I consider the damage to the growing crops exceeds *two thousand pounds,* as there are three hundred and ninety-five acres that are partially or totally destroyed, viz., Mr. Lyford, 109; Mr. Caudwell, 89; Mr. Hyde, 62; Mr. Whitehorn, 54; Mr. Thos. Dewe, 32; Mrs. Tyrrell, 18; Mr. Worrington, 15; Mr. Bradfield, 10; Mr. Mills, 6; and I regret to add it is *all uninsured.* Some idea may be formed of the storm, when I inform you that partridges, larks, and mice, were found dead in the fields—in addition to this, slates were broken to pieces on the roofs, and hundreds of squares of glass were smashed to atoms. The poor will suffer greatly, as the garden produce is much damaged or destroyed. Apologizing for trespassing on your valuable space, I remain, sir, your obedient servant, JOHN DYMOCK, Land Surveyor. *Drayton, 13th June,* 1849.

THE LATE HAIL-STORM.—It will be seen by our advertising columns that the friends of Mr. Lyford have announced a subscription towards the ruinous loss he has sustained by reason of the total destruction of his crops by the hail-storm noticed in our last publication. The destruction to crops by that storm in the parishes of Steventon, Drayton, and Sutton Wick, has been estimated at £2,000. We hope the subscription in his behalf will meet with general support.—*Reading Mercury.*

THUNDER AND HAIL-STORM.—A correspondent informs us that during the night of Friday, and the greater part of the day on Saturday, the villages around the neighbourhood of Aylesbury were visited with a severe storm of hail, rain, and vivid flashes of lightning. At the village of Aston Abbotts, on the evening of Saturday, about 6 o'clock, the storm was very severe, the hail-stones being as large as horse-beans, and the rain descending in a complete sheet of water, the thunder and lightning being at the same time of a most awful description.

HAIL-STORM.—Between three and four o'clock on Tuesday afternoon last, the darkened atmosphere of Rotherham betokened that a storm of no ordinary character was brewing, the wind having suddenly changed from south to due north. The omen was correct, and a tremendous shower of hail-stones commenced, and this continued for nearly half-an-hour, during which time an intermixture of heavy rain was experienced. The hail-stones were not so large as those described in the London papers last week, but some of them were fully an inch in circumference. The worst portion of the storm was felt near Boston Castle, Moorgate, an elevated spot where a number of gardens are situated. It is feared considerable damage has been done.—*Doncaster Gazette.*

THE RECENT HAIL-STORMS IN BERKSHIRE. (*To the Editor of the Mark Lane Express*). Sir,—It is rather a severe reflection on the prudence of the farmers, to find that in an extensive parish like Drayton not one of them (according to your correspondent of last week) is insured. It must surely be a matter of grave consideration, more particularly with those in districts intersected by ranges of hills, and which, from other peculiar causes, are more subject to these visitations, whether they should not make it as much a matter of business to insure their growing crops against damage by hail as they do when harvested against damage by fire: for although, in some instances, the generous spirit of neighbours may reduce the severity of the loss, yet far preferable must it be to reflect that by exercising a moderate forethought a man has protected himself and also set an example of prudence to those around him. The expense cannot be pleaded as an impediment with any reason, as it is now very trifling; and there it no doubt but the expense of insuring in cities and towns to those engaged in trade is in most cases double that of a farmer of similar means, because the premium is in many cases higher, and the Government tax of 3s. per £100 is not charged on hail or fire insurances for agricultural produce. If you can insert these observations in your widely-circulated Journal, it will oblige—A. FARMER.

SHEEP SHEARING EXTRAORDINARY.—On Saturday last Mr. John Baker, jun., of Cuttether, near Liskeard, sheared sixty-three sheep in 16 hours. He commenced at four o'clock in the morning, and finished at 8 o'clock at night, taking the usual time allowed for breakfast and dinner.—*Devonport Journal.*

METEOROLOGICAL DIARY—1849.

Barometer.			Thermometer.			Wind and State.		Atmosphere.			Weather
Day.	8 a. m.	10 p.m.	Min.	Max.	10 p.m.	Direction.	Force.	8 a. m.	2 p.m.	10 p.m.	
	in. cls.	in. cls.									
May 22	29.80	29.85	50	61	51	S. West	lively	cloudy	cloudy	fine	showers
23	29.99	30.17	49	66	61	W.N.W.	gentle	cloudy	sun	fine	fine
24	30.20	30.09	49	72	62	S.W., W.	lively	fine	sun	cloudy	fine
25	29.98	29.98	56	71	62	W. by S.	gentle	cloudy	sun	fine	fine
26	29.98	30.01	55	70	61	W. by S., S.	gentle	cloudy	sun	fine	fine
27	30.03	30.06	55	74	60	S.W., E. by N.	airy	fine	sun	fine	fine
28	30.14	30.20	53	58	56	N. by East	gentle	cloudy	cloudy	cloudy	rainy
29	30.20	30.17	52	70	58	Westerly	gentle	cloudy	sun	fine	fine
30	30.18	30.14	53	72	61	W. by N.	calm	fine	sun	fine	fine
31	30.04	29.98	57	75	62	S. West	lively	cloudy	sun	fine	fine
June 1	30.03	30.09	53	73	62	N. by W., S.	gentle	fine	sun	fine	fine
2	30.10	30.13	55	74	63	N. by W.	gentle	fine	sun	fine	fine
3	30.26	30.22	54	75	60	E., E. by S.	lively	fine	sun	fine	fine
4	30.11	30.00	54	78	64	E., variable	lively	cloudy	sun	fine	fine
5	29.88	29.95	59	79	63	Var., W. by N.	lively	fine	cloudy	cloudy	fine
6	30.06	30.13	58	65	55	Easterly	lively	cloudy	cloudy	cloudy	a shower
7	30.14	30.08	51	72	58	Easterly	brisk	fine	sun	fine	dry
8	30.00	29.90	53	67	56	N. Easterly	brisk	cloudy	cloudy	cloudy	dry
9	29.90	29.84	47	69	53	N. East	brisk	fine	sun	fine	dry
10	29.70	29.76	47	59	48	N. East	brisk	cloudy	cloudy	fine	dry
11	29.77	29.87	44	60	47	Easterly	gentle	cloudy	sun	fine	dry
12	29.90	29.91	43	56	51	N. Westerly	gentle	fine	sun	cloudy	dry
13	30.00	30.10	45	69	51	Easterly	airy	fine	sun	fine	dry
14	30.16	30.05	43	73	55	E.N.E.	lively	fine	sun	fine	dry
15	29.92	29.82	47	69	60	S.E., N.E.	gentle	cloudy	cloudy	cloudy	dry
16	29.86	29.80	53	68	57	N. by E. by W.	gentle	cloudy	cloudy	cloudy	dry
17	29.90	30.00	51	66	57	N.E., N.	airy	cloudy	sun	fine	showers
18	30.10	30.01	47	71	58	S. by W.	airy	fine	sun	fine	dry
19	29.89	29.88	50	60	55	S. West	brisk	fine	cloudy	fine	rain
20	30.13	30.10	49	69	58	W. by S.	gentle	fine	sun	cloudy	dry

ESTIMATED AVERAGES OF JUNE.

Barometer.		Thermometer.		
High.	Low.	High.	Low.	Mean.
30.40	29.60	90	37	58.7

REAL AVERAGE TEMPERATURE OF THE PERIOD.

Highest.	Lowest.	Mean.
68.7	51.0	59.8

Weather and Phenomena.

May 22.—Clouds and rain. 23.—A trace of rain only. 24 to 27.—Four fine, genial days. 28. —Excessively wet. 29, 30, 31.—Beautiful. Solar spots seen on six of these days. June 1, 2.—Lovely weather. 3.—Brilliant and drying. 4.—Cross currents, thundery clouds. 5.—Thunder, distant; sultry at noon. 6.—Cooled by the thunder; rainy. 7.—A bright, cheerful day. 8.—Overcast; cold. 9.—Gleams. 10 to 13. —*Cold, March weather.* 14.—Superb sun; changeable at sunset. 15, 16.—Some gleams; but generally overcast. 17.—Chilly, and showery. 18. —Very sunny; tending to changeable. 19.—Gloomy; fine at sunset; beautiful solar halo. 20. —Sunny. Spots on the sun have been always observed.

Lunations.—May: New moon, 22nd, 7 h. 37 m. morning; first quarter, 28th, 11 h, 23 m. night. June: Full, 5th, 10h. 27 m. night; last quarter, 13th, 10 h. 24 m. night; new moon, 20th, 2 h. 19 m. afternoon, on the eve of the summer solstice, on which may depend the character of the summer.

Remarks referring to Agriculture.—The table will indicate a dry period; but of very low average temperature after the great heat of June 5 (quoted by some at 86 deg. max.) which preceded the thunder and hail-storm. Haymaking has progressed finely, and the crops are heavy; those of the artificial grasses astonishingly so. Hereabouts the crops of corn are very fine: the first wheat-ear seen by me was observed on June the 8th. Rain would do good in East Surrey; but we read that much has fallen in the eastern counties. The promise of abundance is great.

J. Towers.

Croydon.

CALENDAR OF HORTICULTURE.—JULY.

The General Meteorology of the month of June, and its effects upon fruits and vegetables, form the subject of the concluding paragraphs. I, therefore, commence with the

Operations in the Kitchen Garden.

July, unless in peculiarly dry seasons, is the only month wherein Britain has its periodical rains; such, therefore, may be reasonably expected. If, however, a summer's drought set in—as was the case in 1847—the gardener ought to prepare his ground for seed-sowing, by drenching the spot with water from a fine rose-pot, three successive evenings, and by covering it with stout mats throughout the day. If the soil has been previously digged and settled, it will not become hard or bound by these waterings; and the seeds sown on the 4th morning will all vegetate, provided the mats be laid over the ground daily till the plants rise. I have long impressed these practical facts, because surface waterings do more harm than good in parching weather.

First period of ten days.—Sow purple, green, and white Cape *Broccoli*, to come to the table in April next year. *Kidney beans* the last crop. *Lettuce* of any early kinds—cos, or cabbage—but the early-seeded black Gotte, and the tennis-ball, are nice and speedy hearters. Paris Cos is said to fly up for seed rarely, if the true sort can be obtained. *Turnips*, for winter supply: the early stone and the Dutch are best for table use, and all do better in the open field than in the garden.

Peas seldom answer; but if the ground be deep, rich in decayed matter, and have been soaked with water to the depth of a foot, Mr. Knight's tall marrow, sown in rows six feet asunder, and properly staked, may bear a valuable supply in September and October. Hoe among parsnips, carrots, beets, onions, and turnips; and thin out any that closely approach one another—six to eight inches are average distances.

Second period of ten days.—Plant out broccoli of every sort for spring use. Dig the ground thoroughly, and incorporate manure; let it settle; then, in the evening, dibble, or work the holes by trowel; place each plant at the proper distance, and fill the hole with water; two to three feet are the distances; and the varieties may be Grange's cauliflower, cream colour, and early white, for supplies from October to February; early purple for March, Portsmouth cream colour for April and May (very large heads), Miller's dwarf white, cauliflower white, and Chappell's cream colour for May. *Savoys* and *winter greens*, including Buda or Jerusalem Kale. *Celery*, either in trench, or on the flat surface of deep and rich ground. Preserve all the roots, but divest each plant of its side shoots, and give a very liberal watering, which repeat for several evenings, if the weather continue dry.

Small salads.—Some cress, mustard, radish, lettuce, if the supply required be constant, should be sown almost weekly. *Onions* to stand over winter, but not before the last week. Black and white turnip-rooted Spanish radish are to be sown in the second period; the black is most esteemed; it grows to a large size if thinned to six inches apart: white and red Italian turnip-radish raised last month ought now to be thinned to stand at half that distance. *Melons* and *cucumbers* no longer need any artificial heat, though hand-glasses, or glazed pits, are yet required, in order to defend the plants from drenching rains and burning sun. The stopping of the fruit-bearing laterals is still required; and occasional sprinklings, before closing the lights after warm days, are very beneficial in suppressing the acarus. The fruit of melons ought to be gathered before it becomes dead ripe. Cucumbers take more water than melons, and, if prudently managed, the produce will be very considerable. The plants on open ridges, sown expressly for *Girkins*, should be trained in regular order, and if duly watered in hot weather will grow rapidly.

Last period of ten days. Garlic and *shallots.*—When the leaves change colour and begin to wither, pull up those which are most ripe, but leave others to attain their full size and become quite ripe. Treat large onions in the same way.

Leeks.—Transplant as before directed, in rows a foot asunder, and in wide dibbled holes six inches apart; drop into each a little fine rich earth, and water it, just to fix the roots.

Sweet herbs.—Attend to these according to previous directions.

Cabbage colewerts.—Gardeners produce these from hearting plants which have been once cut over for use. The stumps produce secondary sprouts, and those serve for autumn and winter "greens." But the true colewert is raised expressly from the seeds of the best York, Battersea, and sugar-loaf varieties, sown now in beds, on an open spot or wide border of prepared earth, moderately thick, trodden and raked in. In August and September the larger plants are removed (retaining the smaller), to be planted in rows 12 inches apart, and at half that distance in the rows.

Gather ripe seeds; cut and dry aromatic herbs; clear the ground, removing stalks, haulm, decayed leaves, and every kind of litter. All these matters placed in some proper place in heaps, and wetted with house-slops and suds, adding occasionally a light covering of fine earth, wood-ash, and soot, will progressively decay, and yield a valuable compound manure. The hard stumps of cauliflower and the like, when thoroughly dry, can be burned, and thus converted to alkaline inorganic vegetable ash.

Fruit Department.

At the beginning of July thin the later apricots, the earliest peaches and nectarines, and at other periods those which ripen later. Finish the removal of all superfluous and ill-seated wood, after which, when the July growth has nearly ceased, train in and nail the well-placed shoots of the year as successional bearers. Continue the operation of syringing to remove insects and dirt; if the season be dry give a liberal watering over the roots, and renew the mulching in order to keep in the moisture of the ground.

Figs.—Cut away superfluous, rampant shoots, particularly those formed near the root, retaining only such as can be trained orderly, and that promise to be fruitful. Fertility is certainly induced by timely pressing the green tops between the third and second joint below the summits till the tissue feel to give way. The gardener ought to foresee the development of young figs, so as to be prepared to nip off all that are formed by the 10th of August; a second development will be the result, and on such only for a crop of next year can any dependence be placed.

Vines.—Retain all the leaves of the fruitful shoots; cut those back at their second joint above a cluster. Secure and train these shoots, and continue to shorten to one eye, every new shoot from the laterals retained as next year's bearers. Wherever a trellis can be adapted to fruit-walls just so far off only as to permit the free use of the fingers, tying-in will be found better than the old practice of nailing.

Strawberries.—When new plantations are contemplated, beds of deep mellow loam should be dug and levelled to receive the runner-plantlets now rooted at the first process from plants which are *seen* to be fertile. Security would be obtained by having pegged each selected plantlet in a small pot, whence it could be removed, ball entire, to its proper bed. Many persons nurse these runner plants one season before final planting; but if the weather be moist, time must be gained by setting them at once in their beds, in rows two feet asunder every way, or if in a single long row a yard apart, giving liberal watering if the weather prove dry. I have found that the British Queen has prospered wonderfully in border-rows first put out in the spring of 1847, at one yard or more apart, the intermediate spaces being occupied by another set of runner plants in 1848. Both sets are now surprisingly productive.

Espaliers, wall and low dwarf *apple* trees will now require a very nice and particular pruning to produce fruit-spurs; I have frequently urged the amateur gardener to perform this operation only once, in order to avoid that trouble which the common practice of a two-fold pruning will entail upon him. During the semi-ripening of the spring-formed breast-wood in June, it has been found useful to half break those shoots, leaving them suspended so as to check the sap, and direct it to the lowest eyes at their origin. Were these shoots cut back in June to those eyes, a thicket of secondary wood-shoots would be protruded in July, all to be cut back at the final spur-pruning. Now however, at the close of the month, and onward to nearly the middle of August, all the projecting wood, whether snapt (as before said) or entire, must be skilfully pruned to the four or five eyes above their origin, and then many of the buds will swell and greatly increase the number of the spur eyes. Espaliers and their congeners will thus be kept neat in figure, and be amply furnished with well-seated spurs.

Pear-trees should be spur-pruned in a different manner; they form their own eyes without the knife, and frequently fail if it be incautiously used; but when a spur eye becomes manifest, and the season of wood-growth shall have passed, the knife can safely be employed. The habit of each species and variety with watchfulness and experience will faithfully instruct.

Budding can be performed in any part of the month after the first week, with the proviso that the bark of scion and stock 'run freely," and detach itself from the young wood. It succeeds best in moist and cloudy weather. Apricots, peaches, and nectarines upon stocks raised from plum-stones, or upon one another raised from the stones of each; pears upon the pear or quince stock, plums upon plum, and cherries upon cherry stocks. The operation is most successful when the stock is young and vigorous, and the eye or bud bold and seated upon a shield of mellow and juicy back. In this fine and delicate art the latin adage *Experientia docet*—most pertinently applies.

Space is not allowed to allude to the operations of the forcing department, &c., &c., so often noticed in former articles; I therefore close with the promised *Retrospect*. The season since our last has been dry here; brilliant days have only occurred at intervals, while gloom has been more consistently present; and the temperature, after the oppressive heat of June 5, was reduced far beyond the average. We can, however, complain of nothing excepting the havoc committed by the snow and frosts of April 17th—19th, with the currants, gooseberries, and other tenderer fruits. Vegetables are now fine and abundant, and potatoes are very healthy—not rampant as in 1848, but of a subdued and more promising growth. The full moon of the 20th, on one of the finest afternoons, followed by the solstice of this day, may regulate the summer. We want rain here, but as a dry and warm season is a general blessing, local variations are of far less consequence.

Croydon, June 21.

AGRICULTURAL REPORTS.

GENERAL AGRICULTURAL REPORT FOR JUNE.

During the greater portion of this month the weather, in nearly all parts of the United Kingdom, has been very favourable for the growing crops, which have progressed steadily in our forward as well as in the most backward districts. Comparatively little rain has fallen in any quarter; and moisture is stated to be required on some of the barley lands. South of the Humber wheat is mostly in full ear; but in the north it is considered somewhat backward. However, harvest work is expected to be commenced quite as early as last season. Respecting the probable yield of the wheats, opinions are divided; but we have no hesitation in saying that, judging from the present appearance of the fields, the produce will be a full average one; a good blooming time is now wanted to ensure the safety of the crop. We do not anticipate much from spring corn. The quantity of land under culture this season is evidently not large; yet our reports agree in stating that both barley and oats are looking remarkably well.

Rumours of the re-appearance of the potato disease have reached us from several parts of England, as well as from Ireland. It is scarcely to be expected that the disease in question has been wholly eradicated, especially in those districts in which the greatest losses were sustained last year, and in the season which immediately preceded it; yet it too frequently happens that some parties jump to conclu-ions which are wholly unwarranted by facts. That the haulm has become discoloured on some of even the best lands is very possible; but that circumstance does not prove that the tubers have become affected, or that the produce will be a deficient one. The quantity of potatoes lost last year, by disease, was comparatively small; and the loss was nearly, or quite, made good by the foreigner, who sent us upwards of one hundred thousand tons in moderate condition. This season, he will, no doubt, forward double that quantity; hence statements about blight and so forth, having no foundation in truth, will, we conceive, fail to have their accustomed influence.

Notwithstanding the low prices at which grain is selling in our markets, the imports from abroad—though they have slightly decreased in the course of the month, owing chiefly to the continuance of the dispute between Denmark and Schleswig Holstein—are large for the time of year. During the month ending on the 5th June, current year—the last accounts issued by the government being made up to that date—the arrivals from abroad into the United Kingdom were not less than 946,629 quarters of grain, and 215,368 cwts. of meal and flour. In the same period home consumption duties were paid on 964,141 quarters of the former, and 277,009 cwts. of the latter. The bonded stocks were only 231,926 quarters of grain, and 182,451 cwts. of flour and meal. These heavy arrivals would appear to prevent any improvement in value; yet, such has been the limited nature of the supplies forwarded by our farmers, that the wheat trade, since about the middle of the month, has become steady, at an advance in the quotations of from 2s. to 3s. per quarter. Flour has slightly improved in value. That of spring corn has been fairly supported.

From enquiries made by competent parties, it is evident that the stocks of home-grown wheat now on hand throughout the southern, eastern, and western counties, are unusually small, and of but middling quality. Those in the north are, however, somewhat in excess of former corresponding periods. It is evident, looking at the immense consumption going on, that very large imports will be required from abroad to keep prices down to their present level.

A fair average amount of business has been transacted in wool, considering the disturbed state of the continent, and prices have been steadily supported. Large quantities have reached us from our colonies, and which will be submitted to public competition in the course of next month.

The hay harvest has progressed rapidly in the forward counties. The produce is heavy, and of very fine quality.

The accounts respecting the appearance of the hop bine being very unsatisfactory—many of the plantations being in an unusually bad state—the hop trade has become steady, at improved quotations. The duty has been done as low as £80,000. Advices from Ireland and Scotland are to the effect that only a moderate business has been transacted in most articles of grain; nevertheless, prices have ruled firm in every instance. The consumption of Indian corn, in the former country, continues unusually large. The cattle trade has been far from active, and prices have, in some instances, had a downward tendency. The supplies of stock have been decidedly good.

REVIEW OF THE CATTLE TRADE DURING THE PAST MONTH.

Smithfield, as well as the leading markets held in the provincial districts, has been seasonably well supplied with fat stock, during nearly, or quite, the whole of the month. Generally speaking, the demand has continued in a sluggish state, at drooping prices. The number of store animals brought forward has not been so large as we have frequently noticed at corresponding seasons; hence, they have mostly been held at rather high rates, considering the depressed value of fat stock. From abroad we have not received such heavy importations as during the corresponding period in 1848. This must be attributed not to any want of supply on the continent, but to the low prices obtained for most kinds of stock in our markets. The importations, since the commencement of the month, have been as follows:—

Beasts	1,300 Head.
Sheep	7,631
Lambs	386
Calves	1,459
Pigs	2

IMPORTS AT CORRESPONDING PERIODS.

	June, 1847.		June, 1848.
Beasts	4,594	..	2,044
Sheep	29,430	..	9,591
Lambs	995	..	74
Calves	844	..	1,692

From the above it will be seen that the imports have been chiefly regulated by the prices ruling in Smithfield; yet we must not forget to observe that the general quality and condition of the stock from abroad are steadily improving; consequently, that the actual falling off in the arrivals is not so large, as respects the available amount of food, as might appear from a glance at the comparative figures just given.

The quantity of stock at the present time in the country is unquestionably large. This fact, added to the abundant supplies of food on hand in all parts of the country, renders it somewhat improbable that high prices will rule during the remainder of the year.

We regret to state that the epidemic has made its appearance in some of our grazing districts; up to the present time the losses have not been extensive; yet not a few graziers have been put to serious expense in endeavouring to cure the diseased stock.

The imports of foreign stock at Hull, &c., have not exceeded 1,200 head, chiefly sheep and calves. The supplies on offer, in Smithfield, in the course of the month have been as under:

Beasts	15,899 Head.
Cows	450
Sheep	153,320
Calves	2,667
Pigs	2,322

SUPPLIES AT CORRESPONDING PERIODS.

June.	Beasts.	Sheep & lambs.	Calves.	Pigs.
1844 ..	13,290 ..	169,800 ..	1840 ..	2600
1845 ..	13,476 ..	131,390 ..	2212 ..	2345
1846 ..	15,284 ..	163,080 ..	1312 ..	2580
1847 ..	16,222 ..	148,660 ..	3064 ..	2488
1848 ..	17,452 ..	152,730 ..	3846 ..	2641

The bullock droves have been thus derived:—

	Head.
Norfolk, &c.	6,700
Western and midland counties	1,980
Other parts of England	2,300
Scotland	1,070

Beef has been selling at from 2s. 4d. to 3s. 10d.; mutton, 3s to 4s.; lamb, 4s. 8d. to 5s. 8d.; veal, 3s. to 3s. 10d.; and pork, 3s. 2d. to 4s. per 8 lbs. to sink the offal.

Newgate and Leadenhall markets have been but moderately supplied; all kinds of meat have moved off slowly at our quotations. Beef from 2s. 2d. to 3s. 4d.; mutton, 3s. to 3s. 8d.; lamb, 4s. 6d. to 5s. 6d.; veal, 3s. to 3s. 8d.; and pork, 3s. 2d. to 4s. per 8lbs., by the carcass.

NORTH HANTS.

May gave us plenty of rain, which caused the meadows and grass-lands to produce much grass, clover, and sanfoin. On the water-meadows much is already cut; some in stack. On the high lands there will be an abundant crop, where the grazier has well stocked and manured the same. The poor mower now finds employment, after passing through a winter and spring of great hardship through want of work. The clovers and tares are generally a good crop. Plenty of rye, and other green stuff for fodder. Generally speaking, the fallow-land is very foul of weeds, through there being an overabundance of rain during the last month. Where turnips have been sown the fly has been too busy, in some places; yet, generally speaking, the early-sown are now sufficiently thick on the ground for a good standing crop. Since our last report the growing wheats have amazingly improved—particularly on the strong lands; the colour good, the stem strong, and, where the ear has shown, of a good size. Fine nights and hot days is all that is wanting to bring to maturity this plant, producing the food of man; good judges give it as their opinion that *there must be a fair average yield of this year's growth; and that the harvest will not be so late as was anticipated about a month since.* Barley varies much in appearance, so much depending upon the management and quality of the land; generally speaking, the plant looks well, and is growing fast—not only the early but the later sown, where some had been injured by insects and the destructive wireworm, there still remains sufficient on the ground for an average crop. Oats are not so good as barley; the early-sown look thin and sickly, yet on kind land the late-sown are growing fast. Peas and beans will be a fair average produce; although the black fly has attacked the latter, there still appears a sufficiency of food for a fair yield. Graziers complain still of their beasts and sheep selling at very low prices, although a slight rise has taken place latterly. Fat wether sheep are making from 3s. 4d. to 3s. 10d. per stone; lambs, 5s. 4d. to 5s. 10d. do.; best beasts, 3s. 8d. do.; second-rate do., 3s. to 3s. 4d. do.; calves, 3s. 4d. to 3s. 8d. do.; pigs, 3s. 4d. to 4s. do. Fruit, generally, suffered much from the frosts in April last; the apples alone promising a good yield. The corn trade is still very dull, and the state of the agriculturists most lamentable; and how the farmers are to struggle on, with the high rents and increasing rates, appears to be a mystery that no one is able to solve.

WEST KENT.

The bean crop wants rain: in some fields the blossoms are falling off, and in some a few dolphin have appeared; there are many inferior pieces. The early sown peas (November and December) look well, and promise a crop, whilst the late sown want rain: November and December sowing should be more commonly adopted, from present appearances. Many fields of wheat are but thin, and do not look so healthy as it might be expected to see them: this will *not* be an 1847 crop. The barley crop promises fair; no doubt rain would be of service to it, but the early sown covers well, and is not suffering. The oats look well where good seasons were made, but on stiff clay lands they require rain. Grass and clover are in general capital for quality and quantity, and is fast getting into stacks; and with this fine weather must be good, and at the smallest possible expense to the farmer. Swede turnips are just making their appearance, and in many places are quickly eaten off by flea: some showers are much wanted for this crop; those who continue sowing till this month is out, will be as forward as those who sowed the first week in the month, and perhaps less subject to mildew. Cherries are not a good crop, all the forward sorts are cut off. Filberts are very slightly set; not half a crop. Gooseberries very short, the yellows being the only sort that escaped the frost. Apples, in places, are most abundant, whilst in other places they are entirely cut off.

AGRICULTURAL QUERIES.

SUBSOILING.

TO THE EDITOR OF THE FARMER'S MAGAZINE.

Sir,—In your last magazine a correspondent, signing himself J. D., informs us that subsoiling in East Lothian has been tried under every possible variation of circumstances, and is now relinquished. So important a subject requires further examination, and if any of your readers can give any information respecting it, from actual experience, I am sure they will be conferring considerable benefit on many persons who, like myself, are very fond of the practice which is now said to be useless.

I am, sir, yours, &c.,

A Constant Subscriber.

Sir,—Will you, or some of your correspondents, be kind enough to furnish me, through the medium of your magazine, with the proper size of boxes to feed cattle in, in order to make the best manure? Is the bottom of the box to be below the surface of the ground? will 10 feet by 9 feet be a sufficient size? and how are the hay-rack and trough or manger for turnips to be made to be suitable when the manure has accumulated two feet in thickness? As I am extremely wishful to improve my manure, but at as light an expense as possible, for my landlord will not lay out sixpence, the above information, with any further particulars you may think necessary, will greatly oblige, yours,

A Tenant Farmer.

June 10.

A subscriber to the Farmer's Magazine, who has extensive saw-mills, is desirous of receiving information if, and in what manner, the saw-dust can be usefully employed in agriculture. Having been told it can be applied with advantage, both charred and rotten, and having tried in vain to bring his saw-dust into those states, he would be greatly obliged by being informed how it can be effected. The plan of charring suggested in page 533 of the Farmer's Magazine for June last has been tried without success.

CULTIVATION OF HOPS IN IRELAND.—Mr. Samuel Burke, of Thomastown, Kilrush, has sown an acre and a-half of hops on his land. The crop is already over ground, and promises well. The cultivation of the hop is indeed a novelty in that part of the country.—*Limerick Chronicle.*

AGRICULTURAL INTELLIGENCE, FAIRS, &c.

ABINGDON FAIR, June 20.—There were but few good cart-horses fit for the London dealers here, but the few were sold at very good prices. In the fair the number of horses was shorter than usual, but there were some very useful nags and harness horses. Several Welshmen attended, as usual, with their droves. All sorts of horned cattle met with a very bad sale; a great many were driven home unsold. There was a great number of sheep and lambs penned, and the prices were rather better than at the last fair at Ilsley.

BEDALE FORTNIGHT FAIR, June 19.—We had a larger supply of cattle and sheep than usual, in consequence of which business was rather slow. Beef was a little lower than last fortnight, and lean stock was from 5 to 10 per cent. below previous rates before business could be transacted. Beef 5s. 3d. to 6s. 6d. per stone; mutton, 5d. to 6d. per lb.

BORO'BRIDGE FAIR.—This great horse-fair was held during the present week, and a considerable amount of business was transacted. First-rate hunters and carriage horses met with ready sale; there was also a good demand for animals suitable for the army. In other descriptions less was done; and, as usual, there were many of an inferior kind, which it required considerable tact to turn into money.

CHIPPENHAM FAIR, June 22.—The stock, generally speaking, was in first-rate condition, and fetched good prices, the larger number changing hands. The three-year-old Devons, Welsh, Herefords, and short-horns were full 10s. each dearer than such would have realized a fortnight ago, all moderate ditto also going off with less solicitation from the sellers. Alderney and York cows, in milk and calf, made from £15 to £18; moderate ditto selling at from £12 to £14; ditto, heifers, of good size and breed, from £12 to 14 guineas each; large calves made £3 to £5 each; small sucklers from 12s. to 20s. ditto. A few fat grass-fed beasts made 9s. 3d. per score pounds; ditto, cows, 8s. 6d. ditto; fat bulls, 8s. ditto; fat calves, from 5d. to 6d. per lb. Sheep were soon sold at better prices for the sellers, nearly all being cleared off early in the day. Tegs at from 26s. to 28s. each; wethers at from 30s. to 35s. ditto; ewes at from 20s. to 24s. ditto; lambs at from 14s. to 18s. ditto. Fat sheep were sold at from 3s. 4d. to 3s. 10d. per stone of 8lb. Fat lambs making 7d. to 8d. per lb. Pigs in better demand, at rather increased prices. Horses were sold well where such could be warranted. Cheese.—A good supply of Wilts, Dorset, Somerset, and Gloucester make. Trade rather dull, yet the best dairy make went at 2s. to 3s. per cwt. more money, with a fair demand, nearly all selling, best doubles at from 58s. to 61s. per cwt.; singles, 46s. ditto; common Dorsets, 34s. to 40s.; ditto, half cowards, at from 36s. to 44s. ditto; skims at from 26s. to 30s. ditto. A few prime Cheddars and fancy Cheese making from 66s. to 70s. per cwt.

DARLINGTON FORTNIGHT FAIR.—We had a very fair supply of Cattle and Sheep; of lean stock the supply was unusually large. The demand was small, and business very flat. Beef sold at from 5s. 4d. to 6s., and for very prime 6s. 3d. per stone; Mutton, 5d. to 5½d. per lb.

DROITWICH FAIR.—There was a good supply of lambs, but many of inferior quality. The best averaged 7d. per lb., and the inferior about 6d. Sheep were from 5½d. to 6d. Of cows there was a good supply, but of a very inferior quality; the best averaged 5½d., and very few sales were effected; prime qualities, 6d.; inferior averaged about 5d. A great many sheep and lambs were driven home unsold.

GLOUCESTER MONTHLY MARKET, Monday last.—There was only a short supply of fat beef, and things generally were looking up. Prime animals were worth from 5½d. to 6d. per lb. The sheep and lamb market was better supplied, and prices varied, according to quality and size, from 5d. to 6d. per lb.

LEDBURY FAIR.—There was a fair supply of fat stock. Beef, 5d. to 5½d.; prime wethers fetched 6d.; lambs, 6d. Of pigs there was a good supply, but prices were low, and but little doing. All kinds of lean stock hung on hand, and the greater part was driven back unsold. Wool, 10d.

LINCOLN FAT STOCK MARKET.—We had a good show of sheep, but there was only a dull sale, and many sheep and beasts were taken home again. Beef, from 5s. 9d. to 6s. 6d. per stone; mutton, from 4½d. to 5½d. per lb.

LLANGENNECH FAIR.—There was a large show of store cattle, the greater part of which were steers and heifers, but the demand was not so great as at the recent fairs in Carmarthen, Neath, and some other places in this district. The principal cattle dealers not having returned from England, the demand was for the most part limited to country jobbers and farmers. Prices were a shade lower than at late fairs. Of cows with calves at their side there was a large number, of which a considerable proportion were old, and low in condition. A great many changed owners, but at low prices.

MUIR OF ORD MARKET, June 13.—The weather was fine, but the show of stock and the attendance of dealers was very limited; almost exclusively Highlanders from the west of Inverness and Ross-shires, and from the islands. There were only a few dealers present from the south, and not many from the north; and the market was a very dull one; prices looking down. For six-quarter-old Skye and West Highland beasts, from 30s. to £3. Two-year-old do., £3 to £3 10s.; and three-year-old stots, from £3 10s. to £5 10s. Of fat cattle a fine lot of eight brought £12.

NORTHAMPTON FAIR, Monday, June 19.—The supply was short of both fat and store sheep, which caused a brisk sale, and Saturday's prices were improved, there being a large supply of fat sheep on that day, causing a dull trade. Of fat beef the supply was small. Good beef made 3s. 6d. per stone; fine neat wether mutton about the same price. Of store beast there was a fair supply, principally of the Welsh, Devon, and Irish breeds. Herefords seem to have disappeared until the August fairs, when they may again be expected. Of milking cows the supply was short, but quite enough for the demand, and several of them went back unsold. There were plenty of horses, colts and ponies, but few buyers.

RETFORD FAIR, (Thursday last.)—The quantity of fat stock now exhibited was but small, yet the quality was remarkably good; prices however ruled low to the farmer, and many beasts were sold at little more than they were bought in at last autumn. Store cattle were not plentiful, but they were nevertheless a drug, notwithstanding the present plentiful nature of the season. Fat Sheep of the best quality realised 5d. per lb.

TAUNTON FAIR was largely supplied with stock, the demand was active, and the prices obtained were considerably better than have lately been realized. Fat oxen sold rapidly at from 9s. to 10s. per score; and sheep from 5d. to 6d. per lb. Cows and calves sold freely, and met with eager purchasers at good sums. Some fine plough oxen were disposed of, and stock in general experienced a better demand than has recently been obtained.

TRINITY MUIR MARKET.—This great leading market commenced on Wednesday week with the sale of sheep. The market was very largely supplied, there being more sheep on the ground, both fat and lean, than were ever on the Muir within the memory of the oldest men in attendance. Prices were for hill wedders 3s. to 4s. below the prices given at the corresponding market last year; and fat sheep were 4s. to 6s. lower. The latter brought about 5½d. per lb. to sink the offals; but the su--ly exceeded the demand. Captain Wemyss bought a lot of fine crosses from Mr. Ruxton, Farnell, at 29s.;

blackfaced wethers sold from 28s. to 29s. Ewes and lambs brought from 16s. to 19s. The stockmasters were ill-pleased with the sales; and an immense number was consequently driven away unsold. The show of cattle next day was large, the fat stock being generally of prime quality, and the drove beasts being in good condition for grass. Dealing went on slowly. Fat beasts brought from 6s. 6d. to 7s. per Dutch stone; and very few of that class remained unsold. Three-year-old stots and queys brought from £12 to £18; two-years-olds from £7 to £10; year-olds from £5 to £8. Small queys and farrow cows brought from 4s. 6d. to 5s. per Dutch stone of their estimated weight when fat. Drove cattle brought from £10 to £15 per head, according to weight and quality. A great number of small beasts could not be turned into money, the pastures being so backward as to deter purchasers from speculating on any terms.—Mr. Pattullo showed the best quality of fat; they realized £20 per head.

YORK FORTNIGHT FAIR, June 21.—We had a good supply of fat beasts, which met with dull sale at from 6s. to 6s. 6d. per stone. A good show of sheep sold at rather lower prices, being from 5d. to 5½d. per lb. A plentiful supply of lambs sold readily at from 6d. to 6½d. per lb. A large number of lean beasts were shown, and sold at lower rates.

IRISH FAIRS.—Ardnaree was one of the dullest and most dispiriting which took place this season. Any few lots that changed hands were sold at prices that could leave nothing for their keep for the last six or twelve months. Country cows were sold as low as 25s. a-head, with a slight advance. Few of a good stamp were brought forward, and were not looked after. Longford.—A large stock of horn cattle; and notwithstanding the depression of the times, good young stock brought a fair price, but the large number of inferior kinds had few buyers, and that at low price, indeed many left the fair for want of purchasers. The supply of sheep was smaller and prices low. A good number of horses were on the green, but all of common description, although not a low price, taking into account the quality. A middling supply of pigs, but all of a long-nosed breed, and good prices looked for and obtained in most cases in expectation of a supply of food for them shortly. Carlow was unusually dull, the buyers being few and no disposition to purchase. Good stock was not in demand, nor was the supply of this description of stock considerable. Some good yearlings of best quality sold for 7*l.* to 7*l.* 5s.; others of an inferior quality, ranged at prices considerably lower; milch cows sold for 8*l.*; pigs were in demand. There was a good show of wool, for which the owners demanded from 12s. to 13s. 6d. per stone.—*Carlow Sentinel.* Athy was very well attended with buyers. The stock, in general, was of the very best description, and all that exchanged owners brought good prices, when compared to other fairs. Good horses sold well, but they were very few. Heifers, 5*l.* to 13*l.*; milch cows from 7*l.* to 16*l.*; hoggets, 25s. to 35s.; store pigs, from 40s. to 50s.; fat pigs, 3*l.* to 5*l.*; sheep sold well. Altogether it was a good fair, and went off very favourably.

HOP INTELLIGENCE.—The accounts received from nearly all parts of Kent and Sussex are still more unfavourable this week than last. Fly and lice, honey-dew, and in some districts mould, are on the increase. From the following districts in Kent nothing can be more unpromising than the state of the bine; part of Maidstone (in the well-cultivated grounds the bine has improved), Brenchley, Leeds, Horsmonden, Hunton, Offham, the lower part of Yalding parish, Chart Sutton, Hollingbourne, Tudeley, East and West Farleigh, Barming, Wrotham, Edenbridge, and Goudhurst. There are better reports from Hadlow, although they are very foul there. In some few districts the bine still continues growing, although the crop is considered in much danger; and, unless an early and favourable change takes place, the chance of a crop will be poor indeed. The districts where the more favourable reports are from are: Loose, parts of Staplehurst, Berstead, the upper parts of the parish of Yalding, Wateringbury, East and Town Malling, Lenham, part of East Sutton, and Brenchley. From other parts of Kent the reports are bad, but not hopelessly so. This may be said of Frittenden, East and West Peckham, Mereworth, Boughton Monchelsea, Birling, Trosley, and Ditton. The *Doncaster Gazette* gives the following, dated East Retford, June 20: " We have little to observe relative to the hop plantations here; but it is certain we say that there is no improvement. Since our last report a fortnight ago the weather has not been of a favourable character, the days being mostly sunny and hot, and the nights frosty and cold; and these continued alterations always have a blighting influence upon the hops. The fly has increased rather than diminished; and although the lateral shoots have continued to grow rapidly, and still continue to look vigorous, yet no sooner has the young leaf begun to unfold itself than it is covered with them as thick as they can possibly stand, and before it has got to half its wonted size it is covered with thousands of lice, which in turn impoverish the foliage and leave the plant in a state of exhaustion, from which it but rarely recovers thoroughly, even with a succession of warm and genial weather. During the last few nights we have had cold cutting winds, chiefly from the N.W., attended with frosts; which in bleak and exposed situations has caused the plant to look yellow and sickly. Towards the close of last week we first discovered the appearance of the ' honey dew,' in slight specks on the upper surface of the leaves; but on Monday morning it had accumulated considerably, and the exudated sap was actually dropping from the tips. Since then it has continued to increase, and is now ascended eight or nine feet above the bine. In several grounds, too, the brown smit has set in; but this might have been expected, inasmuch as it invariably follows the overflow of sap, without electric weather succeeds, accompanied with heavy rains; but even in this case, where the plant is predisposed to disease, it seldom or ever regains its pristine state." From Sussex the accounts are in some districts more promising than any from Kent. In a few gardens in the district around Sedlescomb the hops look strong, and the bine over the top of 14 feet poles. The fly has decreased in most of the grounds in the districts of Frant Cowden, Sundridge, Withyham, East Grinstead, Sevenoaks, Rye, and Otford. Even from the most favourable reports we cannot speak well; as even, if in some gardens there is an appearance of a crop, these are few and far between: this remark will apply to all the parts above enumerated. But when we turn to the reports from Lamberhurst, Uckfield, Brede, Peas-Marsh, Catsfield, Mayfield, Playden, Battle, Brightling, Udimore, and Crowhurst, it is evident that there cannot be anything like a crop unless a change comes to annihilate the vermin. A correspondent in the *Sussex Express,* under date of June 21, giving an account of the plantations around Lingfield and the borders of Surrey, writes as follows: " The hops in this district we fear must be a failure. The lice, by legions, are on the leaves; and the bine is generally not more than two-thirds up the poles. The fly has, in some instances, died on the full leaf (these two days past) for the lack of moisture; but where there is a green shoot they are numerous and healthy. The midsummer-shoot (as it is called) has not made its appearance, and is thought not likely so to do. They are in such a backward state that a short crop only is expected."

WORCESTER, (Saturday last.)—The late grounds have followed the early ones, and our whole district is now suffering from blight; the vermin has greatly increased, and the hot sun has caused the honey to run in a manner which indicates fatal mischief to the crop, and unless a speedy change for the better takes place, we shall not pay much duty this year, which is to-day called £7,000 to £8,000: in 1846 we paid upwards of £36,000. We have more business doing at advancing prices.

REVIEW OF THE CORN TRADE

DURING THE MONTH OF JUNE.

In reviewing the course of the grain trade during the month, the weather demands our consideration in the first place, that being the pivot on which everything else must turn. It has, however, exercised less influence of late than is usually the case in June, and in spite of splendid sunshine the value of wheat has during the last week or two tended upwards. The fact is that the stocks have become so diminished, that many are inclined to question whether they will suffice to carry us on to harvest; and though we are of opinion that little cause exists for apprehension on that score, still it is certain that the quantity of bread stuffs in the country has been reduced into a very narrow compass, and that the new crop will have to be commenced upon as soon as secured, unless in the interval supplies reach us from abroad on a more extensive scale than they have done during the month now about to terminate. As regards the prospects for the wheat harvest there is nothing to complain of. The weather has since our last been auspicious; in the early part of the month the temperature was, it is true, low, and the prevalence of north-east wind, with occasional night frosts, checked vegetation; latterly, however, we have had powerful sunshine and warm nights, and a material improvement has taken place in the appearance of the wheat crop; for spring corn the weather has been rather too dry, and on light hot soils barley is said to show evident symptoms of being in want of moisture. Oats, though to a less extent, are also suffering from drought, and peas are not filling so well in the pod as could be wished. For wheat the dry weather has, on the other hand, been highly auspicious, and if nothing should occur to mar the prospect we may calculate on a large yield. The harvest, however, can scarcely be expected to be early; the cold east winds during part of May and in the commencement of June having so far kept back the crop that the plant did not begin to shoot into ear before the middle of the month in the south, and is hardly yet out in the more backward parts of the kingdom.

Hay-making was generally commenced round about London on the 11th June, and the work having met with no interruption a large proportion of the crop is stacked in excellent order. The produce is unusually heavy, and the quality very fine; we must consequently expect prices to rule low for that article, which to a certain extent will influence prices of oats and other sorts of corn and pulse used for feeding.

We have now arrived at a period of the year when for some seasons past symptoms of the disease with which the potato has since 1846 been affected, have usually manifested themselves; and the growers of that root, as well as the public, have been anxiously watching the approach of the much dreaded disorder. In the northern parts of the kingdom the plant appears as yet to be free from the blight; but in the south and west it has again made its appearance. It is still too early to allow of judgment being formed as to the probable extent of the loss likely to result from this cause, but we are happy to say that many extensive cultivators express an opinion to the effect that the disease is gradually on the decline; and, judging from the progressive improvement from year to year since the first in which it visited our islands, it is fair to infer that as it has become better understood, the remedies adopted to counteract its effect have proved so far successful, that in a few more seasons it may be wholly conquered. Altogether our prospects, in regard to the future supply of food, are decidedly favourable; and if it were not for the fear of undue foreign competition, farmers might take heart and overcome their difficulties. There is, however, too much reason to apprehend that with less need of foreign importations than has existed this year, the imports will increase, and that prices will thereby be kept so low as to inflict further serious injury on the home producer. Over the whole of continental Europe the seasons have been favourable; in the southern parts harvest is at hand, and in the north the crops are forward and promise an abundant return. From the United States of America, and from Canada, the reports also speak highly of the probable result of the harvest, and it is almost certain that there will be a very large surplus growth abroad for shipment to Great Britain. In Europe the stocks of old corn are, no doubt, moderate, but on the other side of the Atlantic a very large proportion of the corn grown in 1848 remains on hand, holders having hitherto been dissatisfied with the prices offered. Is it, however, probable that they will continue to act in this manner much longer? Another heavy crop is nearly ready to be gathered, and the only available market for disposing of their surplus is England, whose wise legislature has opened the ports to all the world.

We have, on former occasions, remarked that the effects of free trade would not be fully felt until we should have secured at least one good harvest, and we were certainly not prepared, considering the extreme deficiency of our crops last year, to expect so great a depreciation in prices here as has been caused by the first five months of unrestricted imports. We therefore look with considerable apprehension on the working of the new order of things after harvest; but meantime a small rise in quotations is not improbable. Our farmers are certainly bare of stacks, and for a time the supplies from abroad are likely to be comparatively small. The immense shipments made from France, Holland, and Belgium, must, we are inclined to think, have reduced the available resources of those countries, so as to prevent further exports of moment until after the new crops shall have been secured. As yet there is no authentic news of the blockade of the principal Baltic ports, the Elbe, the Weser, &c., by the Danish fleet having been raised, and though peace is said to be about to be concluded, even if that be the case, some time must necessarily elapse ere supplies of moment can reach us from that quarter. We have, therefore, only the southern parts of Europe and America to expect receipts from, and these will not, we think, prove overwhelming; it is therefore not altogether unlikely that even with a continuance of auspicious weather the value of wheat may be well supported during the whole of next month.

The weather which would be favourable for wheat would certainly do mischief to the crops of spring corn and pulse, and if the drought should continue, barley and oats would without doubt rise in value, prices of both these articles being at present very low, and the stocks of foreign having been greatly reduced.

Independent of our own wants, we shall have to provide for the necessities of Ireland ; that country instead of being in a position to send us supplies has for months past been obliged to import, and will still require considerable aid between this and harvest. Indian corn has been the principal article of consumption there, but some quantity of rye, coarse flour, and other low priced articles, have also been shipped from hence to the sister isle. The reports from thence as to the potato crop are of a conflicting character, but that the blight again prevails there is, we fear, certain.

The trade in wheat has, as we have already intimated, assumed a firm tone since our last, and prices have advanced since the close of May fully 4s. per qr. at all the leading provincial markets. This rise has not been caused by speculation, but entirely by the smallness of the supplies from the growers, which have in many localities fallen short of the quantity required for the local consumption. When this has been the case buyers have been under the necessity of obtaining what they have stood in need of from the nearest point where foreign could be had, and the stocks of the latter have been extensively drawn upon. The total quantity remaining in warehouse at present in the united kingdom, taking flour and wheat together, does not, we are disposed to think, exceed 500,000 to 600,000 qrs., and of this comparatively small stock a large proportion consists of low inferior qualities, scarcely suitable for the manufacture of good flour.

The arrivals of wheat into London coastwise, as well as by the various railways, have been trifling in the extreme; but this has caused less inconvenience at Mark-lane than it would have done elsewhere, as about one-half of the whole of the foreign in the country is lying in the London granaries. Notwithstanding the extreme insignificance of the receipts of home grown wheat at Mark-lane prices remained stationary until the 18th instant. Really fine fresh qualities may in some instances have realized a little more money before, but no alteration was made in quotations till the day named, and then the advance hardly amounted to 1s. per quarter. During the succeeding week a further rise to about the same extent was established, and on Monday last, the 25th, wheat brought fully 2s. per qr. above former terms.

The supplies of wheat from abroad into the port of London show a marked falling off, as compared with previous receipts, no more than what we have frequently received in a single week having come to hand during the whole of the month. Meanwhile, our millers have, in consequence of the scarcity of English, been obliged to use foreign extensively; and having, besides, had a steady country demand, the greater portion of what has arrived has been sold from on board ship, in addition to which a considerable quantity has been taken from warehouse, and there is, consequently, at present little pressure on the market. There has been an evident disposition on the part of holders to avail themselves of the opportunity afforded to realize, and the rise on foreign has scarcely been so much as on home grown wheat. In the early part of the month prices rather tended downwards than otherwise, and on the 4th of June a decline of 1s. per qr. was pretty generally conceded in order to facilitate business. This fall was subsequently recovered, and since then quotations have risen ; the value of good wheat, whether white or red, being fully 3s. per qr. above what it was at the end of last month. Polish

Odessa of moderate quality is worth, at present, 42s., and fine 44s.; French, Belgium, and Baltic red, from 45s. up to 52s.; and really fine high mixed Danzig, being very scarce, 56s. to 58s. per qr. The latter is, however, more a nominal than a real price, most of the Danzig here being of secondary quality, and averaging in value from 46s. to 54s. per qr.

In the early part of the month there was a good deal of talk among the millers as to the propriety of lowering flour, but the firm tone which holders of wheat afterwards assumed rendered the step unadvisable, and the nominal top quotation has remained stationary at 44s. per sack. Town made household flour was at one period sold freely at 34s., afterwards it advanced 1s., and the best marks can now hardly be bought at 35s. per sack. A similar change has occurred in the value of foreign manufactured flour. American was, at the lowest point, offered at 23s., afterwards it advanced to 23s. 6d., and on the 20th instant some large purchases of Western Canal were made, partly on speculation, at 24s. per barrel, a price which has not since been exceeded. The quantity of French now here is inconsiderable, and the most approved sorts cannot be purchased below 34s. to 36s. per sack.

Supplies of English barley have nearly ceased to come forward, and the arrivals from abroad have been much smaller than formerly. Beyond a steady retail demand for grinding barley there was not a great deal doing in the early part of the month, and the inquiry was at no period so extensive as to lead to any improvement in prices. Within the last week additional activity has been imparted to business, under the impression that the growing crop may have suffered more or less from the drought. Of English malting barley there is none on hand, and very little of the foreign is of sufficiently fine quality to be deemed suitable for that purpose by our maltsters. Prime Saale, the sort most approved of, has been rather sought after, but the want of supplies has prevented many bargains being closed. The value of grinding barley has risen about 1s. per qr. since our last, and this advance has occurred within the last eight days. The stock in warehouse has been considerably diminished, but we continue to have offers from abroad at low rates, and some quantity is, we believe, on passage at present from Memel and other ports not affected by the Danish blockade, which circumstance is against any rise of importance in prices.

The transactions in malt have been on rather a restricted scale, notwithstanding which, the value of the article has tended upwards, more particularly since the notion has gained ground that the dry weather is acting detrimentally on the growing barley plant.

The arrivals of oats from our own coast have been very small, and though the receipts from Scotland have been tolerably good, having had scarcely any Irish supply, the total quantity of home grown corn received has been comparatively trifling. Meanwhile a considerable falling off has taken place in the arrival of this grain from abroad. There was, nevertheless, much pressure on the market in the first part of the month, owing to the anxiety of importers to effect sales from on board ship of some of the previously received large supply of foreign. Really good oats were at no time offered below the rates current at the close of May, but light and out-of-conditioned qualities receded 6d. to 1s. per qr. on the 4th and nearly as much on the 11th of June. After prices had become reduced nearly 2s. per qr. the dealers bought somewhat more freely, and the bulk of the foreign is now in second hands. Latterly a slight rally has occurred, still fair feeding qualities, weighing 38 to 39 lbs., may be had at present at 15s. to 17s. per qr., and lighter descriptions at still lower rates. Scotch, of moderately good quality, were at one time sold at 20s. to 20s. 6d., but have since advanced to 21s. to 22s. per qr.

Beans of home growth have come forward sparingly, and the consumption has been thrown principally on Egyptian, the latter being comparatively cheap, owing to good stocks on hand, and some further arrivals from Alexandria. The value of neither English nor foreign has varied much, and quotations of Egyptian are precisely as they were at the end of May—21s. to 23s. per qr. The market has stood the late importations well, and wears a firm appearance. The reports relative to the growing crops of beans are till now favourable.

Peas are said to require rain, which has caused holders to raise their pretensions more or less within the last week or two; still but little improvement can be noticed in prices, the value of the article having remained very nearly stationary.

Nearly all the Indian corn which has been offered has been taken on Irish account. The business in this article has been confined almost exclusively to free on board sales. We have no stocks on the spot, and for local consumption Indian corn appears to find little favour. At Liverpool and other ports on the west side of the island, the purchases seem also to have been principally for shipment to Ireland. In proportion, however, as new potatoes come forward, the demand for Indian corn on Irish account is likely to diminish, and we are disposed to think that prices have been at the highest point: at Liverpool as much as 35s. to 36s. per 480 lbs. has been paid for the best qualities.

The trade in grain abroad has been a good deal interrupted by political events. At the principal ports in the North of Europe for instance, business has been much impeded by the German-Danish war; and though there appears at present some prospect of the differences between these nations being settled by negotiation, still some time will probably elapse before matters are definitely arranged, and the blockade raised. Prices have, nevertheless, been steadily maintained in the Baltic, owing partly to the smallness of the stocks, in consequence of the previous large shipments, and partly to the impression which merchants there appear still to entertain, that Great Britain will continue to require supplies.

From Dantzig we learn that the water in the Vistula had become so shallow, owing to dry weather, as to render the navigation of the upper parts of the river difficult for the barges, which had, in some measure, interfered with the transmission of supplies from Poland. The requirements of the Russian army acting in opposition to the Hungarians, had influenced prices in the interior; and at Warsaw, equal to 30s. per qr. had been paid for rye. The stock of wheat at Dantzig consisted, we are informed, principally of secondary and inferior qualities, and really fine high mixed samples being scarce, had commanded high terms. The top quotation was, on the 20th June, 43s. to 44s., and a few days before a lot of moderately good quality, rather foul, and weighing only 62½ lbs. per bush., had changed hands at 40s. per qr. free on board. No shipments had been ventured on under the apprehension of seizure by the Danish cruisers.

At Memel, which port is not included in those blockaded, a fair extent of business seems to have been done in barley, and some purchases of wheat had also been made there with a view of the English markets.

From Stettin we learn that matters had remained very quiet, in consequence of the impossibility of shipping to Great Britain; the nominal quotation for wheat continued 36s. to 37s. per qr.

At Rostock the transactions had also been unimportant, but holders had insisted on former rates, say 35s. to 37s. per qr., according to quality.

At Wismar and Lubeck, owing to those places not having been blockaded, the operations in wheat had been rather more extensive, and good parcels weighing 61 lbs. per bush., had commanded 38s. to 39s. per qr., free on board.

At Hamburgh prices receded a little early in the month, but afterwards a rally took place, and on the 22nd June good upland on the spot was worth 39s., whilst from out-ports there had been offers at from 37s. to 39s. per qr., the prices varying according to the chances afforded of being enabled to ship without risk of capture.

In the Dutch markets the purchases for export have not been extensive of late, the value of wheat being too near on a par with prices here to hold out much inducement to consign to this country. This has also been the case in Belgium for some time past, which accounts for the diminished receipts from thence.

From France we still get supplies of wheat and flour, though, judging from quotations there, but little profit can have attached to the venture. In the South of France, and in Italy and Spain, the crops are fast approaching maturity, and the prospects for the harvest are described as promising.

From Marseilles we learn that the arrivals from the Eastward had been rather large, which had caused some reduction in Polish Odessa, Danube, and similar qualities of wheat.

At Leghorn the tendency had also been downwards, and we may expect some further arrivals from places East of Gibraltar.

By the steam ship Niagara, we have recent advices from America. The crops there were progressing favourably; still, holders of bread-stuffs had shown little inclination to lower their pretensions; and at New York, on the 12th June, good brands of Western Canal flour were worth 4 d. 62½ c. to 4 d. 87½ c., equal to 20s. 9d. to 21s. 6d. per barrel, free on board. The shipments had not been extensive, only 28,555 barrels having been exported during the preceding fortnight. The arrivals down the Hudson had been on rather a moderate scale; since the opening of the navigation only 288,000 brls. having come to hand. The greater portion of the flour shipped had been for Liverpool.

An Account of the Total Quantities of Foreign Corn imported into the principal ports of Great Britain (viz., London, Liverpool, Hull, Newcastle, Bristol, Gloucester, Plymouth, Leith, Glasgow, Dundee, and Perth) in Eighteen Weeks ending June 13th, 1849, since the 8th of February preceding (including the quantity of Wheat and Wheaten Flour loosed from bond on that day), and the amount that would be available for revenue, if the Tariff proposed by Lord John Russell in 1841 was levied on this supply.

	Quarters.	Tariff per qr.		Amount for Revenue.		
Week ending June 6, 1849.		s.	d.	£	s.	d.
Wheat and Wheaten Flour	2,613,685	8	0	1,045,474	0	0
Rye and Rye Meal	42,889	5	0	10,722	5	0
Barley and Barley Meal ...	336 825	4	6	75,785	12	6
Oats, Peas, and Beans......	624,893	3	4	104,148	16	8
Week ending June 13, 1849.						
Wheat and Wheaten Flour	49,485	8	0	19,794	0	0
Rye and Rye Meal	3,499	5	0	874	15	0
Barley and Barley Meal ...	22,920	4	6	5,157	0	0
Oats, Peas, and Beans......	42,803	3	4	7,133	16	8
Total...........	3,736,999	..		1,269,090	5	10

TIMBER.

	£	s.	d.		£	s.	d.
Baltic Timber, per load of 50 cubic feet..	3	0	0	to	4	0	0
Yw. Deals, per standard hundred .	12	0	0	..	16	0	0
Deck Deals, per 40 feet 3 in.	0	18	0	..	1	4	0
Pipe Staves, per mille	115	0	0	..	130	0	0
Lathwood, per fm. of 4 feet........	5	10	0	..	6	10	0
Petersburgh, Riga, and Archangel .... Yw. Deals, per stand. hundred ..	13	0	0	..	15	0	0
White....................	11	0	0	..	12	0	0
Yw. Battens....................	13	0	0	..	15	0	0
Riga Logs, for 18 feet cube	3	0	0	..	4	0	0
Stettin Staves, per mille of pipe..........	75	0	0	..	130	0	0
Swedish Timber, per load	2	10	0	..	2	15	0
Gothenb. Yw. Deals, per 100 12f. 3in. 9in...	18	10	0	..	23	0	0
White ditto	16	0	0	..	19	0	0
Yw. Battens, per hd. 12 ft. 2½ in. 7 in.	11	0	0	..	14	10	0
Christiania Yw. Deals, per hd. 12ft. 3in. 9in.	25	0	0	..	26	0	0
White ditto......	22	0	0	..	23	0	0
Quebec and St. John's Spruce Deals.. per 100, 12 ft. 3 in. 9in.	14	0	0	..	17	0	0
1st qual. yw. Pine Deals, per st. hd.	13	0	0	..	16	0	0
Second do. do................	9	10	0	..	10	10	0
Third do do................	7	10	0	..	8	0	0
Red Pine Deals, per hd. 12ft. 3in. 9in.	17	0	0	..	21	0	0
Red Pine Timber, per load	2	17	6	..	3	12	6
Yw. ditto	2	15	0	..	3	15	0
Birch ditto	3	0	6	..	3	5	0
Elm ditto	3	10	0	..	3	15	0
Oak ditto	5	0	0	..	5	10	0
Standard Staves per mille standard	65	0	0	..	75	0	0
Puncheon Staves, per mille	17	0	0	..	19	0	0

MAHOGANY, &c.

Mahogany,	St. Domingo	5½d.	to	1s.	9d. per foot.
	Cuba	5½		1	
	Honduras	4¾		1	
	African	4½		0	5½
Cedar	Havana	5		0	6
Rosewood.	Rio	12*l.* 10s.	to	18*l.*	per ton.
	Bahia	9		0	14

BARK.

Per load of 45 cwt.

English, Tree..............	£15	0	0	to	£16	0	0
Coppice.................	16	0	0		18	0	0

LIVERPOOL (DUTY FREE)—Quercitron, 8*l.* 6s. to 9*l.* 6s.; Dutch Oak, per ton, 4*l.* to 5*l.*; German, 3*l.* 10s. to 6*l.*

HIDE AND SKIN MARKETS.

			s.	d.		s.	d.	
Market Hides,	56 to	64lbs.......	0	1¼	to	0	1½	per lb.
Do.	64	72lbs.......	0	1½		0	1¾	,,
Do.	72	80lbs.......	0	1¾		0	2	,,
Do.	80	88lbs.......	0	2¼		0	2¾	,,
Do.	88	96lbs.......	0	2¾		0	3	,,
Do.	96	104lbs.......	0	3		0	3¼	,,
Do.	104	112lbs.......	0	3½		0	4	,,
Calf Skins			4	6		5	0	each.
Lamb Skins			1	6		2	5	,,
Horse Hides			7	6		0	0	,,
Polled Sheep			0	0		0	0	,,
Kents and Half-breds.......... ..			0	0		0	0	,,
Downs........................			0	0		0	0	,,
Shearlings			0	7		0	9	,,

FLAX.

BELFAST, (Friday last.)—Flax: fine, 60s. to 65s.; good, 56s. to 58s.; good middling, 49s. to 52s.; middling, 40s. to 45s.; coarse, 34s. to 40s. per cwt.

WOOL MARKETS.

BRITISH WOOL.

BEVERLEY, June 20.—This newly established wool market was held in the Corn Exchange, and had a very limited show; consequently few sales were effected. Perhaps the farmers generally are not aware of the establishment of this market.

HOWDEN, June 19.—There was a moderate supply of wool at our market to-day, but, owing to the unfavourable state of the weather, there has been little or nothing doing. Prices were from 9d. to 10d. per lb.

HULL, June 19.—We had a fair supply of wool in the market to-day, the greatest part of which was sold at about last week's prices. Some of the ordinary lots met with slow sale, and at lower rates.

PONTEFRACT, June 16.—This being the last market this season, the quantity shown was limited, which was readily sold at last week's prices.

SELBY, June 15.—The quantity of wool at our market to-day was but small, compared with that of the preceding week. The average price, 11s. per stone.

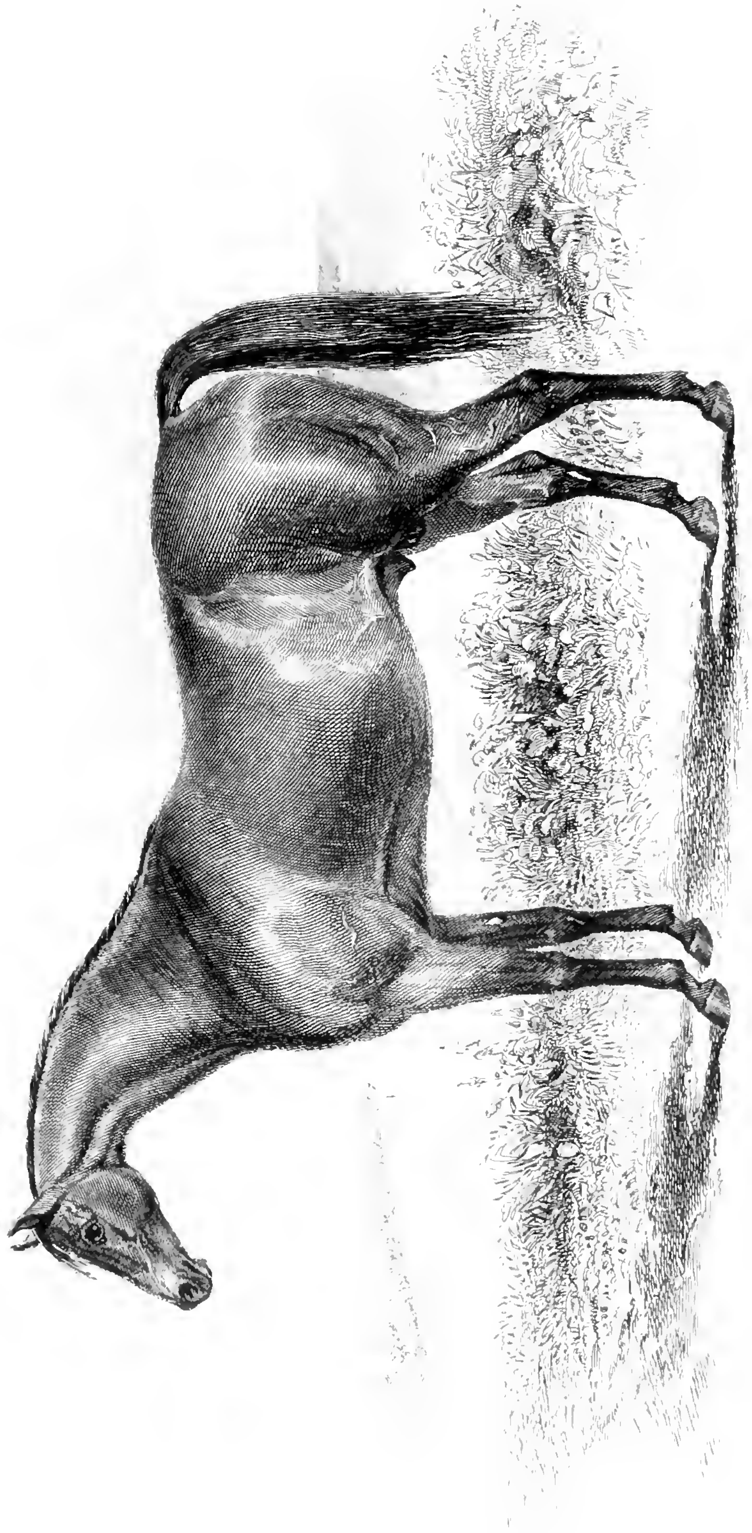
YORK, Thursday.—We had a good attendance of buyers this day, and the quantity of wool exhibited was unusually great, there not being less than 700 sheets; of which the greater part was sold at last week's prices, viz., hogg's and ewes' 10s. 3d. to 11s., hogg's 10s. 9d. to 11s. 6d., Cheviot ditto 11s. 6d. to 12s., ditto ewes 9s. 6d. to 10s., Masham hoggs 7s. 9d. to 8s. 6d., moor wool 4s. 6d. to 5s., docks and casts 6s. 6d. to 7s. 6d. per stone. £10,500 changed hands this day in the market for wool.

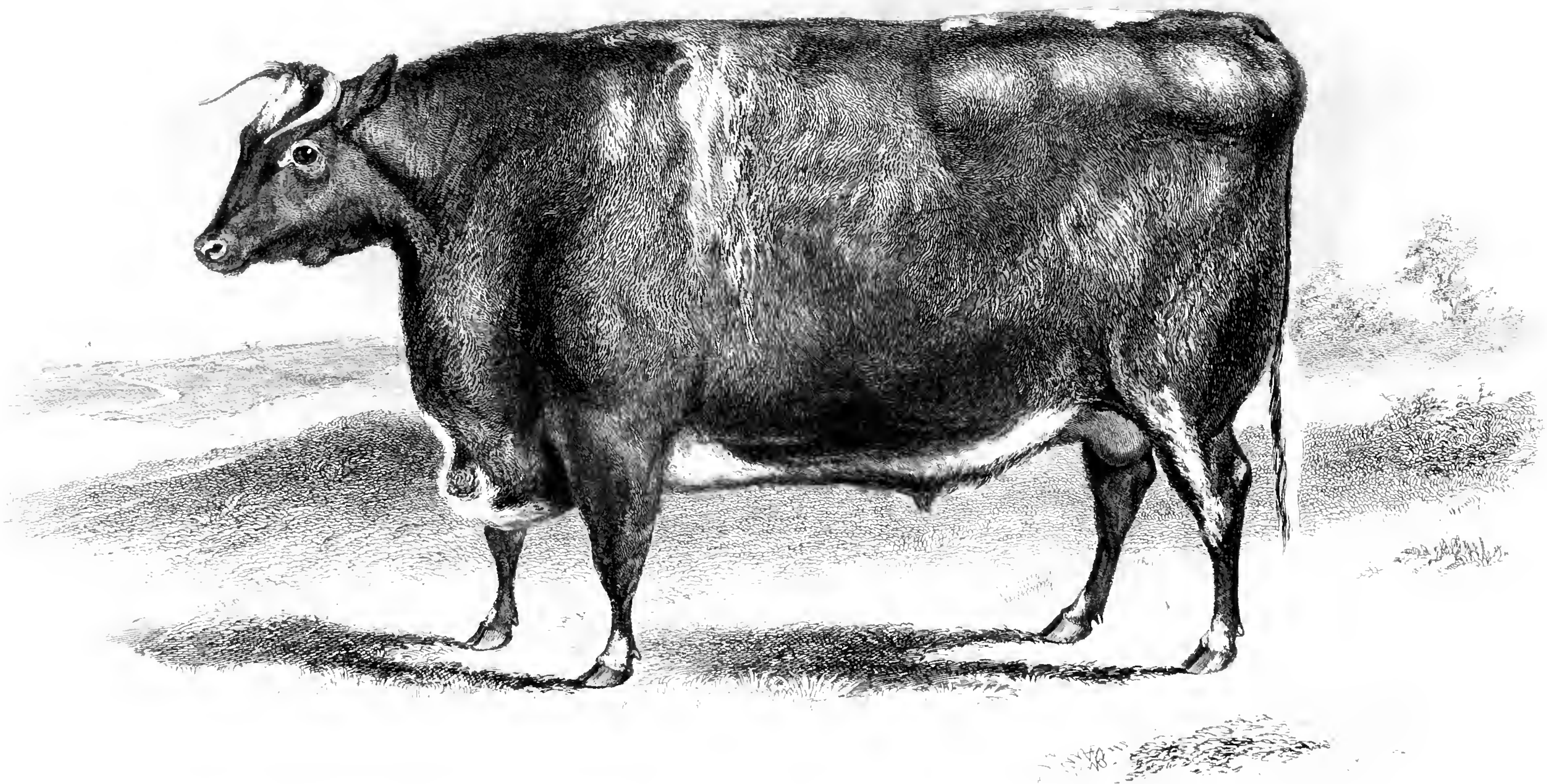
DONCASTER, (Saturday last.)—There was a large show of Wool, and a good attendance of buyers; we note no alteration in value from last week, and most of the lots offered were sold in the early part of the market. Superior clips, 11s. to 11s. 6d.; Lincolnshire, ⅓ to ½ hogg, 10s. to 10s. 9d.; inferior, 9s. to 10s.; locks and cotts, 6s. to 8s.

WOOL FAIRS AT SALISBURY.—A public meeting was held on Tuesday last at Salisbury, for the purpose of establishing two annual wool fairs in that city. Robert Farrant, Esq., in the chair. Mr. S. Long, of Amesbury, proposed the first resolution, as follows:—"That this meeting is of opinion that it is desirable to establish here two annual wool fairs, and pledge itself to promote its object to the fullest extent of their power." Mr. George Pain, brewer, seconded the resolution; which was carried with acclamation. Mr. Burt, of Winterbourne Stoke, then proposed the second resolution, to this effect:—"That the most suitable times for holding the wool fairs are the last Tuesday in July, and the last Tuesday in February." Mr. William Botley seconded this resolution, after adding the following in reference to the time of commencing and closing sales:—"That the sales commence at eleven o'clock in the forenoon, and end at one o'clock; and re-commence at three o'clock, and finally terminate at five o'clock." This was unanimously adopted. On the motion of Mr. Hodding, Mr. Rawlings was appointed secretary. Mr. Rawlings observed that in the case where ewe and teg wool were sent together, as referred to by Mr. Squarey, such should be paid for as two samples (five shillings). The several resolutions were carried unanimously, and annual and other subscribers then gave in their names.

MAIDENHEAD WOOL FAIR, June 19.—The supply of wool was not so large as expected, but this arose from the little publicity given to the fair, which certainly could not be avoided, as its establishment was only determined upon within the last fortnight. Business was done by samples, and it was suggested by some parties that the success of the fair would be better ensured by the farmers sending the wool in bulk: this, perhaps, will be done another year, when arrangements are more complete than they were on the first occasion. It is also questionable whether the fair was not fixed too early in the season, as there are many farmers in the vicinity of Maidenhead who have not yet finished shearing, and were, therefore prevented from sending any to offer for sale. A fair amount of business was done during the day, there being rather more than 2,000 fleeces sold. The prices obtained were as follow:—, Ewe and wether wool 21s., mixed wool 22s. to 22s. 6d., teg wool 33s. per tod. The dinner: In the afternoon there was a public dinner at the Town Hall to celebrate the event, which was attended by about 70 of the gentry and agriculturists. The chair was taken by the High Sheriff (R. Gibson, Esq., of Sandhurst Lodge), who was supported by R. Palmer, Esq. M.P.; Viscount Barrington, M.P.; Colonel Vansittart, Wm. Locke, Esq. (Mayor of Maidenhead); C. Sawyer, Esq.; C. Stephens, Esq. There were also present J. Smith, Esq.; J. Langton, Esq.; B. Bellis, Esq.; F. R. Warde, Esq.; J. Clarke, Esq.; and Messrs. Baylis, Broome, Cannon, J. Hobbs, G. Hobbs, Headington, Mills, Peto, Swallow, J. W. Shackel, R. Stevens, and other agriculturists and tradesmen of the town. The usual loyal and other toasts were given, and all parties separated well pleased with the day's proceedings.—Abridged from the *Reading Mercury*.

Printed by Joseph Rogerson, 24, Norfolk-street, Strand, London.





London, Published by . . . Rogerson . . . Strand

THE FARMER'S MAGAZINE.

AUGUST, 1849.

No. 2.—Vol. XX.] [Second Series.

PLATE I.

A COACH STALLION.

The subject of our first Plate, the property of J. Shaw, Esq., of Acomb Hall, near York, obtained the First Prize of Thirty Sovereigns at the Meeting of the Royal Agricultural Society, at York, in July, 1848, as the Best Stallion for Carriage purposes.

PLATE II.

A SHORT-HORNED STEER.

The subject of the second Plate, bred by and the property of His Grace the Duke of Rutland, of Belvoir Castle, obtained the First Prize of Twenty-five Sovereigns in the third Class of Short-horned Oxen or Steers at the Smithfield Club Cattle Show, in December, 1848; the Silver Medal was also awarded to His Grace as the breeder.

WATER—ITS IMPURITY AND PURIFICATION.

BY J. TOWERS, MEMBER R.A.S., H.S. OF LONDON.

The inquiry concerning sewerage—the supply and property of water in and about Croydon, instituted by the General Board of Health, and conducted by William Ranger, Esq., C.E., on the 22nd and following days of March last, has led to the promulgation of important chemical facts. Water, as found in nature, is, in consequence of its solvent power, always more or less impregnated with certain substances foreign to it. Even that bland and soft fluid which falls as rain from the clouds is far from chemically pure: it not only contains ammonia, but is tainted with carbonaceous and sooty matter, varying in quantity according to the local presence or comparative absence of smoke in the atmosphere.

Distilled water, so essential to the philosophic chemist, is obtained by the condensation of steam; it furnishes the only example that we possess of water in its purest condition—one wherein 8 parts of oxygen and 1 part of hydrogen, both by weight, exist in a state of electric union; but such water is unfit for the table, being flat and insipid, and perhaps, from the entire absence of air and vegetable matter, effete, and of little value to the gardener.

As a leading fact, established by repeated and conclusive experiments, when a stream of galvanic electricity is passed through a volume of water, the two gases above-named are developed, and may be separately collected, by an appropriate apparatus, in the proportions, by *measure*, of 2 volumes of hydrogen gas to 1 volume of oxygen gas. And the products so obtained may be combined, and again made to appear as *water* in its utmost state of purity, wherein it will surpass that produced by distillation, inasmuch as it will be free from that peculiar flavour which results from the operation of heat in close vessels.

Pure water must then be assumed as the type whenever we come to the investigation of its chemical, solvent, and combining properties. And during the late examination of the drains and supply of water, it was found that there were, locally, wells and flowing streams which contained water of ordinarily good quality; yet, in numerous instances, it was either deficient, or of inferior quality —or, what is far worse, contaminated by the proximity of drains and egouts, the foul matter from which had percolated the earth and found its way into the wells. Though interested in the improvement of a town and vicinity which naturally present extraordinary advantages, it is not my present object to offer any other remarks upon proposed sanatory regulations.

Water, pure as it is obtained from springs and clear streams, though perfectly free from contamination, contains in solution various substances derived from the rocks or soil through or over which it passes. Some waters, according to Dr. Fownes, "hold protoxide of iron, and are effervescent from carbonic acid gas: others are alkaline, probably from traversing rocks of volcanic origin; some contain a notable quantity of iodine or bromine." But in the waters of common wells, the impregnation generally consists of some salt of lime. Thus in the report by Dr. Playfair, to exhibit the *hardness* of the waters that are at present used in the town of Croydon, the superiority of the water of the *river* Wandle over that of the *wells*, in five districts remote from each other, is decidedly proved. Taking the hardness of the river at 16°1 per cent.—each degree of hardness indicating, according to the hypothesis, that produced by 1 grain of chalk per gallon.

The hardness of well No.	1	gave	18	degrees.
	2	,,	22	,,
	3	,,	21	,,
	4	,,	17½	,,
	5	,,	48	,,

Hardness proceeds in most instances from lime held in solution by carbonic acid, and it is evidenced by the curdling of soap—an effect which results from the affinity that exists between the alkali of the soap, and some acid in the water, generally the *carbonic* above-named; but in many cases the *sulphuric* acid may be suspected, and I believe that it is not absent from the water of some districts of Croydon, wherein sulphate of lime (gypsum) assuredly exists. The barytic test (barytes water) always producing a white deposit from the water of a well which supplies two adjoining houses where I reside, afforded the first trace of this ingredient; but another circumstance, of a startling nature, soon occurred to confirm my suspicion. Two brick cisterns, placed at a considerable elevation to supply the lower offices, were lined with lead in the year 1846; in August, 1848, the plaster of the ceilings under the lead cisterns became spotted with moisture, and upon examination it was found that the sheet lead was so corroded as to admit the percolation of water through a great number of holes. Every corroded spot was surrounded by broad and irregular white patches; and as the metal was thus destroyed, it became requisite to renew the lead bottoms entirely, the plumber stating that he must prevent the certain recurrence of the mischief by a resinous varnish applied over the whole surface. Barytic water has so strong an affinity for carbonic acid, that it cannot be trusted as a certain indicator of the presence of sulphuric acid. But if hard water be first tested by a solution of oxalate of ammonia, added gradually till it cease to separate any lime that is existing as a carbonate, a few drops of either nitrate of barium or of silver (lunar caustic) may produce a milky cloudiness, in which case the existence of sulphate of lime is confirmed, and its quantity in any given volume of the water can be determined by a skilful analytical chemist.

The hardness of water is in most instances caused by *chalk*, held in solution by carbonic acid; and here I approach the chief object of this paper, and hope to prove that by the adoption of a very simple process, patented by Dr. Clark, Professor of Chemistry at Aberdeen, the hardest water may, with little or no cost, be meliorated to an extent that will surprise the uninstructed reader who is continually incurring a great loss and expense in the soap which he has vainly attempted to bring into a state of useful lather. The following lines are extracted from Dr. Clark's "Theory of the Process":—

"In water, chalk is almost or altogether insoluble; but it may be rendered soluble by either of two processes of a very opposite kind. When burned as in a lime-kiln, chalk loses weight: if dry and pure only 9 ounces will remain out of a pound of 16 ounces. These 9 ounces will be soluble in water, but they will require not less than 40 gallons of water for entire solution. Burnt chalk is called quick lime, and water holding quick lime in solution is called lime water: the solution thus named is perfectly clear and colourless. The 7 ounces lost by a pound of chalk, on being burned, consist of carbonic acid gas."

So far is plain, but the reader who may attempt to prove the exact quantity of lime which any given measure of water can dissolve, will find that 1 single grain of the best quick-lime, however finely powdered, will not be all taken up by 712 grains of rain water (that proportion nearly being required, if we take a gallon at 10lbs.) They, therefore, who try to make very strong lime-water by using much lime, err greatly. Again we read:—"The other mode of rendering chalk soluble in water is nearly the reverse. In the former mode a pound of pure chalk becomes soluble in water by losing (in burning) 7 ounces of carbonic acid; but in the second mode not only must the pound of chalk retain the 7 ounces of carbonic acid, but it must combine with 7 additional ounces before it can be dissolved." Thus—a pound of chalk dissolved in 560 gallons of water, by 7 ounces of carbonic acid, would form a solution not sensibly different in ordinary use from the filtered water of the Thames in the average state of the river.

How far the patent obtained in 1841 may be an obstacle to the general adoption in families of a process so simple and certain I dare not undertake to assert; but let any person who finds the water he uses so hard as to break and curdle soap, prepare some lime-water, and taking half a pint of the former, drop gradually into it some of the clear lime-water, and he will soon perceive that, though both be equally bright, the two or three first drops of the latter will produce a manifest haziness, which, on further additions, will increase to a milky whiteness: in a short time, if left quiet, the white matter will subside, and then a fresh addition of the lime-water will again produce turbidity. Thus progressively all the chalk which can be acted upon by lime will be deposited, and the super-natant clear fluid will be water, deprived of fully three parts of four of the chalk which was originally combined with it, by the solvent power of *two* equivalents of carbonic acid upon one equivalent of lime.

Space is not now left to continue a subject of so much importance to almost every house-keeper.

THE MANURE FROM HOUSE-FED ANIMALS.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

The attention of the stock-owner has long been, and of late increasingly, directed to the superior value of the manure of animals fed in covered places. That of stall-fed cattle has been for many years estimated at its true value, and in more modern days that of swine has been held in much higher and juster estimation than formerly.

It will hardly fail to be productive of good, if a few recently published facts on the manure produced from these sources, are collected together. It is a theme deeply interesting to every practical farmer. The ably conducted discussion, not long since, on one branch of this subject, occupied the attention of the London Farmers' Club when examining a much more comprehensive theme, viz., "The best mode of providing manure for a farm." It was introduced by Mr. C. Lawrence with much practical good sense and scientific knowledge. If the lecture was, perhaps, too much confined to the merits, real or imaginary, of the box system, we may well forgive the enthusiasm of a recent convert for the sake of the value of the facts with which he illustrated his arguments. His experience of the benefits of the box-system, a very short extract from his address will describe. "I converted all my own stalls into boxes two feet deep, and of an area equal to nine feet square; and from my own experience and observation in other cases in which this dimension has been exceeded, I would caution any one against boxes of a larger size. These are filled in from twelve to thirteen weeks, when they turn out seven *cartloads* each of manure fit to go at once upon the land, containing all which has passed through the animals undiluted and unfermented; and consequently comprising every inorganic element as well as those, the decomposition of which is to furnish the organic materials of vegetation and nutrition. When the boxes require to be emptied at a period at which it would be ineligible to cart the dung on the land, we lightly plough a sufficient space on a convenient headland, to receive any little fluid which may ooze out from the heap. This is formed five feet in thickness, and of a certain length and breadth to enable us to calculate, when settled, the quantity in cart-loads. We mix rough salt with the dung as the heap is formed, and when completed we dilute sulphuric acid with about eight times its weight of water, and apply this over the surface, and then cover it immediately with six to nine inches of earth. No turning is necessary previous to use on the land. All the litter is cut in from four to six inch lengths by the chaff machine—

a very important feature in this system, as respects economy in litter, facility of emptying the boxes, (which could hardly be accomplished if long straw were used without the aid of the hay-knives, as it is so hardly trod), the ready absorption of the fluids, and the fitness of the manure for immediate application to the land without any turning." The merits of the box-feeding mode of producing manure, could hardly be more truely stated. There are, however, other points to be considered in this mode of feeding cattle, which a Norfolk farmer has with equal talent lately described: they are so practically and so fairly given, too, that I am sure that few of my readers will depart from his conclusions. "It is from the herds of the old Yorkshire and Lincolnshire short-horns," remarks Mr. Keary (*Jour. R.A.S.*, vol. 9, p. 429), crossed and improved by bulls of the Durham breed, that the main supply of grazing animals is annually obtained. They are purchased by the graziers in those rich fen districts where a bullock of 70 or 80 stone and a sheep can be fattened on an acre, and upon inferior pastures they are frequently grazed during the summer, and then finished in stalls, boxes, or yards during the following winter. Each of the above plans (continues Mr. Keary) has its separate advocates, and I merely mention them without presuming to determine which is the best. On farms where straw is scarce, stalls in warm hovels used to be preferred; but during the last few years the plan of box-feeding has come extensively into practice; and, like all new systems, is advocated by some of its supporters as being the only mode in which cattle can be properly fattened. In stall-feeding upon the old plan, the animals are generally tied up in pairs, and in well-arranged buildings a passage-way is left between the heads of the cattle and the back wall for the convenience of supplying and clearing out the manger. There are also shutters so contrived as to open and shut according to the weather, in order to preserve an equal temperature, and also underground drains for carrying off the liquid manure into a tank. A feed of turnips or other roots is given the first thing in the morning: the stalls are then cleaned out, and the cattle supplied with dry litter. When the morning's feed is consumed, a dry feed of linseed cake, bean or pea meal mixed with clover, chaff, or other dry food, is then served out. The animal is then left quiet during the forenoon and usually lies down. At noon turnips are again given, and by some the dry feed also as before, repeating it at night, whilst others prefer giving the artificial food only twice in the day.* When stall-feeding is managed in the best manner the animal is well cleaned daily with a curry-comb or hard brush, which tends much towards promoting and preserving its health. Boxes are generally from eight to ten feet square, are separated from each other by three or four strong rails, and have a manger in front divided in the middle, so that the roots and the dry food may be placed in separate compartments. One of the leading features in the system, and one upon which its advocates lay great stress, is, that the manure is not removed as in stalls: fresh straw is daily sprinkled over the box, the trampling of the animals kneads the manure into a solid mass which frequently remains untouched for several months, and thus is made very fertilizing to any crop for which it is used. Those who practise box-feeding, frequently use the cattle compound instead of linseed cake, or bean, or pea meal; and this may be almost considered an essential part of their system. This kind of food consists of three parts of barley, bean, or pea meal, and one part linseed meal, and is thus compounded. The linseed meal is first placed in boiling water, in the proportion of 1lb of linseed to a gallon of water, until it forms a sort of jelly—the barley or pea meal is then added, the mixture being well stirred all the time. The mash thus formed is taken out of the copper and pressed closely into some large vessel, in which it will keep several days. It is usual to commence by giving from 5lbs. to 7lbs. per day, and the quantity is gradually increased up to 12lbs. or 14lbs. Although almost all cattle will eat that quantity with the greatest avidity, it is seldom they can be induced to eat more. Turnips or other roots are frequently given with the compound in the boxes exactly in the same manner as in the stalls. When the object of feeding cattle is to make a large quantity of straw into manure, open yards, with roomy good sheds, are preferred. From ten to fifteen cattle are sometimes grazed in one yard, but the more they can be divided the better, as they are then generally quieter and less apt to disturb each other. Long bins in which the turnips are given are placed in different parts of the yard: about three bushels of swedes per day will generally satisfy a bullock, provided a fair quantity of linseed cake or other artificial food be added. There is generally a manger in the shed, so that the dry food may be given at any time during wet weather. The times of feeding are very much the same as those described in stalls, and some graziers, in addition to the turnip and cake, give a little long hay at night. If hay cannot be spared, the racks are daily filled with straw, and although this is not very nutritious, it is necessary to give bulk to the food: even cattle eating turnips will voluntarily consume several pounds of straw daily. The water of the turnips being soon separated, straw is necessary to enable the complicated digestive process peculiar to herbiverous animals to proceed properly. Without bulk of food they cannot ruminate, and rumination is necessary to keep all cattle in health. Having described the three systems generally pursued in winter-feeding cattle, it may not be amiss to stop for a few minutes to inquire into their respective merits. The advocates of stall feeding assert that the temperature can be better regulated in stalls than in yards, that each animal can eat his share undisturbed. The removal of the manure daily, they consider more healthy for the beast than when it is allowed to remain under him for several months, and they also contend that the animal when tied up and deprived of exercise fattens quicker. In boxes the animal is said to be more comfortable and contented, to thrive faster, and the manure to be undoubtedly very superior. In open yards provided with comfortable sheds, the bullock is treated more in conformity with his natural habits, and being a hardy animal he will seek shelter whenever it is required or is necessary for his comfort. Whichever plan may be adopted, I believe one or two rules are applicable to each. Warmth, that is shelter from wind and rain; cleanliness, a good lair, quiet and undisturbed repose when the animal is disposed to take it, and as far as practicable, supplying the food in small quantities, carefully removing out of the bins or mangers all soiled or rejected food. Salt in moderate quantities is much relished by cattle: it promotes digestion, and is productive of health."

As I remarked at the commencement of this paper, it is certain that the manure of swine is much more highly estimated than formerly. The ordinary stock of pigs kept by a farmer is in fact in many districts considerably on the increase; and thus, as I had occasion to observe in another place (*Bell's Messenger*) on recurring to the practice of the early English farmers, whose stock of pigs was in many cases exceedingly large. To the reason of this old agricultural custom Mr. J. H. Fennell (Quar. Jour. Agric., 1846, p, 372) pretty correctly alludes. "When we reflect," he says, "that even in the great men's castles the people subsisted chiefly upon salted meat during winter, we perceive the value of the privilege of feeding hogs in the royal forests, granted by the great Forest Charter of Henry III." In Doomsday Book, which is an account of the various land estates in England shortly after the conquest, we find an Anglo-Saxon noble bequeathing 2,000 swine to his two daughters, and 200 to two priests. At that time the forests were only specifically valued, as they afforded pasturage to a certain number of pigs, which fed on the mast (or beech nuts) and acorns, to be found there, and were watched and guarded by swineherds who were then more numerous than shepherds are now. That even wild boars then abounded in most parts of England is pretty certain. Fitzstephen, in his description of London, written in the latter part of the twelfth century, mentions boars amongst the wild animals which frequented the forest that at that time surrounded the city. It would be a research full of interest (and I may resume it some winter evening) to trace the agricultural forest rights still partially exercised in some English districts, with regard to the right of pannage in the royal forest lands. On the present occasion our attention will be directed to a more practical and a far more generally useful theme—the excreta of the pig. The dung of the swine has been noticed by Professor J. F. Johnston, and more at length by Sprengel, the celebrated German chemist. It is described by the first (Elem. of Ag. Chem., p. 168) as soft and *cold*, like that of the cow, containing, like it, at least 75 per cent. of water. As this animal lives on more varied food than that of any other animal reared for the food of man, so the manure obtained from it is consequently as variable in quality. Applied alone as a manure to roots it is said to give them an unpleasant taste, and even to infuse the flavour of tobacco. It answers well (adds Professor Johnston) for hemp and hops, but mixed with other manures it may be applied to any crop. In some districts, however, he concludes, pigs' dung is considered one of the richest and most valuable that can be applied to the land. The practice in Germany, according to Sprengel (Jour. R. A. S., vol. 1, p. 492) is to mix it with cow dung before being used as manure. "Of all animals," he remarks, "in consequence of the large amount of liquid food they obtain, swine discharge the greatest quantity of urine; which acquires in putrefaction the most intolerable odour, occasioned by a peculiar volatile substance, at present imperfectly known; and it is this substance probably which communicates the unpleasant flavour to esculent roots. According to my own investigation, 100,000 parts by weight of the urine of pigs fed on corn offal, consisted of—

Water	92.600
Urea, with a very little mucus, albumen, and colouring matter	5.640
Salts, as common salt, muriate of potash, gypsum, carbonate of lime, and sulphate of soda	1.760

"It results from this analysis that the urine of the pig contains rather a smaller proportion of water than the urine of cattle, and $1\frac{1}{2}$ per cent. more of urea; and this circumstance perfectly explains the reason of its being more caustic in its fresh state than that of cattle, a larger supply of ammonia being created out of the greater amount of urea present. Accordingly, before we can apply the urine of the pig to growing plants, it must necessarily have undergone putrefaction. To prevent, however, an useless escape of the ammonia, it will be very advisable to dilute it with a good deal of water before exposing it to putrefy. The ill effects of pig urine, not properly putrefied, are commonly ascribed to the presence of a peculiar acidity, but they arise from no other cause than the caustic ammonia.

"If this urine is conducted, as is generally the case, into the manure pit, a great loss of manuring matter, in the form of gas, always takes place; and it is therefore the best plan to convey the urine by itself into a tank, and mix it with a large quantity of water: for this plan, however, a judicious arrangement of the sty is necessary, and, if situated near the cattle stalls, the urine of the pig can be mixed with that of the cattle, and here, under the directions already given, be allowed to putrefy. It is maintained that when the urine of the pig gets into a pond containing fish it kills them: should this really be the case, the effect would probably be occasioned by sulphuretted hydrogen, resulting from the decomposition of gypsum, a gaseous poison, to the action of which fishes are very sensible, and of which a very small quantity is required to kill them instantly."

It is in our present state of knowledge with regard to the analysis of the excreta of the pig, needless to follow this branch of the inquiry further; our own practical knowledge confirms some of the conclusions to which these eminent chemists have arrived; others I regard as at least exceedingly doubtful. I allude to its action in imparting a flavour to roots, and as being in anything like moderate proportions inimical to fish. I believe it to be a most powerful manure, especially when made by animals fed on good and fattening food; it has long been almost the only manure of the little cottage cultivators; and it is assuredly a favourite with the gardener and the owners of orchards. A Somersetshire farmer too, has recently given his very valuable evidence in its favour as a manure for turnips; and as they are altogether of a practical nature, we need hardly vary the language of his report. In a paper addressed to the editor of the "Farmer's Magazine" (vol. 30, p. 144), Mr. Samuel Pocock, of Thoulstone Farm, after referring to a debate on the subject, at the last meeting of the Frome Agricultural Society, remarks—"Well knowing the excellence of pig manure, five years ago I was induced to try it solely for turnips. I tested it against guano and bone dust. The result was quite equal to the guano, and beat the bone-dust hollow. My farm is one part clay and another sand; I found the same result on both. I have also the management of a farm in Hampshire, a poor thin soil, and there the manure was equally beneficial. I have continued to use it ever since with the same results. To carry out my plan, convenient farm buildings are necessary. I have a large dry shed, in which, first of all, I put a layer of dry coal ashes, about a foot thick and four feet wide, to which the deposits of the pigs are taken, both liquid and solid, and as soon as it begins to ooze out I put on more ashes, and so on till it gets to about four feet in thickness. I then again commence a fresh layer, and treat it in the same manner. After lying some time, it is turned two or three times, and then it is fit for drilling. I have put in this year 45 acres of turnips with nothing but this manure, and the result is now open for the inspection of any who may choose to see it. I found the droppings of three pigs, carefully preserved, to be ample for two acres, and quite equal to three sacks of bone-dust per acre. I am not speaking theoretically, but from actual experience; and I consider if we can get such valuable manure for nothing but the labor, it is much better than putting our hands in our pockets and paying 28s. or 30s. per acre for artificial manures.'

The plan suggested from practical experience of preparing a drill manure for turnips, by an admixture of ashes and pig manure, I believe might be extended to a very large number of farming districts with decided advantage. We must not forget, however, in such an attempt to provide a valuable drill manure, certain precautionary measures, without which the compound produced will be of inferior value. In the case of the ashes, they should be always prepared with as large a portion of charcoal in them as possible. Those from coals are, it is true, peculiarly useful for some soils, from containing a portion of sulphate of lime in them, as well as charcoal; but these are not commonly obtainable to any large extent; but then the farmer has very often the means of *charring* vegetable substances, and let him ever remember not to entirely *burn*, but to merely *char* these matters. Then as to the excreta of the pig, let him not forget that the more the pigs are fed with *grain* the more enriching will be their dung. With these precautions to avoid failure, and keeping the ashes as dry as possible before they are mixed with the dung, so that the charcoal may absorb the more copiously the liquid portion of the manure, I have no fear that a home-made drill manure for turnips may be prepared, which would save the farmer very often an outlay for artificial manures, for which he is not always certain either of their real composition or of a profitable return.

ON THE ADVANTAGEOUS GRAZING OF SHEEP AND CATTLE, WITH A VIEW TO INCREASING THE STOCK-PRODUCING CAPABILITY OF THE LAND.

BY M. M. M.

The amount of animal food consumed in a nation is by no means a bad criterion of its advancement in prosperity. Whether a low diet tends to keep down the energies of the population, or whether an energetic and prosperous people will become flesh-consumers, may not be easy to settle; but it is possible that both these states of things may have their influence. That the severe and protracted labour of the people of this country, and the effects of our northern climate, may have much influence in increasing the use of animal food, there is no doubt; while, on the other hand, the means used to extend the supply have been far greater than perhaps in any other country in the world. In 1834, Mr. M'Culloch estimated, after a variety of reasonings, the total number of cattle in Great Britain to be 5,100,000, with a population of 17,000,000, or one animal in round numbers to every 3½ of the population: of these of course but a certain proportion are fattened for consumption. And the same authority gives the annual produce of England and Wales, exclusive of Scotland, to be 1,200,000. Taking this as a basis, and our population at 15 millions, and assuming the net average weight of *meat* per animal to be 550lbs., it will give 660,000,000lbs. of beef consumed per annum, or 44lbs. of beef to each individual of the population, including children—nearly one pound of animal food in the shape of beef per week. The sheep, Mr. M'Culloch gives at 6,800,000, the calves at 200,000, and the swine at 555,000; and the money-value of these he gives at £11,600,000, whereas he values the cattle at £14,400,000; so that if the proportion of food assumed to be supplied by these bear the proportion in round numbers of one-fifth less in quantity, it will give the consumption of animal food at considerably more than two pounds per head for each individual in the adult population per week.

The supplies of cattle in Smithfield exhibited last year [1848] amounted to

Beasts	209,170
Cows............	6,162
Sheep	1,343,890

from the country alone, while the foreign cattle amounted to

Beasts	27,259
Sheep	105,735

giving a total of 242,589 head of cattle, and 1,449,625 head of sheep; and taking the cattle to average 550lbs. each, and the sheep at 50lbs., it will give an aggregate of 133,423,950lbs. of meat sold in the London market alone, exclusive of veal and pork, and the carcasses; and this may be taken as the supply of the London market alone; for though some of the meat may be sent to the suburban villages, still meat slaughtered there also finds it way to London. Now, assuming the population of London to be 1,500,000, it will give a consumption of 89lbs. of animal food per annum to each individual in beef and mutton alone, exclusive of pork and veal, at least one-fifth more.*

It is a question no less interesting to the agriculturist than the political economist, how the supply may be increased with an increasing population; and the profits are a stimulus equally urgent upon the one, as are the theoretical axioms of the other.

In this country, food, to be palatable, to be consumable, must be *fat;* unless it have this recommendation, it is absolutely unsaleable. The appetites of the higher, and the necessities of the lower classes, urge on the demand for fatted beef, and mutton, and pork; and any brought to market in a state other than fat is looked upon as carrion. The members of the operative's family have to content themselves often with the gravy and vegetables, while the head of the family consumes the flesh, to enable him to perform his labour; and hence, when the fat is not available, one important source of the food of his household is dried up. Hence the grazier must supply the whole of his animals in a fattened state to the consumer; and therefore it is not the number of animals, nor their weight in pounds and stones, he has to consider, but he has to provide for them the means of fattening before they can be brought before the consumer.

There is, however, it is too well known, a certain amount of difficulty in providing fat animals. It is not every animal which can be made to lay on fat by any known means; and it is comparatively a few only which can be induced to lay on this fat so early as to meet the demands of the consumer.

By paying attention to the breeding of the

* The estimate of food for Paris is 86lbs. per head, and Brussels 89lbs. per head per annum of flesh-meat.

animals having a tendency to lay on fat in their early stages, a great revolution has taken place in the production of animals with this propensity in early life. The fat-forming process is one, *cæteris paribus,* incompatible with the growing or the milking of the animal, and it is quite impossible to combine both these qualities. There are certain qualities in races which are hereditary and transmissive. Experience has enabled skilful breeders to judge from external conformations the physiological tendencies of the animal. From a combination of qualities, such as the inexpressible, soft, elastic, velvety touch—the mossy coat, the goggle eye, the deep chest, the wide hips, &c.; and not only can a breeder judge of the qualities of a particular race, but he can select the most promising of his own, or another's herd, and thus engraft the peculiarity upon the animals he breeds. With an animal it is the same as with a plant: if the individual possessing a peculiar quality be paired with another of the same disposition, inasmuch as in physiology as well as mathematics "like produce like," the produce may, as a general rule, have a greater degree of the quality than an animal indiscriminately bred. Take, for instance, the fat-producing tendency; if this is an object with the breeder, and all the animals with developments of this quality, and with conformations coincident therewith, are selected and bred from, and all those which do not give such manifestations rejected, a given herd will, in a series of years, vastly improve in this particular.

There are certain qualities precedent which must first be attained. The aim of those who wish to cultivate fattening propensities must first be to obtain a race of animals having an early growth. Inasmuch as growth is necessarily to be matured before feeding can be successfully completed, this is the first desideratum; and having overcome this difficulty, the fat-producing quality is easily attained.

The fact is too well known how far this principle has been developed by successful breeders. However select a party may have kept his herd or flock, there are circumstances which will suddenly or gradually disseminate the good qualities he has attained, and though diffused with more or less alloy, still the object is being gradually attained. Nothing has tended more to spread this than the zeal with which many noblemen have taken up the breeding and rearing of the best animals; and not to mention any living instances, the late lamented Earl Spencer did more to give tone, and to disseminate the best qualities of animals, than will perhaps ever be appreciated. Once attained, his results became the property of his tenants, friends. and dependants, since they have spread far and wide; and he is only an instance of scores of others now going on, east and west, and north and south, spreading the same valuable properties, and engrafting, as it were, the stocks of one production with a series of better grafts.

The agricultural societies have given impetus to the extension of valuable qualities; and much and loud as have been the outcries against the fatted animals brought there, they have taught our grazing population wherein good qualities consist—have excited a healthy and vigorous emulation, have diffused sound forms, and tended to extend good animals more than all other causes put together. Few districts but now possess some better feeder, especially in male animals, which experience has shown possess more power of transmitting qualities than females; and the result is, rapid strides in the animal youthfully mature; and when so prepared, calculated to lay on fat, and be early ready for the butcher, and for our people's food.

Nor have they progressed as *feeding* animals so far as they have as *breeding* animals, because, owing to the comparative scarcity of the latter, they have been kept as much as possible for the latter purpose, while the most inferior only have been fed; and thus the foundation is being laid for a better and still more successful race of feeders.

It is not to be supposed, however, that the progress hitherto has been small. Confining attention in this instance to *cattle* only, the fairs and markets are supplied with a class of animals quite different from what they were within twenty, but more markedly within fifty years. Then it were a folly to attempt the feeding of an animal under three years of age, but more generally they were four or five.

Great as have been the improvements of sheep, it must be confessed that it is rather to the tendency to feed in maturity, than to arrive at that state in an early stage. The object with a mass of feeders of the Cotswolds, of the Leicesters, and the improved breeds generally, is, to aim at having them fat just before the second year of their lives, and therefore few breeders have aimed at anything beyond it. Quantities of Leicesters are sold fat at 15 to 18 months old, in Yorkshire. The more hardy and less improved breeds, however, have a still greater period of growth; and the best specimens of mutton are considered those of the three and four year olds, and therefore the demands of the market have not urged the breeder to produce early mature animals, except for the manufacturing districts.

The swine have arrived at a degree of perfection which it is difficult to supersede, and any great improvement over which we are unable to conceive any advance. The large-breed animal—coarse, difficult to feed, and at its extreme growth of a very great size—has given way unto the small-breed animal, with a maturity of fatness capable of being realized at its very earliest stage.

1. THE ECONOMY OF FEEDING YOUNG ANIMALS.

The question of the economy of early feeding resolves itself into the profit of the grazier, and the production of the largest quantity of food for the community; and though these might appear at first sight to be precisely co-extensive, in reality they are not. It is possible to produce food at a loss; and thus one hundred stones of animal food may, in some states of things, be produced at a greater profit than a hundred and fifty.

To estimate the question properly, it is necessary therefore to calculate the expenses of the two processes; and as the principle will equally apply to all cases, the writer selects two sets of animals; viz. one where a certain number of sheep are fed off at one-year old, and another where they are kept on hand till two. In order to make the cases as equal as possible, it is manifestly necessary to select in both cases the same capabilities of food, and have 20 acres of seed ley, capable of carrying five sheep per acre from the 6th of April, and 10 acres of turnips, capable of grazing ten sheep per acre, from the 20th of October to the 6th of April. It will be necessary to suppose the sheep lambed on the 6th of April in both instances, to make the cases equal. The ewes are in both cases supposed to be depastured away, to show the results of the feeding animals, to make the cases equal.

First Year.

April 6.—50 ewes and 75 lambs depastured to the 20th July. Ewes drafted off to hill pastures, and 25 lambs purchased, weight 10lbs. per qr., in their place.

Oct. 20.—100 lambs depastured on the turnips up to the 6th of April.

Second Year.

April 6.—100 "hogs" depastured on the seed leys till Oct. 20.

Oct. 20.—100 sheep depastured on the turnips up to April 6th, and sold off at 22lbs. per quarter, 88lbs. each .... 8,800 lbs.

Deduct 25 lambs, purchased weight	1,000
Total produce of the 30 acres	7,800 lbs.

Early Feeding.—First Year.

April 6.—50 ewes and 25 lambs depastured to the 20th July, and 25 lambs purchased, weighing 10lbs. per qr. up to Oct. 20.

Oct. 20.—100 lambs depastured on turnips up to the 6th of April, and sold off fat, at 17lbs. per quarter.

Second Year.

April 6.—50 ewes and 75 lambs depastured to the 20th July, and 25 lambs purchased, weighing 10lbs. per qr. up to Oct. 20.

Oct. 20.—100 lambs depastured on turnips up to the 6th of April, and sold off fat at 17lbs. per qr.

Produce of first year, 6,800 lbs.	6,800 lbs.
Deduct 1,000 less, purchased 1000..	1,000
	5,800 lbs.

Produce of second year....	6,800 lbs.
Deduct 1,000 less, purchased	1,000
	5,800 lbs.

Amount as above, 1st year	5,800 lbs.
Amount as above, 2nd year........	5,800
	11,600 lbs.

Extra produce of young feeding on 30 acres, in animal food, as follows:

By new mode	11,600 lbs.
By the 2 years' old method	7,800
In 2 years....................	3,800 lbs.
Or increase per annum	1,900 lbs.

The question of profit, however, is somewhat different, as will appear from the following estimate, rating the price of mutton to be in all cases 6d. per pound, and the cases always to be precisely those above.

First, or Two-year-old Mode.

DR.	£	s.	d.
Oct. 20.—20 acres of seeds, at £2 10s. per acre	50	0	0
25 lambs, *at £1 each*	25	0	0
April 6.—10 acres of turnips, at £6 ..	60	0	0
Second Year.			
Oct. 20.—20 acres of seeds, at £2 10*s*.	50	0	0
April 6.—10 acres of turnips, at £6 ..	60	0	0
	£245	0	0

CR.	£	s.	d.
Second Year.			
May.—100 fleeces of wool, at 10*s*.	50	0	0
8,800 lbs. of mutton, at 6*d*.....	220	0	0
Value of 75 lambs, at 10s.....	37	10	0
	£307	10	0

Profit...... £62 10 0

Second Method.—First Year.

Dr.

		£	s.	d.
Oct. 20.—	20 acres of seeds, at £2 10*s.*	50	0	0
	25 lambs, at £1	25	0	0
April 6.—	10 acres of turnips, at £6 ..	60	0	0
	Extra cost of consuming—a woman for 20 weeks......	5	8	0
Oct. 20.—	20 acres of seeds, at £2 10*s.*	50	0	0
	25 lambs, at £1	25	0	0
	10 acres of turnips, at £6 ..	60	0	0
	Extra labour of consuming turnips, as above	5	8	0
		280	16	0

Cr.

	£	s.	d.
13,600 lbs. of mutton, at 6*d.*	340	0	0
Leaving a profit of	59	4	0

But these are not all the elements of deciding the absolute profit; an investment of more capital is required in the one case, and it will not be too much to say that one-sixth to one-eighth more capital will be necessary to carry on to the same extent.

For instance; in the one case an outlay is required for twice the number of extraneous stock in the same period, and more labour is required in cutting the turnips; and the whole process is more costly, and involves a larger outlay of capital.

The same rule will apply in the case of cattle, of pigs, or of any stock where the difference is admitted into calculation; though it may be more difficult to carry out in cattle than in sheep, and in both cases it is not easy to draw a perfect parallel, because in the forcing of these young animals it is always profitable to give a small quantity of stimulating and fat-producing artificial food. The economy of this must be admitted in the outset, both in the increase of food, and the improved condition of the soil; and this being admitted as a general principle, there is no necessity for admitting it as an element of calculation in this particular.

2. Sources of our Fat Stock.

The sources from whence the great manufacturing towns, and the commercial, including the metropolis, draw their supplies, vary in summer and winter. In the former they are derived chiefly from the grazing valleys of the country, mainly the alluvial deposits of the rivers intersecting the island, and which produce grass of the richest quality, having many feet depth of soil, and being capable of growing plants of the greatest vigour, and supplied in abundance with all the elements necessary to the production of flesh and fat. The same districts with the Downs produce also a supply of summer mutton.

In the winter and spring months the supplies are of a different character, and from a different quarter. They consist of house-fed cattle and of turnip-fed sheep, and are spread over the lighter soils of the country, as the summer-fed animals are, as a general rule, over the heavier.

Taking the London market for the year 1848, the number of *bullocks,* as nearly as can be come to, were from the following places; viz.

From the Northern parts of the country	44,650
From the Eastern	46,300
From the Midland....	27,150
From all other parts	28,240
From Scotland	12,862
From abroad of all kinds	27,259
Total.................	186,461

3. Sources of Supply of Lean Cattle.

These, as a general rule, come from the districts of the country where the grass is too inferior to feed animals, and where from a variety of causes it is not used for dairy purposes. These are the hill-side pastures of the valleys through which the various rivers of the country run; the hill-tops unfit for cultivation, and where the hardy varieties of cattle are reared; and the inferior and second-rate grass-lands of the country generally. The Highlands of Scotland breed and send off large quantities of cattle, each of which, at two years old, costs the breeder little short of five pounds. The lean cattle from various parts of Scotland, which are collected annually at the Falkirk trysts, are not fewer than 80,000 on a low calculation. From Ireland there are not very accurate means of coming to the precise number imported with which the writer is acquainted; but a few years ago, it was at least 60,000. The deaths of Irish cattle, however, have been of late so great from the pleuro-pneumonia, that the graziers have shown less disposition to purchase them than formerly.

From Wales also there is a small supply, while the remainder are the short-horns from the North, purchased at the Yarm and Darlington fairs; the Herefords of the South-West, and the Devons of the South, afford the sources of supply for the grazing pastures, and for winter feeding.

As regards sheep, the supplies are almost co-extensive with the cattle, and from the same localities, because the breeders of cattle are usually also breeders of sheep in a greater or less degree, as it is seldom either desirable or profitable to keep one class of stock exclusively on a farm. Hence on the uplands the hardy horned sheep, or the more compact Cheviots, on lower levels the Bambroughshire, and in the south, in similar situations, the Cotswolds; while on the lowlands, the Leicesters, the improved Leicesters, and the Downs, are more generally partly bred and partly grazed; and hence there is in the lowlands much less selling off and driving, and consequently purchasing of sheep for grazing purposes. Whereas in cattle, grazing is a branch of farming quite distinct from breeding, though sometimes combined with it. Inasmuch, however, as the root-cultivator who winter-feeds his sheep, can feed in winter many more than he can graze in summer, he necessarily needs a supply, and this supply comes partly from the situations we have indicated above; the hill sides and uplands, where they have a deficiency of winter food; and from those farms and situations where they are unable to feed their green crops on the land, from the nature or condition of the soil.

We shall return to the other branches of the subject.

Sowerby, Thirsk, 17th July, 1849.

APPLICATION OF CHEMISTRY TO AGRICULTURE.

No. II.

REMARKS ON GREGORY'S ELEMENTS OF CHEMISTRY.

BY A FARMER.

Much as has been said and written on the nutrition of plants and animals, we have met with nothing which so clearly and simply defines the difficulties of the question, and points out what is already known on this subject, as the remarks of Dr. Gregory, in his "Outlines of Chemistry, for the Use of Students"—a book which, by the way, we venture to recommend most strongly. He says—

1st. The presence of decaying vegetable matter in the soil promotes vegetation by furnishing a steady supply of carbonic acid. (This decaying vegetable matter may, however, when it exists in too large a proportion, as in peaty soils, be injurious to vegetation.)

2nd. The presence of decaying azotized matter, as animal manures, is very advantageous, by furnishing a supply of ammonia, which is essential to vegetation, and is scantily supplied by the atmosphere.

3rd. The supply of carbonic acid and ammonia can only favour the development of vegetation in-so-far as alkalies and phosphates are supplied to the soil.

4th. As all the more valuable parts of plants contain sulphur and phosphorus, in the form of albumen, fibrine, casein, &c., it is evident that these parts cannot be fully developed except the soil contain alkaline or earthy phosphates with sulphuric acid or sulphates.

5th. If the soil is rich in alkalies, sulphates, and phosphates, and if it also contain soluble silicates, essential to the stem of the grasses and cerealia, it is fertile for all nutritious crops, and such crops will in that case derive from the atmosphere alone all the carbon and nitrogen (carbonic acid and ammonia) they require, *provided time be allowed*. The advantage of decaying organic matter, or of manures containing ammonia in such a soil, consists in shortening the time necessary for the development of the plant—a matter of the last importance in our uncertain climate, but of far less consequence in southern regions, where summer is perhaps twice as long.

6th. The ashes of wood, straw, leaves, &c., consisting entirely of matter extracted from the soil by the plants, for the purposes of vegetation, must prove a most fertilizing manure, and in all cases the ashes of any crop must be the best manure for that vegetable.

7th. But as the ashes of plants are represented by the dung of the animals which feed on them, so the dug of animals fed on turnips, hay, straw, potatoes, &c., &c., must be the best manure for turnips, hay, corn, or potatoes respectively.

8th. When by the addition, to an average soil, of guano or of bone earth, a very heavy crop is obtained, say of wheat, we are not to expect that a repetition of the same treatment will produce the same effect. We must bear in mind that the presence of the increased supply of phosphates, by means of the guano or bone earth (in which the soil had most probably been poor) has enabled the wheat plant to take up a much larger quantity than otherwise it could have done of alkalies, silicates, and the other necessary minerals. Since the guano or bone earth does not contain these substances, it can easily be understood why the continued use of these substances leads to the exhaustion of the soil, and that years may elapse before it again becomes in the course of nature as fertile as to yield a full crop of either wheat or anything else from a top-dressing of guano.

9th. The only certain rule is this—*as far as possible to restore to the soil in the shape of manure exactly what it has lost in the crop;* if the soil were originally fertile, this will maintain its fertility, which will ever be gradually augmented by the action of the weather on the subsoil.

10th. With a view to this, every particle of solid or liquid manure, especially human excrements, should be preserved with the utmost care. It is their mineral elements which are the most valuable, and since these have all come from the soil, in preserving them for manure we are only restoring what we have taken away. In this country the waste of valuable manure is lamentable, and is necessarily followed by a slow but certain deterioration of our soil and crops, which we are now endeavouring to remedy by the expensive, precarious, and partial method of bone-earth and guano. But guano will ere long be exhausted; and when other countries know the real value of their bone-earth, they will not willingly part with it—at all events, not except at a very high price.

11th. If a soil is not fertile generally, it must be deficient in most of the substances above alluded to ; but if it yields good crops of one vegetable, and not of others, it must be wanting in the characteristic mineral elements of the latter, which must then be supplied.

12th. The ashes of plants being known, the fact that a certain vegetable, cultivated or wild, thrives in any given spot, furnishes us with an analysis of the available or soluble constituents of the soil, and enables us to direct our measures of improvement according to the crop we wish to raise.

13th. Although certain substances characterize the ashes of certain plants, as potash does those of turnips and potatoes, and lime does those of peas, beans, &c., yet in many cases one of these substances may be substituted for another, as soda for potash, or magnesia for lime.

14th. It is maintained by some that carbon is introduced into plants in part as humic acid, humus, or humate of ammonia, dissolved in the juice, and derived from the mould in the soil. But there is no evidence that fertile soils contain humus in a form soluble in water, and the sap when first entering the plant is colourless, while all solutions of humus, &c., are brown. Besides, in forest land, which is not manured, the proportion of humus or of carbon in the soil, instead of diminishing rather increases, while enormous quantities of carbon are removed annually in the shape of wood. Here, as in the case of the first vegetables, it is plain that all the increase of carbon must be derived from the carbonic acid; since, if the plant does absorb humus or humic acid, or humate of ammonia (which is not yet proved), it must give to the soil as much or more humus, &c., as an excretion from its roots.

15th. It has also been argued by some that plants may obtain their nitrogen either directly by the absorption of the nitrogen of the atmosphere, or by causing that gas to form ammonia, by combining with hydrogen derived probably from water, &c., or, lastly, from the decomposition of nitric acid, which acid is supposed to be formed in the atmosphere by direct combination of its elements. *But no evidence has ever been given either that plants can absorb nitrogen directly, or that they can cause the nitrogen of the atmosphere to combine with hydrogen.* As for nitric acid, although traces of it have been observed in thunderstorms, *it does not appear to be formed in sufficiently large quantity ;* and if it were, no proof has yet been offered that plants can derive their nitrogen from it. The action of nitrate of potash and of soda proves nothing, because it may be due to the alkalies alone, and probably is so, since they do not seem to act better than other salts of the same bases. Moreover, many plants, such as tobacco and sunflower, contain much nitrate in their juices, and therefore appear rather to form nitric acid than to destroy it. *On the whole it appears nearly certain that ammonia is the only source of nitrogen in plants.* It is self-evident that the atmosphere must contain ammonia derived from the putrefaction of animal and vegetable matter, and also, that however small the proportion, the absolute quantity in the air at any one time must be sufficient for the supply of the vegetable world, and through it of the animal world, since all animals and vegetables ultimately putrify, giving off their nitrogen in the form of ammonia. It is quite easy to detect ammonia in rain water, by which means it is conveyed to the roots or leaves of plants, and it has also been proved that the juices of plants contain abundance of ammonia. The proportion of nitric acid formed during thunder storms is so very small as to lead to the conclusion that it is formed only from the ammonia present in the atmosphere. Should this prove true, as is highly probable, then ammonia will still be the source of all the nitrogen of plants, even if part of the nitrogen be derived from nitric acid. It is generally admitted that in nitrification the whole of the nitric acid is derived from the oxidation of ammonia.

We have already expressed our high opinion of the above brief outline of vegetable chemistry, and as the views we have in previous papers attempted to advocate are there expressed in language at once clear and forcible, we make no apology for the length of the quotation, and will now briefly discuss such of the positions above laid down by Dr. Gregory, as do not exactly agree with our own opinion.

In paragraphs numbered 1, 2, 3, and 4, he lays down *the necessity* for a certain quantity of alkalies, sulphates, and phosphates being present in the soil, and *the expediency* or *usefulness* of a certain quantity of decaying animal and vegetable matter being also present. All chemists are agreed in the truth of the first part of the position; and though the majority are against us, we would venture to assert that to some of our cultivated plants a certain quantity of decaying animal and vegetable matter are equally necessary. As, however, in paragraph 5, Dr. Gregory states that "if the soil is rich in alkalies, &c., it is fertile for all nutritious crops, and such crops will in that case derive from the atmosphere alone all the carbon and nitrogen (carbonic acid and ammonia) they require, *provided time be allowed.* The advantage of decaying organic matter, or of manures containing ammonia," consists in hastening the ripening of the crop, "*a matter of the last importance in our uncertain climate.*" This comes so near to saying that decaying vegetable matters are *necessary,* as well as the other parts of our plants, that we will not discuss the point.

We also agree with the conclusion, that the ashes of any plant, and consequently the dung of any animal fed upon that plant, will prove the best manure for future crops of that plant, as stated in paragraphs 6 and 7.

Paragraph 8 confirms in the strongest terms the fact which was attempted to be proved in a recent discussion in this magazine, viz., that though good crops may for a certain period be produced by the use of bones or guano, the farmer is by no means to expect a continuance of good crops from them, because these manures only contain *some* of the substances requisite to perfect vegetation. Disappointment in the crop as well as impoverishment of the soil can therefore only be the result of the continued use of bones or guano. Too much weight cannot possibly be given to the rule laid down in paragraph 9, and in which we most cordially agree, viz., that the only certain rule for the guidance of the farmer is "*as far as possible to restore to the soil in the shape of manure exactly what it has lost in the crop.*"

We also agree with Dr. Gregory, that it is desirable to save every portion of the excrements of man and of our domestic animals. But whilst we admit thus much, the question still stares us in the face, how is this to be done in our crowded cities? Chemistry could confer no greater favour on us than by pointing out, how we can at the same time avoid risk to the health of the inhabitants of our large towns, and yet preserve the solid and liquid excrements. Till this can be done we must content ourselves by purchasing our manures from other countries.

The only time wherein the Dr. oversteps the mark and over-estimates the present position of his science is when he states in par. 12,—that, "*the ashes of plants being known,* the fact that a certain vegetable, cultivated or wild, thrives in any given spot, furnishes us with an analysis of the available or soluble constituents of the soil, *and enables us to direct our measures of improvement according to the crop we wish to grow.*" In reply, we think that if the analyses of plants are ever to be so useful, we are as yet very far from possessing any of such undoubted accuracy as to direct the farmer what measures of improvement he must take.

Dr. Gregory agrees with Liebig in stating that the plant, when not able to procure the substances it needs, makes use of another, as potash for soda, lime for magnesia. But we venture to express an opposite opinion, as this theory is contradicted by our own observation. Besides, it contradicts the previously expressed opinion, that the best manures must contain the *same* substances which are present in the ashes of the plant we wish to grow.

With regard to the importance of humic acid, humus, &c., &c. as the direct source of the carbon of vegetation, Dr. Gregory settles the question by asserting, that "it has never yet been proved *that fertile soils contain humus in a soluble state.*" This, though somewhat strongly stated, is so near the truth, that we leave it untouched, and we have great pleasure in bringing this opinion forward as a corroboration of the views we advocate in opposition to Professor Johnston.

To the opinions of the Dr., respecting the source of nitrogen, we shall again refer in our further "wadings" through Professor Johnston's works, only here remarking that they agree with our own.

(*To be continued.*)

The Learned Professions in Sardinia.—The fees of physicians and surgeons were fixed by a tariff on the 28th November, 1841. The price of a visit is 9d., increasing, according to the time of night, distance, &c., to about 8s. In surgery, the fees vary, according to the degree of the surgeon, as well as the time, distance, and operation, from 6d. to 8s.; and in the Bassa Chirurgia degree (the phlebotomists and dentists), the extent of whose operations is defined by law, petty distinctions are actually made between bleeding the arm, hand, or foot, the prices being 2¼d., 3d., and 4½d. respectively; and it also costs 2¼d. to have a tooth extracted, and 4½d. to have a root or fang of it removed, according to the imperial laws of the King of Sardinia (*Tyndall's Sardinia*).

ON THE PREVAILING EPIZOOTIC IN CATTLE, CALLED PLEURO-PNEUMONIA.

BY FINLEY DUN, JUNIOR, EDINBURGH.

[Premium, Gold Medal.]

The term Pleuro-pneumonia is derived from two Greek words—πλευρα, *a side, rib,* πνευμων, *a lung.* The import of these words clearly points to the seat of the disease.

Besides being styled by various other scientific denominations, pleuro-pneumonia has been popularly called "the distemper among cattle," "the prevailing epidemic," "the trouble," and emphatically "the disease."

There are few diseases which present a more extensive or interesting field of inquiry than the prevailing pleuro-pneumonia epizootic. This disease principally affects the substance of the lungs, and involves, to a greater or less degree, all the important tissues within the cavity of the thorax.

It belongs to the class of epizootic diseases. The characteristics of these are, that they spread over large tracts of country, present the same general symptoms, follow an analogous course, and result from the operation of some general causes.

Concerning the HISTORY of pleuro-pneumonia, there is but little satisfactory information; and although epizootics affecting different parts of the respiratory system have raged in most countries of Europe, yet the description given of them shows that they differ in various degrees from the pleuro-pneumonia prevailing in this country. It appears, however, that a disease exactly analogous to it has for many years existed in different parts of Switzerland, and in several departments of France.

Remarks upon the progress, nature, and symptoms of the malady, in the arrondissement of Avesnes, have been made by M. Lecoq, one of the veterinary professors at Lyons, aud published in the *Recueil Médecine Vétérinaire* for May 1833. Cases from this article are brought forward by Mr. Youatt, in his work on cattle, p. 407, as chronic pleurisy combined with pneumonia; and, from the symptoms and post-mortem appearances, we cannot help thinking that it is much the same kind of pleuro-pneumonia which at present prevails in this country. This formidable disease raged in Ireland for some time before it made its appearance in Great Britain. But whether it was imported thither from the Continent, or arose spontaneously, has not as yet been ascertained. It crossed the Irish Channel in the spring of 1841, and, following the course of the Irish droves, soon spread over the western parts of England. While as yet its scene of action was circumscribed, remarks upon its symptoms and pathology were publised by several eminent practitioners. Among these was Mr. John Barlow, V.S., who appears to have been the first in this country who described it minutely and scientifically. (*Veterinarian* for 1842, p. 438, and for 1843, p. 493.)

But the disease was not long confined to a few localities, or to those stocks among which the Irish cattle had been mixed; it gradually extended itself, and has since visited most parts of the island.

By its widespread ravages, it has ruined many breeders and holders of stock, and its effects have been indirectly felt by the community at large, in the enhanced price of butcher-meat and dairy produce. Since its first appearance in 1841, no change has taken place in the nature of the disease, and any abatement in its virulence has been but temporary or partial. Sometimes the disease passes steadily on from one district to another; sometimes it suddenly disappears from a particular locality, and carries its devastations to a distance; and sometimes, after being absent for weeks, and even months, it again returns to pursue its ravages with unmitigated fury. Such temporary absence of the disease, and its sudden return, without any assignable cause, cannot, in many instances, be otherwise accounted for than by supposing that the germs of the disease have during that time remained latent. Indeed, it seems highly probable that the subtile principles of the disease are frequently in operation for weeks before the symptoms become apparent.

Before proceeding further, it may not be out of place here to give a short account of those parts principally affected in pleuro-pneumonia, a knowledge of which is so important to the practitioner; for if he is acquainted with the structure and normal condition of the important organs affected by the disease, he will more readily understand the abnormal or morbid phenomena, and be more likely to pursue safe and successful remedial measures.

The lungs are the light, spongy, and elastic substances contained in the thoracic cavity, and corresponding to its shape. Between the right and left lung the heart is placed. The lungs are almost entirely composed of air-vessels, of veins, and of arteries, bound together by cellular parenchymatous tissue. They are the organs immediately concerned in the oxygenation of the blood. They are enveloped by their own serous membrane, the pleura, which, reflected over the inner surface of the ribs, attaches them to the parietes of the chest, separates the right from the left lung, and forms a medium through which pass the air and blood-vessels going to the lungs. The colour of the lungs varies in different animals, but depends, in some measure, upon the quantity of blood in them when examined. The age of the animal has also a modifying influence as to colour. The lungs are white in the cow, grey in calves, red in the horse, and red, with dark spots, in the dog. The trachea, or wind-pipe, after passing into the chest, branches off into the right and left bronchii, which, as they pass along, give off smaller tubes, each ultimate ramification of which ends in hundreds of small cells communicating with one another. It is inflamma- of the mucous lining of these cells and tubes which constitutes bronchitis. The pulmonary artery from the right side of the heart ramifies upon these cells, which being constantly filled with air, the impure blood loses its carbonic acid, becomes oxygenated, and, passing into the pulmonary veins, enters the left side of the heart, from thence to be distributed to all parts of the system.

The CAUSES of disease, both immediate and remote, are subjects full of interest and importance, and a knowledge of them not only aids in the prevention of disease, but also leads the practitioner to form a more correct prognosis, and to pursue the most approved course of treatment. It is, however, unfortunate that the causes of pleuro-pneumonia have not has yet been satisfactorily ascertained. No department of the history of the disease is less understood, or more involved in doubt and obscurity. But in this respect pleuro-pneumonia is not peculiar. It is but one of an extensive class which embraces most epidemic and epizootic diseases. And if the causes which produce influenza, fevers, and cholera, were clearly explained, those which produce pleuro-pneumonia would, in all probability, be easy of solution.

Viewing the wide-spread and similar effects of pleuro-pneumonia, we may surmise that they are referrible to some common cause. And although much difference of opinion exists upon this subject, it cannot be denied that CONTAGION * is a most active cause in the diffusion of the disease. Indeed, a due consideration of the history and spread of pleuro-pneumonia over all parts of the land will be sufficient to show, that in certain stages of the disease, it possesses the power of infecting animals apparently in a sound and healthy condition, and otherwise unexposed to the action of any exciting cause. The peculiarity of the progress of of pleuro-pneumonia, from the time that it first appeared in England, is of itself no small evidence of its contagious nature. Its slow and gradual progress is eminently characteristic of diffusion by contagion; and not only were the earlier cases which occurred in this island distinctly proved to have arisen from contact with the Irish droves, but also subsequent cases, even up to the present day, show numerous examples in which contagion is clearly and unequivocally traceable.

Many persons refuse to admit the contagion of pleuro-pneumonia, because, in some instances, the communication of the sick animals with the healthy cannot be proved to have taken place. Upon this point we cannot do better than quote Dr. Watson's remarks respecting exanthematous diseases. In

* Contagion and infection have, until lately, been considered as varying somewhat in meaning, the former term being applied where contact with the sick was necessary for the propagation of the disease; and the latter, where it was conveyed by the atmosphere. But this distinction has in great measure been done away with, and contagion and infection seem now to be used synonymously by the best authors. (See *Hooper's Medical Dictionary*—Art. *Contagion.*) We also subjoin Dr. Watson's remarks upon this point. In his *Principles and Practice of Physic*, third edition, vol. ii., pp. 707, 708, he says—"You will hear persons disputing about the *term* contagion; but such disputes can only arise from the want of a distinct definition of the sense in which it is employed. I understand a disorder to be contagious, when it is in any way *communicable* from one person to another. Some would restrict the word contagion to the cases in which there must be absolute *contact* of the healthy body with the sick body, or with its visible offscourings. When the disease can be conveyed through the medium of the atmosphere, or by means of other intermediate substances called fomites, they would call it *infectious*. And there is no objection to such a distinction, provided it is understood by the reader or hearer, as well as by the writer or speaker. But since, in all cases, the disease is conveyed to the person of the recipient by particles of matter proceeding from the person of the sick, and since it seems very unimportant whether those particles are in a solid or gaseous form—whether they are imparted by direct contact of the two human bodies, or by being wafted through the air, or carried upon articles of clothing, I shall include both and all these modes of communication under the single term, *Contagion*. This, in fact, is what is done in common discourse; all disorders that are 'catching,' I shall take leave to consider *contagious*."

his *Principles and Practice of Physic*, third edition, Lecture LXXXIII, he says :—

"It is a very instructive fact respecting this disease, (small-pox,) thus rankly contagious, and arising from no other source than contagion, that when it is epidemic in any place, many instances of it occur which we can by no means trace to contagion. Dr. Gregory tell us that, of the numerous cases received into the small-pox hospital, (to which he has long been physician,) not one in twenty is capable of being referred to any known source of infection; the disease being ascribed by the patient to cold, fatigue, change of air, or some other innocent circumstance. A prisoner shut up in solitary confinement in the Penitentiary at Millband was seized with small-pox. Surely this should warn us against the inferring of analogous disorders, (of continued fevers, for example,) that they are necessarily not contagious, because we often fail to discover any way in which the poison could have been applied. If small-pox be produced by contagion alone, and yet the mode in which the contagious matter has been communicated eludes sometimes our closest scrutiny, then we must conclude that the same thing may happen in *other* contagious diseases, of which the contagious property may not be so strong or so obvious. Nay, the argument from analogy will lead us a step further. If once a disorder of this kind is decidedly proved to be sometimes the effect of contagion, we cannot help entertaining a doubt whether the disorder in question really ever has any other cause."—(Vol. ii., pp. 710-11.)

These remarks concerning exanthematous diseases apply in an especial manner to pleuro-pneumonia. The influence of contagion, as the sole exciting cause of that disease, not, however, being as yet fully established, we cannot altogether assent to Dr. Watson's conclusions regarding the exclusive and all-powerful effects of contagion. But we hold that, although contagion may not be the sole exciting cause of all cases of pleuro-pneumonia, it is undoubtedly the principal and most fertile cause.

As an argument against the contagion of pleuro-pneumonia, it has been said, that it does not, in every instance, attack animals placed apparently in circumstances the most favourable for the production of the disease. It is contended, for example, that cases occur among cattle at pasture, or among such as are stall-tied, and yet the other animals in the same herd, or byres, may not at the time be affected. And sometimes, when the disease breaks out in byres where many cattle are tied up together, it seems to select particular animals for its attack. Sometimes, also, those immediately on either side of the sick one escape, or are not affected until long after. These facts may prove that the disease is more readily generated, and more quickly developed, in some states of the constitution than in others. They do not, however, afford any evidence of the non-contagious nature of the disease. "For we know," says a medical writer, "that undoubted contagions are sometimes excited to unusual activity, or are at other times nearly deprived of reproductive powers, simply by variations in the conditions of the media which surround them." —*British and Foreign Medico-Chirurgical Review*, April 1848—Article on "The Contagion of Yellow Fever," pp. 372-3.

"However active any exciting cause may be—however undoubted the contagion of any agent, they all demand" (says the same author) "a predisposition of body—they all require certain conditions of the atmosphere. Small-pox is hardly communicable in a very dry and cold air; it is developed rapidly in a warm and moist atmosphere. Yellow-fever is arrested by cold; plague by cold and dryness, as well as by intense heat and dryness. Cholera has been arrested both by great dryness and great humidity of the atmosphere, &c., &c. We find it assumed as a fact by several of the older writers, and even some of the present day, that certain contagions are propagated only in a 'corrupted atmosphere.' . . . . But it is quite obvious, that this is merely another mode of stating that one contagion is more readily reproduced than another; the conditions of existence and propagation vary, but this is no valid ground of distinction, it is merely a question of degree. No one could deny the contagion of small-pox or cow-pox because in some places they cannot be inoculated." —(*Op. cit.* page 373.)

And so is it with pleuro-pneumonia; the contagion is more active and diffusible in some cases than in others. But the intensity of the contagion, and its specific power upon the animal organism, also vary much in the different stages of the disease. Where it runs its course rapidly, and the inflammatory fever is strong throughout, the contagious power is much diminished. In the early stages, neither immediate contact, nor inhalation of the exhalations from the bodies of the sick, can engender the disease. In the latter states, however, when the breath is fœtid, when the fæces and urine have an intolerable odour, and when the typhoid fever is present, the disease is decidedly contagious, and communicable directly by miasmata, or by *fomites* becoming imbued with the specific poison.

There are many persons who, while believing that pleuro-pneumonia is contagious, suppose that by a certain disposition of external circumstances or by certain chemical combinations, it may occasionally be produced *de novo*, or independently of the action of the specific virus. In support of this theory several facts are adduced. Thus Professor Coleman, of the Royal Veterinary college, London, mentions that—

"In the expedition to Quiberon in 1795, some transports, crowded with horses, had their hatches shut for a considerable time in consequence of a storm; several of the horses were suffocated, and shortly afterwards glanders appeared amongst the remainder. No contagion is more specific than glanders, and it is almost as easy to suppose small-pox to be generated as this disease. The same observer states that during the American war sheep were sent from England to America, but in a few weeks a febrile disorder broke out, and they all died. A typhus fever broke out on board the Diamond man-of-war while on a cruise in the West Indies, at a time 'when none of the circumstances were present which commonly produce that disease.' In the case of hospital gangrene, particularly when occurring after campaigns in hot countries, the development of a contagious virus can hardly be disputed. Erysipelas furnishes another example of a disease generally non-contagious being able under certain conditions to develop a contagious poison."—(*British and Foreign Medico-Chirurgical Review*, Art. *cit. supra*, p. 377.)

But if pleuro-pneumonia were thus capable of being produced without the intervention of a similar pre-existing poison, surely the spread of the disease, when it did appear, would have been more rapid, its devastations less partial, and we would, in all probability, have been visited by its attacks previous to 1841. It is well known however, that its progress has been slow and gradual, and its attacks partial, and that no change has taken place in our atmosphere to account for its appearing now rather than a hundred years ago. And although, with respect to cattle, ventilation, cleanliness, and management are at present, in many instances, defective, still their sanitary condition is infinitely superior to what it was but a few years ago.

Concerning the means by which the specific virus is elaborated—how it enters the system, is reproduced, and, after a variable period of incubation, produces a disease typical of the one from which the morbid poison emanated—our information is but limited. On this subject a celebrated author remarks:—

"We know very little about the seminal principles of diseases, and that little serves to show that no sooner does it enter the body, (as in the case of contagion,) than it is gone at once beyond our reach. It germinates in secret. It spreads itself abroad it secret. And when at length it excites various organs and systems to extraordinary modes of action and of suffering, then, and not sooner, begins our knowledge of a present disease, and our power of interfering with it. In truth, these modes of action and of suffering are to us the disease. They are, moreover, our only objects of medical treatment."—(Dr. Latham on *Diseases of the Heart*, vol. i., p. 183.)

The best explanation concerning the germination, the incubation, and the production of disease, is that propounded by Professor Liebig. And, as an epitome and exposition of his elegant and ingenious theory, we cannot forbear giving, what might otherwise seem a rather long quotation, from Dr. Watson's valuable work on the *Principles and Practice of Physic*:—

"The ancients attributed various disorders to a fermentation of the animal fluids. The cause of fever, according to Hippocrates, was some morbid matter in the blood. This matter, by a process of concoction, was brought, in a certain number of days, into a state in which it was ready for expulsion from the body. It was then thrown off by hæmorrhage, by sweat, by alvine discharges; or deposited upon the surface in the form of abscess, or cutaneous eruption: and these eruptions or evacuations constituted the crisis of each fever.

"The doctrine thus enunciated by the father of physic is very nearly the same with that which Liebig is teaching in the nineteenth century. This distinguished chemist ascribes the phenomena which succeed the introduction of certain animal poisons into the blood, to a process exactly resembling fermentation. Let me try, in a few sentences, to expound to you his views on this deeply interesting subject. You know that the brewer excites the fermentation of his *sweet-wort*, by adding to it a small quantity of *yeast*. Wort is an infusion of malt, and contains sugar and gluten, with other vegetable matters, in solution. Yeast is putrefying gluten; and its compotent particles are therefore in a state of intestine motion or transposition. When placed in contact with sugar in solution it has the property of communicating a similar intestine motion to the elements of the sugar, whereby they arrange themselves into new and simpler forms; namely, into alcohol and carbonic acid. If there were no gluten in the wort, this would be the whole of the process: during which the added yeast disappears.

"But the decomposition or fermentation of the sugar reacts upon the gluten in the wort, and converts it gradually into yeast, which, mingling with the liberated carbonic acid, rises and floats upon the surface of the fermenting liquid. So that, when the process is completed, there has been produced thirty times as much yeast as was originally added to the wort.

"Now this is but a type of what happens in other fluids under analogous circumstances; and it may be laid down as an abstract proposition in Liebig's, or rather his translator's words, that 'a substance in the act of decomposition, added to a mixed fluid in which its constituents are contained, can reproduce itself in that fluid, exactly in the same manner as new yeast is produced when yeast is added to liquids containing gluten.'

"Thus the virus of small-pox (which virus is formed out of the blood) causes such a change in the blood as gives rise to the reproduction of the poison from the constituents of that fluid. And whilst this process is going on, the natural working of the animal economy is disturbed: the person is ill. The transformation is not arrested until all the particles of the blood which are susceptible of the decomposition have undergone the metamorphoses.

"Liebig shows that similar processes may take place in mixed fluids, (and therefore in the blood,) without the regeneration of the added substance: just as the fermentation of a solution of sugar is effected by the addition of yeast, without any reproduction of the yeast, if there be no gluten in the saccharine solution. In such cases, the disease which accompanies, or results from the transformations that occur in the blood, is not contagious: the poison is not renewed. It is thus, apparently, that certain *miasms* produce disorders which are not communicable from person to person.

"In order that a specific animal poison should effect its own reproduction in the blood, and excite that commotion in the system which results from the formation and expulsion of the new virus, it is requisite that a certain ingredient (analogous to the gluten in the brewer's sweet-wort) should be present, in the blood: and this ingredient must have a definite relation to the given poison.

"If this ingredient be indispensably necessary to life, the poison, which transforms and destroys it, is inevitably a fatal poison. May not this be the *modus operandi* of the poison of hydrophobia?

"Again, if this ingredient be wanting, no reproduction of the poison takes place; nor, of course, any of those symptoms which are consequent upon such reproduction. The poisonous qualities of the animal substance are not developed. It ceases to be a poison.

"And this ingredient, if naturally present, is exhausted and destroyed, for a while at least, by the operation of the poison. Hence, for a while at least, the same disease cannot be again produced by the agency of that poison. Supposing the ingredient to be one which is not essential to the composition of the blood, and to have been thus destroyed or exhausted, it may never be replaced; or it may be replaced only after a long interval. In some persons it may never exist at all; or it may exist at certain periods only of their lives. It may even be acquired by unnatural or peculiar modes of living.

"All this is not only very possible, but probable: a certain number of peculiar substances do certainly exist in the blood of some men which are absent from the blood of others. In childhood and in youth the blood of the same individual contains variable quantities of substances, which are not to be found in it at other periods of life.

"This theory of Liebig offers, then, a reasonable explanation—the only explanation, indeed, that I have ever met with—of the curious facts, that certain contagious disorders furnish a protection, temporary or permanent, against their own return; that they have a tolerably definite period of incubation, and run, for the most part, a determinate course; that some persons are less susceptible than others of the influence of these animal poisons, or are not susceptible at all; and that the same individual may be capable of taking a contagious disease at one time, and not at another.

"Moreover, the light supplied by this theory gives distinctness to our conceptions respecting certain deviations from the regular course and type of these diseases, which deviations are not uncommon.

"Thus the symptoms which precede and usher in the eruption are sometimes slow, halting, and irregular in their progress; appear and then recede, and reappear, so that we are in doubt what is about to happen, until at length the disease declares itself in its decided and authentic form.

"We may suppose this to depend upon some tardiness or interruption of the process whereby the virus is (to use the ancient term) concocted. Again, the series or combination of symptoms that mark the specific disease is sometimes *incomplete*. We have the eruption of measles without the catarrhal symptoms; the sore throat without the rush of scarlet-fever. And experience has found that, where the malady is thus imperfectly developed, the protection it confers against its own recurrence is also incomplete. To explain this double failure, we may reasonably infer a corresponding defect in the series of changes which the poison tends to produce in the mass of the blood. Glandular enlargements and chronic abscesses are frequent *sequelæ* of these exanthematous disorders. They may be considered to represent the dregs of the reproduced virus, which has been imperfectly eliminated from the system by the usual channels.

"Such is a brief exposition of Liebig's ingenious theory. Do you ask whether I adopt it, with implicit credence in its truth? I answer, by no means. Respecting points so curious, it is scarcely possible to refrain from speculation altogether. These views come recommended by the authority of a consummate chemist. They furnish a plausible explanation of the main facts of the case: namely, that the disease is produced by an animal poison; that the specific virus increases prodigiously in quantity within the body during the progress of the disease; and that the susceptibility of its influence in that individual is thereby somehow exhausted. I entertain the theory, therefore, until a better one is propounded. It has this incidental merit, that it involves no risk of practical error."—(*Watson's Principles and Practice of Physic*, vol. ii., pp. 718-21.)

Although contagion is admitted as producing many cases of pleuro-pneumonia, still it is very generally asserted that there must be other EXCITING CAUSES at work capable of generating it independently of contagion. But if this be so, none of the many theories adduced to account for its exciting causes seem fully to explain its phenomena, and as yet no one cause has been brought forward to the sole operation of which the disease can be satisfactorily referred.

Of the many sources from which hypotheses concerning the cause of epidemic and epizootic diseases have been derived, none seems so probable, and none affords such ample scope for speculation, as the atmosphere. Accordingly, no source has been so frequently and keenly searched, and none has produced so many theories, each in its turn purporting to elucidate the origin of all diseases whose cause was previously unknown. The ancient idea, that insalubrity of climate and locality was owing to the deficiency of oxygen in the atmosphere, is now entirely disproved. The belief that disease was produced by the gravitation of the heavy, poisonous carbonic acid gas, is fast waning away, and giving place to sounder views on the subject of gaseous diffusion. By the life-preserving and life-supporting influence of the important law of gaseous diffusion, all noxious effluvia and poisonous emanations are freely and fully diluted, and that uniform purity of atmosphere maintained, which is indispensable to the existence and well-being of all living things. The important action of the law of diffusion in the economy of the universe is thus beautifully and eloquently illustrated in an article on "Chemistry and Natural Theology," in the *British Quarterly Review*, Feb. 1848 :—

"The carbonic acid with which our breathing fills the air, to-morrow will be speeding north and south, and striving to make the tour of the world. The date-trees that grow round the fountains of the Nile will drink it in by their leaves; the cedars of Lebanon will take of it, to add to their stature; the cocoa-nuts of Tahiti will grow riper upon it; and the palms and bananas of Japan change it into flowers. The oxygen we are breathing, was distilled for us some short time ago by the magnolias of the Susquehanna, and the great trees that skirt the Orinoko and the Amazon. The giant rhododendrons of the Himalayas contributed to it, the roses and myrtles of Cashmere, the cinnamon-trees of Ceylon, and forests older than the flood, buried deep in the heart of Africa, far behind the Mountains of the Moon. The rain which we see descending was thawed for us out of icebergs which have watched the pole-star for ages; and lotus-lilies sucked up from the Nile and exhaled as vapour the snows that are lying on the tops of our hills."—(P. 218.)

Some years ago, SULPHURETTED HYDROGEN was adduced as a cause of epidemics, and especially of that terrible form of fever so prevalent upon the coasts of Africa. To it was ascribed, by Mr. Daniel, professor of chemistry in King's College, London, the fatal insalubrity of the rivers of that coast, which is annually the grave of so many Englishmen. This gentleman, who first brought the theory into notice, believed that sulphuretted hydrogen resulted from the "decomposition of the sulphates of sea-water by admixture with fresh water containing vegetable matter."—(*Edinburgh Medical and Surgical Journal*, vol. lxiii., p. 442.) The gas produced, whether in this manner, on the banks of the Niger, or from the breaking up of vegetable and animal remains wheresoever occurring, was supposed to exercise a most noxious influence upon the animal organism. So great was the credit attached to this theory, and so confident were its supporters of the intense and active virulence of the gas, that when, in September and October 1841, three-iron steam-vessels were being fitted out for the Niger expedition, extensive arrangements were made for the ventilation of the vessels, with special reference to the removal of sulphuretted hydrogen, and the purification of the air.—(*Op. cit.* p. 420.)

By experiments made upon the lower animals, it has been ascertained that, even when breathed in comparatively small quantities, this gas has a most deleterious and even fatal effect. But in those parts of the African coast most inimical to health, sulphuretted hydrogen, if present at all, is inappreciable to any of the senses, and has not been detected by chemical research.—(*Op. cit.* p. 442.) Although it did exist in the atmosphere, and were appreciable to our senses, and answered to the chemist's tests, we have still sufficient evidence to prove that we might breathe such an atmosphere with perfect impunity, as regards at least the production of fever. For although this gas is an almost unfailing element of the atmosphere of the analytical laboratory, as shown by the blackening of silver coins left exposed, and is often present in such quantity as to be strongly appreciable to the nostrils, still, chemists and their assistants are not affected by fevers or other diseases in such proportions as to establish the statement, that exposure to the influence of sulphuretted hydrogen *is* the exciting cause of epidemic or epizootic disease.

It seems to be a very generally credited idea that sulphuretted hydrogen is evolved in large quantities from drains, cesspools, &c.; and that it is the principal source of the disease, and especially of the fevers, which frequently infest large and populous cities. But in the recent examinations into the sanitary condition of towns, it appears that many of the gentlemen (among whom were Dr. George Wilson and Dr. Anderson) who lately gave evidence in Edinburgh upon this point, were of opinion that, even if sulphuretted hydrogen were always evolved from decomposing animal and vegetable matters, which is still a matter of doubt, and even granting that it might, when respired for a long time continuously, tend to reduce the physical powers and predispose to disease, still it could not be considered as the exciting cause of the maladies attributed to it.

SELENIURETTED HYDROGEN, or hydroselenic acid, has also been advanced as an active agent in the production of disease. "This gas is said to act very powerfully upon the lining membrane of the nose, exciting catarrhal symptoms, and destroying the sense of smell."—(Fownes' *Manual of Chemistry*, p. 166; see also Prout's *Bridgewater Treatise*, p. 109.) From its instability, and the facility with which its hydrogen combines with the oxygen of the atmosphere, it is immediately broken up into water and selenium, the latter subsiding as a red powder, (Turner's *Chemistry*, eighth edition, 1847, pp. 332-3.) Since, therefore, the compound itself cannot long exist in the presence of oxygen, and since the products of its decomposition are innocuous, we have no evidence to show that seleniuretted hydrogen can produce disease.

The compounds of carbon and hydrogen have also been suggested as the causes of epizootic disease. Light carburetted hydrogen, also called fire-damp, or marsh gas, has in particular been referred to as producing disease. In many coal-pits it is found in considerable quantities, and at times issues in copious jets from pent-up cavities in the coal. It is abundantly evolved from the decomposition of vegetable matter. Without entering into any lengthened argument respecting the possibility of carburetted hydrygen producing epidemic disease, it may be sufficient to state that colliers and miners spend the greater part of their lives surrounded by, and breathing, an atmosphere containing very variable, but often considerable quantities of this gas. These men, however, are not particularly predisposed to disease, nor are they affected by any general epidemics referrible to their mode of life; and such being the case, we may surely infer that light carburetted hydrogen is devoid of poisonous action, and does not in moderate amount render air irrespirable.

The most recent theory that has been adduced regarding the exciting cause of catarrhal epidemics, is that advanced by Professor Schönbein, the discoverer of gun-cotton. This distinguished Swiss chemist found that, by the decomposition of water by electricity, or by the agency of phosphorus on moist air, a substance was produced, which, from its peculiarly strong odour, was called OZONE.*

Ozone when inhaled, even in small quantities, is said to produce bronchial irritation. It is destroyed by sulphuretted hydrogen and sulphurous acid. It possesses bleaching properties similar to those of chlorine. It decomposes iodide of potassium. This last property has been taken advantage of in detecting the presence, or in estimating the amount of ozone in the atmosphere. The method usually adopted for this purpose is to expose in the open air a known quantity of iodide of potassium, mixed with a solution of starch. The ozone supposed to be present in the atmosphere, decomposing the iodide of potassium, liberates iodine, the quantity of which is ascertained by the intensity of blue colour produced in the solution of the starch. The amount of ozone thus found to exist in the atmosphere is supposed to vary at different times. By a series of experiments, instituted by Professor Schönbein, it appeared that, during the extensive prevalence of influenza, the quantity of this substance present in the atmosphere was considerably augmented, as was also the case in very cold weather, and during thunder-storms.—(*British and Forign Medico-Chirurgical Review*, April 1848, p. 542. Dr. Day, *On the Domestic Management and Diseases of Advanced Life*, p. 130.)

The evidence of the presence of ozone in the atmosphere is very slender, and the hypothesis of its being the efficient agent in the production of epidemics is entirely gratuitous. The only proof we have of its presence in the atmosphere is its action upon iodide of potassium. But iodide of potassium is also decomposed by free * nitric acid, which is known to be evolved during thunder-storms and other electric conditions of the atmosphere, which have been also found favourable for the production of ozone. Since, therefore, under the same circumstances, both substances are frequently produced, and since their action upon iodide of potassium is exactly the same, it is evident that its decomposition cannot be depended upon as a test for detecting the presence, or for estimating the amount, of ozone in the atmosphere, unless the absence of nitric acid have been previously secured. In addition, it is not improbable that some of the other occasional constituents of the atmosphere, and especially some of the various gases which hover over large towns, may, like nitric acid, possess the property of decomposing iodide of potassium.

It would also seem probable that, if ozone possessed the power of exciting pulmonary or other disease, such disease would be aggravated before, during, or soon after, the occurrence of electric discharges, which, by an increase of the exciting cause, would materially augment the number and severity of the cases in which its influence was felt. But an increased malignity, or a wider spread of disease in general, or of any malady in particular, is not as yet established as occurring in connection with variations in the electric state of the atmosphere. Thus, for example, it has not been proved that thunder-storms develop new diseases, or aggravate existing ones; and if such consequences cannot be proved as resulting from electricity, they cannot *à fortiori* follow from ozone, which is one of the products of electricity.

* According to De la Rive and Berzelius, ozone is an allotropic modification of oxygen, occasioned either by electricity, or by the catalytic activity of certain substances, (as, for example, phosphorus;) whilst Professor Schönbein regards it as a higher state of the oxidation of hydrogen, the combination of which is effected either by an electric or catalytic influence.—(*British and Foreign Medico-Chirurgical Review*, April 1848, p. 543.)

* Although the nitric acid evolved during electric discharges eventually combines with ammonia, yet it is probable that, from the insufficient amount of ammonia, small quantities of acid may for a time exist in the atmosphere in a free state.

The facility with which ozone is decomposed by some gases, as mentioned above, renders it extremely improbable that it can be the exciting cause of any wide-spread disease; for such a facility of decomposition would in many instances destroy its power of diffusion, and render its attacks extremely partial. It is a curious and interesting fact, that two substances—sulphuretted hydrogen and ozone—each of which has been supposed to be a powerfully exciting cause of disease, should, when they meet, act upon and destroy each other.

Further, it is suggested by Dr. George Wilson, that an argument against the alleged power of ozone to produce bronchitis or other pulmonic affection, may be derived from the fact, that although electric machines have now been in extensive use for more than a hundred years, and all their influences on the body have been carefully watched, yet no instance has been recorded of electricians or their assistants being attacked with affections of the lungs in consequence of their handling electrical apparatus. When it is remembered that, during the working of even a small friction-machine, the peculiar electric odour, ascribed by Schönbein to the development of ozone, is often insupportably powerful, it is difficult to believe that the physiological action of the azone should not have been observed if his views were true. It is further to be noticed, that plate electric-machines, which are often constructed three or four feet in diameter, and that the hydro-electric machine, which was daily exhibited in London for months, and which gave off sparks a foot long, have been kept in action beside human beings for many successive hours, yet no record has hitherto been published of any deleterious influence having been observed to be exerted by even these powerful machines.

Catarrhal epidemics, as influenza, are generally preceded by fogs:—

"It has been observed, also, that shortly before, or during, or soon after, the prevalence of these epidemic catarrhs, *epizootic* diseases have raged; various species of brutes, and of birds, have been extensively affected with sickness; while, on some occasions, prodigious swarms of insects have made their appearance. In short, a great variety of facts concur to render it probable that some peculiar condition of the air existed, which, though it might be favourable to the multiplication of some species of living creatures, such as the insects just referred to, operated as a poison upon the human body, and upon the bodies of many of the brute creation."—(Dr. Watson's *Principles and Practice of Physic*, vol ii., p. 43.)

As a theory regarding the cause of influenza, the existence of these countless SWARMS OF INSECTS is thus brought forward by Dr. Watson, in his work already so often quoted:—

"Another hypothesis, more fanciful perhaps, at first sight, than these, yet more easily accommodated to the known phenomena of the distemper (influenza), attributes it to the presence of innumerable minute substances, endowed with vegetable or animal life, and developed in unusual abundance under specific states of the atmosphere, in which they float, and by which they are carried hither and thither. Myriads of these animalcules, or of these vegetable germs, coming in contact with the mucous membranes, and especially with that of the air-passages, irritate (it is imagined) these surfaces, and exercise a poisonous influence upon the system. Now, the sporules of certain fungi, which ruin the health and destroy the vitality of larger plants on which they prey, are inconceivably small. I shall prove to you presently that vegetable effluvia are capable of producing, in the human body, symptoms not very dissimilar from those of influenza. Again, that the waters of this globe swarm with living creatures, which are invisible by our unaided eyes, the microscope has taught us. Others, too minute to be estimated even by that wonder-showing instrument, in all probability exist. We cannot doubt that the gaseous fluid which surrounds this planet, equally teems with living atoms. We know that multitudes of insects, and of cryptogamous plants, infinite in number in respect to our finite powers of computation, *are* sometimes suddenly hatched or developed, in places which were previously free from them. It is easy to conceive that atmospheric infusoria (so to speak) may rapidly congregate, or vivify, in masses sufficient to render deleterious the very air we breathe. If this be so, we can understand how such a cause of disease may first act here and there, and presently overspread large districts; how it may move, or be wafted from place to place, or be carried about by persons; how its course and operation may be circumscribed and definite; and how some germs or ova may remain after the visit, retaining their vitality, and ready in future seasons again to start into life and activity under favouring circumstances. Taking the insect hypothesis, and knowing as we do, that some animal poisons, (that of small-pox, for example) have the singular property of multiplying themselves in the human body, like yeast in beer, we may conceive that diseases, produced by animalcules, may thus infect the fluids of the body, and become contagious in the fullest sense of that term. Lastly, the uniform duration of these epidemics has been supposed to add probability to the notion that they result from the operation of some organic principle, which has its definite periods of growth and decay. All this is sheer hypothesis: but it is as good an hypothesis as I am able to offer you; and you must be content to conceive of it as being possibly the true one, until a better shall be proposed."—(*Op. cit.*, vol. ii., pp. 45-46.)

As a cause of influenza, this hypothesis might not be impossible; for that malady (in its epidemic form) seldom tarries long, but after a few weeks abates, and soon almost entirely disappears. On the other hand, pleuro-pneumonia has existed for a long space of time; its spread has not been sudden its progress has not been influenced by prevailing winds, and its severity has been very uniform over large tracts of country. These phenomena are such as could scarcely accompany a disease induced by insect swarms.

The origin of epidemics has been assigned to ELECTRICITY, some supposing that the electrical state of the air becomes altered, and others, that an undue amount of electricity accumulates in the bodies of animals. (Watson's *Physic*, vol. ii., p. 44.) It has also been conjectured that the existence of magnetic currents might exercise some morbid influence upon the animal economy. Such theories, however, do not appear to rest on any solid foundation; for although we are not disposed to deny that electricity has a powerful effect upon the animal organism, still no bad consequences to the health, either of man or of the lower animals, have as yet been traced to its influence, nor any evidence adduced to show that it really has any specific effect in producing disease.

MIASMATA issuing from the earth have long been supposed to possess the power of producing epidemic and epizootic diseases. Endemics occurring partially, and varying at different times in intensity, may be referrible to that cause; but were pleuro-pneumonia, or epidemics, especially such as visit countries in the temperate zones, dependent upon miasmata, their attacks would be local, and more or less intermittent, their diffusion more rapid, the type of the disease more liable to change with the season of the year, the weather, or the locality, and its appearance and progress would be affected by the physical and geological character of the country; none of which circumstances are in any great degree observable in pleuro-pneumonia, as it appears in this island.

From the preceding statements and inferences, we think we are warranted in saying that there has not as yet been found among the constituents of the atmosphere, in meteorological changes, or in the products of the earth, an adequate and satisfactory cause to account for the existence of the majority of epidemic or epizootic diseases. Holding this to be true, we here urge it the more earnestly, since many believe and have implicitly adopted some one of the above theories as satisfactory to their own minds, but, as we think, upon insufficient grounds.

While speaking of the alleged immediate causes of pleuro-pneumonia, in common with epidemic diseases, we must not omit noticing some of the other pseudo causes, to which much weight is sometimes attached, and which are frequently adduced as applying particularly to pleuro-pneumonia. Among these are different varieties of food, climate, exposure to various sorts of weather, and deficient ventilation.

Pleuro-pneumonia cannot, however, be produced by any particular sort of FOOD, for it is found under every variety of feeding and management. Cattle at pasture seem to be peculiarly liable to its attacks, and the disease among them is still more severe and destructive than in the case of stall-tied animals. It has been asserted that the cause of pleuro-pneumonia may be traced to the extensive use of draff, and other refuse of the distillery; but this ridiculous assertion is irreconcilable with the fact that the disease has raged where such sorts of food have never been heard of.

The preposterous idea that the use of bones and guano as manures can have anything to do with the exciting of any malady whatsoever, is too absurd to detain us.

Some have considered it to be caused by fever; but although fever is an effect, it certainly is not the cause of pleuro-pneumonia.

Cold, even although very intense, does not seem to have much effect upon the health of cattle; and it assuredly cannot produce any general or wide-spread disease.

Cattle suffer very much from excessive heat. It is evident, however, that any effect which it may have on them in inducing disease, is merely that of a predisposing influence. Sudden and violent changes of temperature, and humidity of atmosphere, are two very powerfully exciting causes of most maladies; but still their operation alone is not sufficient to produce the disease in question.

Although many of the first cases that occurred in this island were in low, damp situations, yet hundreds of instances could be adduced of its occurring in dry, sheltered, and otherwise healthy localities.

Severe winds prevailing from certain quarters have been supposed to exercise a fatal power of generating in the system the seeds of pleuro-pneumonia. In *themselves*, however, they have no specific influence, although they may sometimes become the carriers of contagion, and assist it its diffusion.

Bad housing, and want of ventilation, may predispose animals to the attacks of pleuro-pneumonia, and increase the severity of the disease when it does appear, yet neither of these circumstances can of itself be entirely its cause.

Although pleuro-pneumonia is not produced by the action of any one of these circumstances alone, yet many of them must be considered as predisposing to the disease, and although not its immediate exciting causes, yet, by depressing the physical powers, they render the system more liable to disease, and less able to withstand its assaults. Deficient ventilation, filth, insufficient and bad food, may indeed predispose to the disease, concentrate the animal effluvia, and become the *matrix* and *nidus* of the organic poison; but still, not one of these circumstances, or even all of them combined, can *produce* the disease in question. There must be the subtile poison to call them into operation, the specific influence to generate the disease. On the other hand, it appears probable that the exciting cause of pleuro-pneumonia, whether it be contagion or whatever else, cannot *per se* generate the disease; but that certain conditions or predisposing causes are necessary to its existence, and without which its specific effects cannot be produced. But although these REMOTE or PREDISPOSING causes are very numerous, they are often difficult of detection; nay, it is sometimes impossible to tell to what the disease is referrible, or upon what weak point the exciting cause has fixed itself. A source of perplexity results from the fact, that the disease appears under every variety of circumstance, and is often fomented by apparently the most opposite causes. It appears in well and ill-ventilated byres; it may attack cattle well fed and in good condition, as well as those starved and neglected; it may occur irrespective of the description of food, of cleanliness, and of the system of management. There is no season of the year that checks its course; no sort of weather that mitigates its severity, or seems to stay its progress. But although thus occurring in some measure irrespective of circumstances, yet a strict inquiry will, in many instances, disclose facts which before had eluded observation, and to the influence of which the disease may often be traced. The general principles of management may be sound, and the practice efficient, but still the predisposition to the disease may be referrible to the continued operation of some slight and apparently unimportant cause—

> Gutta cavat lapidem, non vi, sed sæpe cadendo.
>
> OVID.

The predisposing causes of pleuro-pneumonia admit of many divisions and subdivisions; they may, however, be considered under two general heads—*hereditary* and *acquired*.

By hereditary causes, we mean those inherent in families, and which pass from parents to their offspring; by acquired, those produced by the operation of external circumstances.

With reference to the former, we know that, as the good points and properties of an animal are transmitted from one generation to another, so also are the faults, and the tendencies to particular diseases. As in the same families there is a similarity of external form, so is there also an internal likeness, which accounts for the common nature of their constitution—modified, however, by difference of age, sex, &c.

Among the acquired predisposing causes of pleuro-pneumonia may be enumerated, general debility, local weakness resulting from previous disease, irritants and stimulants, exposure to cold, damp, or sudden changes of temperature, want of cleanliness, the breathing of an atmosphere vitiated by the decomposition of animal or vegetable matters, or laden with any other impurity. In short, under this head may be included everything which tends to lower the health and vigour of the system, and consequently to increase the susceptibility to disease.

Before entering upon the consideration of the symptoms exhibited in pleuro-pneumonia, we purpose making a few general remarks upon the PULMONARY DISEASES OF CATTLE. In cattle, catarrhal affections and runnings at the nose are seldom to be met with. The effects of the irritation generally pass downwards, affecting the bronchial tubes, or the substance of the lungs, and, if the animal be a milk-cow, involving the udder. Inflammatory diseases do not run their course so rapidly as in the horse, and they are always liable to assume sub-acute, or chronic characters. In the pulmonary diseases of cattle there is a great liability to effusion, which, on account of the large quantity of cellular or areolar tissue entering into the composition of their lungs, is as apt to be poured into the substance of the lungs themselves, as into the cavity of the chest. Both lungs are seldom equally affected. The researches of French physiologists have shown, that in the human subject the right lung is more liable to disease than the left one. This fact seems to be fully borne out in cases of pleuro-pneumonia in cattle, and may arise from the circumstance that the right lung is the larger, and admits the circulation of a greater amount of air and of blood, thus tending to the development and support of inflammation.

In every sort of inflammation of the lungs there are three stages or changes: 1. Congestion: 2. Red hepatisation: 3. Grey or white hepatisation.

In the first stage are found engorgement and pure inflammation. The circulation of air and blood is, however, still carried on. The lungs crepitate and float in water. In this stage percussion yields a dull sound; and auscultation detects, in addition to the natural healthy murmur, a sharp, crackling noise, arising from the presence of serum in the minute air-cells.

Secondly, in the stage of red hepatisation there is no circulation of air, no crepitation. The specific gravity of the lungs is greater than that of water. Various parts have grey streaks among the red gorged structure, showing the commencement of effusion. Percussion over the inflamed parts produces a dull sound, and auscultation fails to discover the natural healthy murmur, while the crackling observed in the first stage is now dull and confused. There is also observable in some cases a low rumbling sound.

The third and last stage, from which recovery is all but hopeless, is that of grey hepatisation. Lymph is effused throughout the substance of the lungs, which are marked with black patches, caused by the colouring matter of the blood being imprisoned in the vessels. The lungs are mottled, and in some cases show effusion of pus. In this stage, the sound resulting from percussion is dull and dead in the extreme. The ear detects in some parts of the lungs the same sound as in the stage of red hepatisation, but in other parts no sound is audible.

The primary SYMPTOMS of pleuro-pneumonia are generally obscure, and too often excite but little attention or anxiety. As the disease steals on, the animal becomes dull and dejected, and, if in the field, separates itself from its fellows. It becomes uneasy, ceases to ruminate, and the respirations are a little accelerated. If it be a milk-cow, the lacteal secretion is diminished, and the udder is hot and tender. The eyes are dull, the head is lowered, the nose protruded, and the nostrills expanded. The urine generally becomes scanty and high-coloured. It is seldom thought that much is the matter with an animal until it *ceases* to *eat;* but this criterion does not hold good in most cases of pleuro-pneumonia, for the animal at the outset of this disease still takes its food, and continues to do so until the blood becomes impoverished and poisoned. It is *then* that the system becomes deranged, the digestive process impaired, and fever established. The skin adheres to the ribs, and there is tenderness along the spine. Manipulation of the trachea, and percussion applied to the sides, causes the animal to evince pain. Although the beast may have been ill only three days, the number of pulsations is generally about seventy per minute; but they are sometimes eighty, and even more. In the first stage, the artery feels full and large under the finger, but as the disease runs on, the pulse rapidly becomes smaller, quicker, and more oppressed. The breathing is laboured, and goes on accelerating as the local inflammation increases. The fore extremities are planted wide apart, with the elbows turned out in order to arch the ribs, and form fixed points for the action of those muscles which the animal brings into operation to assist the respiratory process. In pleuro-pneumonia, the hot stage of fever is never of long duration. The state of collapse quickly ensues, when the surface-heat again decreases, and the pulse becomes small and less distinct. We have now that low typhoid fever so much to be dreaded, and which characterizes pleuro-pneumonia in common with other epizootics.

Auscultation, when directed towards the situation of the inflamed spots, fails to perceive the low rustling murmur of the healthy lungs, and detects a crepitating *râle,* which, as the case advances towards an unfavourable termination, becomes duller, and at last is altogether inaudible. Percussion indicates a dull deadness of sound, which the experienced ear cannot fail to distinguish from the clear, free resonance of the healthy lung.

The horse, labouring under pleuro-pneumonia, or, indeed, any pulmonary disease, will not lie down; but, in the same circumstances, cattle do so as readily as in health. They do not, however, lie upon their side, but couch upon the sternum, which is broad and flat, and covered by a quantity of fibro-cellular substance, which serves as a cushion; while the articulation between the lower extremities of the ribs and their cartilages admits of lateral expansion of the thorax. In this position cattle generally lie towards the side principally affected, thus relieving the sounder side, and enabling it to act more freely. There is sometimes a shivering and general tremor, which may exist throughout the whole course of the disease. This seems to be dependent upon the impurity of the blood, its unequal distribution, its collecting around the internal organs, and its ceasing to be duly circulated through the capillaries of the skin. These chills and rigours do not necessarily prove the presence of inflammation, but merely show a tendency to it. They are entirely different from the general coldness of the surface usually apparent in the latter stages of the disease.

As the case advances in severity, and runs on to an unfavourable termination, the pulse loses its strength and becomes quicker. Respiration is in most cases attended by a grunt at the commencement of expiration—a symptom, however, not observable in the horse. The expired air is cold, and of a noisome odour. The animal crouches. There is sometimes an apparent knuckling over at the fetlocks, caused by pain in the joints. This symptom is mostly observable in cases in which the pleuræ and pericardium are affected. The animal grinds its teeth. The appetite has now entirely failed, and the emaciation becomes extreme. The muscles, especially those employed in respiration, become wasted, and the shoulders and elbows unnaturally prominent from the shrinking of their investing muscles, and from being constantly kept out to increase the width of the chest. The belly is tucked up, and the flanks heave. The oppressive uneasiness is excessive, the strength fails under the violent and convulsive efforts attendant upon respiration, and the poor animal dies asphyxiated.

Some cases, however, do not terminate thus. The creature not unfrequently drags out a miserable existence for some days longer. Under such circumstances, the dulness and dejection, the local disturbance, and the general prostration rapidly increase. The blood, imperfectly circulated through the capillaries of the lungs, is not fully oxygenated, and is so impure as to be unable to fulfil its functions. Its flow is impeded: it ceases to act as the stimulus of its vessels; it becomes, as it were, a foreign body, and it stagnates in the capillaries, having in such a state lost its natural affinity for the tissues. The bowels, however, seem to take on the excretory functions of the lungs, and the fæces have an intolerable odour. Diarrhœa, and sometimes dysentery, are present, which, running their course, generally defy all remedies, and soon put a period to the sufferings of the animal.

Among the symptoms above enumerated, we have not included *cough*, because it is not uniformly an essential symptom of pleuro-pneumonia, although frequently found with it. It is generally absent when the inflammation is more particularly confined to the substance of the lungs, where swelling can take place without sufficient pressure to induce much pain. If in such cases it be present, it is generally short and suppressed. On the extension, however, of the inflammation to the pleura, or mucous lining of the bronchii, cough is an almost never-failing symptom. In the former case it is short, painful, and performed with a double effort, and in the latter it is loud and harsh.

Two forms of fever, the active and the passive, develop themselves in most cases of pleuro-pneumonia. The fever and inflammation pass from the active into the passive state. In the first onset of the disease, the inflammation exists in its greatest intensity. The pulse is full but oppressed, and soon becomes small, showing that the heart is working against an obstacle, viz., pumping impure blood into the previously filled arteries. There is a great degree of fever. The temperature of the horns and ears is high, and the mouth is hot and dry, an almost infallible indication of pulmonary inflammation. In most cases of pleuro-pneumonia this state is of short duration, and towards the third or fourth day, and sometimes even sooner, it gives way to the passive state. The pulse now becomes smaller and quicker; the fever is subdued, and assumes the typhoid form, and the surface-heat falls below the natural temperature of health.

So active is the sympathy between the different parts of the pulmonary apparatus, that inflammation or disease can scarcely exist in any one of its structures, without spreading and involving the whole to a greater or less degree. And although the above are the symptoms generally exhibited by cattle labouring under pleuro-pneumonia, yet, in some instances, they are considerably modified by the difference of extent to which they involve the varieties of structure.

When the pulse is characteristic of strong inflammation, is quick, hard, firm, and corded, the pleura will generally be found to be extraordinarily affected. When such is the case, the nostrils are much dilated, and the alæ have a flapping action. The respirations are hurried and laboured. The inspirations are shortened as much as possible, in order to avoid the acute pain caused by the stretching of the inflamed membrane. On pressure being applied to the intercostal spaces, pain is manifested, which, from the wincing of the animal, appears to be greatest nearest to the sternum.* The ridge, from the ilium to the sternum, formed by the corrugation of the integuments, and produced by the increased action of the abdominal muscles, and which forms so characteristic a symptom of inflammation of the pleura in the horse, is, on account of the great bulk of the stomach of ruminants, not discernible in the pleural affections of cattle. Sometimes, however, it is well marked in calves, and in young animals attacked by the disease before the first stomach has become much enlarged, or adapted for the reception of large quantities of vegetable food.

Along with pleuro-pneumonia we find more or less of bronchitis, or inflammation of the lining membrane of the bronchii and air cells, which inflammation is generally the precursor of structural or organic change in the pulmonary tissues. The symptoms of bronchitis may, however, predominate over those usually characterising pleuro-pneumonia. We may have a frequent cough, at first dry, afterwards accompanied by a peculiar wheezing, rattling noise, occasioned by the air having to pass through many small canals filled with serum. The mucous membranes are reddened. The nasal discharge is of a muco-purulent character, but during the earlier stages of the disease the exudation is scanty. Pressure of the trachea causes the animal much pain. The pulse is at first hard, and quicker than in health; but, as it becomes more accelerated, it loses its hardness, and is soft, and even indistinct. There is in bronchitis a great tendency to effusion. Serum is thrown out, which, accumulating in the lesser air-tubes, suspends the action of large portions of the lungs. The blood is therefore imper-

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* "L'animal témoigne une très grande sensibilité sur toute la surface des côtés, d'un côté ou de l'autre; quand on percute cette partie, la percussion ne fait entendre qu'un son sourd, si même on en obtient cette sensibilité du thorax, l'un des signes pathognomiques de la pleurésie dénote bien une douleur dans un partie quelconque de la plèvre costale."—Hurtrel d'Arboval, auctore BLAINE, *Veterinary Art,* Fifth edition, p. 319.

fectly oxygenated. In this state it exercises on the system a powerfully narcotic influence; it stagnates in the capillaries, and the tissues are deprived of their requisite nourishment. It is seldom that, in the prevailing pleuro-pneumonia, the symptoms of bronchitis appear very prominently; and although inflammation is present in the mucous structure, yet it is obscured by the inflammation of the pleura and parenchymatous substance of the lungs.

Although the symptoms exhibited in pleuro-pneumonia are a combination of those found in pneumonia, pleurisy, or bronchitis, yet that malady differs essentially from all these, inasmuch as it exhibits that typhoid or adynamic fever so pathognomonic of epizootic diseases.

There are several circumstances which modify in a great degree the attack of pleuro-pneumonia, which cause some diversity in the symptoms, and may make some difference of treatment necessary.

1. The constitution of the animal. The constitutional peculiarity may be ætal, sexual, hereditary, or acquired. For example, previous malady may have produced some functional derangement or constitutional disease, which, interfering with the general health, will predispose to the operation of exciting causes.

2. The condition of the atmosphere, and the habits of the animal.

3. The duration and intensity of the malady, and the previous medical treatment.

4. The fact that it is the *epizootic* form of the disease with which we have to deal.

The particular seat of the disease; for, as the inflammation more or less affects the bronchii, the pleura, or the substance of the lungs, so will there be a corresponding variety of the appearances under which the disease presents itself.

The DURATION of pleuro-pneumonia is very various. In cases which terminate fatally, and where nothing has been done to relieve the animal, death generally occurs from the seventh to the tenth day. Where recovery ensues, a change for the better usually takes place about the fifth or sixth day, and is indicated by the decreased action of the heart, the diminished fever, the temperature of the mouth becoming more natural, the equalisation of the surface-heat, the less hurried and laboured respiration, and the return of the crepitous *râle* heard at the commencement of the inflammation, and which betokens the resolution of the parenchymatous induration, and the returning permeability of the air vessels. In cases, however, where the inflammation has relapsed into the subacute or chronic form, the duration of the disease is very indefinite. A fortnight or three weeks may sometimes elapse before any favourable symptoms present themselves; and although in such cases a recovery appears to take place, yet there generally remains some latent fault or structural derangement.

The TERMINATIONS, or events, as they are sometimes called, of pleuro-pneumonia are very various. They include resolution, congestion, effusion, adhesion, hydrothorax, hydrops pericardii, mortification, suppuration, and hepatisation.

Resolution follows when no organic change has taken place, and when the pulmonary apparatus maintains its integrity.

In congestion, the blood and serum pass through the distended blood-vessels, the air-cells are filled up, and the lungs exhibit a red, gorged structure.

If inflammation have involved the mucous membrane of the bronchii, a frothy effusion takes place, which, if it goes on accumulating, entirely cuts off large portions of the lungs from the access of the air. From the large amount of cellular tissue in the lungs of cattle, there is a great tendency to effusion into the parenchymatous substance.

Extensive adhesions frequently take place between the pleura costalis and pleura pulmonalis, caused by the effusion of coagulable lymph.

Hydrothorax is caused by the serous effusion from the surfaces of the pleuræ becoming morbidly increased, and collecting in the pleural cavities. After the abatement of the primary disease, no fixed time can be stated for the commencement of effusion, and the rapidity with which the fluid increases is exceedingly various. Hydrothorax is generally very insidious in its attacks, and its detection in the early stages requires the utmost discrimination. For although the fatal derangement may be rapidly progressing, the temporary return of the appetite, and general improved appearance of the animal, will be apt to lull the suspicions of all but the most experienced and critical observer. The following are the most prominent symptoms of hydrothorax in cattle. The hind legs are thrown close together, and drawn under the belly, giving the animal a very narrow appearance behind. The belly is large and pendent, and the fore extremities wide apart. The head is thrown forwards, the nose dilated, and the breathing painfully laboured. The *times* of inspiration and the extent of the expansion of the chest vary on either side according to the amount of fluid effused. Auscultation discovers no sound below the level of the water, the line of which is tolerably distinctly marked. Percussion yields a uniformly dull sound, when applied below the level of the water; but above it, it may be clear and resonant. The hand placed upon the side of the chest does not plainly feel the stroke of the heart, which extends over an unnaturally large space. The impulse is generally greater between than upon the ribs. The pulse is vibratory, quick, small, and scarcely perceptible.

In combination with hydrothorax, although sometimes occurring independently of it, we may have effusion into the pericardium, which is generally indicated by an unnaturally bright eye, an undue elevation of the surface-heat, a violent throbbing of the carotid arteries, a fluttering, irregular, intermittent pulse, and palpitation of the heart, which, from the pressure of the serous effusion, soon becomes unable to propel the current of blood.

The extreme irritation set up previous to the commencement of mortification, generally cuts off the animal before the state of gangrene begins.

Suppuration is not a very common termination of inflammation of the lungs in cattle. To produce the formation of pus, a certain amount and duration of inflammation are required, and in pleuro-pneumonia these conditions seldom obtain.

Hepatisation is a very common termination. The cellular parenchymatous substance of the lungs becomes solid, and contains clots of dark grumous blood. When cut into, the lungs exhibit a liver-like appearance, and show infiltrations of bloody serum and lymph, to which is owing the peculiar yellow colour they assume.

These different events seldom occur perfectly distinct or separate from each other, and indeed several of them are frequently found to co-exist. Thus resolution is frequently accompanied by a certain amount of effusion. Of this effusion part may be pure serum, and part contain the plastic materials which produce adhesions between contiguous surfaces. In some portion of the lungs pus may be matured, while in another the inflammation may have run on to hepatisation, which in many cases shows well the existence together in the same spot of the previously mentioned terminations—the usual products of inflammation.

Besides the above terminations, there are several subacute and chronic derangements which occasionally result from the disease.

Chronic cough is sometimes induced by the extreme sensibility of the previously-inflamed mucous membrane. In this state, change of temperature, or any trivial cause, produces irritation; a long, deep inspiration follows, which, being forcibly expelled by the action of the ribs, the diaphragm, and the abdominal muscles, causes a cough, loud, harsh, and prolonged. This cough, although a source of inconvenience, and showing that the animal is more liable to the attacks of inflammation, does not, however, materially interfere with the general health, or prevent the accumulation of fat.

Some cases of pleuro-pneumonia assume the chronic form, and not a few of these terminate in phthisis pulmonalis. The more immediate symptoms of consumption are sometimes long in developing themselves, but still the recovery from the previous disease is never complete; the animal never gains condition, and its general appearance is unhealthy. The eyes are dull, the coat stares, and the appetite is capricious. A frequent, short, clear, and moderately loud cough is present, which, as the fibrous gluey effusion is poured into the lungs, and inflammation is established, becomes more rough, frequent, and painful. As mucus and pus are thrown out, the respirations become more hurried and laboured. The pulsations are at first but slightly accelerated, but as the disease proceeds, their number is considerably increased. The pulse is soft and compressible, and eventually becomes very weak. The respiratory murmur, as discovered by auscultation, is louder than in any other disease. It is most heard in certain tracts corresponding with the course of the large air-vessels. The sound elicited by percussion is much less dull than might be expected. The eyes are sunk, glassy, white, and pearly. The schneiderian membrane is covered with a yellow, glairy fluid, and, as the disease runs on, the discharge becomes more copious, and is very fœtid. Diarrhœa and sometimes dysentery is present. The pulse is now small and quick, and rises still higher on the slightest exertion. The debility is excessive, the general irritation extreme, and the animal pines away under the hectic inflammation, or dies from dyspnœa, occasioned by the accumulation of the muco-purulent effusion. The tubercles discovered in the lungs of cattle and in those of the horse are so similar, that we cannot do better than subjoin Mr. Blaine's description of them, as found in the horse:—

"In the early stages the tubercles appear like small hardened masses, dispersed thoughout the parenchymatous substances of one or both lungs, varying in colour and size from that of a pea to that of the largest hazel nut. In a later stage these soften internally, and pus is secreted within, which, eroding and absorbing the walls, escapes, and more extensive ulceration follows."—(Blaine's "Veterinary Art," p. 321.)

Post-mortem examinations are very important in enabling us more clearly to understand the nature and symptoms of disease, and to verify or correct our prognosis of the cases that come under our notice.

In conducting the post-mortem examinations of animals that have died during the first stages of pleuro-pneumonia, it is of importance to take into consideration the side towards which the animal lay previous to death, especially if, before the blood be coagulated, the carcass be allowed to remain long in the same position; for if such has been the case, the gravitation of the blood towards the lower side may produce a state of congestion which will render it very difficult to judge of the relative state of the lungs previous to death.

In cases of pleuro-pneumonia the post-mortem appearances are very various. In the majority of cases, however, the right lung shows the disease in its more advanced and worst forms. The lower parts of the lung, to which the blood gravitates, and whence it flows less easily to the heart than it does near the large vessels, seem to be always first affected. In the same animal the lungs frequently show all the different stages of the disease—the more dependent parts being perfectly hepatised, others exhibiting effusion of serum and lymph, while in others we find the state of pure engorgement.

When the animal dies in the first stages of the disease, the lungs are congested, black, and easily broken up; and, when cut into, blood and frothy nucus flow from them. When large portions of the lungs are found in this state, we may surmise that the disease has quickly run its course, and that death has been somewhat sudden. But when the disease is protracted there is always more or less hepatisation, adhesive matter being effused into the cellular connecting substance; the lungs are thus blocked up, the action of the air is prevented, abscesses may be formed, and the lung becomes a mottled indurated mass, easily torn, but so solid and heavy as to sink in water.

The lining membrane of the bronchii is more or less injected, and the mucous secretion is very abundant.

The extensive pleural adhesions which so many cases of pleuro-pneumonia exhibit, and which are regarded as strictly diseased conditions, result from an effort of nature to prevent the friction caused by the contact of the inflamed surfaces. Serum is thrown out, and lymph and albumen deposited; which becoming coagulated, the flocculi arrange themselves in layers, and are streaked with pink lines, or interspersed with red patches, caused by the colouring matter of the blood. These layers are more vascular and red nearest to the ribs and the lungs. A serous or albuminous deposit may be re-absorbed; but lymph becomes organized, and those morbid adhesions ensue which no treatment can remove. Where a great accumulation of organized lymph has taken, the lung, although not of itself having been the seat of inflammation, becomes compressed, loses its elasticity, its light spongy appearance, and seems in its structure more to resemble muscle than lung. From the adhesion and subsequent separation of their surfaces, the pleuræ are sometimes found rough, and studded with small points. Serous effusion within the cavity of the chest results from the increased action of the pleural vessels, and may gallons of water are thus poured out. Sometimes the fluid is albuminous, and sometimes it contains pus.

By sympathetic action all the serous membranes are more or less affected. The pericardium sometimes contains as much as a gallon of serum Its visceral and parietal layers may, like the pleural surfaces, be adherent, and covered with deposits of lymph and albumen.

The substance of the heart may participate in the disease, but such cases are exceedingly rare. The cavities of the organ, however, are generally filled with dark grumous blood.

The bronchial glands are sometimes in a state of suppuration.

In some cases the liver is entirely disorganized, and the bile thickened and dark-coloured.

The third stomach will sometimes be found distended with dry hardened food, which is caked on the surface of its leaves. This condition depends upon the disordered state of the digestive system, and the rapid absorption of the more fluid contents of the stomach. It is found to a greater or less extent in all inflammatory affections of cattle.

The bowels are sometimes much inflamed, especially if large quantities of purgative medicine have been given. This, however, is not a metastasis, but an extension of the inflammation.

From the unwillingness of many holders of stock to afford satisfactory information concerning the loss among their cattle from pleuro-pneumonia, from the large numbers sent to the butcher in the earlier stages of the disease, and from the difference of mortality in town and in the country, the per centage of those that recover cannot easily be estimated with certainty. The recovery of *one-half* of the animals affected is an average statement which the experience of few practitioners can attest. To fix the recovery at a *third* would perhaps approach nearer the truth. Under the present vicious management of cattle in most large towns, the percentage of deaths is very great—sometimes as high as *five-sixths* of those attacked. The statistics of the disease in Edinburgh show still higher figures, which a recently-published report* fixes at *eight-ninths*. This, however, cannot be a general average even in Edinburgh; and the cases from which the result has been obtained must surely have been either entirely neglected, or the treatment adopted injudicious.

In order either to form a correct prognosis, or safely and successfully to undertake the treatment of disease, the practitioner ought to be intimately acquainted with the anatomy and physiology of the

* Pond's Reasons for the Prevalence of Pleuro-Pneumonia in Dairy Stock, &c.

parts affected. He must discover the temperament of his patient, take minute cognisance of every symptom, and allow for every modifying influence. He must be able to discriminate between similar symptoms exhibited in different diseases. For example, he ought to be familiar with the peculiarities of the different kinds of cough, and be able to recognise and distinguish between the cough of pneumonia, short and suppressed; that of pleurisy, clear, distinct, and performed with a double effort; that of bronchitis, dry, harsh, and rattling: all which varieties form a striking contrast to the full, loud, sonorous cough caused by irritation or obstruction of the larynx or trachea. In order, therefore, that the cough may be of value as a characteristic means of diagnosis, its peculiarities must be particularly observed.

A close attention to the peculiarities and variations of the PULSE is also of great importance in distinguishing between different diseases, or the different stages of the same disease. For instance, we will note the dull, sluggish circulation of pneumonia, with the artery full and oppressed; the wiry, hard, and corded pulse of pleurisy; the clear, soft beat of bronchitis; the quick, small, and scarcely perceptible pulsation of hydrothorax: the soft, weak, compressible pulse of phthisis; and the fluttering, intermittent throb of heart-disease. In each we find the pulse a characteristic symptom, and an index of the state both of the respiratory and circulatory organs.

In health, the number of pulsations bears a relative proportion to the number of respirations. In an average-sized ox they are as four to one; but this proportion is somewhat modified by the age of the animal, and the circumstances in which it is placed. If this natural harmony be disturbed, if the relation between the amount of air and of blood sent into the lungs be destroyed, the breathing, and hence the circulation, must be affected. If there be anything in the windpipe preventing the free ingress of air, Nature makes up for it by increasing the number of respirations. Their number is augmented, because they are not so deep or so long. Coincident with this is an increase in the number of the pulsations. The blood, from want of sufficient oxygen, is not properly purified; and the heart's action is increased to force it onwards. The lungs and the heart thus act and re-act upon each other. From the peculiarity of the *velum palati* and the length of the trachea, cattle are unable to expectorate; and our diagnosis is, therefore, unassisted by observing the appearance and nature of the sputa.

In the diagnosis and prognosis of pleuro-pneumonia, and indeed of all chest diseases, great advantage is derived from AUSCULTATION and PERCUSSION. Without these valuable aids our knowledge of their nature and extent would be very imperfect and circumscribed.

Many veterinary surgeons make use of the stethoscope; but the author is of opinion that the one in common use cannot be so conveniently applied to the lower animals as to man. In regard to cattle, the use of the instrument of Lannec may be supplied by the following simple and ready method:—Throw a handkerchief over the animal, and apply the ear directly to its side. In auscultation it is necessary to take into consideration the age of the animal; for in young animals the respiratory murmur is much stronger than in those more advanced in years. The sounds also vary considerably, according to the region of the chest to which the ear is applied. Immediately below, and a little behind the superior border of the scapula, the murmur is loud and distinct. As this increase of sound is produced by the air passing through the larger divisions of the bronchii, it is called "bronchial respiration." Proceeding backwards along the false ribs, the sound gradually diminishes.

Among cattle, the respiratory murmurs are louder than in most animals, and the crepitating noise is very distinctly heard. This would seem to depend in a great measure upon the larger size of the minuter air cells, the less degree of thickness of the parietes of the chest, and the thinness and close approximation of the ribs to each other.

On the application of the ear to the chest of cattle whose lungs are in a sound, healthy condition, a low murmur, a pleasing, rustling noise is heard. In the first stages of pleuro-pneumonia this rustling murmur seems more loud; and there is also a low, crackling sound, like that produced by a bladder partially filled with air. As the case proceeds, this crackling noise, caused by the presence of serum in the minute air cells, becomes duller, or ceases to be heard. The natural, healthy murmur is also entirely gone; and, in its place, there may in most instances be detected a low, rumbling sound. As the serum and lymph accumulate in the air cells and in the lesser bronchii, large portions of the lungs are thrown out of use; and in these the ear fails to detect any sound whatever.

We not unfrequently find in the *same lung* the disease presenting itself in these different stages. In the upper part we may have the crackling crepitating noise; a little lower down, the dull, masked, and rumbling sound of bronchial respiration; while in the still more dependent parts, the inflammation having run its course, and all circulation of air and blood having ceased, we find the lung become a hepatised mass, as indicated by total absence of sound.

It is principally by auscultation that the practitioner will be enabled to discriminate with certainty between the different stages of the disease, and it is only by persevering practice and a cultivation of the sense of hearing, that he will be enabled to arrive at an accurate knowledge of the state of the disease.

Coupled with auscultation, percussion may with great advantage be used. In the application of percussion, strike on one side, and then, as nearly as possible, on the corresponding part of the other; and thus, by trying both sides, you will by comparison judge which is the one principally affected. The application of the knuckles or points of the fingers to the chest of the healthy animal elicits a sound, clear, hollow, and resonant; but when the lungs are inflamed, the sound produced by percussion becomes more dull and veiled, but varies in intensity with the duration and severity of the disease. When the pleura becomes affected to much extent, the application of percussion produces a more uniformly dull sound than when the inflammation is confined to the substance of the lungs.

It is only by careful and repeated examination of animals, both in health and disease, that such a knowledge can be acquired of the morbid and healthy murmurs, and such perfection attained in the discrimination of sounds, as will render auscultation and percussion available as sure and safe means of diacresis and prognosis.

There are FEW DISEASES which CAN BE MISTAKEN FOR PLEURO-PNEUMONIA, except those affecting the organs contained in the chest; and although the practitioner should, in the first stages, mistake a case of *pure* pneumonia, pleurisy, or bronchitis; and treat it according to the mode to be pursued in the pleuro-pneumonia epizootic, he would not greatly err.

Pleuro-pneumonia might be mistaken for phthisis pulmonalis; but the slow and gradual development of consumption, the absence of all active symptoms, and the nature of the cough and the pulse, cannot fail to mark the difference between the two diseases.

Although many distinguishing symptoms exist between the two maladies, the author has repeatedly seen fardel-bound mistaken for pleuro-pneumonia. But the *grunt* of fardel-bound, produced by the third stomach pressing upon the liver and diaphragm, is very loud, and, when once heard, cannot be mistaken. It attends both expiration and inspiration; whereas the grunt of pleuro-pneumonia is only at the *commencement of expiration*. The cough, when present, is loud and full; while that of pleuro-pneumonia is more suppressed. In fardel-bound, there is no tenderness along the trachea or spine, no dilatation of the nostrils, and no increase of the width between the fore extremities. In fardel-bound the third stomach may generally be felt by pressure directed forwards and upwards within the short ribs, on the right side. The fæces are hard, caked, and dark-coloured. The results of auscultation and percussion are the same as those yielded by the healthy lungs.

The PROGNOSIS of disease is a point of much importance, and one which generally demands discrimination and experience. Upon the facility and correctness with which the practitioner predicts the *event* of disease, will depend in a great measure his success in practice. Let the prognosis be given cautiously—avoid extremes—neither be too sanguine nor too diffident; for, in the one case, by the failure of some promised event, you lose the confidence of your employer; and in the other, if you show too much diffidence, your abilities are underrated, and your directions are not seconded, or fully carried out.

Always take a general view of your patient before going up to him, and, at your first visit especially, examine him very particularly, and consider the case until you perfectly understand it.

Where the symptoms of pleuro-pneumonia are very acute, and where the inflammation is violent and rapid in its progress, a large number of cases will recover. But on the other hand, when the disease appears to assume a milder form, when the inflammation arises less suddenly and severely, and is more protracted in its course, and when the general fever and local disturbance are less—in all such cases our prognosis will be less favourable, and the disease more fatal. It follows, therefore, that the mortality among these cases depends in a great measure upon their apparent mildness: for where the symptons have not acquired much intensity, the measures adopted are likely to be wanting in vigour and promptitude; while, in addition, not a few of these apparently milder cases are characterized by that typhoid fever which prevents the adoption of active antiphlogistic treatment.

Cases of pleuro-pneumonia which assume the distinct forms either of pneumonia, pleurisy, or bronchitis, will generally terminate favourably; while those characterized by prostration of strength and typhoid fever will be much more difficult of treatment, and often terminate fatally.

Where animals are exposed to east winds and drizzling rains, the symptoms seem to approach nearer to those characterising *pure* pneumonia; while, on the other hand, dry, cold weather, and sharp, severe wind scause the symptoms of pleurisy to become more apparent.

When pneumonia results from exposure to cold, all the respiratory organs are more or less affected. The inflammation involves in its course the larynx and trachea, and death is produced rather by the ingress of air being arrested than by congestion.

It is this form of pulmonary disease that generally attacks animals brought from a warm to a colder climate. Pleuro-pneumonia, when it runs its course in this manner, is not nearly so fatal as when it assumes the epizootic form.

Young animals seem less predisposed to pleuro-pneumonia than such as are nearer maturity; and fat cattle are attacked less frequently than those in more backward condition.

But of all sorts of stock, milk cows are the most liable to the disease. From the highly artificial condition in which they are kept, from the large quantities of food given to excite the secretion of milk, and from the great vascularity of their systems, they are predisposed to violent and often fatal attacks. Cows, during gestation, seem to be little liable to disease; all parts, except those immediately connected with the fœtus, being in a state of apathy. Nature, during this time, appears to hold in abeyance and arrest the progress of disease; but when the young animal comes into the world, the mother often falls a victim to the malady, which may for months have been hanging about her. This law operates in many cases of pleuro-pneumonia, which become developed shortly after parturition, and, running their course in the ordinary way, are almost always fatal. Exceptions, however, to this law, which nature seems to have instituted for the preservation of the fœtus, are to be met with; and when the disease does attack cows near parturition, it generally causes abortion; and if the calf be born alive, it seldom survives long.

THE COMMON HEN

[PHASEANUS GALLUS.]

These beautiful domestic birds are endeared to every one at all interested in rural affairs. The male is truly a majestic bird, proud in his gait, gaudy in his plumage, and mysterious in his habits. Immured in an unlighted hovel, he contrives to reckon the silent strides of time with precision, and whilst the whole household sleeps soundly, and even the watch-dog dozes in his kennel, the cock charges himself with the safety of the homestead, and slumbers not, but, like a trusty watchman, calls at stated intervals. Soon after midnight the cock crows as if he heralded the first returning wave upon the tide of new born day. The second crowing of the cock is immortalized in holy writ ("Before the cock crow twice," &c.), interwoven as it is with the history of the Passion of Our Lord; and well may it be said of the cock that he has given "*time a tongue*," since men in all ages have reckoned time by the "shrill clarion," of "the bird that warned St. Peter of his fall."

The female is altogether an unassuming creature, gently and quietly walking her rounds, picking up here a grub and there a grit, and now a grain of corn; and having little of the warlike character of the cock, save only when she defends her brood; and this she does so fearlessly, that the bravest of fighting cocks need not be ashamed of such a mate, or to be descended from such a matron; yet it is to the homely virtues of the hen more than to those of her chivalrous mate that we look with the greatest interest.

We speak of the dog as being a carnivorous beast, and cry out against the cat as being fell to any living creature that falls into her clutches; but we do not blame the gentle domestic hen for deeds of blood; yet I will endeavour to show that she is not altogether free from this stain, and that she will pick a bone as well as cat or dog, and even lay violent hands, and that right often, to prey upon the carcass; and although the prey be only small, the industry displayed with tooth and nail to catch it, shows that cruelty is a piece of her true character, and that animal food is a part of her natural and even of her necessary diet. If poultry were to be fed with clean grain, the eggs sold would not always pay for the grain bought; but if we examine the craw of the hen, we shall find that it contains earth and stones, and animal and vegetable matter—evidently showing that soiled grain and other vegetable substances, with a portion mulct from the myriads of insects and small animals that swarm in the summer sun about the earth's surface, are the ordinary articles of food which the bird gleans into the stomach.

The decay of animal and vegetable substances is usually hastened by grubs and worms collecting upon them, and in this manner nature easily alters the character of the most offensive substances, and rapidly disperses them abroad even when accumulated in immense masses. Witness the sea-weed cast upon the shore, swarming with animal life in a few days after the storm. Now it has been pretty clearly proved that typhus fever and cholera follow in the wake of filth, and settle down in the undisturbed possession of localities where putrid and offensive matter is allowed to stagnate; and on the other hand, luxuriant crops follow in the track where this same filth lies buried under the surface of the earth; and the "Muck Manual" (a very beautiful little hand-book of manures, notwithstanding its ugly name) has accordingly adopted for its motto, "Muck is the mother of money;" and I do not know of any route so direct from the muck to the money as by the two removes that I shall endeavour to point out, namely—first to get it alive in the form of glutinous insects and earth worms, to be used as a part of the food of domestic poultry, and these in their turn by the second remove to be carried to market in the form of eggs and carcasses to be converted into money. Now, as there is nothing more common than weeds, and the endless variety of articles that are comprehended under the term manure, and few things more unpleasant or more unprofitable than a heap of this idling in its native ugliness about the doors of cottages, or in the ditches, and by the road side, I thought I might be doing the community some service by showing how this idle manure could be put out to interest in a bank of earth, and as there are always too few eggs to enable the poor man to get them cheap, I would fain see more new laid eggs upon his table, and less old filth before his door.

When a boy at school, I recollect right well, that it was no small task to collect baits for trout fishing, to get earth-worms of the right size and colour, and to the extent that several boys would require. Now worms will crawl a long way during the night, as may be seen by their tracks across fine soil after rain; and wherever decaying vegetable matter is to be found in a moist state there they will congregate and breed.

I have for years past grown crops upon high ridges, or rather beds, with deep alleys between; and into these deep alleys refuse matter, such as is usually carried to rotting heaps, is thrown, and covered with soil, or rather with subsoil. In this manner about one square yard of ground would be soiled and covered in a cottage garden every day. Passing over the benefit that a cottage garden derives from this deep working and the mixing of manure with subsoil, the garden becomes the dung pit, or more properly the soil-yard; and when you call at a cottage and garden, conducted after this fashion, you will find the dung *absent on business*, and not idling about the door, as is too often the case; and by forking these well-dunged alleys, in a few days they will be found full of earth worms; and, in short, the filth buried there has made one stride in the march of decay, and gluttonous grubs and earthworms are hurrying it forward and growing fat upon its ruin. In such alleys or trenches as these I have picked a pint of earth-worms, for fishing, in a few minutes, the alleys having been filled with turf-parings, grass-sweepings, &c.; and when I have seen the tin box, containing the worms, emptied of its contents to the fowls, after the party had returned from the fishing, I could not help thinking that if hens were good for anything, it would be worth while to treat them to a bait of earth-worms occasionally, seeing that they relished animal food so much. Accordingly, when digging, I have set a child to collect the worms as they were turned up, and was very much gratified to see the poultry quarrelling over a quart of them.

If it be true that hens confined in yards lay eggs without shells, when they are deprived of the liberty to range and find the lime and the other necessary materials of which to build a perfect egg, then it may be also true, that since a laying hen has to manufacture about three-fourths of an ounce of yolk of egg daily, animal food is the best raw material that can be given; and when we consult works on chemistry, and see what enters into the composition of bones, and into the composition of eggs, we find, *à priori*, that a marrow bone well-pounded should be good food for a laying hen; and I got the hens to eat a bone that I pounded, after dogs and cats had given it up, thereby showing that flesh and fat and bone are readily assimilated in the craw of the domestic fowl.

The heat of the body of a fowl during the period that she lays eggs is intense: the redness that the comb and wattles assume is sufficient evidence of this; therefore it is not only necessary to give laying hens animal food to maintain the heat of the body, but it is equally necessary to give them external warmth in imitation of nature; for when the sun heats sand or loose earth, we find the hens burying themselves in it, evidently adding to their internal heat by applying the external in the most effectual manner.

"Do not sell your hen in a rainy day," is an old caution; and the necessity of dryness in rearing and maintaining healthy fowls cannot be too strongly urged; for nature has given oil-bottles to those birds that are exposed to the water, and you may see them greasing their plumage, and the water will freely pass off in globules after this, in the same way as the cabbage leaf carries the silvery globules of rain. Low diet, damp lodgings, and exposure to cold, are the real *henbanes* in keeping poultry.

The ease with which poultry is propagated in warm climates, and the fact that our native birds select the warm season to breed in, and still more, the abundant sport that fowlers find after a fine dry summer, would be sufficient evidence of the importance of a high and dry temperature. But I must argue this important point more closely; for if we wish to have eggs in season and out of season, artificial heat is the *sine quâ non*; for if all the rest of the egg-building apparatus were in order, the shell of the egg never could be baked to that heat and to that hardness which it assumes at a low temperature. When a hen has laid a brood of eggs, and commences sitting, it is evident that the last egg never cools from the time that it commenced its formation in the embryo state in the body of the fowl, up to the time that the living chick issued from the shell, or more properly, up to the time that the perfect bird was slain for use—and mark well, that this last egg was the only one of the brood that suffered no delay from cold. Now, since the perfect egg lies dormant, and eventually decays in the cold, and cannot be converted into chickens, without the regular application of heat, it is equally reasonable to maintain a high temperature to the same matter in its embryo state, and in the earlier stages of its development. Minorca hens, in the south of Devon, will lay eggs all the winter, provided they are kept warm and in high feather. I could point to several cottages where these fowls are kept; and were it not for the high prices obtained for their eggs in winter, it would go hard with the family when the husband cannot find work. The hens are kept in the same apartment where the fire is kept, and all the inconveniences arising from the arrangement are borne in the same way that other unpleasant trades and occupations are carried on *to get a living*. And you may just as easily hatch eggs in the cold, after they are laid, as get hens to lay eggs if kept cold, since the development of the egg from the embryo of the size of a mustard-seed in the body of the hen is the commencement, and the hatching the egg after it is laid is only a continuation of the same process, evidently demanding the same high temperature. Hence the necessity of an artificial spring if we would propagate poultry in winter; for they will only increase with rapidity where they are made happy, and enjoy an atmosphere as serene as the shorn lamb and callow raven would delight in.

HAYMAKING.

The presence of the hay season reminds us of the little which scientific men have done to assist the grass-farmer in the securing of his hay. In almost every district there is a peculiar mode of haymaking, and sometimes one method is found to answer, and sometimes another; but it arises rather from the chances of seasons and practice than from any scientific principles involved in the process being understood by the haymakers, or the mind which directs them. In France, where there is not any great progress made in any agricultural operation, excepting perhaps the management of their town manure, or "poudrette," the practice is simply to dry the grass till it is perfectly destitute of moisture, and then to stack it. By this means it is as dry as straw, and has none of the sweet and peculiar aroma so desirable and so valued in English hay; nor indeed, if this perfect dryness at stacking were desirable, would it be easily attainable in our sea-girt isle. The Scottish method is not very worthy of imitation; and before-hand as that nation is as farmers, they seem to be behind-hand in this. They allow the hay to mature its seeds before they usually cut it; and, when cut, its securing is too often left to the weather and to chance, for the sake of attending to some other crop; and hence the Scotch are not celebrated for their good hay.

In the south of England great pains are bestowed—but, we think, not always quite judiciously—to obtain good hay; and the London method, as it is called, has been long shown up as a pattern of perfection. The details are long and tedious, and spread, even in favourable seasons, over several days; but a faint outline of them will not be uninteresting nor uninstructive.

The first day, the grass is spread and turned once or twice; and it is the same evening put into what are technically called grass cocks or heaps, as much as two persons can lift. On the second day these heaps are shaken out, again turned, and again put into the same grass cocks, or of larger dimensions. On the third day a similar process is observed; and on the fourth day it is considered to be in stacking condition.

We think, however, that the practice in the North of England is far preferable to any other we have met with. It is usually allowed to remain one day in swathe, so as to admit of a large portion being brought into operation on a favourable day; but when the weather is peculiarly favourable and sunny, it is spread after the mowers, and turned either by hand or by the hay-machine very assiduously. If the prospects of the weather are still fine, the same turning is performed the following day, and at night it is put into what are called "foot-cocks," or "lap-cocks," which are thus described in the Prize Report of the North Riding of Yorkshire "Raked into small heaps, of the dimensions just capable of being taken up in the arms, and then shaken, so as to present an even surface; it is folded round the arm, and so doubled and set down firmly on the ground, and there remains until a promise of another favourable day, when they are thrown out and exposed to the sun again; and this is repeated until the whole is fit for 'pike' or conical heaps, containing from half a ton to a ton."*

The practice is that which secures the greatest amount of nutriment, and exposes to the least risk; for the heaps, called in the north by the not very elegant but very expressive designation of "muckey cock," are much injured by every rain that falls, being too large to allow the rain either to fall off or to run through, and also to allow the wind to dry through or penetrate; while the small lap-cock, standing on four feet, admitting air below and shielding off the rain above, any reasonable amount of exposure either to wet or to a sluggish atmosphere is easily obviated.

So much for the *practice* of haymaking; but the scientific views involved in these processes are perfectly rational and intelligible. The principal ones are the following: The *grass must be fully developed before it is mown;* if not, it will be found in its early stages to contain so much water as to be reduced, on drying, into so small a compass, that it will in quantity much disappoint the haymaker. On the other hand, it must *not be permitted to stand until its seeds are formed*, much less ripe. The practice, too prevalent in Scotland, of looking to the *seed* as well as the hay, is one which cannot be too much reprehended. All plants in arriving at maturity have their starch and sugar and gum in large quantities converted into woody fibre—a wise provision of Divine Providence for enabling the stem to bear the matured seeds—and as sugar and gum and starch are nutritive elements, it is desirable that these should be preserved; and hence the point for successful grass-cutting is that between the full development of the plants and before the formation of their seeds, in other words when they are in flower.

Another principle not to be lost sight of in haymaking is the *stacking of it in a dry condition;* if

* "North Riding Prize Report," Jour. R.A.S., v. 9., p. 515.

otherwise, the juices ferment so violently that the stack is more than half burnt, and sometimes entirely destroyed by fire: the heat evolved is so great that the process of spontaneous ignition will sometimes take place. On the other hand, it is a fault if, like the French hay spoken of at the commencement of this article, it is *got too dry*; for, though a violent and destructive fermentation is of course to be avoided, a slight and incipient one is absolutely necessary to the full development of the best qualities of the grass. There have been few investigations into the principles of the fermentation of hay, but there is little doubt that it is the vinous fermentation of the saccharine matter of the hay which renders it as palatable to the animals as the beer is more so than wort. Nothing, moreover, injures hay more than *exposure to the wet*. In this country there is no security against it, and incessant rains wash out the most soluble, and hence most nutritious portions. The "lap-cock" system of Yorkshire is, we think, the best preservative against this natural impediment existing in our climate to the securing of the hay crop. Dried hay if again wetted *must be thoroughly freed from this moisture* before it is stacked; otherwise, instead of heating and burning, it will become "mouldy," and both unpalatable and unfit to eat.

Before concluding we cannot help alluding to a practice too much neglected in stacking hay. There are too few who add to the haystack what they know will make it both a palatable and healthy aliment, and overcome many of the injuries to which the hay is liable; we mean the addition of salt in stacking. This has a great tendency to check excessive heating and moulding, and makes it much relished by the animals which consume it.—Farmers' and Gardeners' Journal.

HAYMAKING.

Sir,—I quite agree with the major part of your observations lately expressed regarding haymaking in the different parts of England, when at the same time you made some remarks regarding the systems generally adopted in both France and Scotland. These are very well and judiciously timed, and ought to bear with them an amount of interest and careful investigation worthy not only of an attentive consideration, but, so far as individual circumstances will permit, persons ought to give themselves practical proof of which way is best, and most suitable for their local situation. From what experience I have obtained in haymaking, both in the North, under the Scotch system, and in the neighbourhood of London, and from observations in other districts of the country, I beg to offer a few remarks for your consideration: I certainly prefer what you term "The London method;" but when the weather is favourable, they seldom or ever think of cocking the hay before night; and should the weather for haymaking operations prove favourable, they generally commence and shake out the swarths at least on the day following being cut; this being done, either that afternoon or on the following day, the hay is thrown into winrows; these rows may contain all the hay in a line across the field, of some fifteen or twenty yards in width. While in these rows, the hay generally receives repeated shaking and turning over with the fork and in fine weather I have seen a great deal of hay carried on the fourth and fifth days after cutting; and few indeed allow it (if possible) to stand over beyond six or seven days before being in the rick; it being, I may say, a universal custom throughout the hay districts near London, to have large canvas cloths suspended over the ricks during the time of building; this being done by means of two strong perpendicular poles, one at each end of the rick, having a similar one, but more slender, suspended between these upright poles, over which the rick-cloth is laid, and lashed to it, like a sail to a yard-arm. This cloth is let down, and extends over the whole rick during night, and whenever rainy and unfavourable weather breaks in to mar the haymakers' operations. By this means, more or less hay can be secured as soon as it may be found in a proper condition for carrying. Under such management, there is no occasion waiting until a whole field is ready to carry, but it rather runs a great risk of fearfully damaging the whole.

I candidly admit the Scotch system is susceptible of much and great improvement: bearing on this point, your observations are temperate and judicious; the Scotch agriculturists must soon bestir themselves in this department of their farming economy. One thing, I believe, operates very much against the Scotch farmer—causing them frequently to have their hay about too long in the fields, to their no small loss and inconvenience; namely, they generally want, to a very large extent, anything like the same degree of heat, solar heat and radiation from the ground; this is decidedly against them, and very necessary, nay almost indispensable to good and successful haymaking. What may appear singular, but *not* the less *true*, I find that something very nearly approaching to the Scotch method in haymaking is very extensively practised in Cornwall; and the greater part of this county has as rainy and *misty* a character as any part of Scotland, even that part not excepted where a Highland youth answered to a question from Dr. Johnson, while on his travels there—"Na', it dis'na' aye rain here: it sometimes snaws."

Cornwall, July 9, 1849. G. D. Rhynie.

MANAGEMENT OF SHEEP.

If you think the following observations worthy of notice, you may insert them :—

Now that the lamb fairs are approaching, when people lay in their winter stock, I wish to call attention to an evil, which has crept in within the last quarter of a century, and causes some loss and considerable annoyance; but as it is, notwithstanding, of easy remedy, I trust all due pains will be taken to prevent its recurrence.

In my early life among the hills, certain kinds of lambs, which those for whose benefit I write will understand without specification, were never put in with the rest of the flock; but sold to the butcher at what they would bring—a practice that made little difference at the time alluded to, as the two classes of ewe and wedder were sold separately. Now, however, since the introduction of crosses, there is no separation; and if it chance, as it often does, that there are such animals in the lot as I have just spoken of, buyers, ignorant of the fact, and not perfect judges of stock, pay no attention to them till spring, when, for the first time, it is discerned that the gimmers, in not a few instances, although in lamb, have little chance of dropping their young till May or June. Now, it is well known that birthlings under the circumstances stated seldom come to anything, while their dams, in carrying so late in the season, are reduced a full half in value. I would therefore seriously advise flock-masters not to put such animals in their lots; and further, to be prepared to answer promptly a question which every buyer has a right to put—*is the stock clean?* It may be that some people have a stray beast about the steading of bad quality and mischievous habits, calculated to do a great deal of harm. I say cut his head off, otherwise he will entail more mischief on the flock than all he is worth many times over. I have no doubt that even those who send sheep to the fat markets have suffered from their own inattention; but it is particularly hard that such as buy at store markets in spring should dree the same misfortune from having no previous knowledge of the circumstances.

To me crossing appears the most beneficial system for all classes that has ever yet been tried. Of this improvement since its rise the progress has been wonderful. About a quarter of a century ago it commenced; but still the transition from "bygane times to new come changes" was upon the whole slow for several years—most people thinking that our northern climate would never suit the experiments hazarded. Results, however, have proved the contrary; but still the experiment might have proved a failure but for the great quantity of winter food raised for the nurture of mothers as well as lambs. Lockerby Show, established about twenty years ago, was in the beginning three weeks or a month before Penrith, as the hogs could not be kept in the country; and, as the demand was chiefly for the midland countries of England, the draughts from hirsels sent south were started immediately. It, however, soon appeared that this was not the most profitable mode, and the aim before long of all good managers became plenty of turnips till grass time. One thing, however, is still greatly wanted—proper cutting of turnips, as without that stock will waste every day in the midst of plenty; even then they will not improve as they should do without artificial food; and I have no hesitation in saying that a half, three-fourths, or even a pound of oats per day, at the price they sold for last winter, would pay cent. per cent. Only hear some of those people to whom I allude, the good managers to wit, boasting on a Wednesday evening of the prices they had got in these bad times, viz., from 32s. to 37s. for clipped hogs. Of course, those who had not been so lucky made inquiry. "Oh! your hogs would be corn-fed?" "Certainly they were," was the answer invariably returned: "I got double pay for my oats; and after the experience I have had, I am determined to save trouble, and let my sheep carry my grain on their backs to market."

There was another matter which produced great difficulties at the time when crossing was first commenced, what was to be done with so many cast ewes in so brief a period. For this "lion in the path" the extension of turnip husbandry has supplied a remedy, but as yet farmers have not taken sufficient advantage of this important adjunct to the successful prosecution of their business. Common turnips ought to be sown early, so as to be ready for being eaten down by the first day of October at latest, as then the pasture fields begin to fail, and the sheep require a change to enable them to keep in the improving state. At this period of the year good animals of this description are very readily sold, but the great bulk of them should be cleared off before the prime sheep come into the market.

I have ventured to give these hints, knowing well from experience that necessity is the mother of invention, and that many a farmer must be compelled, in such times as the present, to try some new plan in order to improve his condition. Such times and the changes which they necessitate have been of benefit before the present day, and I trust will be so in days to come. If trade in the great manufacturing districts remain good, and the consumption of food continue as it has been of late, I have no hesitation in saying that beef and mutton will be fairly sold, for John Bull does not relish salted meat from any part of the world, not even though it be preserved and sent from Sydney. I am, yours, &c.,

—Dumfries Courier. A. B.

DISEASES OF SHEEP.—PINING.

This is a disease proceeding from enervation and costiveness, and caused by excessive dryness of pasture, astringency of food, and want of proper exercise. It is little known in the south and centre of England, but has long made fearful ravage in many parts of the Cheviot mountains, of the southern Highlands of Scotland, and of the hill-districts of Galloway. It has been obscurely known for ages under the name of Vinquish; and, in modern times, became boldly and terribly known under the Scottish name of Pining—a word which denotes lassitude and languishing emaciation, and which aptly describes the miserable and wasted appearance of the disease's victims. It sometimes affects whole flocks at once; and, in the course of nine years, it killed upwards of 900 sheep under the care of the intelligent Hogg, the celebrated shepherd of Ettrick. Yet, though it often begins, and spreads, and devastates like a violent epizootic, it is neither infectious nor contagious; and in places where the state of the pasture does not actively provoke it, or has not occasioned it to be best known, it sometimes attacks a straggling sheep upon a dry spot, and holds the animal there till he dies, and makes no inroad whatever upon the rest of the flock.

The earliest symptoms of the disease are lassitude of motion, heaviness about the pupil of the eye, and general indication of febrile action. "At the very first," says Hogg, "the blood is thick and dark of colour, and cannot, by any exercise, be made to spring; and when the animal dies of this distemper, there is apparently scarcely one drop of blood in the carcass. It lives till there does not appear to be a drop remaining; and even the ventricles of the heart become as dry and pale as its skin. The disease is most fatal in a season of drought; and June and September are the most deadly months. If ever a farmer perceives a flock having a flushed appearance of more than ordinarily rapid thriving, he is gone. By that day eight days, when he goes out to look at them again, he will find them all lying, hanging their ears, running at the eyes, and looking at him like so many condemned criminals. As the disease proceeds, the hair on the animal's face becomes dry, the wool assumes a bluish cast, and, if the shepherd have not the means of changing the pasture, all those affected will fall in the course of a month."

The sheep most infected with the disease of pining are those which have dry, grassy pastures, abounding in flats and ridges of white and flying bent, without a sufficient accompaniment of rich and succulent herbage in bogs or elsewhere, to counteract the astringent effects of the general food of the flock. On steep and rocky lands, where the herbage is short and sweet, the disease does not exist; on hard, heathy lands, which are generally intermixed with little green stripes, provincially called gairs, it is scarcely known; and on grassy, benty lands, where succulent and laxative plants are intermixed with the general herbage, it is generally scarce and unspreading in the proportion in which the succulent and laxative plants prevail. But on most sheep-farms of deep, strong grass, dry and wiry spots exist on which sheep cannot be allowed to feed many hours together with safety; and on some sheep-farms of pervadingly fine feeding character, astringent plants may be diffusely spread abroad in sufficient quantity to occasion considerable danger. Two fields on a farm in Somersetshire invariably produced the opposite effects on cattle—the one of purging them, and the other of constipating them; and on being examined by a botanist, the former was found to abound in purging flax, Linum catharticum, and the latter in the powerfully astringent officinal, tormentil, or septfoil, Tormentilla erecta; and something similar to this, no doubt, occurs on many a sheep-farm. The very land, too, in many instances, which formerly produced the rot in sheep, has been found, after being thoroughly dried by artificial draining, to produce pining; and as all such land was formerly too wet, it may now be inferred to be too dry. The extermination of moles, also, has been blamed for causing such a change of herbage as to engender pining, especially on lands which had previously been drained. "In the place of the mountain daisy, the sweet-scented vernal grass, the healthy sheep's fescue, the rich native clovers, the aromatic yarrow, the spreading rib-grass, which, with their kindred plants, delighted the sight, a quite different and inferior set of plants frequently possessed the soil, such as moss and lichens, tufty hair-grass, and the like. This was produced by want of that constant supply of fresh earth which the mole brings to the surface, and which, whether spread regularly by the farmer, or casually by the sheep and lambs in the active exercise of playful instinct, or even allowed to remain as thrown up, covers annually a considerable portion of the surface, and must tend to produce great variety and better herbage." But this seems to apply chiefly to peaty or boggy lands which have lost their excessive moisture by draining, and afterwards become excessively consolidated and indurated by acquired aridity; and it probably has little or no reference to those friable and loamy lands which the mole most delights to frequent, or in which it has from time immemorial been found.

Peculiarity of constitution in some breeds of sheep, either in itself or in connection with unfavourable conditions of pasture, seems likewise to have something to do with liability to pining. "Whether it be that the mountain varieties of our sheep possess weaker digestive organs than the larger-sized sheep, or that, from some other unknown cause, they are more subject to the costive habit which produces pining, it is certain that the Cheviot sheep are more subject to it, under the same circumstances of feeding and treatment, than the Leicester. One of the most extensive and intelligent farmers on the Cheviots says that, on some of his farms, one portion of his flock are Cheviot sheep, and the other a cross nearly allied to the Leicester, and that he has frequently observed a great part of the Cheviot sheep affected with pining, while not a single one of the other breed would have the slightest symptom of the disease, though they pastured indiscriminately together."

The best immediate remedy for pining, as well as an easy and effectual means of preventing it, is the removal of the sheep to more succulent pasture; and this may be proportioned, in both frequency and duration, to both the comparative unhealthiness of the animals, and the comparative aggregate succulence of the herbage. The most obvious medicinal remedies are common salt and Epsom salt; but these, of themselves, are little more than mere palliatives, and cannot be expected either to prevent or to cure. An important preventive is the artificial sowing of intermixtures of succulent herbage-plants; and this, on all farms of predominantly dry and wiry pasture, would operate at the same time as a great promoter of general health, and a mighty means of aggregate economy.—Rural Cyclopædia.

CHEAP MANURING.

GREEN MANURES.

It was said in our last, that the base or bulk of the substitute dung heap, for outlying fields, must consist of vegetable matters grown or obtained near the spot. But there are places where the quantity of such matters at hand is not enough, and would require considerable expense of cartage to collect a sufficient heap. In these cases, the cheaper way may be, to cultivate cheap and quick growing vegetables for the purpose; or even for ploughing under, without working in heap at all; thus saving all expense of carriage. This is now commonly called "green manuring;" the principle being to enrich the soil, by setting a quick growing plant to draw organic matters from the air, and inorganic from the subsoil; and then ploughing it into the soil. Peaty soils do not require it, being already full of vegetable matter (and wanting chiefly lime to neutralize the acid; and nitrate of soda, or sulphate of ammonia, to supply nitrogen). For poor light and sandy soils these green manures do well; and also for poor clays; which, however, are much improved by having the subsoil burnt (or rather charred) with peat, spent bark, saw-dust, or any other cheap fuel. And as vegetable matters work sour, the land should be limed before, or soon after ploughing them under; and the cheap inorganic dressings, as lime, salt, and gypsum, may be added, to help their growth, and so promote their drawing other matters from the air and soil.

The vegetables grown for this purpose should have the following properties, namely, they should—

1—Flourish on poor soils;
2—Require little labour of cultivation;
3—Have cheap seed;
4—Be of quick and sure growth;
5—Stand all weathers and vermin;
6—Run their roots deep;
7—Bring up what the following crops require;
8—Smother weeds; and
9—Produce a great quantity of foliage, which decays easily in the soil, and leaves no hurtful residue.

The plants best known for this purpose may be most concisely and clearly described and compared when thrown together in a table.

TABLE OF GREEN MANURES.

Plant.	Soil required.	Labour in culture.	Cost of seed.	How bear vermin, &c.	How stand the weather.	Months of growth.	Tons per acre.	Depth of roots.	Potass. (1000 parts contain—)	Phosph. acid.	Nitrogen.	Rate of decay.	Observations.
Spurry, eatable, 3 crops a year.	poor and dry.	little.	cheap.			2	3	15 in.	9	1.5	4	quick.	May be sown on stubble, or 3 times a year, March, May, and July.
Tare, eatable, 2 crops a year.	good.		dear.	badly.	tender.	3	6 or more.	not deep.	3.4	3	4.3	quick.	Gypsum will often forward it.
Buckwheat 2 crops.	poor peaty.	little.	dear.	well.	not wet.	2	3 or 4	not deep.	1.5	0.7	2		Sown on stubble, grows rapidly with gypsum and nitre.
Rape, eatable, 1 or 1½ crops.	good.		cheap.	suffers.		5	6 to 12*	deep.	4	1	3.5	roots slow.	*12 tons per acre if left to blossom; the roots thick and hard.
Rye, eatable.	poor.	little.	dear.	well.	well.	6		not deep.	very little.	little.	4		Sow after harvest, to eat or plough down in spring.
White lupin, uneatable.	all except limy.		dear.	well.	well.	4	12	24 in.	1	1.8	4.3	stalks slow.	The best of green manures; equal to yard dung. Sow in May, to plough down in Autumn: lasts 2 years.
Red clover, eatable.	good.		cheap.				8	2½ ft.	4	1.3	3.4	quick.	The roots about equal to ½ the stalk and leaves.
White clover, eatable.			cheap.				3 or 4	15 in.		1	3.5	quick.	Produce about ⅓rd that of red clover.

Here we see at one view, that spurry will produce 2 or 3 crops a year; is eatable; will thrive on poor dry soil, with little labour, and little cost of seed. How it stands weather and vermin does not appear. That it requires 2 months' growth, and yields about 3 tons per acre; its roots running 15 inches deep. That every 1000 pounds contain 9 of potass, 1½ of phosphoric acid, and 4 of nitrogen. That it decays quickly in the soil; and that it may be sown on stubble, after harvest, or (to enrich a poor soil) 3 times in succession; ploughing down the March crop, in May, and sowing another upon it; and the same again in July, and so of the others, helping the farmer to judge at a glance, which may most likely suit his purpose.

Besides these, tansey and mugwort together are strongly recommended by Sprengel, as possessing the properties above enumerated. Borage is said to throw up a heavy mass of foliage; and so does the Bokhara clover, which, however, seems liable to suffer from the slug. The prickly comfrey has been said to produce 90 tons of green foliage on an acre, but I cannot lay my hand on the particulars.

These green vegetable manures may be divided into three classes.

1. Those which are to be ploughed down where they grow; generally rapid growing ann.

2. Those which are grown on rough or poor spots not worth other cultivation, for cutting and carting to the better soil adjoining; in which hardiness and weight of produce are chiefly looked for, and perennials best esteemed.

3. Those which are to be eaten down by animals; and the latter growth and roots only turned over by the plough, to rot in the soil; which must of course be wholesome and palatable, and require further considerations, beyond our present limited subject of "cheap manuring."

1. Of the first class, spurry is extensively used in Belgium, and upon poor dry soils probably answers best; but on peaty ground, buckwheat is said to do better. Tares and vetches produce much heavier crops than either, but require better soil, and more cost and care, and more liable to vermin. Rape and rye can be sown after harvest, and will grow the winter through; but rape must have good land, and does not so well bear vermin as rye.

The white lupin has been recently introduced into this country; with what success, in our climate, I have not yet seen. But in Italy it has been extensively used, down from the time of ancient Rome, and has been adopted with great success in Germany. This, or vetch, or mustard, or even quick-growing turnips may be grown, and ploughed down between crops, not on poor outlying lands only, but also on soils in high cultivation, instead of dung; especially when helped on by the requisite inorganic dressings. And I have long since given, in your columns, my reasons for believing that by such a system land may be kept in high condition, under pure vegetable culture (for the market), without cattle or live stock, or other dung than night soil in the return carts.

A good set of comparative experiments on green manures, their respective produce and effects, would supply a valuable addition to our agricultural knowledge.

2. Of the second class, grown on rough or waste spots, to cut for manuring the adjoining fields, none promises better, for poor outlying lands, than the mixture of tansey and mugwort. Both are perennials, satisfied with poor, hungry soils, stand all weathers, suffer little from vermin, and grow through the winter; produce a great mass of foliage, say 24 tons an acre, rich in potass; their roots running 2 to 4 feet deep into the subsoil; are easily cultivated; last 10 years without further expense, and will sow themselves again; may be cut twice a year. One acre of them will green manure 2 acres for 2 years; or keep 4 acres of hungry soil in fertile condition. But this acre they require to themselves; not growing like spurry upon the stubble, between harvest and seedtime. Or any other quick-growing plants, which flourish naturally upon the waste places, may be extended by cultivation, and helped by the cheap dressings above named. They should be cut when in blossom, as they then yield the heaviest and richest produce; but before seeding, that they may not be carried into the tillage land as weeds. If the land is under crop at the time they can be heaped in compost for the substitute dung heap; or, if it is bare, they can be ploughed in at once. But this will, of course, be a question for the farmer's convenience.

3. The third class, which are to be cut for fodder, or eaten down, and the roots and latter growth only used for manure, will, of course, be regulated by the character of the farm and the nature of the stock.

Of grass, from 2 to 4 years' growth, the roots may run from 2 to 3 tons an acre. Of lucern and sainfoin, 5 to 10 years' growth, they may amount to 5 or 6 tons. Rape gives stout and heavy roots, but I have no estimates of their weight per acre; they form a very powerful and productive manure.

These few letters are not the mere result of my own reflections upon chemical theory, but comprise a very concise summary, of an attentive comparison, of the numerous practical experiments published, during the last 5 to 7 years, in the Royal English and Scotch Agricultural Journals, the *Gardeners' Chronicle*, and *Mark Lane Express*, and several other agricultural periodicals. In the course of another year (unless anything to the purpose comes out in the meantime), I may probably publish them in a fuller and more systematic form; in 6 or 8 plain practical lectures for farmers' clubs, to be read by their own secretaries; with chemical and explanatory notes and references, at the end, to lay open the principles on which the practice is founded, and supply materials for profitable discussion after each lecture. Meanwhile I shall be glad of any practical objections in your columns or any other periodical; but not in private letters, to answer which individually would occupy much more time than I have to spare. J. PRIDEAUX.

SCIENCE AND AGRICULTURE.

The improvements which have taken place in agriculture during the last few years, though made mainly by practical men, have been in a very great measure due to the advances which science has made, and especially the scientific views men have been led to carry into every branch of physical nature; and although science may not have originated many of the discoveries which have taken place in the cultivation of the soil, still by investigating the causes of which accidental circumstances have been the instrument in developing, a much wider and more judicious extent of advantage has been reaped.

Take, as an instance, bone manure. Of so little use were these valuable fertilizers once considered to be, that they were allowed to accumulate in large quantities, if not removed at considerable expense. On being carted away and spread, the greatest possible amount of advantage was found to result, and no little pains were taken to ascertain to what their fertilizing qualities were due. A great mass of facts were collected. It was found, for instance, that they did not answer on cold clay soils; that on some other soils they seemed to be of little service; that they were more successful in a wet season than in a dry; and that they were the most successful on peaty or sandy-soils. Still practice could not unravel the mystery of their success. One man found, and demonstrated by absolute experiment, that boiled bones were as useful as fresh—nay, others said that burnt bones had an efficacy equal to raw. Hence, a variety of theories sprung up. One set of philosophers declared, that to the phosphate of lime alone it was that they were so fertilizing; another, that it was due only to their nitrogen. One farmer claimed merit for the animal matter, and another the gelatine; and the one sought green bones from the kennels, and the other procured them only from the glue boilers.

Science came to all their rescue, and prevented the waste of thousands in labour and money. She showed that ammonia and phosphoric acid are, in fact, the great elements of success in turnip growing. In some soils the former, and in others the latter was deficient; and hence, she at once accounted for the burnt bones answering in one locality better, and for the dry in another. But she went further: she manifested the necessity for the elements being in as slight a degree of fixation as possible; that a smaller amount of vital energy should be required in the plant to procure its necessary food, and left this energy free, so to speak, to eliminate and assimilate the food available for its wants.

Hence, it was science alone which showed the value of rendering bones soluble, by treating them with sulphuric acid. This rendered the phosphoric acid more free—more soluble, so to speak; and the same as regards the gelatine and animal matter; and thus the great secret of success in the application of bones was solved by the aid of science alone. To show the advantages in a national and economical point of view, we need only show the saving of the latter process over the old mode.

By the old mode:—	£	s.	d.
Two quarters of bones at, say, 18s. per quarter	1	16	0
Cartage, say,	0	2	0
Per acre..	£1	18	0

By the new mode:—	£	s.	d.
Four bushels of bones, at 18s. per quarter	0	9	0
Four stone of sulphuric acid, at 1s. 2d. per stone	0	4	8
Mixing	0	2	0
	£0	15	8

Showing a saving, per acre, of one pound three shillings.

Taking M'Culloch's estimate of the quantity of turnips, in England, at..........2,000,000 acres,
and Scotland, at................ 450,000 „

2,450,000 „

this, at the saving alone of one pound three shillings per acre, will amount to £2,817,500.

Nor is this all. There are few cases where a better crop of turnips will not be obtained by vitriolized bones, than by any quantity of bones applied in an undissolved state; and though the beneficial effects of the latter may be somewhat more permanent than the former, still, as the object of green-crop cultivators is mainly to gain a root crop, and leave its consumption on the land, to keep it in condition, this is effected most admirably by the vitriolized application.

But science once let in, it did not rest: it began its reseaches in order to investigate where this valuable principle in turnip cultivation could be discovered in nature, and procured at less expense than searching on the Continent for the bones of men, and bringing them, at a great expense, from these distant regions. She pointed to the green-sand formation, as containing one, at least, of these valuable elements, and showed on a map how these inexhaustible mines of fertility were a more prominent object on a map of England than were the Guano Mountains of Peru upon that of America; and she soon, moreover, reasoned, that if it were in the green-sandstone formation, it were also in the gault, and might be expected to be found in the mountain limestone, because there the organic remains might be expected to contain it. And so indeed it has proved. The analysis of various limestones gives as much as a per-centage varying from one-half to one per cent.; and this alone is a large application of the particular principle required—the phosphate.

Nor has science stopped at the application of solvents to bones; sulphuric acid having the tendency to charge the lime with a double portion of phosphoric acid, and thus to render the latter more readily available for plants, as we before intimated; and chemistry taught that the same might be done with other substances containing the same principle, and the coprolites found in several parts of the island, so hard as to be almost impregnable by the ordinary operations of nature, are by it macerated and rendered soluble, and filling up an hiatus instead of sending our ships to foreign countries for bones.

The above is one instance of what science has done for agriculture, and it is quite sufficient to show that we are indebted to it for many and great advantages, whatever Mr. Sandford Howard or any of the disparagers of science may assert to the contrary.

But it is not the only one. Our drainage works have been rendered almost perfect by the application of the principles of physics. Our farms may be advantageously improved by a knowledge of the principles of geological science. Our farm-buildings may be improved and benefited by attention to the principles of animal physiology, and applying these principles to the rearing and fattening of stock. While a knowledge of mechanics will lessen the labour, and reduce the expense of carrying on a farm, in a degree which is very considerable.

The application of science is more than ever necessary. Our soils are old and worn-out, and have now been called upon to compete with the virgin soils of the continents of Europe and America, in both corn and meat; and, if we are to do this successfully, it is only by the greatest exertions, and by availing ourselves of all the appliances and means which science places within our reach—Gardeners' and Farmers' Journal.

LECTURE ON THE ANATOMY, PHYSIOLOGY, AND DISEASES OF THE ORGANS OF RESPIRATION, WITH PARTICULAR REFERENCE TO PLEURO-PNEUMONIA IN THE OX.

DELIVERED AT THE MEETING OF THE ROYAL AGRICULTURAL SOCIETY, AT NORWICH, JULY 18, BY PROFESSOR SIMONDS, OF THE ROYAL VETERINARY COLLEGE, LONDON.

The lecture was delivered in the Shire Hall, the attendance being very good the Earl of Chichester, the President of the Society, presiding. It was illustrated by a number of coloured drawings representing the internal organs of the ox, horse, &c., some of which showed the lungs of the former in a healthy condition, and in the early and advanced stage of pleuro-pneumonia.

The lecturer commenced by observing, that pursuing the course which he had hitherto adopted, in addressing the members of this society at their annual meetings, he should not presume to trespass unnecessarily on their time, by the introduction of matter which was altogether of an introductory character. To speak of the great and rapidly increasing benefits which arose from these periodic meetings, however inviting a subject might be, was a work of supererogation, for all were ready to admit, from the Prince of royal blood to the humble plebeian, that they exercised an important influence both socially and morally over our rural population, and contributed in no small degree to our national welfare. In directing their attention to the general arrangement and uses of those important parts of the animal organism of which he had to speak, it would be necessary to take a rapid glance at the progress of digestion, for the purpose of placing the office of the lungs in a clearer light; for here he had to speak of the formation of the blood from the food, and its progress and changes till it entered the heart; and although he should have chiefly to describe the respiratory organs, still it must be obvious to all, that he must commence by shortly explaining the circulation of the blood. During life, the continued demand for new material, to supply the waste of the tissues, which arises from a variety of causes, called forth or gave rise to those sensations which we designate hunger and thirst.

Both the quantity and quality of food which was partaken would, however, depend on the habits and conformation of the animal, but in all it underwent a successive series of important changes. In the mouth it was masticated or divided into smaller masses, during which time it was also insalivated; it then passed over the tongue, and descended the gullet into the stomach. Here it was acted upon by the gastric juice, and he might remark that this action was of a chemical character. In other words, the food was here digested. The lecturer then proceeded to explain the different actions which the food underwent after passing from the stomach, until it was formed into blood, and referred to drawings of some of the organs through which it had to pass during its transformation. He then observed that it would be necessary to explain the constituents of which blood was composed, prior to directing their attention to the action of the lungs, as the central respiratory organs—for unless they possessed some information upon this point, they could not rightly understand their functions. Blood then might be defined to be a fluid, circulating through the heart, arteries, and veins, carrying the materials of life, renovation, and secretion; building up the system in young, and supplying the wants of the system in the old. But it not only circulated through the system for the purpose of building up every part, but also to maintain heat in the animal—all animals possessing the power of maintaining a heat of their own, independent of the atmosphere around them. The heart might be designated the central pump from which the system derived this fluid; the arteries the carriers, and the veins the returning conduits. In vertebrated animals, this fluid was of a red colour, while in those that were invertebrated it was colourless. While circulating, it appeared to be a red homogeneous fluid; but upon being drawn, it separated into solid and fluid portions, and if analyzed it would be found to be made of dissimilar parts. It contained in reality four chief components—fibrine, albumen or serum, globules, and salts, each of which had an important part to play in the system. Blood, it was well known, appeared to the eye to be of a red colour, and this redness was of a deeper shade in the higher order of animals than in many of the inferior. This redness it was found depended altogether upon the presence of the red particles; remove these and the fluid would become colourless. Blood, when drawn from an animal, coagulated; and this coagulation depended upon the presence of a material called fibrine, and by the amount of this they could ascertain its quality. After the blood had stood for some time, there appeared a fluid of a pale yellow colour, which was called serum, which possessed no power in itself to coagulate, and had a specific gravity little more than water. Serum, although in reality a fluid, contained an important element, which was capable of undergoing solidification, but not spontaneously. This was albumen, which it was well known solidified in heat, and if he were to expose some serum to a heat of 160 degrees it would coagulate. It would also coagulate by admixture with mineral acids. The lecturer illustrated this by mixing some acid with a quantity of serum in a small phial. He next proceeded to notice the constituents and qualities of fibrine, which was obtained from the fluid before it coagulated. It might justly be described as the basis of the animal machine. It formed plugs in cases of hæmorrhage, and temporary bands in fractures. It was self-coagulating, white in texture, tough and elastic. It was found to exist in a larger relative quantity in arterial blood than in venous blood, because the arteries appropriated a quantity prior to the passage of the blood into the veins—thus showing how important fibrine was to the support of the system. He next proceeded to notice the red globules found in the blood, and which gave colour to the fluid. There were thousands of these globules in a drop of blood, but they were so minute that they could not be discovered without the aid of glasses. It was formerly supposed that there were certain parts of the body, the blood in which did not contain them, and that the eye was one of those parts; but modern research had disproved this position. It had been found that the blood in the eye was supplied with these particles, but not in sufficient quantity to colour it. The microscope was necessary to develop their existence. They were found to be flattened discs, and they varied in size from the 4500th, to the 2800th part of an inch. They might take the general average size at the 3,000th part of an inch. They were of greater specific gravity than the other parts of the blood, which was shown by the fact, that when the coagulation of the blood was delayed, they settled to the bottom of the vessel. They were intimately connected with the health, strength, and vigour of an animal, for they were found to exist in a less proportion in the blood of an animal in ill health, whilst, on the contrary, in a robust animal they existed in a larger degree. The blood of a lean animal contained a larger quantity than that of the fat one. They were important for this reason, that animals, as he had already stated, possessed a power of keeping up a heat independent of the atmosphere, which was called animal heat, and it might be said that this property was, in part, owing to these bodies.

The blood on entering the lungs becomes impregnated with the oxygen of the air which we breathed, and the oxygen supplying the place of the carbonic acid gas, caused the condition of the blood to become changed. The lecturer pointed out the mode in which the blood passed into the heart, and from thence into the arteries, by reference to a coloured drawing. The change which the blood underwent in its passage was very important, as it then got rid of its superabundance of oxygen by its union with the carbon, and thereby engendered heat. The carbonic acid thus formed was got rid of during the process of respiration. Most of them were aware that chalk was a carbonate of lime, and they knew that carbonate of lime was not very soluble in water. The lecturer exhibited some transparent lime water in a phial, and by means of a glass tube he blew into it, when it was found that by mixing with the expired air from the lungs it became opaque. This experiment showed that we had carbonic acid gas given from the lungs in the act of respiration, and that this united with the lime in the water and formed it into carbonate of lime. It was necessary that he should dwell briefly upon this part of the subject, because it had at one time been supposed that the carbonic acid gas exhaled from the lungs was formed by the oxygen breathed into the lungs uniting with the carbon of the blood in those organs; but this had been shown to be incorrect: an interchange, but not a union of the two gases he had named, alone took place. The lecturer then demonstrated the change that took place in the blood upon its entering the lungs and becoming impregnated with oxygen, by pouring some oxygen upon a small quantity of blood contained in a bottle. Immediately the blood assumed a bright red colour. The lungs, he observed, were the great cause of the arterial change in the blood, while the capillaries of the system were the cause of its undergoing what was called the venous change. Many functions of the animal system might be stopped for a considerable time, but in the case of respiration this could only be done for a very short period. If we held the breath, we were compelled very shortly to resume the act of breathing—a fact which depended partly upon, and consequently demonstrated, that there was an accumulated quantity of carbonic acid gas in the system, which it was necessary for the preservation of life we should exhale. The central organs of respiration were called lungs, and were placed in a cavity which was described as the middle one. There were three great cavities formed by the skeleton of the animal —the cerebral, which contained the brain and the nerves of sense; the central, which contained the lungs and the heart, the chief organs of respiration and circulation; the third cavity, which was formed by the pelvis, and in females contained the organs of generation. The thorax or chest, although formed by the bones, was arranged in a different manner from the other two cavities. It was necessary, in order to allow of the expansion of the lungs in respiration, that the bones of this cavity should give way; and therefore they found that the ribs were united to the trunk by means of cartilages. In this was found a beautiful provision of nature; for although the bones were sufficient to protect the cavity from injury, they were also sufficiently elastic to allow of the expansion of the lungs in the act of respiration.

After explaining the action of the lungs and some of the organs of the thorax, he observed that we might suppose that these organs had no other part to perform; but if we examined them, we should find that they discharged a double office. The windpipe conveyed the air to the lungs. The upper part of the windpipe was called the larynx, which presented the same general appearance in all animals, although it was modified in order to suit the tones uttered by each. It was composed of a number of cartilages; and if they directed their attention to the different sounds which it gave forth in different animals—the braying of the ass, the neighing of the horse, the bellowing of the ox, the bleating of the sheep, the barking of the dog, and the grunting of the pig, they would at once perceive the necessity which existed for the difference of formation that was observable in the construction of the larynx of these animals. The larynx received the air as it was about to enter the windpipe, and it also received the air expelled from the windpipe, before passing from the mouth and nose. The larynx then communicated with the windpipe, which was likewise composed of cartilages, which frequently supplied the place of bone in the system. Cartilage was pliable, tough, and not liable to be put out of order by natural means. The interior surface of the windpipe was lined with what was called a mucous membrane, the object of which was to shield the windpipe from the action of the atmosphere. It extended into what were called the bronchi, which were lost in the cells of the lungs. This was not unfrequently the seat of disease. They had all doubtless heard of bronchitis—inflammation of the larynx, and common catarrh. He pointed out, by means of a drawing, the passage of the air from the mouth and nostrils to the lungs, until it terminated in what was called the air cells. With respect to the lungs themselves, he observed that they would require a very short description. They might be termed light, spongy bodies, filled with air-cells and vessels, and were covered with pleura. A considerable quantity of elastic tissue entered into their composition, and it was also evident that a certain amount of contractile tissue existed. The respiratory motion which we perceived when a person breathed was partly caused by the active operation of those powers, and was not, as had been said, altogether owing to the compression of the chest. In the act of expiration, a portion of the air was forced out by compression of the sides, and the pressing forwards of the abdominal viscera, by the contraction of the muscles. This action ceasing, the ribs sprung back by their cartilages, and the diaphragm contracting at the same time the dimensions of the thorax increased. The air contained in the lungs by its elasticity caused them to expand, and a rush of fresh atmospheric air down the windpipe took place into the cells to equalize its density. This caused the motion which was felt in breathing. As the chief use of this function was to eject carbonic acid gas from the system, and to produce red blood, so the quantity of air respired was regulated accordingly. It was impossible accurately to convey any just idea of the quantity of air inhaled and exhaled. The quantity of carbonic gas evolved varied from four to even eight per cent., but the quantity was governed in a great degree by the age of the animal, and its exertions or muscular movements, for he ought to tell them that every movement was accompanied by a corresponding alteration in the condition of the tissues. As an animal underwent increased exertions, in proportion would be the increased quantity of carbon produced in the system; and therefore it was necessary that a proportionate quantity of oxygen should be inhaled by increased breathing, so as to curb or counteract its effects, otherwise death would ensue. This was sometimes shown to be the result of over exertion in the case of horses. Hunters had been known to drop down and die in consequence of being unable to inhale a sufficient quantity of oxygen to counteract the carbon produced during their violent exertions. After dwelling a little longer upon this part of his subject, and illustrating certain organs of respiration in the ox and the horse by a reference to drawings, he passed to the second division of his lecture, namely, the consideration of that very destructive disease which had lately affected cattle, and which had produced sad ravages in this country, as it was one which he had no doubt would excite the interest of all present. The name given to this disease was pleuro-pneumonia; and although there might not be much in a name, nevertheless he thought it right to state that a worse one, or one more inappropriate than that, could not have been chosen. Pleuro-pneumonia would at once lead medical men to believe that the disease was inflammation of the pleura, extending to the lungs. When, however, he told them that this disease was not in any one of its stages inflammatory, he thought they would say with him, that it was one which should not be called pleuro-pneumonia. That term for the disease was calculated to lead to false treatment. He would take a glance at the epizootes which had visited all the countries of Europe from the earliest history of man down to the present time. Mention was made of the plagues of Egypt, and we also read of the murrain. Homer, 900 years before Christ, frequently alluded to their ravages in Greece. Virgil, Ovid, and others, describe their outbreaks in Italy. They were viewed as contagious, but this murrain was not pleuro-pneumonia, which might fairly be considered as a disease of the present generation. But whether that be disputed by some or not, it was a question worthy of their notice; therefore it was on those grounds that he should glance at the epizootes which had visited this country. In 810 they had it recorded that all the cattle in the Emperor Charlemagne's dominions—that was in Germany—were swept off. During the time of the dark ages the accounts appeared to be very imperfect, but in 1509 there was a recurrence of these outbreaks. In 1514, and again in 1599, beef and veal were forbidden to be eaten by the Council of Venice on account of its diseased condition. In 1691 sheep were destroyed by thousands by pustular eruptions in various parts of their body, or small-pox. In 1693 pulmonary phthisis destroyed all the cattle in Hesse, and vegetables were said to have been affected with the red rust, which was supposed to be originally the cause. In 1713 Rome and its neighbourhood suffered to an extraordinary extent, and 30,000 head of cattle were said to have died in nine months of malignant dysentery, and with tumours and ulcers on the body. In 1730 Bohemia, Saxony, &c., and in the following year France suffered much from the prevalence of disease amongst cattle. In 1745 Holland, France, Germany, and England were visited, and, in his opinion, by the called pleuro-pneumonia. In a little pamphlet written in 1735, by Dr. Barker, the disease was described as an affection of the lungs, preceded by a husky cough, lasting a week or more. He described the disease and its symptoms, and those symptoms were the same as in the present disease. Dr. Barker said the symptoms were acute, preceded by a dry and husky cough, which lasted for a week or so. In the second stage the animal lost its appetite, the secretion of the milk was diminished, increased cough, nasal discharge, weeping eyes, pulse hard, body hot, and the respiration very difficult and laboured. In the latter stage of the disease there was a gradual increase of the above symptoms, purging came on, and sometimes continued for a week or more; and this diarrhœa was often accompanied with the swelling of the paunch. If the cattle swelled and their flesh became cold, it was a certain sign of approaching death. Now this was important, because the disease appeared to be new to the present generation; if, however, his opinion was correct, and it was not new, it then followed that the disease must have died, or become lost to us from some cause; and consequently that which had occurred once might occur again, and this disease migh disappear entirely from amongst us. He (the lecturer) had remarked that the disease described by Dr. Barker exhibited similar symptoms to that of pleuro-pneumonia. Dr. Barker went on to state that in making a post mortem examination all parts of the animal were found sound except the lungs. In these the blood vessels were stuffed up, and extended with coagulated blood. They were so distended as to make the lungs look larger than usual. In 1760 an outbreak took place in England amongst the cattle, which was described by Dr. Layard as a putrid, malignant, and inflammatory fever. In 1763 England experienced another heavy loss amongst the cattle. The digestive organs were the chief seat of the disease; the animals had intestinal worms and flukes in the liver. He had already stated that pleuro-pneumonia was preceded by a disease which was termed the old epidemic, and that the present disease was regarded as the sequence or consequence of it. He was of opinion that they were two separate and distinct affections, and in no way depended one upon the other. It is true that animals that had been affected with the former were sometimes affected with the latter; but it was also true that many animals affected by pleuro-pneumonia had not been previously affected by the other. Then again it was true that the two diseases existed on the same farm independent of each other. It was also true that exema attacked the horse, the sheep, poultry, and so on; while the pleuro pneumonia was confined almost entirely to the ox. Undoubtedly the disease had been imported. It was said that it had been long observed on the continent, whence it extended to England, and showed itself like Asiatic cholera and other diseases of a similar kind. By some it was believed that the atmosphere was the cause; but then came the question, how is the vitiated condition of the atmosphere to be ascertained? They could only look at the results which had been produced, for if the air was impure they had no means of discovering its impure particles. The potato disease had puzzled the greatest of English philosophers, but its cause and the laws which governed it were alike unknown. The perfume given in a bouquet was acknowledged by all to be delightful to the sense of smell, but not a particle of that perfume could be detected by the chemist. Malaria was caused by the sun's rays reflected on marshes and stagnant waters, but the deleterious matter which caused death could not be detected by the chemist if he were to analyze the air. Whether the disease depended on the altered condition of the animal, or whether it was occasioned by some deleterious matter in the air, emanating from the earth, he could not say. It might be by one or both of these causes. The atmosphere might become impregnated with that which was injurious to life, and it was well known that in many periods great difference took place in the atmosphere. It was a remarkable fact that Dr. Prout found, that on the 9th of February, 1832, there was a considerable difference in the weight of the air. The lecturer then directed the attention of his hearers to the Bridgewater Treatise, in which that subject was fully treated upon. Dr. Prout said the weight of the air continued to rise for several days, and was succeeded by cholera. He attributed it to some gases having caused the air to be displaced. The wind turned from the west to the east, and continued there until the end of February; and the cholera commenced immediately after the change of the wind. He (the lecturer) did not know whether the same thing had been observed with regard to the present disease; but it would be quite sufficient for him to observe, that there was some cause at that time for the disturbance in the atmosphere which altered the weight of the air, and might have caused the cholera. Whether pleuro-pneumonia was a disease depending on ordinary infection, was a matter of some importance, because it would show them that they should avoid purchasing animals that were in any way supposed to be afflicted with the disease, or putting them amongst sound animals. It was true that in some cases they could trace the disease to some infected animal: but it was also true that animals had been attacked with the disease, when no diseased animals had been in the neighbourhood. The attack might also be facilitated from an alteration in the food, or bad ventilation of the building in which the animal stood. It might also arise from the excitement caused by the animal being conveyed from one part of the country to another, which rendered them more liable to disease than before. Care should be taken not to feed the animal on that which would predispose it to the attack. The question entirely arose how fœted air could produce such injurious effects. He had before stated his opinion that this disease was not an inflammatory one; and in order to explain his views on this portion of the subject, he directed their attention to the diagrams of the lungs of the ox and the horse, and pointed out the difference between the two animals in that respect. Fœtid air was supposed to cause the disease, but it did not directly produce any effect on the lungs; if it did, they might expect that the animal would show it by a cough. The air entering into the lungs the poison was abstracted by them, then carried by the blood into the system, and produced the most virulent form of the disease by re-acting on the lungs. He could not go through all the symptoms as morbid consequences of this disease. What he had said would suffice to show that in all diseases of this kind, just in proportion as the air-cells become pressed together and the chest confined, so would be the effect of the difficult respiration; the pain of the animal increasing and causing death. While this was going on the oxygen in the lungs did not exercise the beneficial influence which was found in a healthy state, and the blood consequently became more carbonized. This over-carbonization produced other derangements of the digestive organs, and that was the wind-up of the disease. He next alluded to the treatment to be observed with the affected animal. And first with reference to the propriety of bleeding. Excessive bleeding would be injurious. If the disease was found out soon after the animal was attacked he would recommend bleeding; but that must depend on the stage of the disease. He did not recommend bleeding under the supposition that it would produce a reaction; but he recommended it that it might remove more of the poisoned blood from the lungs of the animal. Great care should be taken so that the system was not debilitated; as too much bleeding would weaken the animal, and might produce injurious results. Another mode of treatment was the application of medicinal agents. The first was the exhibition of aperient medicine. The alimentary canal was the means to get rid of the fœtid blood, and for removing any pernicious effects from the system. Another of the agents which they might employ to subdue the disease was diuretica; and as these medicines did not produce so much debility in the lower animals, the proper use of them was allowable. They ought, however, to give water which was impregnated with nitre. He considered that opium, in combination with calomel, might also be used. They had all heard of brandy and water; and, as a stimulant, it might be efficient. If the animal had entered the second or third stage of the disease, a stimulant might be necessary, and brandy would probably be found beneficial; but he should say that a compound of ammonia was far preferable, and the best of these he considered to be liq. ammonia acet. Great benefit was also to be derived from mineral tonics. They had a large class of medicines from which to choose; and they must choose according to the condition of the animal, and the stage which the disease had assumed (applause).

In conclusion, he observed that it must be evident from the description he had given of this malady that there could be no specific for it; and it was also evident that he who undertook the treatment of such a disease without a knowledge of its nature, and of the structure and functions of the organs it affected, was acting like an ordinary artizan who set about the repair of a machine, the wheels and levers of which he was entirely ignorant (Hear, hear). And now, having completed his task, it only remained for him to thank them for the kind attention he had received. He had made no attempt by the selection of high sounding terms, or eloquence of diction, to render the subject interesting; preferring to convey to them in familiar language a knowledge of those scientific principles which in practice could not fail to promote the objects of this national and important society (loud applause).

The Earl of Chichester then proposed the thanks of the meeting to Professor Simonds for his very able lecture; and at the same time he expressd his regret that he (Professor Simonds) had been compelled, in consequence of want of time, to curtail his discourse.

The motion was carried by acclamation.

Professor Simonds briefly acknowledged the vote, after which the company separated.—Norwich Mercury.

THE APHIS FAMILY.

The most familiar examples of this insect are the black fly which destroys the bean crop, the hop fly, and the apple blight. These are so well known, and of such importance, as to need no apology for a little information respecting them.

In their mode of reproduction these insects differ from all others. They produce eggs in the autumn, by which the existence of the species is ensured during winter; but are viviparous—that is, *produce their young alive—during summer.* The eggs remain undeveloped during winter, and in the spring the perfect insects come forth from them. These perfect insects then go on, not to produce eggs, but to bring forth other insects as perfect as themselves, until autumn returns, when eggs are once more produced, and safely stored up for the winter.

The celebrated French naturalist Reaumur paid great attention to these insects. He one day observed one insect become the parent of twenty; in fact, he says: "When they once commenced, they seemed to do nothing else." But the most remarkable fact connected with these insects is that they are virgin mothers. Another French naturalist isolated the female insects as soon as they were born, and yet he obtained nine generations of perfect insects without contact with the male. In fact, the male insects are not produced until autumn.

These insects are found everywhere, and on almost every plant, and have recently attracted great attention as the supposed cause of the potato disease. This opinion is, we believe, now generally abandoned. One species has recently been discovered in the inside of apples, and no visible aperture by which they could have entered.

They are, however, happily, kept in check by numerous enemies, amongst which the most efficient is the common "lady-bird." It is said that in a southern county the parish authorities of a rural district, by means of a fire-engine and tobacco-water, tried to drive away an unusual flight of these lady-birds, in utter ignorance of their harmlessness and usefulness. These animals, as well as several others of the insect tribe, destroy the aphides by millions. Tobacco-water may be useful in a garden; but it is, of course, impossible to use it in a field. The only hope of a palliation of the evil here is good generous farming, by means of which the plant attacked may still retain sufficient vigour to recover its strength and arrive at maturity.

FORCING STRAWBERRIES.—I beg to be allowed to make a few remarks upon my system of forcing strawberries, and which I have for some time successfully pursued. I begin by filling, with good turf and loam, as many 4½ inch pots as I require plants. This being done, they are taken direct to the bed whence I intend having the plants. I then select the earliest runners, seeing they are not damaged by treading on; the strongest plants I place singly in each pot, and slightly fasten them with a peg to keep them from being disturbed by the wind. I take great care they are never allowed to suffer for want of water, for on this greatly depends the strength of the plants; nor do I delay the watering merely because a few black clouds are to be seen loitering in the west. Neither do I like to trust to old men or boys to water anything of consequence, for I have seen a great deal of mischief done by this. Perhaps, unfortunately, the old man is troubled with rheumatism; then you may be sure he will save a journey if there is a possibility of doing so; and the boy will be certain in saying that he has given them a good soaking. I always contrive to have a sort of nursery bed for the purpose of getting plants for forcing, which I manage to have as near the walk as I can, as so placed they are much more easily watered, and are not so liable to be disturbed, as when the pots are standing in the quarters where we are daily treading in search of fruit. The Keen's Seedling certainly is the best for an early crop, and the British Queen for the last; the latter is well known to be far better in flavour; but with the greatest care and attention, it is impossible to succeed in procuring so large and satisfactory a crop as from the Keen's Seedling. By the time the plants are well rooted, I have a good mixture of turf and yellow loam, and a small portion of sand, but very little or any manure. I now have the runners cut; they are no longer nourished by their parent plant, neither do they require it, for they are quite capable of supporting themselves. The next thing is to shift them into 7½ inch pots of the above mixture, paying attention to drainage, and putting in a good handful of soot; this is a sure preventive against the admittance of grubs or worms, and, at the same time, adds greatly to the health of the plant. After they are all potted, I allow them to remain to be slightly shaded for a week or two; after that time I make a choice of the more exposed situation, here I have them all plunged in ashes, if they can be obtained; and if not, let them be plunged in soil. The soot, if attention was paid in putting it over the drainage, will, in this case, be very beneficial by defying the worms from entering at that passage. Plunging strawberries is undoubtedly an excellent practice, for not half the quantity of water is required. The plants ought to be plunged in a situation where the plants are fully exposed to every ray of the sun, and a sufficient space of room between pots for the wind to act freely about them, taking care at all times to keep the runners cut close off. At the commencement of the autumn rains, they should be taken up and sheltered from wet, in pits and frames, which I think the most proper situation for their time of rest. When the time arrives for commencing forcing, the zinc troughs which are kept for this purpose are filled with a mixture of rough soil and decomposed manure, being in depth about three inches, and sufficiently wide for a double row of plants. Zinc is objected to by some people for similar purposes; but I have practised the method for some time, and upon no small scale, and have always found it answer admirably: the hasty rambling of the roots, even quite at the bottom of the pans, will teach a lesson of its innocence; and will not the roots, if in such a place, render some assistance to the plant at the time it is swelling fruit? At this time I supply them about three times a week with well diluted liquid manure; but gradually withholding it at the commencement of colouring, giving air at all favourable opportunities, and discarding the practice of drying up the poor plants for a week before gathering, thinking it adds to the flavour of the fruit. Whether a discontinuance of water adds to the flavour or not, one thing it will help to do—increase the number of red spider, which is the worst enemy to gardeners, and against which I use every precaution, believing it to be much more easy to prevent than to cure. I never suffer the plants to remain in the house an hour after the fruit is gathered, as I have frequently seen a material injury caused by leaving them standing amongst other plants, or near the vineries. I take them direct to where they are intended to be planted, if required for that purpose. But I have never been so successful with old plants as with younger ones; they appear to suffer much more in dry weather than the former; but perhaps some of our experienced brothers would oblige on this point, by giving the result of their practice—CHAS. BUNDY.

MEETING OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND AT NORWICH.

The reputation which the county of Norfolk has obtained for excellence in the cultivation of the soil gave an increased interest to the society's meeting at Norwich; and, as a whole, it may be deemed to have realized the expectations formed in respect to it. No prizes being given by the Society for the best cultivated farms, the county of Norfolk could not be brought into competition with other districts upon this head; but we are enabled to state that a party of most experienced farmers from one of the midland counties embraced the opportunity of making an agricultural tour through the best cultivated parts of Lincolnshire and Norfolk in their way to Norwich, visiting such farms as were of the greatest repute in the district through which they passed, one of whom communicated to us, as the result of their inspection and observations, that Mr. Hudson's farm at Castle Acre bore away the palm. By the verdict of this jury, therefore, Norfolk maintains its reputation for superior cultivation. We should like to see a match between Norfolk and Lincolnshire for the best cultivated farm, the occupation of a tenant farmer. We may here observe that Mr. Hudson's illness, and consequent inability to perform his duties as one of the stewards of the cattle-yard, was matter of deep regret to all: he was, however, ably represented by Mr. Druce, who for many years has rendered good service to the Society in that capacity. As regards the accommodation afforded for the business purposes of the society at Norwich, we have no hesitation in pronouncing it to have been excellent — the show-yard, the best the society ever had; the attentions of the local society assiduous and successful; the entries of stock above an average, as will be seen by the subjoined statement:—

Year of Meeting.	Locality.	Entries of Stock.
1839	Oxford	249
1840	Cambridge	352
1841	Liverpool	319
1842	Bristol	510
1843	Derby	750
1844	Southampton	575
1845	Shrewsbury	437
1846	Newcastle	613
1847	Northampton	459
1848	York	724
1849	Norwich	624

The entries of implements greatly in excess of any previous meeting, as shown by the following table:

Year of Meeting.	Locality.	Entries of Implements
1839	Oxford	23
1840	Cambridge	36
1841	Liverpool	312
1842	Bristol	455
1843	Derby	508
1844	Southampton	948
1845	Shrewsbury	942
1846	Newcastle	735
1847	Northampton	1321
1848	York	1508
1849	Norwich	1880

As regards the exhibition of stock, taking it as a whole, we have difficulty in bringing ourselves to the conclusion that it reaches an average in point of quality. There were some animals of a very high order of merit, such as Mr. Booth's two shorthorn cows, and Mr. Wilson's yearling heifer, an almost perfect animal. Mr. Quartly's Devon bull could scarcely be surpassed. The Hereford and Devon classes were more evenly good than the shorthorns. The yearling classes of all were very promising. The show of Southdown sheep far exceeded that of former years; Mr. Jonas Webb was eminently successful, and deservedly so, having won the first and second prizes for shearling rams. It is said that the judges selected six rams out of the whole number exhibited, as being far superior to any others, and that they had some difficulty in deciding to which of these splendid animals the prizes should be awarded. It turned out afterwards that *the whole six were Mr. Jonas Webb's!* Mr. Fisher Hobbs, who appeared for the first time as a Southdown breeder, took the first prize for rams of any age. The show of pigs was not so varied as usual. It will be seen, however, that Mr. Hobbs's improved Essex maintained their character, carrying off first prizes in two classes. Mr. Hobbs was very successful, carrying off more prizes than any other single individual. The implements were most numerous and varied, manifesting a continuous improvement in the manufacture. The growing desire to possess improved machinery, which has obtained an impetus through the necessities of the times, gave an extraordinary degree of interest to the competition for the portable steam engine applicable to thrashing and other agricultural purposes, the prize for which was awarded to Mr. Garrett, of Leiston, who also obtained prizes for his turnip drill on the ridge, his corn drill, his drop drill for depositing seed and manure, his portable steam thrashing machine, and his horse hoe on the flat. The prize steam engine was purchased by Mr. W. Hutley, of Powers Hall, Witham, Essex, a practical tenant-farmer, who has thus set an excellent example to his brother farmers, and who, we venture to say, will not expend a whit the less in human labour, whatever he may do in horse labour. The Messrs. Ransomes obtained a prize for their Biddell's scarifier, and a silver medal for their universal plough, as also a silver medal for a corn-dropping machine—an implement which, from its simplicity of construction and efficiency, promises to take an important position amongst the really useful implements of the farm. Amongst other things, Mr. Crosskill, of Beverley, obtained a silver medal for a portable farm railway, which we consider highly deserving the attention of those farmers who study economy of labour. For the names of the other exhibiters to whom prizes were awarded, and a notification of the implements, we must refer our readers to the list of prizes which will be found in the supplement. As regards the funds of the Society, we learn that the proceeds arising from visitors to the yard will not be so great as in former years. So far, also, as we could obtain information, we believe that although some of the larger manufacturers have received a tolerable number of orders, still, upon the whole, business has not been so brisk as they expected. This can scarcely be matter of surprise when we look at the low prices which have for some time prevailed, and the uncertainty which hangs over the future. The number of visitors was, no doubt, considerably curtailed through the want of complete railway communication with Suffolk and Essex: the inconvenience of travelling even a dozen miles by coach from one railway to another operating in these days as a serious impediment. His Royal Highness the Duke of Cambridge honoured the meeting with his presence, having gone down on Tuesday, but was obliged to return on Wednesday, so that he was unable to attend either the Council Dinner or the great dinner on Thursday. The Rev. E. Sidney, M. A., delivered a lecture "On the parasitic fungi of the British farm," and Professor Simonds a lecture "On the anatomy, physiology, and diseases of the organs of respiration of domesticated animals, with particular reference to pleuro-pneumonia in the ox." These lectures were very highly spoken of by the parties who were able to attend, but the necessary attention required to the business of the society, and the attraction of the trial of implements going on at the same time, prevented that attendance which the importance of the lectures demanded. It is, however, satisfactory to know that the agricultural public will have an opportunity of perusing a correct report of them in the Journal of the society. The whole of the proceedings passed off admirably, and we did not hear of the occurrence of the slightest accident. The year of office of the president terminates with the country meeting, and the new president commences his duties. Upon this occasion the Earl of Chichester retired, and was succeeded by the Marquis of Downshire. We cannot omit the opportunity of recording not only our own, but the general opinion, of the assiduous, effective, and unassuming manner in which the Earl of Chichester has gone through his year of office. We feel persuaded that the noble Earl secured, from those members of the society to whom he has become known during the past year through conducting its affairs, as warm a feeling of respect as he enjoys in the estimation of friends and neighbours in his own county: more no man need to desire.

It will not be irrelevant to notice in this place the enthusiastic reception which met his Grace the Duke of Richmond upon both occasions of his rising to address the meeting at the dinner on Thursday. If the demonstration thus made be considered as an approval of his Grace's opinions and conduct in reference to questions affecting the interests of the farmers, there can be no doubt as to the opinions of the farmers themselves. We cannot close our remarks without recording the very general approbation expressed of the unassuming yet effective performance of the duties of his office by Mr. Hudson, the secretary of the society, and the active and business-like management of Mr. B. T. Brandreth Gibbs as honorary director of the show, and for whose services, gratuitously rendered for several years, the society is greatly indebted.

Upon an analysis of the prizes we find that Norfolk has won by far the greater number of prizes for stock, as compared with any other county; whilst Essex and York, which are both equal, stand next in order.—Mark Lane Express.

THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

A Weekly Council was held at the Society's House, in Hanover Square, on Tuesday, the 26th of June; present, the Earl of Chichester, President, in the Chair; Hon. R. H. Clive, M.P.; Hon. H. W. Wilson; Sir Francis Lawley, Bart.; Sir M. W. Ridley, Bart.; Sir J. P. Boileau, Bart.; Mr. Baines; Mr. Raymond Barker; Mr. Bastard; Mr. Blanshard; Mr. Brandreth; Mr. Beale Browne; Mr. T. P. Brown; Mr. French Burke; Mr. W. Burroughes; Mr. Burton; Col. Challoner; Mr. F. C. Cherry; Mr. Capel Cure; Mr. S. Druce; Mr. Foley, M. P.; Mr. Kinder; Mr. Milward; Mr. C. E. Overman; Mr. Parkins; Professor Sewell; Mr. Shaw (Northampton); Mr. Villiers Shelley; Mr. Slaney, M. P.; Rev. T. P. Slapp; Mr. T. Turner; Mr. T. R. Tweed; Dr. Walker, Professor Way; Mr. Henry Wilson, and Mr. G. Wood.

Fibres in Drains.—Professor Way having suggested at a former meeting that application should be made to the Rev. M. J. Berkeley, the distinguished philosophical investigator of the lower orders of vegetation, the Council were favoured on this occasion with the following reply from that gentleman in reference to the nature of the vegetable fibre transmitted to him, and which had been taken by Mr. Little, of Llanvair, from a drain adjoining to a mangold wurtzel crop :—

"King's Cliff, June 25, 1849.

"There is not the least doubt that the fibrous substance you have communicated to me is the root of some phænogamous plant, as the spiral and other vascular tissue most clearly indicate. It is quite certain that it is no fungus, or of the nature of the root-like bodies which are so common in mines. It is impossible, without an opportunity of inspecting the matter *in situ*, to say to what phænogamous plant it is attributable; but I see no objection to its being the fibre of mangold wurtzel, though a fibre of beet-root from my garden exhibits rather annular than scalariform tissue. The one, however, is but a modification of the other, and the fibres growing in running water may be expected to show some slight difference. I received, not long since, a somewhat similar fibrous substance, doing great injury to draining pipes in South Wales. It came from Mr. Dillwyn Llewellyn, and a substance identical with the last from Mr. Moggridge, of Swansea. In both cases it was clearly the fibrous roots of some phænogam, which had found its way into the pipes."

The Council ordered their thanks to the Rev. M. J. Berkeley for the favour of this communication.

Maize.—Mr. Keene transmitted a specimen of the forty-day maize grown in the open ground, on the western side of the lake in St. James's Park. The seed was sown without manure on the 21st of May, the whole of which, after germination, had suffered much in the first twenty days of its growth, from the daily nibbling of the first tender leaves by the pheasants kept within that enclosure; but is now rapidly recovering, as the pheasants had a week ago ceased to injure it. No rain had fallen since it was sown, and it could not properly be earthed up till after rain. The plants had risen an inch in height daily since appearing through soil. The continued east winds had been prejudicial to the growth of the Maize, but Mr. Keene considered the present weather so like that in the Pyrenees at the same season, that he had no doubt of ripe and valuable crops being obtained of the Forty-day Maize this year in England. Mr. Burke and Mr. Slaney, M.P., reported favourably of their trials of the Forty-day Maize in this county.

Mr. Blanchard stated to the Council the successful result of his sowing wheat and rye mixed together, in the manner practised in the South of France, the crop yielding one quarter more of each grain than would have been obtained if separately sown. Sir Francis Lawley mentioned that the same practice was adopted in some parts of Yorkshire, and that he had himself tried it with satisfactory results.—The Hon. R. H. Clive, M.P., presented a supply of water from his drains in Shropshire for analysis.—Mr. Green communicated a statement on the application of bones as manure.—Mr. Marston addressed the Council on suggested improvements in thrashing machines (on which the Council directed that Mr. Garrett should be requested to report).

The Council then adjourned (it being understood that the next weekly Council would be held on the 10th of July, from 12 to 1 o'clock; and a Special Council on the same day, at the latter hour. It was thought probble that no Council would he held on Tuesday next, in consequence of the holding of Quarter Sessions hroughout the county on that day).

A Weekly Council was held at the Society's House, in Hanover Square, on Tuesday, the 10th of July. Present—The Earl of Chichester, President, in the chair; Lord Bridport; Hon. R. H. Clive, M.P.; Hon. Captain Howard; Sir Thomas Dyke Acland, Bart., M.P.; Sir M. W. Ridley, Bart.; Sir John V. B. Johnstone, Bart., M.P.; Sir Robert Price, Bart., M.P.; Colonel Austen; Mr. Baines; Mr. Raymond Barker; Mr. Barnett; Mr. Bennett; Mr. Blanshard; Mr. Bramston, M.P.; Mr. Brandreth; Mr. French Burke; Colonel Challoner; Mr. F. Davy; Mr. Evelyn Denison, M.P.; Mr. Dunne, jun.; Mr. Dyer; Mr. W. J. Garnett; Mr. Garrett; Mr. Grantham; Mr. Kinder; Mr. Lawes; Mr. Miles, M.P.; Mr. Milward; Mr. C. E. Overman; Professor Sewell; Mr. Shaw (London); Professor Simonds; Mr. T. Turner; Professor Way; Mr. Jonas Webb; and Mr. W. White.

Communications were received from Dr. Davies, on his Asphaltine for roofing, with specimens of the manufactured article; from Mr. Keene, on the progress of experiments on the growth of the Forty-day Maize, with specimens of the growing plants; and Mr. Wodehouse, M.P., on a disease in the root of the oat plant; and from

Mr. Hillyard, on Prizes to be offered for a breed of sheep midway between the Southdown and Leicester.

The Bishop of Norwich presented a copy of his work entitled "Heads for the arrangement of Local Information in every department of Parochial and Rural Interest;" the Count de Gourcy, a copy of his second Agricultural Tour in England; Mr. Nesbit, a copy of his Lecture at Saxmundham on Agricultural Chemistry; Mr. T. K. Short, a copy of his Essay on the Farming of Yorkshire; and Mr. Bullen, a copy of the 6th number of the Agricultural and Industrial Journal; for all which, the usual thanks of the Council were ordered.

A Special Council, for the transaction of the monthly business of the Society, was then held, the Earl of Chichester, President, being in the chair.

Finances.—Colonel Challoner, Chairman of the Finance Committee, presented the Monthly Report on the Accounts of the Society; from which it appeared, that at the end of the previous month, the current cash-balance in the hands of the bankers was £1,825 (including the special balances on the Norwich Meeting, the Life-Composition, and the arrear of subscription accounts). He also informed the Council that early in the month of June last, the Finance Committee sent out 1821 arrear letters, containing the opinion of eminent counsel as to the liability of members to pay their arrears of subscription; and which the Committee had great pleasure in being able to report had been attended with considerable success. Many members had expressed great regret at not having previously forwarded their subscriptions, and taking measures to prevent the recurrence of similar omissions, by giving orders on their bankers for the regular annual payment for the future; many others, who imagined they had ceased to belong to the Society, had paid up their arrears, and requested their names to be withdrawn, and a very small number of persons, in their answers to the circular, still disputed the Society's claim for the arrears. With regard to the latter class of persons, the Chairman remarked that the Finance Committee had already sufficient powers delegated to them by the Council to enable them to take such measures as would secure the Society from the loss of moneys so justly due to it. Colonel Challoner then proceeded to report the recommendations of the Committee in reference to the future entries for the Implement Yard, at the Country Meetings of the Society, and the arrangements connected with refreshments for the parties whose duties confined them within its enclosure during the period of meeting.

Farming Accounts.—Colonel Challoner, as Chairman of the Farming Account Committee, then submitted to the Council the Report of that Committee, along with specimens of the various forms of accounts recommended by them for the use of practical farmers. The Council ordered that a complete set of these forms should be printed and sent round to each Member of the Council for the purpose of receiving their comments and suggestions. The Council also directed that the Secretary should write a letter to each of the publishers of two farming account books in the library, that had come under the notice of the Committee, informing them that the assumption of the Society's "approval and sanction" in those works was incorrect, as no work whatever on the keeping of farm accounts had to that time received either the approval or sanction of the Society.

Implement Exhibition.—On the motion of Mr. Garrett, a Committee was appointed: "To take into consideration the recommendation of Implement Makers generally, exhibiting at the Annual Meetings, as regards discontinuing the Prizes for Implements, and to determine whether an improved system of showing them to the public may not be adopted"—consisting of Lord Portman, Hon. Capt. Pelham, Mr. Brandreth, Colonel Challoner, Mr. Garrett, Mr. B. Gibbs, Mr. Fisher Hobbs, Mr. Miles, M.P., Mr. Shaw (London), Mr. Shelley, Mr. Thompson, Mr. George Turner, and Messrs. Easton and Amos.

Member of Council.—On the motion of Mr. Milward, Mr. William Simpson, of Hendon, Middlesex, was elected a Member of Council in the place of the Earl of Lovelace, whose engagements prevent his due attendance.

Reports were received and adopted from the General, Norwich, and Veterinary Committees. At the suggestion of Colonel Challoner, Members of Council and Governors of the Society were allowed, under certain conditions, the privilege of entrance into the Implement Yard on the evening previous to its being thrown open to the public. The letter of the Right Hon. Sir George Grey to the President, granting the supply of Metropolitan Police required at the Norwich Meeting, was laid before the Council.

The Council then adjourned to Tuesday, July 17, at the Guildhall, Norwich.

NEW MEMBERS.

James Brown, Esq., of Rossington, near Bawtry, was elected a Governor of the Society.

Alford, William, Broughton-Astley, Lutterworth, Leic.
Batley, Benj. James, Lee Road, Blackheath, Kent
Blomfield, Lieut.-Col., Necton Hall, Swaffham, Norf.
Burcham, William, Booton Hall, Reepham, Norf.
Chapple, William, Gornhay, Tiverton, Devon
Cheale, Alexander, jun., Uckfield, Sussex
Cooke, John, Flemston Hall, Bury-St.-Edmund's
Curtis, Rev. John, East Dereham, Norfolk
Dalton, Rev. W., Swaffham, Norf.
Dalton, John, West Bilney, Lynn, Norf.
Dowson, B., Quay, Great Yarmouth, Norf.
Fellowes, Rev. Thomas, Beighton Rectory, Norwich
Fletcher, Josiah, Norwich
Freeman, Joshua, Dersingham, Lynn, Norfolk
Girdlestone, Robert, Kelling Hall, Holt, Norfolk
Hales, Rev. Robert, Hillington, Castle-Rising, Norf.
Huddleston, Purefoy, Norton, Woolpit, Suff.
Ives, Ferdinand, St. Catherine's House, Norwich
Ives, George, Norwich
Jones, Sir Willoughby, Bart., Cranmer Hall, Fakenham, Norfolk
Long, Kellett, Dunston Hall, Norwich
Morant, George, Holme, Wareham, Dorsetshire
Paver, William, Peckfield, Ferrybridge, Yorkshire
Roper, Samuel, Croxton, Thetford, Norfolk
Sandby, Rev. George, Denton Lodge, Harleston, Norf.
Sayer, David, Norwich
Simmons, John, Messer, Killiganson, Truro, Cornwall
Stark, William, Norwich
Tawke, Arthur, M.D., Norwich
Thompson, William, M.P., Underby Hall, Kirby-Lonsdale
Wright, Thomas, North Runcton, Lynn, Norfolk.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

MEETING AT NORWICH.

It would be difficult to name any great society whose progress, in its early days, will compare in rapidity and in success with that of the Royal Agricultural Society of England; an Institution, whose formation was retarded long after the more than probable value of such a society to the agriculture of the United Kingdom had become apparent to many of the most enlightened farmers. This delay was chiefly owing to the complete failure of the Board of Agriculture, which, established by the exertions of Sir John Sinclair in 1793, and chartered by George the Third, was supported for nearly a quarter of a century by an annual parliamentary grant. This, however, being withdrawn in 1817, with it ceased the Board of Agriculture—a fate little lamented by the farmers of our islands, for it made many mistakes, and was far too much mixed up with the politics of the day, to possess the confidence of any but the party under whose banners it happened to array itself. Its managers entirely forgot the fact, that "he who makes one blade of grass grow where none grew before is worth the whole race of politicians" ("Modern Agricultural Improvements.")

For many years, therefore, after the dissolution of the Board of Agriculture, there was not to be found in this country any national society which, in its objects and power, could be compared to the great and successful Highland Society of Scotland. The first person who steadily and successfully exerted himself to form such a society was Mr. William Shaw, of London, a gentleman to whom in this, as in many other great efforts, agriculture is deeply indebted. On many occasions, during 1834 and the succeeding years, in more than one agricultural periodical, he suggested and advocated the establishment of a national institution for the advancement of practical agriculture, and of practical agriculture only. He had also, to accomplish this object, several personal communications with the late Lord Spencer, the Duke of Richmond, Mr. Handley, and other great leading agriculturists; and, in consequence of these efforts, at the dinner of the Smithfield Club, on the 11th of December, 1837, Lord Spencer, in his address to the Members of the Club, suggested the establishment of such a society—a suggestion which was warmly received by the meeting, and was immediately responded to by the Duke of Richmond, Mr. Handley, Mr. E. W. Wilmot, and, in fact, by the whole party.

Lord Spencer remarked (alluding to the Smithfield Club), "Our society in the metropolis is totally useless for the promotion of the general purposes of agriculture, but if a society were established for agricultural purposes exclusively, I hesitate not to say that it would be productive of the most essential benefits to the English farmer. There is one point, however, which I must impress upon you, in reference to the formation of a society such as I have mentioned, namely, that there can be no prospect of our obtaining any useful results, unless politics, and the discussion of all matters which might become subjects of legislative enactment, are scrupulously avoided at its meetings." The Duke of Richmond, at the same meeting, expressed as his opinion that "such an institution would promote agriculture, and confer great and inestimable advantages on every class of the community." Mr. Handley, when observing that he had long contemplated the formation of such a society, very truly remarked that "there is not a single department of farming but what is capable of vast improvement."—*Farmer's Magazine*, vol. viii., p. 48.

A short time after this discussion, there appeared a very excellent pamphlet from the late Mr. Handley, dated from Culverthorpe, in January, 1838, entitled "A Letter to Earl Spencer (President of the Smithfield Club) on the formation of a National Agricultural Institution." In the course of this, he very justly observed (and the answer to his concluding question can only be made in one way) "great attention and expense, spirited emulation, and well-directed experiments, grounded upon scientific principles, have succeeded in producing that near approach to perfection in breeding and feeding cattle, which was so remarkable at the late Christmas show. Why, then, should not the same combined efforts be united in the application of *science* to the sister art, agriculture, which your lordship has justly pronounced to be still in its infancy?"

The public impression of the value of such a society to the advancement of agriculture, now became too general to fail of producing the expected results, and in the early part of the following month of March an advertisement appeared in the public papers, to the effect that several noblemen and gentlemen "having observed the great advantages which the cultivation of the soil in Scotland has derived from the establishment and exertions of the Highland Society, and thinking that the management of land in England and Wales, both in the cultivation of the soil and in the care of woods and plantations, is capable of great improvement by the exertions of a similar society, request that those who are inclined to concur with them in this opinion, will meet them on Wednesday, the 9th of May, 1838, at the Freemasons' Tavern." To this was attached the signatures of the Dukes of Richmond and Wellington, the Earls Fitzwilliam, Spencer, Chichester, Ripon, and Stradbroke, Lord Portman, R. Clive, B. Portman, B. Baring, Sir James Graham, Sir F. Lawley, J. Bowes, E. Buller, R. A. Christopher, H. Blanchard, W. T. Copeland, J. W. Childers, R. Etwall, H. Handley,

C. S. Lefevre, W. Long, W. Miles, J. Neeld, E. W. W. Pendarves, P. Pusey, E. A. Sandford, R. A. Slaney, J. A. Smith, R. G. Townley, W. Whitbread, and Henry Wilson.

In consequence of this address, on the 9th of May a very numerous and influential meeting was held, at which Earl Spencer presided; and at which, after some attempted interruption by one or two persons who did not exactly comprehend the objects of the proposed society, it was resolved, on the motion of the Duke of Richmond, seconded by Mr. Handley;—1. "That a society be established for the improvement of agriculture in England and Wales, and that it be called the 'English Agricultural Society.'" 2. On the motion of Sir Robert Peel, seconded by Mr. C. Shaw Lefevre, "That no question be discussed at its meetings of a political tendency." 3. On the motion of Sir James Graham, seconded by Mr. W. T. Copeland, "That the society should consist of two classes, Governors and Members." 4. On the motion of Earl Fitzwilliam, seconded by Mr. P. Pusey, "That annual meetings be held successively in different parts of England and Wales." 5. On the motion of the Earl of Chichester, seconded by Mr. E. S. Cayley, "That a Committee be appointed to frame Rules and Regulations, and to report to a general meeting on the 27th of June." And it was finally agreed that all those who joined the Society before that day might become members of the Society; but that subsequently to that period, they should be elected by the Committee.

The list of those who by the 12th of May, or within three days of the Society's formation, were its members, is worthy of being preserved: it is a list which we have little doubt will long be a source of interest to the English farmer, for it contains the names of almost all those who, with Mr. Shaw, may be regarded as the founders of the Society.

LIST OF SUBSCRIBERS TO THE ENGLISH AGRICULTURAL SOCIETY, MAY 12, 1838.

Acland, Sir T., Bart.
Adeane, H. J.
Alston, R.
Alston, R. G.
Amherst, Lord
Angerstein, J. J.
Antrobus, Sir E., Bart.
Arbuthnot, Right Hon. C.
Archdeckne, E.
Bagge, W., M.P.
Baker, J. W.
Barber, R.
Barclay, C.
Barclay, D,
Baring, W. B.
Barker, G.
Barker, J. R.
Barker, T. R.
Barnard, R.
Barneby, J.
Beach, Sir M. H., Bart.
Bevell, J.
Blachford, O.
Blake, —
Bland, W.
Blanchard, H.
Bowes, J.
Boys, H.
Boys, —
Bouverie, E.
Bramston, T. W.
Braybroke, Lord.
Bridport, Lord.
Bromwell, Rev. R.
Brookes, J.
Bruges, W. H. L.
Budd, Capt. H.
Buller, E.
Buller, T. W.
Buubury, Sir H., Bart.
Burke, F.
Burlington, Earl of
Caldecote, R. M.
Calverley, T.
Cambridge, H.R.H. the Duke of.
Capper, —
Cavendish, Hon. C. C.
Cayley, Sir G., Bart.
Challoner, Col.
Chapman, T.
Chapman, G.
Chichester, Earl of.
Childers, J. W.
Christopher, R. A.
Clay, W.
Clive, Hon. R.
Cook, O.
Copeland, Alderman
Cormack, W.
Cormack, W. J.
Crompton, S.
Cure, C.
Curteis, E. B.
Curtis, W.
Dacre, Lord
Davenport, E.
David, E., Esq.
Denison, W. J.
Dixon, R. W.
Downshire, Marquis of
Drury, G.
Egerton, T. W.
Eliot, Lord
Ellman, J.
Ellman, T.
Enys, J. S.
Essex, Earl of
Etwall, R.
Euston, Earl
Evans, W.
Exeter, Marquis of
Fitzwilliam, Earl
Flight, T.
Flounders, B.
Freeman, W. P.
Gardner, Rev. C.
Gibbon, A.
Gibbs, H.
Gidley, C.
Gooch, Sir T., Bart.
Goodrick, Sir F., Bart.
Gordon, —, M.P.
Goring, Mrs.
Goring, C.
Gorringe, J. P.
Gorringe, Mrs. J. P.
Gowing, E.
Grace, Rev. H. T.
Graham, Sir J., Bart.
Grafton, the Duke of
Graham, Rev. H. G.
Grantham, S.
Grey, W. H. C.
Grimshaw, W.
Hall, G. W.
Halsted, T.
Handley, H.
Handley, W. F.
Hatherton, Lord
Hayward, M.
Heathcoate, J.
Heathcoate, Sir W., Bart.
Heneage, E.
Herbert, Hon. S.
Hewer, J.
Hewitt, Lieut.
Hewett, W. H.
Hillyard, C., Esq.
Hobbs, W. F.
Hodges, T. L.
Hodson, W.
Hodson, —
Holmes, W. S.
Honey, Rev. J.
Hoskins, K.
Howick, Viscount,
Hulse, Sir C., Bart.
Hurst, R. H.
Hurst, —
Ide, J.
Ilchester, Lord
Jodrell, Sir P., Bart.
Johnson, Sir F., Bart.
Johnson, Rev. Dr.
Johnson, C. W.
Kenyon, Lord
Kerrison, Sir E., Bart.
Kilson, Rev. H.
Kimberley, W. G.
King, Lord
Knatchbull, Sir E., Bart.
Knight, H. G.
Lansdowne, Marquis of
Lawley, Sir F., Bart.
Lefevre, C. S.
Lemon, Sir C.
Ley, J. H.
Livesey, T.
Long, W.
Lyon, J.
Marshall, Capt. H.
Marshall, W.
Melbourne, Viscount
Miles, P. J.
Miles, W.
Milne, A.
Moore, Rev. H.
Moreton, Lord.
Moreton, Hon. A.
Morgan, Sir C., Bart.
Morton, J.
Morrison, J.
Mount, W.
Neate H., St. John.
Neeld, J.
Noakes, ——
North, F.
Northumberland, Duke of.
Nurse, W.
Ogle, H.
Oliver, W.
Pagden ——
Palmer, R.
Parkes, J. W. H.
Patten, W.
Patterson, W. S.
Peel, Sir R., Bart.
Pegus, Rev. W.
Pell, Sir W. O.
Pendarves, E. W.
Peppercorn, H.
Perry, G. W.
Philips, J. Burton.
Phillips, Mark.
Phipps, Thomas Helc.
Pinnock, Rev. J.
Pinnock, Rev. H.
Pittman, rev. T.
Platt, —
Plestow, C. B.
Portman, Lord
Price, Sir R., Bart.
Pusey, P.
Radnor, Lord
Ransome, J. A.
Rawden, C. Wynd
Rayleigh, Lord
Richards, Jamea
Richmond, Duke of
Ridgway, J.
Ripon, Earl of
Robinson, Rev. W. B.
Rogerson, John
Rogerson, Joseph
Rushbridger, John
Russell, Lord C.
Sadler, Henry
Salomons, David
Sandford, E. A.
Saunders, T. B.
Satterfield, Joshua
Shaw, Wm.
Sheffield, Lord
Sherborn George
Sheridan, R. B.
Slaney, R. A.
Smith, Jeremiah
Smith, J. A.
Smith, W.

Smythies, Rev. J. R.
Sondes, Lord
Spencer, Captain
Spencer, Earl
Stace, —
Stanley, Lord
Starr, —
Stone, W.
Stradbroke, Earl of
Strafford, Dugdale
Suffolk, Earl of
Sumner, Col. H.
Talbot, Earl of
Tattersall, J.
Thompson, P. B.
Thompson, Rt. Hon. C. P.
Tilden, John
Townley, R. G.
Trotter, John
Vane, Rev. J.
Verney, Sir H., Bart.
Wall, B. C.
Watson, Hon. R.
Webb, William,
Webster, Lady
Weeding, Thomas
Welby, Sir W., Bart.
Welland, Charles
Wellington, the Duke of
Wensley, Rev. J. A.
Whitear, Rev. W.
Whitbread, W.
Whitlaw, C.
Whitting, J. H.
Wilbraham, G.
Wilkinson, Rev. F.
Williams, W.
Wilmot, Sir E., Bart.
Wilmott, E. W.
Wills, B.
Wilson, Henry
Wingate, W. B.
Wood, C.
Wood, John
Worsley, Lord
Youatt, William.

Thus commenced the Royal Agricultural Society of England—an association which, in ten years only from its formation, has outstripped, both in power and in usefulness, not only the Highland Society of Scotland, and every other agricultural association in the United Kingdom, but bids fair to achieve still greater things hereafter, for the husbandry of Great Britain. — *Norfolk News.*

THE MEETING.

It was at the meeting of the Norwich Town Council, on Tuesday, the 9th of February, 1847, that the intention of the Royal Agricultural Society to make an excursion into East Anglia was publicly announced in Norwich. The Mayor, Jeremiah Colman, Esq., at that meeting called attention to a letter he had received from the Society. A printed document was enclosed, stating that the meeting for 1849 would be held in some place of the eastern district, to be selected next year by the Council. Mr. Willett moved, and Mr. Banks seconded, that the letter should be referred to the city committee, which was carried. The probability of the East Anglian meeting being held in Norwich was touched upon by Edmond Wodehouse, Esq., at the dinner of the Norfolk Agricultural Society, held on the 18th of June in the same year. Shortly after committees were formed of county and city gentlemen; the subject was taken up by the local press; and subscriptions were opened for the purpose of defraying the local expenses, and also for raising a sum of money to be contributed to the funds of the Royal Agricultural Society to meet the extraordinary expenses. The Committee consisted of the following gentlemen — Wm. Burroughes, Esq., Chairman; the Mayor of Norwich (S. Bignold, Esq.), the Hon. Wm. Rous, Sir J. P. Boileau, Bart., Sir William Foster, Bart., the Rev. James Bulwer, Richard Noverre Bacon, John Hilling Barnard, John Barwell, John Betts, Geo Lovick Coleman, Jeremiah Colman, Arthur Dalrymple, Wm. Freeman, Robert Gilbert, jun., Anthony Hamond, R. B. Harvey, John Hudson, John Godwin Johnson, Wm. Matchett, John Norgate, Thomas Osborne Springfield, John Sultzer, Abel Towler, Edward Willett, and John Wright, Esqrs.; Elijah C. Bailey, Esq., the intelligent and zealous acting secretary of the Norfolk Agricultural Society, was chosen honorary secretary to the committee.

Bury and Chelmsford became competitors with Norwich for the honour of being selected as the place for the meeting in 1849; and liberal subscriptions were raised in both towns, committees being formed to make the necessary arrangements.

At the first Council Meeting of the Society, held in 1848, a deputation was appointed to inspect the different localities in the eastern district, from which the selection was to be made for holding the county meeting of the society in 1849. That deputation consisted of Raymond Barker, Esq., John Kinder, Esq., Wm. Shaw, Esq., and Brandreth Gibbs, Esq.

The Council made their decision on the 3rd of May; when deputations attended the meeting of that body in London, from Norwich, Bury, and Chelmsford. The deputation from Norwich included the Earl of Leicester, the Hon. Edward Coke, M.P., Edmond Wodehouse, Esq., M.P., Sir John P. Boileau, Bart., Wm. Burroughes, Esq. [Chairman to the Committee], Edw. Willett, John Sultzer, John Barwell, Jere. Colman, R. N. Bacon, John Betts, and E. C. Bailey, Esqrs.—Mr. Wm. Burroughes explained the various points on which Norwich grounded her claim; stating the accommodation and facilities offered for the shews of cattle and implements; besides which, £1,000 was offered in cash; and St. Andrew's Hall would be fitted-up for the dinners, &c., of the meeting, under the superintendence of the surveyor of the society, but by Norwich workmen.—The other deputations also stated their cases.—In the discussion which ensued, Mr. Hamond, the late Mr. Harvey, of Pulham, and Mr. Hudson, of Castleacre, strongly advocated the claims of Norwich; and, on a division, there was a large majority in favour of Norwich.

The Council requested Mr. Hudson, of Castleacre, to make another inspection of the lands in the neighbourhood of Norwich, placed at the disposal of the society by the authorities of the city, for the trial of the light and heavy land implements.—The result of that inspection was reported to the Committee on the 7th June; when Mr. Hudson stated, that he had been favoured by Mr. Staff, the Town Clerk of Norwich, with every facility for making his inspection; and had found land within distance of about two miles from the city quite heavy enough to try any implements. Upon the same farm (Mr. Parker's) and within half a mile from such heavy land he found land sufficiently mild to try implements adapted for light land culture. The Council expressed their thanks for the pains Mr. Hudson had kindly taken on this subject, and confirmed the report he had thus transmitted to them. At this meeting, on the motion of Mr. Brandreth, the Council took into consideration the appointment of a General Norwich Committee, when the following list was agreed to:—The Earl of Yarborough (Chairman), Earl of Leicester (Vice Chairman), Duke of Richmond, Earl of Stradbroke, Lord Hastings, Lord Henniker, Lord Portman, Sir John Johnstone, Bart., M.P., Sir John P. Boileau, Bart, Mr. Raymond Barker, Mr. Bennett, Mr. Brandreth, Mr. Burroughes, Col. Challoner, Mr. Druce, Mr. B.

Gibbs, Mr. Hamond, Mr. Harvey, Mr. F. Hobbs, Mr. Hudson (Castleacre), Mr. Kinder, Mr. Miles, M.P., Mr. Shaw (London), Mr. Shaw (Northampton), Mr. Shelley, Mr. Thompson, Mr. Wilson (Stowlangtoft Hall), and Mr. Wodehouse, M.P., with the addition of the then Mayor of Norwich and the Mayor for the next year.

THE COUNCIL DINNER.

The council dinner of the society was held on Wednesday, July 18th, in St. Andrew's Hall, Norwich—about 300 sat down to dinner, the Earl of Chichester in the chair.

The dinner being limited to three hundred, is always an object of especial attraction. The company are more select, the speeches are better heard. The awards of prizes for live stock are read aloud after dinner; almost all the great breeders who exhibit at the show are, therefore, pretty sure to be there.

We have been politely furnished with a list of the company to whom tickets for the dinner were issued, but some of whom were prevented from attending:—The Duke of Manchester, the Marquis of Douro, Earl of Oxford, Dean of Norwich, High Sheriff of Norfolk; H. N. Burroughes, Esq., M.P.; Mr. Betts, chairman of the Eastern Counties Railway; Bishop of Norwich; E. Wodehouse, Esq., M.P.; Professor Sedgwick; G. L. Coleman, Esq.; Viscount Lilford; Hon. Captain Cust; Mr. Cobbold, M.P.; the Earl of Lincoln, M.P.; the Earl of Liverpool; the Earl of Cadogan; Viscount Hill; Lord Hastings; Lord Henniker; the Hon. R. H. Clive, M.P.; the Hon. F. Walpole; the Hon. H. Wilson; the Hon. F. De. Grey; Captain Duncombe; Captain Dudley Pelham, R. N.; M. Sutton, M.P.; Baron Merton; Sir C. Lemon, M.P.; Sir R. Price, Bart., M.P.; Sir E. F. Buxton, M.P.; Sir J. P. Boileau, Bart.; Sir M. White Ridley, Bart.; P. Pusey, Esq., M.P.; M. Philips, Esq., M.P.; T. W. Bramston, Esq., M.P.; B. Ewart, Esq., M.P.; J. H. Langston, Esq., M.P,; — Stansfield, Esq., M.P.; Major Beresford; Colonel Fitzroy; Colonel Austen; Colonel Sitwell; Colonel Challoner; Residentiary Canon of Norwich; Deputy-Mayor of Norwich; Professors Johnston, Way, Simonds, Rev. E. Sidney; J. Parkes, Esq.; C. E. H. Colman, Esq. (Massachusetts, United States); Dr. Daubeney; C. Arkwright, Esq.; High Bailiff of Staffordshire; W. Shaw, Esq., of London; J. R. Barker, H. S. Thompson, B. Gibbs, C. W. Johnson, S. Druce, J. Kinder, J. Hobbs, H. Wilson, B. Crompton, G. E. Frere, F. R. S., J. A. Ransome, and E. C. Barclay, Esqrs.; Lord Londes; the Duke of Richmond; Mr. Shelley; Mr. Villebois; Sir T. D. Ackland, Bart.; Col. Buckley; J. Stuart, Esq., M.P.; C. H. Turner, Esq.; Rev. T. Stanniford; Dr. Tawke; Wm. Kimbleside Gratwicke, Esq.; R. W. Mylne, Esq., &c., &c.

The cloth having been drawn, and the dessert placed, the noble Chairman rose and proposed the usual loyal toasts.

The Chairman then stated the business of the evening, and called on Mr. Gibbs as a portion of the programme to read the prizes for the cattle, sheep, and pigs. He (the Chairman) would then propose the health of the successful candidates for premium for stock. Professor Sedgwick would, after that, make a few observations on a subject he hoped would be interesting, not only to Norfolk men, but all others; namely, on the drainage which had been effected in the northern part of this county, and in Cambridgeshire (Hear, hear).

Mr. Gibbs then read the list of

PRIZES FOR CATTLE.

Short-horns.

Judges—Messrs. Parkinson, Bennett, and Trotter.

Class 1.—Bulls calved previously to 1st January, 1847.

First prize of 40*l.* to No. 21, viz., to Mr. Wm. Todd, of Elphinstone Tower, Tranent, Scotland.

Second prize of 20*l.* to No. 6, viz., to Mr. Thomas Spore Atkins, of Kimberley, Wymondham.

Class 2.—Bulls calved since the 1st January 1847, and more than one year old.

First prize of 20*l.* Withheld.

Second prize of 10*l.* Withheld.

Class 3.—Cows in milk or in calf.

First Prize of 20*l.* to No. 58, viz., to Mr. Richard Booth, of Warlaby, near Northallerton, Yorkshire.

Second Prize of 10*l.* to No. 59, viz., to Mr. Richard Booth, of Warlaby, near Northallerton, Yorkshire.

Class 4.—In-calf Heifers, not exceeding three years old.

First Prize of 20*l.* to No. 68, viz., to Mr. John Kirkham, of Hagnaby, near Spilsby, Lincolnshire.

Second Prize of 10*l.* to No. 70, viz., to Mr. William Fowle, of Market Lavington, Devizes.

Class 5.—Yearling Heifers.

First Prize of 10*l.* to No. 84, viz., to Mr. Benjamin Wilson, of Brawith, near Thirsk.

Second Prize of 5*l.* to No. 91, viz., to Mr. C. Towneley, of Towneley Hall, Burnley, Lancashire.

Herefords.

Judges—Messrs. Milward, Chamberlain, and Higgins.

Class 1.—Bulls calved previously to the 1st January, 1847.

First Prize of 40*l.* to No. 97, viz., to Mr. Edward Price, of the Court House, Pembridge, Hereford.

Second Prize of 20*l.* to No. 98, viz., to Mr. William Hewer, of Hill Farm, Northleach.

Class 2.—Bulls calved since the 1st January, 1847, and more than one year old.

First Prize of 20*l.* to No. 101, viz., to Mr. Edward Price, of the Court House, Pembridge, Hereford.

Second Prize of 10*l.* to No. 105, viz., to Mr. W. Fisher Hobbs, of Boxtead Lodge, near Colchester.

Class 3.—Cows in milk or in calf.

First Prize of 20*l.* to No. 108, viz., to Mr. John Walker, of Westfield House, Holmer, Hereford.

Second Prize of 10*l.* to No. 110, viz., to Mr. W. Fisher Hobbs, of Boxstead-lodge, near Colchester.

Class 4.—In-calf Heifers, not exceeding three years old.

First Prize of 20*l.* to No. 112, viz., to the Rev. J. R. Smythies, of East-hill, Colchester.

Second Prize of 10*l.* to No. 111, viz., to the Rev. J. R. Smythies, of East Hill, Colchester.

Class 5.—Yearling Heifers.

First Prize of 10*l.* to No. 117, viz., to the Right Hon. Lord Berwick, of Cronkhill, near Shrewsbury.

Second Prize of 5*l.* to No. 123, viz., to Mr. George Pitt, of Wellington, near Hereford.

Devons.

Judges—Messrs. Milward, Chamberlain, and Higgins.

Class 1.—Bulls calved previously to the 1st of January, 1847.

First Prize of 40*l.* to No. 131, viz., to Mr. James Quartley, of Molland, near South Molton.

Second Prize of 20*l.* to No. 125, viz., to Mr. Samuel Farthing, of Nether Stowey, near Bridgwater.

Class 2.—Bulls calved since the 1st January, 1847, and more than one year old.

First Prize of 20*l.* to No. 137, viz., to Mr. W. M. Gibbs, of Bishops Lydiard, near Taunton.

Second Prize of 10*l.* to No. 134, viz., to the Right Hon. the Earl of Leicester, of Holkham Hall, Norfolk.

Class 3.—Cows in milk or in calf.

First Prize of 20*l.* to No. 146, viz., to the Right Hon. the Earl of Leicester, of Holkham Hall, Norfolk.

Second Prize of 10*l.* to No. 141, viz., to Mr. John Blomfield, jun., of Worham, near Wells, Norfolk.

Class 4.—In-Calf Heifers, not exceeding three years old.

First Prize of 20*l.* to No. 157, viz., to Mr. T. W. Fouracre, of Durston, near Taunton.

Second Prize of 10*l.* to No. 152, viz., to Mr. John Blomfield, jun., of Warham, near Wells, Norfolk.

Class 5.—Yearling Heifers.

First Prize of 10*l.* to No. 163, viz., to Mr. Anthony Hamond, of Westacre, near Swaffham, Norfolk.

Second Prize of 5*l.* to No. 162, viz., to Mr. John Blomfield, jun., of Warham, near Wells, Norfolk.

Cattle of any Breed.

Judges—Messrs. Millward, Chamberlain, and Higgins.

Class 1.—Bulls calved previously to the 1st January, 1847.

First Prize of 20*l.* to No. 177, viz., to Lieut.-Col. Mason, of Necton Hall, Swaffham, Norfolk.

Second Prize of 10*l.* to No. 174, viz., to Sir Edward Kerrison, Bart., of Oakley Park, Eye, Suffolk.

Class 2.—Bulls calved since the 1st January, 1847, and more than one year old.

The Prize of 10*l.* to No. 181, viz., to Captain Inge, of Thorpe Constantine, near Tamworth.

Class 3.—Cows in milk or in calf.

First Prize of 10*l.* to No. 192, viz., to Captain Inge, of Thorpe Constantine, near Tamworth.

Second Prize of 5*l.* to No. 190, viz., to Captain Inge, of Thorpe Constautine, near Tamworth.

Class 4.—In-calf Heifers, not exceeding three years old.

The Prize of 10*l.* to No. 197, viz., to Mr. Thomas Beards, of Stowe, Buckingham.

Class 5.—Yearling Heifer.

The Prize of 5*l.* to No. 205, viz., to Mr. George Theobald, of Southrepps Lodge, North Walsham.

Class 6.—Cows for dairy purposes.

First Prize of 10*l.* to No. 210, viz., to Mr. Henry Overman, of Weasenham St. Peter, near Rougham.

Second Prize of 5*l.* No competitor.

Horses.

Judges—Messrs. Spooner, Greaves, and Knight.

Class 1.—Stallions for Agricultural Purposes, of any age.

First Prize of 30*l.* to No. 214, viz., to Mr. John Coulson, jun., of Kenninghall, near East Harling, Norfolk.

Second Prize of 15*l.* to No. 224, viz., to Mr. C. H. Branwhite, of Geslingthorpe, near Halstead, Essex.

Class 2.—Two-years-old Stallions for Agricultural Purposes.

First Prize of 20*l.* to No. 250, viz., to the Right Hon. Lord St. John, of Melchbourne, near Higham Ferrers.

Second Prize of 10*l.* to No. 251, viz., to Mr. William Wilson, of Ashbocking, near Ipswich.

Class 3.—Stallions for Dray Purposes.

Prize of 20*l.* to No. 256, to Mr. Wm. Gleaves, of Abbotsley, St. Neots.

Class 4.—Roadster Stallions.

Prize of 15*l.* to No. 262, viz., to Mr. John Baxter, jun., of Wiggenhall St. Peter, Lynn Regis.

Class 5.—Mares and Foals for Agricultural Purposes.

First Prize of 20*l.* to No. 274, viz., to Mr. Thomas Catlin, of Butley, near Woodbridge.

Second Prize of 10*l.* to No. 271, viz., to Mr. John Smith, of Crownthorpe, near Wymondham.

Class 6.—Two-years-old Fillies.

First Prize of 15*l.* to No. 287, viz., to Mr. Benjamin Cubitt, of Sloley, near Norwich.

Second Prize of 5*l.* to No. 296, viz., to Sir Thomas Gooch, of Benacre Hall, Wrentham, Suffolk.

Leicester Sheep.

Judges—Messrs. Stone, Bartholomew, and Allison.

Class 1.—Shearling Rams.

First Prize of 30*l.* to No. 337, viz., to Mr. William Abraham, of Barnetby-le-Wold, Brigg, Lincoln.

Second Prize of 15*l.* to No. 314, viz., to Mr. William Sanday, of Holme Pierrepoint, Nottingham.

Class 2.—Rams of any other age.

First Prize of 30*l.* to No. 360, viz., to Mr. William Sanday, of Holme Pierrepoint, Nottingham.

Second Prize of 15*l.* to No. 381, viz., to Mr. William Fisher Hobbs, of Boxtead Lodge, near Colchester.

Class 3.—Pens of five Shearling Ewes of the same Flock.

First Prize of 20*l.* to No. 393, viz., to Mr. William Simpson, of Kirby Grindalythe, near Sledmere, Yorkshire.

Second Prize of 10*l.* to No. 397, viz., to Mr. William Sanday, of Holme Pierrepoint, Nottingham.

South-down Sheep.

Judges—Messrs. Pope, Trumper, and Boys.

Class 1.—Shearling Rams.

First Prize of 30*l.*, to No. 437, viz., to Mr. Jonas Webb, of Babraham, near Cambridge.

Second Prize of 15*l.*, to No. 430, viz., to Mr. Jonas Webb, of Babraham, near Cambridge.

Class 2.—Rams of any other age.

First Prize of 30*l.*, to No. 463, viz., to Mr. William Fisher Hobbs, of Boxtead Lodge, near Colchester.

Second Prize of 15*l.*, to No. 465, viz., to Mr. J. V. Shelley, of Maresfield Park, near Uckfield, Sussex.

Class 3.—Pens of five Shearling Ewes of the same flock.

First Prize of 20*l.*, to No. 485, viz., to Mr. J. V. Shelley, of Maresfield Park, near Uckfield, Sussex.

Second Prize of 10*l.*, to No. 479, viz., to Mr. J. R. Overman, of Burnham Sutton, near Burnham Market, Norfolk.

Long-woolled Sheep.

(Not qualified to compete as Leicesters.)

Judges—Messrs. Beman, Bateman, and Clarke.

Class 1.—Shearing Rams.

First Prize of 30*l.*, to No. 489, viz., to Mr. Charles Large, of Broadwell, near Lechlade, Gloucester.

Second Prize of 15*l.*, to No. 499, viz., to Mr. Wm. Garne, of Aldsworth, near Northleach.

Class 2 —Rams of any other age.

First Prize of 30*l.*, to No. 506, viz., to Mr. Charles Large, of Broadwell, near Lechdale, Gloucester.

Second Prize of 15*l.*, to No. 511, viz., to Mr. Wm. Garne, of Aldsworth, near Northleach.

Class 3.—Pen of Five Shearling Ewes of the same flock.

First Prize of 20*l.*, to No. 516, viz., to Mr. Charles Large, of Broadwell, near Lechdale, Gloucester.

Second Prize of 10*l.*, to No. 515, viz., to Mr. Charles Large of Broadwell, near Lechdale, Gloucester.

Pigs.

Judges—Messrs. Gillett, Hesseltine, and Clayden.

Class 1.—Boars of a large breed.

First Prize of 15*l.*, to No. 522, viz., to Mr. Ashby H. Wilson, of the Abbey, Wigton, Cumberland.

Second Prize of 5*l.*, to No. 523, viz., to Mr. Edwin Eddiston, of Headingley Hill, Leeds.

Class 2.—Boars of a small breed.

First Prize of 15*l.*, to No. 543, viz., to Mr. Wm. Fisher Hobbs, of Boxstead Lodge, near Colchester.

Second Prize of 5*l.*, to No. 531, viz., to Sir Edward Kerrison, Bart., of Oakley Park, near Eye, Suffolk.

Class 3.—Breeding Sow of a large breed.

The Prize of 10*l.*, to No. 563, viz., Mr. Joseph Tuley, of Exleyhead, near Keighley, Yorkshire.

Class 4.—Breeding Sow of small breed.

The Prize of 10*l.*, to No. 593, to Mr. Joseph Tuley, of Exleyhead, near Keighley, Yorkshire.

Class 5.—Breeding Sow-Pigs of a large breed.

The Prize of 10*l.*, to No. 594, viz., to Mark Stainsby, jun., of Lady Pitt Lane, Hunslet, near Leeds.

Class 6.—Breeding Sow-Pigs of a small breed.

The Prize of 10*l.*, to No. 602, viz., to Mr. Wm. Fisher Hobbs, of Boxtead Lodge, near Colchester.

COMMENDATIONS.

SHORTHORNS.

In Class 1, the Judges highly commend Lord Hasting's bull, the Marquis of Exeter's bull, Mr. Forrest's bull, the Marquis of Londonderry's bull, Mr. Manning's bull, and Mr. Hall's bull.

In Class 3, they highly commend Mr. Richard Booth's cow, Mr. Fowle's cow, Mr. Hobbs' cow, and Mr. Tod's cow.

In Class 4, they highly commend Lord Feversham's heifer.

In Class 5, they highly commend Mr. Smith's heifer.

In Class 1, the Judges commend Mr. Warman's bull.

In Class 3, they commend Mr. Forrest's cow and the Marquis of Londonderry's cow.

In Class 4, they commend Mr. Hobbs' heifer.

In Class 5, they commend Mr. Kirkham's heifer, Mr. Smith's heifer, Mr. Crisp's heifer, and Mr. Towneley's heifer.

HEREFORDS.

In Class 5, the Judges highly commend Mr. Price's heifer and Lord Berwick's heifer.

In Class 4, they commend Mr. Hobbs' heifer.

DEVONS.

In Class 1, the Judges highly commend the Earl of Leicester's bull.

In Class 4, they highly commend Mr. Farthing's heifer.

In Class 1, they commend Mr. Fouracre's bull and Mr. Miller's bull.

In Class 3, they commend Mr. Fouracre's cow and Mr. Ayr Thomas' cow.

In Class 4, they commend Mr. Turner's heifer.

In Class 5, they commend Mr. Blomfield's heifer.

CATTLE OF ANY BREED.

In Class 3, the Judges commend Mr. Beard's cow.

In Class 4, the Judges commend Sir Edward Kerrison's heifer.

HORSES.

In Class 1, the Judges highly commend Mr. Wilson's stallion.

In Class 2, they highly commend Mr. Hobbs' stallion.

In Class 4, they highly commend Mr. Wells' stallion.

In Class 5, they highly commend Mr. Ellis' mare and foal, and Sir Edward Kerrison's mare and foal.

In Class 6, they highly commend Mr. Frost's filly.

In Class 1, the Judges commend Mr. Halford's stallion, Mr. Ward's stallion, Mr. Fellowes' stallion, and Mr. Catlin's stallion.

In Class 2, the Judges commend Mr. Bryan's stallion.

In Class 3, they commend Mr. Browne's stallion.

In Class 4, they commend Mr. Gower's stallion.

In Class 6, they commend Mr. Catlin's filly.

LEICESTER SHEEP.

In Class 3, the Judges highly commend Mr. Burgess' shearling ewes.

SOUTHDOWNS.

In Class 1, the Judges highly commend Mr. Jonas Webb's rams.

In Class 3, the Judges highly commend his Grace the Duke of Richmond's ewes, and Earl of Chichester's ewes.

In Class 2, the Judges commend Mr. Jonas Webb's ram.

LONG WOOLS.

In Class 2, the Judges highly commend Mr. Garne's ram.

In Class 3, the Judges highly commend Mr. Hewer's pen of ewes.

In Class 1, they commend Mr. Hewer's ram and Mr. Garne's ram.

In Class 2, they commend Mr. Hewer's ram.

PIGS.

In Class 2, the Judges highly commend Mr. Hobbs' boar.

In Class 3, they highly commend Mr. Greenwood's sow.

In Class 4, they highly commend Mr. Gillett's sow, Mr. Smith's sow, and Mr. Hobbs' sow.

In Class 6, they highly commend the Earl of Radnor's sows.

In Class 2, the Judges commend Lord Berwick's boar, Mr. Smith's boar, and Mr. R. Smith's boar.

In Class 4, they commend Mr. Storey's sow and Mr. H. Overman's sow.

In Class 6, they commend Mr. Smith's sows.

EXTRA STOCK.

CATTLE.

The Judges commend Mr. Gamble's cow.

PIGS.

The Judges highly commend Mr. Atkinson's boar, and Mr. Tuley's sow and pigs.

HORSES.

The Judges highly commend Mr. Wright's colt and Mr. Abel's colt.

They commend Mr. Morgan's colt.

The CHAIRMAN observed he should beg leave to drink the health of those gentlemen who received prizes for sheep and pigs, and also those gentlemen who received a commendatory notice. He sincerely offered his congratulations, and he was glad to find that Mr. Fisher Hobbs, of Essex, had been so successful. He had only to speak of one drawback; and that was that two prizes for Southdown sheep had gone to other breeders than those of his own county—Sussex. Still Mr. Jonas Webb was his friend, and he was glad to find he had been successful. He was also happy to hear that Mr. Overman had also been fortunate, and obtained a prize (three times three).

Mr. FISHER HOBBS said: My lord Chichester and gentlemen, as the most successful candidate in the classes of sheep and pigs, I rise to thank you on my own behalf and on behalf of my fellow-competitors in these classes. I can assure you I feel very proud in standing in this high position on the present occasion, and not the less so for being a successful candidate in the class of Southdown sheep. I little expected, coming from the county of Essex, that I should be so successful a competitor, beating Mr. Shelley and many other distinguished Southdown breeders. I assure these gentlemen this is my first year of having anything to do with Southdowns; and I can tell them so long as I breed those animals, I will take care to be as successful, if not more so, than at present. I assure you, living in the eastern counties, I felt it my duty to show the farmers that although it was a corn-growing district, we were not unmindful of good bred animals. I have done my part, and I hope to find that other gentlemen, living in the eastern counties, will do theirs. I assure you we value well bred animals very much indeed, and the more we know of them the better we like them. I thank you most sincerely for the compliment you have paid us, and assure you again that I will do my best to introduce the best bred animals throughout the eastern counties.

The CHAIRMAN said that Professor Sedgwick would do what he kindly consented to do, which was to give them some observations on Norfolk and some parts of Cambridgeshire and Lincolnshire. And from what he knew of the Rev. Professor, and of the members of this Association, he was sure the rev. gentleman would have an attentive audience.

Professor SEDGWICK rose (amidst the greetings of the assembly) with great good will, and he would say with great pleasure, although not altogether without some embarrassment. The remarks he should feel constrained to make would necessarily be different from what he had expected. He did expect to be called on to address them, for their President had wished him to do so. He would say that which he believed to be true (cheers). In the first place he was almost ashamed to say that this was the first occasion which he had had the honour to appear at the public meetings of this great Royal Agricultural Society of England. But it had been with deep regret that he had been absent from several meetings. He had been honoured with an invitation from a royal duke, or at least he had received an invitation that was signed by a royal duke, to attend one of these meetings. He deeply regretted he had not been able to attend, but who could wish any man to leave his own province during the harvest season? And it had always been during the long vacation, which was his geological harvest time, that these meetings had taken place. In one view it was a great misfortune, a grievous injury to him that had led to his being present even now. He could not hop off on one leg on a geological tour: his right leg had been damaged, so that he was incapable of locomotion; and he had been obliged to remain in a supine state till he was capable of locomotion. So far he had spoken of himself, and he did not know what the circumstance of the evening would admit of, but it was past nine o'clock, and he was sure that many who heard him, having partaken of the festivities of the day, would not wish to be kept long. He feared that anything he might be able to say about the muddy waters of the Cam, or the sluggish waters of the Ouse, would present but a poor attractive subject to many now before him. But he would not dwell any longer on his introduction. During his professional life he had visited the fens in Lincolnshire and the northern parts of this county, and had paid some attention to the practical works of drainage. Those works which were genuine, had a great bearing upon the agriculture of the country. The largest and finest possible tract of land had been redeemed from sterility. It would be impossible during the mere fraction of an hour to say much; he must therefore be brief and as concise as he possibly could, and rather seek to instruct them where they might receive information than attempt to afford them any without illustrations and diagrams. And he trusted that after this the elements of that meeting would re-assemble—not, indeed, in so large a mass, for that was altogether improbable—but that they would form parties in different parts of the country, and study those matters which he now could but barely hint at, but which were of very great importance. He might remind the gentlemen of this association, that if they went down to the coast of Norfolk they would witness what was a hard subject for engineering; he alluded to the hard battles which the ocean was waging with this county. He thought something might be done by studying the action and re-action of marine irruptions. He thought they would learn, by going along the coast, what were its geological features. They would all be aware that chalk formed the lowest subsoil of the county. Over that they would see a stratifying mass of sand shells, commonly called crag, in the immediate order of sequence, in the ascending order. And they would see, in going down to Yarmouth, almost anywhere where new cuts were made, that there was a brown clay, not so deep as the dry clay in the fens. This contained throughout, almost without exception, lumps of chalk, larger or smaller. They could not fail to mark that, in going along between here and Yarmouth. Now, that had been carried by the floods over the country. But, if we were to speculate, he should say that at one period the hills of Norfolk were continuous with those of Lincolnshire; and the part which was carried away where the breach was made was so mixed up with the water that rushed in, that it was sent like some enormous mass of hasty pudding over the high hills of Norfolk, and even into Essex. This was a most important feature in this county, and in this way it was that there had been formed among them what were technically called cold lands. Then besides this there were masses which belonged altogether to a different class, which formed the whole composition of Essex, and ran over many other places. Now under the chalk there was a bed of sand, called car stone, if they went down some depth of a thousand feet—not that there was any temptation to go down so far, as they would come to a bed of clay. He now spoke of the great bed of the Bedford level. There were two circumstances to which he wished to call their attention. It had been said that they might also dispense with manure on some soils. That was merely an operation to which nature adverted. That which turned the material into the vegetable kingdom then caused that vegetable kingdom to form the pabulum of human life. They knew that the animal kingdom existed simply and entirely upon the vegetable; vegetable nature required much phosphate of lime, and this was found in large quantities in some of the strata of Essex and along this part of the coast of England. But here they had two departments. The sand which abounded on this side of the kingdom had, by the extreme ingenuity of Messrs. Ransomes and partners, in Ipswich, been manufactured into building stone equal to any on earth; and it could be manufactured out of the sands of this county as cheap as any stone could be procured. This was one thing that he had been struck with. He could but regard it as a great triumph of art. This was not strictly an agricultural matter, but still it was of great importance to agriculturists. The next point he would mention with regard to this part of the country was, that out of the crag they brought out a great deal of matter which contained at least 50 or 60 per cent. of phosphate of lime, which formed a valuable manure. There were two circumstances which he had seen within the last six months with extreme interest. Suppose they took a walk along the coast, they would find organic remains, such as mammoth bones, rhinoceros bones, &c., &c. If they looked to the cliffs of Downham and Hunstanton, there were many such. Then underneath the enormous expansion of marsh land they would find that immediately under the soil was a black turf, and then under that grit and fine clay, which combined with a similar bed at Oxford, and which was probably 2,000 feet thick. If they bored down about 1,000 feet they would come to it. Now then they had an enormous extent of flat land, and they had high lands so called by comparison, which would all be productive of corn, but which would be rendered far more so by getting rid of the stagnant water which was at present in them. Permit him to tell them what has been the case from the latter part of the medieval period to the present day. There was the Welland, further on was the Nene, and then there was the little Ouse, all of which ran down to Lynn. There were, then, three main arteries that drained the waters down into the German ocean. Now, the waters acquired velocity by coming down, not a very steep, but still a considerably inclined, plane, by which it left the fens, and brought down a certain quantity of mud. As the water flowed less rapidly, the stream became more clear, and down went the mud. That process, though slow, was nevertheless sure, and in the course of centuries would produce a marked effect on different parts of the country, which would be most apparent where the waters were most sluggish. The consequence was, that now the beds of these riverse had become so raised in places as to have been made quite flat, and so many parts of the country were now flooded that used to be well drained; and so at last mischief arose, which called for the works of the civil engineers. The Romans seemed to have had no civil engineers at the first period of which he had spoken, but some of their subsequent acts proved that they well understood the principles. He had seen cuts through bogs where now no tree could grow, in which the trunks of trees had been found. Now the cause was that the waters had become choked with mud, and the evil became so great that an enormous quantity of land had been submerged. About 700 years ago, from Littleport to Purfleet houses, about three miles, there was quite a little insignificant river, the little Ouse, which now came down to Lynn from Bedfordshire; another part ran to Wisbech. They then made the cut he spoke of, about 700 years ago, and what was the consequence? There was an unusual accumulation of mud upon the marsh land; the vegetable matter, when left alone, almost entirely evaporated and passed into air, but if it was saturated it remained, and became nearly solid. When that cut was made, what took place? They cut a channel, and then this mud came into the beautiful waters of the little Ouse; it did enormous mischief, and the consequence was that after that period all the waters of the Nene came down the first cut for a considerable time. That went on for about 200 years, and the Welland also discharged itself there. In consequence of an Act of Parliament for the navigation of all those waters, the Welland was to have been made the channel by the bishop of Ely; but nothing was done till the time of Charles the First, when, by means of artificial cuts, the waters of the little Ouse were drawn off; still the mud came in with the waters of the Ouse. He wished to show them how difficult it was to fight against nature. How much trouble was occasioned, and what enormous litigation took place, were circumstances that were probably better known to many present than to himself; but he thought it right to mention it, in order that they might have a clue to the subject of investigation. He would suppose them to go down to the marshes from the hills of Norfolk. He would recommend them earnestly to go and observe the country where the Welland came again into the artificial cut, and it would show them how the waters of the Cam had been injured. Then, again, there were some very curious circumstances that had been discovered, especially since the making of cuttings for railways. They had found the remains of wild boars, and black bears, and other animals, which plainly showed what had been the condition of the country before the opening of those rivers. In the neighbourhood of Lynn, where the hundred feet river came in, the waters had come down and formed a Delta, which in time was covered. He would tell them a thing that happened within his memory: 30 or 40 years ago one of those levels was cut through by what was called the ' Eau-brink cut." It had been a most efficient improvement that was well deserving of their notice. He wished them to notice its effects upon the soundings of the river to Lynn. Its effect was to allow the waters to escape more speedily. The waters got away more readily. The Bishop remembered that when he was young the waters used to be obstructed, which was no longer the case. A single flood had, within his own memory, done damage to the Bedford level to the amount of half a million. Such a thing had been done within his memory. The ridge had since been drained, and was now good arable land. He had been told by Sir Thomas Hare that he had some years ago offered to sell a tract of land, of which he was a trustee, for the sum of £1,300, but could not obtain the price for it; now such was the improvements that had been effected there that three or four years ago he let the same land for £1,300 a-year. It was quite within his memory that they had brought the fens into a better condition, not only by drainage, but by mixing the soil; not merely by manuring with the produce of the farm yard, but geologically by a judicious admixture of soils. They were aware that under the bog there existed a fine clay, and that clay being mixed with the peat gave it siliceous matter. The black soil had no carbon, no siliceous matter, and consequently could not grow wheat; but when the clay was brought to it, the wheat grew with vigorous stems, and the crops were admirable. Then they would have 10 or 12 feet of black soil, which was in almost unlimited supply. These were circumstances that were well deserving the attention of any one who was accustomed to fen drainage and fen countries. He would recommend any one who had time for investigation to go across the marsh land. The people in that country distinguished fen from marsh land. Marsh land was land redeemed from the sea. It was not peat but valuable soil. The fen land was formed surface, and was found on what was called peat. The marsh land below Wisbech which he had visited struck him with astonishment. If they crossed the high bridge which led into Lincolnshire they would see the sea below them on one side, and on the other side they would behold corn fields. That large dam used to be covered with water, and to prevent the water covering the land the whole was drained. He was of opinion, however, that they were too much in a hurry; he thought they should have waited two or three years; they should have let the waters off slowly, and by stopping the mud they would have raised the land two feet. Looking down back towards the sea he certainly did not expect to see the mud at a higher level than the high land, but it was higher. That mud bank prevented the flow of the tide, and there was, therefore, a large expanse of stagnant water, the surface of which was filling most rapidly, and making rich land. In this way he believed an enormous quantity of land might be saved, but it must not be done in a hurry, it must be done piece by piece; and there was no saying how long that process must go on (cheers). There was one thing more. He looked upon the elder Mr. Rennie as a perfect giant in engineering. He studied the fens and prepared a plan of drainage by cutting drains to prevent the water flooding the flats. He gauged the fens and levelled them, and found them all quite above the level of high water under ordinary conditions, and therefore all the ordinary expense of water mills might be avoided, and a clear descent down to the sea be obtained without those incumbrances or expedients for drainage which had often proved to be a mere endeavour to turn their dirty water upon their neighbours' fields (cheers, mingled with symptoms of impatience). Much was even now being lost for want of carrying out the late Mr. Rennie's plans (cheers and noise). He would not detain them any longer, but would simply add, that what he had done he had done with the most hearty good will.

The noble Chairman said, some acknowledgment was due to the Rev. Professor, and he desired he might be allowed, on the part of the meeting as well as of himself, to thank him for his very interesting address, and in doing so would acknowledge how deeply the Society had been indebted, from its commencement, for the most warm support it had received from the most eminent men of science. He was quite aware of their cordial sympathy, and he hoped they would hear the Dean of Westminster, whom the farmers of our country were always glad to hear. Practical farmers were not always disposed to follow the advice of scientific men very implicitly, but they were always prepared to hear what they had to say; and if they were only prepared to follow up what such gentlemen said, they would become more intelligent. He heartily thanked the Rev. Professor for the addresses he had delivered (cheers).

Professor Sedgwick, in returning thanks, regretted he had not had a better opportunity of illustrating what he had said than he had. He was deeply obliged by the compliment that had been paid him.

The meeting broke up immediately on the conclusion of the Rev. Professor's speech, evidently too much exhausted by the laborious exertions of the day's engagements to bend their attention to scientific subjects at so late an hour—late to our agricultural friends, although the residents of a populous city would probably regard it even as early for so interesting an occasion.—*Norwich Mercury.*

THE GREAT DINNER.

The great dinner of the society was held in St. Andrew's Hall, on Thursday, July 19th. There was a large gathering of the friends of agriculture—filling the president's table, the body of the hall, and almost filling the side galleries. There were upwards of 900 persons present.

The Stewards for the dinner were:—

High Table.
The EARL of CHICHESTER, President.

Vice Presidents' Table.
The MARQUIS of DOWNSHIRE, President-Elect.

Steward of the Great Dinner.
The Hon. ROBERT HENRY CLIVE, M.P.

Stewards of the Tables.

A	G
Sir Francis Lawley, Bart.	Colonel Challoner
Stephen Grantham	Samuel Jonas
B	H
Colonel Austen	Thomas Raymond Barker
Henry Stephen Thompson	Henry Wilson
C	I
Sir Thomas Dyke Acland, Bart., M.P.	Philip Pusey, M.P.
Henry Blanshard	William Fisher Hobbs
D	J
John Villiers Shelley	Thos. Wm. Bramston, M.P.
Hon. Capt. D. Pelham, R.N.	Humphrey Brandreth
E	K
Duke of Richmond	Sir Robt. Price, Bart., M.P.
John Kinder	William Shaw
F	L
Sir J. Johnstone, Bart., M.P.	Richard Garrett
Jonas Webb	Richard Milward

At four o'clock, the Earl of Chichester took the chair, being supported on his right by the Mayor of Norwich, Earl of Leicester, Marquis of Douro, the Mayor of Lynn, Lord Sondes, and Lord Henniker; on his left by the Lord Bishop, the Earl of Orford, E. Wodehouse, Esq., M.P., Viscount Sidney, and Lord Sheffield. Amongst the Company we observed the Marquis of Downshire (Vice-President), the Duke of Richmond, Lord Colborne, the Hon. E. H. Stanley, M.P., Mr. Bramstone, M.P., Lord Wodehouse, Lord Berwick, the Dean of Norwich, Lord Wm. Poulett, Lord Forrester, Wm. Mason, Esq. (the High Sheriff of the county), Hon. E. Coke, M.P., Sir R. Price, Colonel Challoner, the Hon. W. R. Clive, Major Beresford, M.P., Rev. Geo. Hanbury, Mr. Gurdon Rebow, W. Gurdon, Esq., Hon. Captain Cust, Colonel Buckeley, Professor Way, Professor Simonds, Mr. Arkwright (High Sheriff of Staffordshire), Captain Boldero, M.P., Mr. J. C. Cobbold, M.P., Dr. Daubeny, Colonel Fitzroy, Rev. A. Huxtable, Captain Ives, Mr. Langston, M.P., Captain Moody (late Governor of the Falkland Islands), Baron Martens, Mr. Parker, C.E., Mr. M. Phillips, Hon. Manners Sutton, the Mayor of Bury St. Edmund's, Mr. G. L. Coleman (the late Mayor of Norwich), Mr. R. Chamberlin (the Sheriff of Norwich), the Sheriff of Cambridgeshire, Sir B. Proctor, Bart., Viscount Ranelagh, M. le Comte Seraincourt, Dr. Buckland (Dean of Westminster), Hon. W. W. Wilson, Hon. F. De Grey, Mr. Gooch, General Sir W. Wilson, Sir John Anson, Bart., Sir R. J. Harvey, C.B., Colonel Smyth (16th Lancers), Mr. Walter Long, M.P., Sir H. Meux, Bart., Rev. J. Bailey, Mr. Jonas Webb (Babraham), Mr. C. Large (Oxford), Mr. Shaw (of the Strand), Mr. S. Jonas (Ickleton), Mr. J. Hughes, Lord Bayning, Mr. Burroughes, M.P., the Earl Cadogan, Mr. Currie, the Hon. Captain Duncombe, M.P., Sir W.

Folkes, Bart., Mr. B. Gurdon, the Rev. Philip Gurdon, Mr. Adam Gordon, M. Guenon, Lord Hastings, Viscount Lifford, Mr. C. Neame, Mr. F. Neame, Mr. J. Neame, the Rev. the Canon Residentiary of Norwich, Mr. Beauchamp Proctor, the Rev. Professor Sedgwick, Lord St. John, Hon. F. Walpole, and nearly all the leading agriculturists of the county, with vast numbers also from Suffolk, Cambridgeshire, Buckinghamshire, Rutlandshire, and more distant parts of both England and Scotland.

The cloth having been removed, the Chairman gave the usual loyal toasts; after which,

The Earl of Orford rose to propose to their notice the next toast— Success to the Royal Agricultural Society of England (great cheers). He believed that this was the eleventh anniversary of the establishment of this society. At its first anniversary meeting the number of implements shown was 23, and the number of heads of stock of all kinds exhibited for prizes 249. He could recollect, at the beginning of the institution, how its onward progress was attempted to be impeded by mockery, obloquy, and even by malicious imputation. (Hear, hear.) But they did wisely by treating those attempts with silence—(cheers)—and still more wisely by pursuing zealously the even tenor of their way (continued cheers). Just glance at the results which had developed themselves. Ten years after its establishment, at their anniversary meeting in 1848, the number of entries of stock exhibited for prizes was 724, and the number of implements exceeded 1,500. To what could they attribute this increase, surrounded, almost overwhelmed as they were, from their enemies, by ridicule, caricature, and banter? It was, he hesitated not to say, attributable to the mode in which they conducted their affairs; they opened their exhibitions to every class, and excluded only one subject from their debates, and this was (as had before been remarked) the discussion of party politics (cheers). It was this throwing wide open their gates, by offering prizes and accommodation hitherto unequalled, which induced parties of all shades of politics and ranks in society to come forward. The exhibition of that day was one of the most brilliant shows they had ever seen since the first establishment of the society (great cheering). It was in consequence of the opportunity for competition thus afforded, that every district in England was anxious to have the county meeting held within it; and, indeed, almost bribed the society to come and reside for three or four days amongst them. One very beneficial result from these meetings was the opportunity which it afforded for all parties, from the north, the south, the east, and the west, to meet each other, who, without such instrumentality, would have remained almost in ignorance of their brother agriculturists residing at any distance from them. It was the spirit of competition, which they had so eagerly embraced, that urged men forward. It was this spirit which induced Mr. Hobbs, last evening, to throw down the gauntlet, and offer a challenge, not only to England, but to all the world (cheers). He was sure that this gentleman would do all he could; he observed the eager and determined expression of Mr. Hobbs, when he threw down the gauntlet; but he (Lord Orford) knew it would be taken up, gallantly assailed, and as vigorously supported. He was afraid that his noble friend, the Duke of Richmond, and their noble President, would not allow the pride of downy Sussex to be beaten by the clays of Essex (cheers). It was the spirit of competition which had brought together all those animals and implements which they had that day witnessed. And let them not think that the effects of those exertions were limited to the narrow boundary of this land; they, on the contrary, knew that their machinery increased in perfection every year, and was eagerly sought after by the inhabitants of every part of the world. They had had amongst them, at their various meetings, the representatives of almost every European state; and last, though certainly not least, they found that when agricultural societies were established in other countries, the Journal of their Society was eagerly demanded, and in many instances translated (loud applause). Now, one word with regard to the implements exhibited. The great improvements which had been made in agricultural implements, and the more general diffusion of intelligence, had dissipated the prejudice entertained by some because of the supposition that they interfered with the demand for labour; they had now discovered that the demand for manual labour had increased with the more general propagation of mechanical contrivances. It was neither his habit nor his wish, nor, indeed, would the time permit him, to trespass any longer upon their patience; there was only one remark more he would make before he sat down. If they looked at the different nations of the world—if they turned to France, Germany, Belgium, or Russia—they would perceive they were relinquishing their antiquated notions, and were sending to them for the various improvements they had made, and were anxious to adopt the modes of culture which they had tried here, and proved to be successful (cheers). He would conclude with the toast which he had been entrusted with—viz., "Success to the Royal Agricultural Society of England" (cheers).

Mr. Wodehouse, M.P., rose to propose the next toast. [The hon. gentleman was received with several hearty rounds of applause before he could commence his speech]. When the cheering had subsided, the hon. gentleman said, that in obedience to the commands he had received from the noble chairman, he was about to propose to their notice, and to which he was sure they would all respond, the toast of "Agriculture, Manufactures, and Commerce." It was an alarming toast to give—(laughter)—but let them calm their fears by the assurance, that he would be very brief. He had served a long apprenticeship in public life, and he had brought his mind to this conviction that none of them could stand alone (loud cheers). In the early part of his life, his constituency extended much further than it did at present; he might then have gone almost to the mouth of the Humber, and might have claimed some of those strange beings whom his friend Professor Sedgwick last night described as beings who lived 1,000 feet below the surface of the earth, and had also gone to their rest.

The hall in which he was then addressing them was dear to him from many associations, and reminded him of numerous scenes of municipal hospitalities (Hear)—recollections which he cherished with kindness. He felt that he needed not to offer any apology, standing there as one of the representatives of Norfolk, for saying, with all the sincerity of his heart, God speed the plough (loud cheers), God speed the shuttle, and God speed the sail (continued cheers). This doctrine of mutual dependence on each other was most true ; but no sooner did they find that it was originally decreed by heaven that man should live dependent on man, than the early quarrel between Cain and Abel arose, and the whole train of evil consequences which resulted therefrom. But when he alluded to this, let him assure them he did it without offence to any one. In the walls of parliament, not long ago, he heard a great deal of this doctrine of mutual dependence, which was illustrated by a simile derived from the connexion between the tailor and the shears. Now there was one person who, by the spirit of the constitution, was always considered by himself—the Chancellor of the Exchequer : he was the tinker who very soon came and disturbed the harmony of the whole. Do not let it be supposed that he wished to say anything unworthy of the place in which he stood, or that he was about to allude to anything of a party character ; when he alluded to the Chancellor of the Exchequer, he alluded to one for whom he entertained the most sincere regard, and who was a thorough gentleman (cheers). But Chancellors of the Exchequer were considered in all places and in all times to be a fair cock-shot for anybody to fire at (laughter). There was also in the House of Parliament an allusion recently made to the question of high farming. A pamphlet was referred to, and there was one passage in it to which he wished to call their particular attention. It was said that it was the common practice in England for landlords to put up their farms to private auction and to accept the tenant who offered the highest rent, and asked for the lowest amount for outlay in improvement. This was alluded to as the common practice. God forbid that this should ever be the usual custom in this country ; and God forbid that there should be, in any single instance, the least approximation to it (loud cheering). Above all things, for God's sake let them endeavour to have reciprocity between landlord and tenant (cheers). Then hon. gentleman here read another extract from the pamphlet referred to, the precise words of which we were unable to hear, and thus continued—He felt that he was speaking not only in the eyes of the county of Nofolk, but in the eyes of England, and perhaps of Europe. The individual referred to in the pamphlet he believed was in error, and in very grievous error too—an individual who had occupied a very prominent political position, but who yet had never made the good of his country his eading polar star—he alluded to Sir Robert Peel.

This allusion was the signal for a loud burst of hisses and groans, which continued, even though the chairman rose to order, for several minutes.

At length the CHAIRMAN said—it was with very great regret that he felt called upon, by a sense of the duty which he owed to this society, earnestly to request the hon. gentleman who had just sat down, and every one of the subsequent speakers, most scrupulously to avoid any allusion, either to party politics, or to what had been going on in either house of parliament (Hear, hear). Still more must he beg of them to refrain from naming any party who had occupied a prominent position in party or political warfare (loud cheers). He knew the sense of that meeting would be with him. He felt it was in consequence of the strict exclusion of all such topics that his predecessors in the chair, aided by the general feeling of the great majority of the members, had been able to maintain the uniform peace and harmony which had so eminently distinguished them as a body. He had only one word more to say, and this was an expression of regret that he should have been most unwillingly obliged to interrupt his hon. friend ; and on behalf of the members of the society he would say, that in nothing did they blame him, except for touching upon very dangerous ground. He hoped the hon. member would, in his concluding remarks, confine himself to those special topics laid down in his toast, and take care (as the lawyers have it) not to travel out of the Record (loud cheers).

Mr. WODEHOUSE expressed his sorrow that he had transgressed against the rules of good feeling (No, no). He hoped they would forgive him for this breach of the rules, and make due allowance for the difficulty in a toast of this kind to abstain altogether from such allusions. He had no further observation to offer, and would give them the toast of "Agriculture, Manufactures, and Commerce."

The Duke of RICHMOND was requested to propose the next toast. His grace was most enthusiastically received; several rounds of hearty cheers were given, accompanied by waving of handkerchiefs, and every imaginable demonstration of respect. It was a considerable time before his Grace could commence his speech. He said he had great pleasure in obeying the command of the chairman, because he was well aware the Royal Agricultural Society was very desirous of paying honour where honour was due, and to show respect to the constituted authorities of the land (cheers). The toast in the list was "The Mayor and Corporation of the city of Norwich." To them the Society owed much, for their exertions to promote their interests ; and might he say, that to the inhabitants, be they high or low, rich or poor, the society was also deeply indebted—to the former for the hospitable manner in which they had received them, and for their exertions to promote the comfort and conveniences of the many thousands who attended their meeting; and to the poor for the interest they had shown, and the kindly feeling displayed towards them. Amongst the very numerous advantages which, in his humble opinion, had resulted from the formation of the Royal Agrieultural Society, was the opportunity which it afforded not only for landowners and tenants to attend, but the inhabitants generally in those large and populous towns where their meetings were held. All could attend ; and by becoming known to each other they would become acquainted with those engaged in manufacturing and commercial pursuits. He hoped that to-morrow all parties, when they came coolly to read of and consider the events of the week, would be satisfied that the agricultural interest was one of vital and paramount importance (cheers). This meeting, and its mutual interchange of civilities, would instil into all their minds kind and friendly feelings towards each other; for it was not too much to say, that anything which promoted the agricultural interests of Great Britain added strength and stability to their fatherland (loud cheering). He must congratulate the members of this society upon the assembly here met together, and upon the splendid exhibition which they witnessed yesterday and to-day in their show-yard. It occurred to him—and he knew they would like a free-born Englishman to speak out what he felt—(cheers) that the exhibition of implements yesterday was most creditable to those scientific and talented men who had undertaken their construction; the only drawback he felt was, that they improved so rapidly, one never knew when to purchase. (Hear, hear.)—With respect to the cattle shew—the horses, the cows, and the pigs—the exhibition was of a highly creditable character, and the exhibitors had justly maintained their positions. Permit him also to say, that he thought the occupiers of this and adjacent counties had all maintained the reputation of good practical farmers, which they had so long and deservedly enjoyed. (Cheers.) They might think, when he spoke about sheep, that he was treading upon rather tender ground, because he happened to be an unsuccessful competitor. It was, therefore, his direct interest to say, that never were such good sheep exhibited (Laughter.) An Essex friend of his (Mr. Hobbs) said yesterday, he had great pleasure in receiving a prize for sheep, and that if they did not mind what they were about, he would beat Europe at large. Now he (the Duke of Richmond) thought, that if he beat Sussex and Norfolk he would have triumph enough! At least he would endeavour to prevent his doing it by every means in his power. He had been often beaten, but had still enough of English blood in his veins to persevere. (Cheers) He had been beaten and driven back, but he would never show the white feather. (Continued cheers.) He could not sit down without thanking them for the kind and heartfelt manner in which he had been received that evening. He was in the habit of attending agricultural meetings, because he felt that the improvements in a great branch of their native industry were worth making the greatest exertions they could for. He never felt more at home than when he was surrounded by the tenant farmers of this country. (Loud applause.) It was to them that he owed a deep debt of obligation which no words of his could ever express—(cheers) and no exertion ever repay. He had been in many counties of England, and had attended meetings everywhere, and received at all times kindnesses which to his dying day he should never forget. With every desire for the health of them all, and hoping they might enjoy every blessing which this world afforded, he again asked them to drink the health of the Mayor, Corporation, and inhabitants of this ancient and interesting city, in the cordial manner which their conduct so well entitled them to.—(Cheers).

The Mayor of Norwich (S. Bignold, Esq.) said, the duty which devolved upon him was a very easy one; it was to express his acknowledgments for the kind manner in which the toast had been proposed by the noble Duke, and received by that company. He could assure his Grace, and every member of the society, that Norwich received it with open arms; and if at any future time they should be entitled to a repetition of the visit, the inhabitants would rejoice and be proud to see them again among them.

The Chairman said, he should call on the Lord Bishop of Norwich to propose the next toast. No one would have greater pleasure in listening to the right reverend prelate than himself; all he wished to say was, that he was not responsible in any way for the toast he was about to propose, nor for the place it occupied on the list.

The Right Rev. the Lord Bishop was received with cheers. His lordship regretted that he was sitting by the noble lord in the chair, and that he was present upon that occasion; because he was about to propose that noble lord's health, and in his presence he could not say what he might wish to say, and what they would approve and applaud him for saying. He was proud of calling that noble lord his friend. This was not the first time he had met him upon an occasion like this—for the noble lord was known to him as Chairman, upon many occasions, on the platform of every society that could promote the cause of benevolence and of religion; and on this occasion he considered that agriculture was connected with religion, inasmuch as they both promoted the civilization and the welfare of the community at large (applause). The noble lord's character stood deservedly high (applause). As a landlord none could surpass him. He was a landlord whose object and wish were to promote the prosperity of his tenantry; and his happiest hours were spent in promoting their interests (applause). But he was glad of an opportunity of rising upon this occasion, though it was the first time that he was ever before the Royal Agricultural Society of England. He was glad of doing so, if not with the practice, at least with the spirit, that ought to animate a British farmer (applause). He should be ungrateful to his profession if he could do otherwise, for the Church depended upon the land of England (loud applause). He did not wish them to think that he spoke from the love of filthy lucre; he said it because he thought, as he before stated, that the agriculture of England was intimately connected with the welfare of the Church of England (renewed applause). It was a gratification to him to stand before them at this meeting. It was such a meeting as he loved to appear in, because it was a meeting in which people of all opinions, all persuasions, all denominations, met, forgetting their differences and animosities. They had but one great object in view, and that was, to promote the agricultural interest; and whoever had that interest at heart, he considered him not only an Englishman, but he was persuaded that person must have the spirit of true

Christianity in him (applause). There were divisions between the pasture and the arable land, and there were divisions of opinion among them; but their controversies were amicably carried on, as he knew they had been on some occasions, as to the comparative merits of Swedish turnips and mangold wurtzel. He congratulated himself on meeting not only people of different opinions, but also people of every rank, from the prince to the peasant—from the occupant of Buckingham Palace to that of the meanest cottage in Norfolk. He rejoiced in this, for there they were all of one mind, all upon the same platform, and in the same room; forgetting their differences of rank, and all meeting together, as Englishmen, upon common and neutral ground. They were all met upon the same soil—the soil of England (applause). Don't talk to him of the regions of gold beyond the Oregon territory. Don't talk to him of migrating to the far west in search of gold. They had the gold at home. They had British interests, British ingenuity, and British industry; and here, in Old England, was the true and veritable California (applause). He had a great deal more to say, but he had spoken his seven minutes, and beyond that he must not go. He had now to propose the toast of the Earl of Chichester, and might God bless his endeavours. He hoped they would receive that toast as they ought to do, with three times three English cheers (the toast was responded to accordingly).

The Earl of Chichester, on rising, was received with renewed applause. He said:—Gentlemen, I rise, in the first place, to acknowledge the honour which you have just done me, and the kind manner in which you have received my health, proposed to you in so kind and in so flattering a manner, by my right rev. friend on my left. Gentlemen, I should not think of making any observations to you respecting myself, but there is one point of a somewhat personal kind, on which I feel that I cannot do justice to my own feelings, or perform the duty I owe to this society, if I did not, for a few moments, allude to it. Gentlemen, you have done me the very great honour of placing me, for a year, at the head of this great society. I felt at the time, and I still feel, utterly unworthy of filling that very responsible position ("No, no"). But, however unworthy I am, I can truly say, that I do not believe there is one of your oldest or most attached friends, who more highly appreciates the honour, because there is not one who more highly appreciates the value of this great society (applause). Gentlemen, as many of you are aware, I had the happiness of being one of its first members, and from the moment that the subject was introduced to me by my noble friend the Duke of Richmond (applause), I at once perceived—and I take no credit for any uncommon degree of sagacity for that perception—that we were about to establish one of the most important, and one of the most useful, and as I still believe one of the most prominent, institutions of this great country. Gentlemen, we all know that if our efforts succeeded, this institution would be the means of bringing together men belonging to very different classes of society; that it would bring together all the agricultural classes; that it would bring us into contact with men of science, with men of rank, and influence, and intelligence, and of other countries; with men like the right Rev. Bishop on my left, distinguished in our own country for the sacred office which they fill, and for the zeal with which they discharge the duties of that office, taking care of the moral and religious condition of their fellow men (applause). Gentlemen, I should conceive that no one who anticipated such a combination of science, of learning, of practical skill, and of all the great moral qualities that belong to those who have favoured us with their warmest support, but must have anticipated the best results from the meetings of this society. I shall not, on this occasion, occupy your time by going into detailed remarks on the success which has hitherto attended our efforts in promoting the improvement of agriculture; but I have alluded to the different classes of persons who meet together, and their great efforts for the benefit of mankind, and especially of our own country, because I feel it is due to those valued supporters of this institution who are not agriculturists, to say how heartily we value their support, and how deeply we are indebted for the valuable exertion of their talents which they have so freely devoted to this cause (applause). My right rev. friend has alluded to the amicable discussions and amicable rivalry that take place at the meetings of this society. I am confident that most of you have learned, by experience, that it is useful to us all to meet together to discuss such questions; that it is useful to the practical farmer to become acquainted with the men of science; that his own skill and success in his vocation are improved by receiving some new ideas, whether he receive them from a brother agriculturist, in a different district, or from the man of science. I believe that we all derive great benefit from such meetings and such discussions. It seems to me that we undergo a sort of ventilation, that very much improves the atmosphere in which we labour. It seems to me that we are thus enabled to get rid of many of our prejudices, and perhaps more of our conceit. I look around me, and recollect that I see some of the most distinguished practical farmers from every county of England; and, if I might borrow an illustration from one of the good lectures I have heard given before this society (I allude to that I heard by Professor Simonds), I should say that this kind of ventilation reminds me of what takes place in the human system in the circulation of the blood—that the farmers of England, and all the different ranks of agriculturists, are met on these occasions, and come to this great centre, to get rid of a great deal that they can well spare, and to have their energies and their minds refreshed by this wholesome ventilation (applause); and they return back to their farms with a great many new ideas, with fewer prejudices, with that useful kind of stimulus which competition produces; and I am sure with greater information and greater intelligence. I must say one word upon one class of the friends and supporters of this society; I allude to those gentlemen from foreign countries who so often do us the honour of being present on these occasions. I happen to know, that three or four of the foreign ministers in this country meant to have attended this meeting, had they not been prevented, some by indisposition, and some by the strong claims of public duty; but I know that we have in this room gentlemen from other countries, and though we do not formally propose their healths, I am sure that I am expressing the unanimous feeling of the farmers in this hall, when I tell them that they are heartily welcome (applause); that we always rejoice to see them; and that we are most willing both to communicate and to receive any useful information. Before I sit down, I am instructed by the council of this society to give a toast, which I must propose to your adoption. It is a toast, not like that proposed by my honourable friend, one of the members of this district of Norfolk; it is not a toast, in giving which the proposer will have to go through a difficult navigation. When I was obliged, unwillingly, to call my honourable friend to order, I had a great sympathy for the difficulty in which he was placed. I have, on former occasions, experienced that intricate navigation, and have traversed the shoals and quick-sands that beset the course of that toast; but, gentlemen, I am sure there can be no difference of opinion as to the value of that class of our fellow countrymen whose health I am about to propose. Whatever may be our views of the difficult subjects involved in the science of government and legislation, I am still sure that no good man can doubt that it is the interest, as well as the duty of man, to promote, to the utmost of his power, the comfort and the well-being of the labouring classes. (Applause.) Gentlemen, it might be too much to say, for this great society, that it has attempted, by any direct means, to improve the condition of that important class of the community; but I think we have never omitted to drink their healths; and, on many occasions, when that toast was given, abler advocates than myself have delivered sound and beneficial opinions, and very valuable suggestions have been made, which I trust have not been without their effect on our society. I am confident of this, though we have not taken any direct steps for the improvement of the agricultural labourers, we do confer upon that class an important benefit by promoting scientific farming. I am sure, in proportion to the improvement effected in the science and skill of the farmer, in the like proportion will the agricultural labourer be raised in his position in society. I am confident of this, and I know that many who hear me are farmers, and they well know what I mean. But besides drinking the health of the labouring classes, by promoting the improvement of agriculture we are likely to render them more intelligent and more useful, and, therefore, more happy men. We have offered two premiums on subjects that were likely to promote their comfort. Last year a prize was offered for the best cottage-stove, and this year a prize was offered for the best essay upon cottages. I rejoice to observe that generally with the progress of the society there is, in all parts of the country, a growing interest in the wants and sufferings of the labouring classes; and attempts are frequent to promote the moral improvement of our poorer countrymen. I do not claim for this society any share in that movement; but, when I see that the same men who take the lead in that movement are also the warmest and staunchest friends of agricultural improvement, I cannot but believe that they are under the same blessing, and they are likely to go together to that measure of success which I fully anticipate, and which, I believe, will be attended by immense advantage to the country at large. In proposing the health of the labouring classes, I need not remind the members of this city that we include all classes who gain their livelihood by the sweat of their brow. As it has been stated by the hon. member for the county, we cannot stand alone; but the labourer, whether labouring in the field, or in the manufactory, or in any other department of industry, ought to be equally the object of our care, as being equally a contributor to the welfare of the community: and, if duly cared for as to his comfort, and moral and religious education, he is an equally sound and useful member of the community. I shall not detain you by any further remarks on this most important subject. I am convinced that the condition of the labouring classes is more attended to than it was. I know that it is already much improved in various parts of the country. I feel that the company here need not to be reminded that it is one of our first duties to give every encouragement, and to afford every help, for the benefit of the agriculturists of that class; and I propose the health of the labouring classes, with three times three.—The toast was responded to accordingly.

The Chairman again rose and said: Gentlemen, before I propose the next toast I must state that I only undertook the last on account of the absence of my friend, Sir E. Buxton. I now call upon Mr. Burroughes to propose the next toast.

Mr. Burroughes, M.P., said, it was owing to the accidental and unexpected absence of the gentleman whose name appeared on the list (the hon. H. Wilson), that he was then called upon, and the toast placed in his hands; and there was nothing left him but to bow to the decision of the chair. Upon this occasion he had the less hesitation in doing so, because the toast he had to propose required no lengthened eulogy at his hands, as they would feel, when he told them that it was the health of the judges of the stock and implements that he was going to ask them to drink. He was certain that every person present would appreciate the value of the services of those gentlemen. From his short acquaintance with the breeding of stock, he was not competent to enter on the merits of those beautiful animals which he had had the opportunity of seeing during the last two days. It would be the height of presumption in him to enter into any criticism in regard to the decision of the judges. He was sorry to say that he had only a slight acquaintance with any one of the gentlemen who performed that arduous task; but regarding them as Englishmen, and as persons selected by the Council of the Royal Society of England, he considered it would be presumption in him when he called upon the company to express their satisfaction at the decisions of those gentlemen, who, he boldly asserted, had given those decisions to the best of their ability, and in accordance with the honest convictions of their hearts. He therefore called upon them to drink the healths of the judges of the stock and implements. (The toast was drunk with great applause).

Mr. Hawkins did not think, when he came there that afternoon, that he would be called upon to acknowledge the toast; seeing so many of the senior judges present, he thought they would have risen to do so; and he expected that the judges of the stock would have risen first. He supposed, upon the principle of the plough-share having to do the first part of the work in tilling the ground, he must be the first to rise. He thought he might congratulate the society upon the great exhibition of implements. Every description of implement had been exhibited, suitable for the use of the smallest farmer, and of the most extensive agriculturist in the kingdom. In giving their decision, the judges had paid especial attention to the cheapness and utility of those articles. Whether suited to small farmers, or to those of larger occupations, they had an especial eye to the efficiency and durability of the implements in giving their decisions. He assured the meeting that they had done their duty fearlessly and honestly, and had endeavoured to come to an honest conclusion, as between them and the society. This year the implements had undergone a severe test, owing to the great facilities that the Council had provided for the purpose. When they read the report that would be delivered, they would be satisfied with the steps the Council had taken in regard to these implements. Some curious results had been brought out in trying the various harrows, ploughs, threshing machines, &c. ; and features were presented to the exhibiters themselves that they were not aware of before they came to the meeting. On this account, he congratulated the society upon the exhibition of implements. Great advantage to the country had resulted from their improvement, and from the improvement of stock. He considered that they, as farmers, had improved the soil to the utmost of their power, and that when they came to a proper adjustment between them and their landlords it would do more for British agriculturists than anything that government could do for them (cheers). It was upon this ground that he congratulated the society upon the show of implements. There were few new implements, but the great thing was to improve those they already had. He begged leave to thank them for the compliment on behalf of himself and his brother judges (applause).

The Earl of Leicester was received with loud cheers. He said: The toast I have the honour to propose is, "Success to the Highland and Agricultural Society of Scotland, and the Royal Agricultural Improvement Society of Ireland." I shall not trespass upon your time when I see that the Duke of Richmond responds to the toast, who is far better acquainted than I am with the merits of the respective societies. As a breeder in Norfolk, I cannot sit down without expressing my satisfaction at being allowed to propose this toast in this city, and in this county (applause). I shall, no doubt, derive great benefit from this meeting; and though the eastern counties have been more successful than the nature and quality of the soil might lead us to suppose they would be, I am confident that a spur has been given to this district, that will enable them still more successfully to compete with the more favoured districts of England. But, gentlemen, it is not only the breeders of stock to which this society has opened its arms and extended its patronage, but it has always shown a great interest in the cultivation of the soil; and to this and to the high position we in Norfolk hold in England, as cultivators of the soil, we owe the honour of this visit from the Royal Agricultural Society of England. We are honoured by the presence of many visitors from distant counties, and may I express a wish, that those gentlemen who have sufficient leisure time on their hands will not leave this county before they examine the mode in which we cultivate our land; and I am confident that they and we shall derive mutual benefit. I will conclude, gentlemen, by saying that any members of this society who may find their way to the neighbourhood of Holkham, will be most welcome (applause). I will do all in my power to forward their views in regard to examining the mode in which we till our land. I beg leave to propose the "Highland and Agricultural Society of Scotland, and the Royal Agricultural Improvement Society of Ireland."—Drunk with three times three.

The Duke of Richmond rose, amid prolonged and loud cheers; and, after acknowledging the flattering manner in which he had been received, said, he trusted that they would not regret the favourable reception they had given him before he resumed his seat. In returning thanks for the two societies of England and Scotland, he might wish that he had more Scotch blood in his veins, but he was obliged to confess that he was half-bred, English and Scotch. A man who had real Scotch blood in his veins, in a hall dedicated to the Patron Saint of Scotland—St. Andrew, would have been more eloquent than he could lay any claim to be. The Highland Society of Scotland had been long established, and proved of immense benefit to that part of her Majesty's dominions. It was very extensively supported, and ought to be so, by every landlord who was worthy of that name (cheers). It was not till after he had succeeded to an estate in Scotland that he learned what great good had been effected through the instrumentality of that Society. He was attending a meeting of his tenantry when the subject was mentioned, and he might here perhaps appropriately recommend to all landlords the practice of having their tenants and friends to dine with them at least once in every year (loud cheering). His tenants told him that the Highland Society had been of immense benefit to them. The Royal Society of England originated with himself and the late Lord Spencer, a nobleman beloved by all who had the honour of his acquaintance. They met together, and the subject having been discussed, a conspiracy (if conspiracy it might be called) was entered into to bring the matter forward. By the aid of other gentlemen, the project became strengthened. The question was mentioned at the next Smithfield Cattle Show, and it was so well received by them, that the present Royal Society was the result. They had also reason to be thankful that in Ireland a Royal Agricultural Improvement Society had been established. He must here also express his personal gratification at the very appropriate and eloquent manner in which the Society had been introduced to their notice by Lord Leicester. The high character which his revered parent (loud cheers) bore, not only in the county of Norfolk, but in Great Britain at large, and the deservedly high position he maintained as a liberal and good landlord, entitled the remarks of his son to very considerable respect. He hoped that on his, as on his father's banners, might ever be inscribed the motto of "Live, and let live" (applause). He was glad to find the son was treading in the steps of his father. (cheers). He would advise all landlords, especially young ones, if they had not already done so, to keep up the habit of meeting tenant-farmers (Hear, hear). It was the only way they could become acquainted with their habits and feelings; and he was able to assure them, that if they did, they would never go amongst them without being heartily received and cheered. His Grace concluded by assuring them, that no rivalry existed amongst them but to see who could do the most towards promoting the interests of the great body of the people.

Colonel Challoner said, in obedience to the orders of the President, he had to propose the health of the President-elect; he gave the health of the Marquis of Downshire, which was drunk with three times three.

The Marquis of Downshire said he had to return his sincere thanks for the kind reception they had been pleased to give his name, and he could assure them that it was very gratifying to his own feelings to be so well received among them. If the noble Duke found it necessary to ask for their kind indulgence—he who was so well known and appreciated for what he had done for the farming and agricultural interests—how much more did he need it who was so little known to the most of them? They had been kind enough to notice his name as the son of one whom they well knew, and he was well aware what his father's services were, and he would confess to them that one of the reasons which induced him to accept the high office they imposed upon him was, that the name of the Marquis of Downshire, out of respect for his father, should be at the head of that association. He well knew his father's feeling towards the society; he was one of its first and foremost supporters. For these reasons, and having a deeply-rooted feeling of kindness to the agricultural interest, the late marquis had looked forward to be president at some future time. He was only sorry that he stood there in his father's place; but the laws of God were not to be controverted, and he would do his duty to the best of his ability, and as he really believed his father would have done it. He had not prepared any speech, as he knew they liked better what came from the heart. He had to quarrel with Col. Challoner only for using the word amusement in reference to the society's proceedings; he called it a paramount duty (applause). The Colonel had said he accepted the office of president on certain conditions; that was true; but they must not think, because he took the office on conditions, that he undervalued the compliment. Far from that, he felt the value of the compliment in every sense of the word; but he was bound to recollect what he left behind him in Ireland, and God knew it required to be looked after enough. He, however, felt obliged by being proposed as president, though he had said that he could not give his undivided attention to the duties of the office. If the lesser portion of the year would do for them, then he was their humble servant. He had accepted the office, and he had now the honour of standing before them (applause). He could have wished that some one better known had taken it, and he thought the members had a right to know who was their president. All he could say was, that he was perhaps one of the largest holders of land living by agriculture in the country, though he was a wretched bad farmer, and made nothing by it. Whether he brought his goods to the dearest or the cheapest market, he was as badly off as ever. He conceived that it was not his place, as vice-president, to detain them long. Next year, when he had the honour to fill the higher office, he might find something to say; but this he would say, that he had no earthly means of living but by the land. He would not detain them longer, except to wish them all health and prosperity, a good harvest, and fair play (applause).

The Marquis of Downshire, at the call of the Chairman, again rose, and proposed the Railway Companies, and thanks to them for the facilities they have afforded to the society (applause).

The Chairman then retired, and the assembly separated. —*Norfolk Chronicle.*

THE GENERAL MEETING OF THE MEMBERS OF THE SOCIETY

took place on Friday forenoon in the Guildhall.

The Earl of Chichester took the chair.

Colonel Challoner opened the business by proposing a vote of thanks to the Mayor and Corporation of Norwich for the facilities which they had afforded to the Society. There was no town which the Society had ever visited to the authorities of which it was more indebted than to those of the ancient city of Norwich (Hear, hear).

Sir R. Price seconded the motion.

Mr. Bignold, the Mayor, returned thanks. He was sure that the inhabitants of Norwich would be deeply sensible of the honour which the Society had, by its vote, conferred upon them.

Mr. Fisher Hobbs moved the thanks of the society to the Local Committee, a body to which they were much indebted.

Mr. Shaw seconded the motion, which was duly carried.

Mr. Burroughes returned thanks.

Sir R. Price proposed "A vote of thanks to the owners and occupiers of the land on which the show had been held." The society had been remarkably fortunate this year as to the ground which had been placed at their disposal.

Captain Pelham seconded the motion, which was duly carried.

Colonel Challoner proposed "A vote of thanks to the Committee of the Norfolk and Norwich Museum and the Norfolk Chamber of Commerce, for the liberality with which they had opened their premises to the members of the society."

Mr. BARNETT seconded the motion, which was carried.

Mr. FISHER HOBBS moved a vote of thanks to the directors of the Eastern Counties and the Norfolk Railways for the facilities which they had afforded to the society for the conveyance of stock and implements. He could speak feelingly in the matter, as having experienced the extreme courtesy of the railway authorities, and he had no doubt but that the members of the society would corroborate what he had just stated. (Hear).

Mr. KINDER seconded the motion, which was carried by acclamation.

Sir R. PRICE moved a vote of thanks to Professor Simonds and the Rev. E. Sidney for the valuable lectures which they had delivered. The only drawback in respect to these lectures was, that they had been fixed for hours at which the great majority of the members of the society were actively engaged in the cattle yard.

Colonel CHALLONER seconded the resolution, and hoped that the lectures would next year take place at more convenient hours than those for which they had been fixed in the present year.

Professor SIMONDS, on his own part and that of the Rev. E. Sidney, returned thanks.

The President here left the chair, which was taken by the new president, the Marquis of Downshire.

The Duke of RICHMOND then observed that he it was who had proposed the noble earl as chairman for the present year, and he hoped that nobody had seen cause to repent the selection (Hear, hear, hear). He was sure that he was only expressing the opinion of every member of the society when he proposed a vote of the cordial and hearty thanks of the society to his noble friend for his great and successful exertions in their cause as president.

Colonel CHALLONER, in the name of the society, begged to second the motion.

The resolution having been duly carried,

The Earl of CHICHESTER returned thanks for the honour thus bestowed upon him, and for the still higher honour of having been asked to preside over them as their President for a year. The only merit which he claimed was that of having endeavoured honestly to discharge the not very onerous duties of the office, and in performing these he was bound to state that in common with his predecessors, he had always been ably, zealously, and effectively supported by the members of the council, and by those of the association in general (cheers).

The business of the meeting then terminated.

PRIZES FOR THE IMPLEMENTS.

JUDGES OF IMPLEMENTS.—Mr. Parsons, Mr. Carr, Mr. Lister, Mr. Taylor, Mr. Nalder, Mr. Wallis, Mr. Shaw, Mr. Hawkins, Mr. Love.

CONSULTING ENGINEERS.—Messrs. Easton and Amos.

PRIZES.

For the plough best adapted to heavy land £5, Messrs. Williams and Taylor.

For the plough best adapted to light land £5, Mr. Howard.

For the plough best adapted for general purposes £5, Mr. Ball.

For the best paring plough £5, Mr. Kilby.

For the best subsoil pulverizer £5, Mr. Comins.

For the best drill for general purposes £15, Mr. Hornsby.

For the best corn-drill £10, Messrs. Garett.

For the best turnip-drill on the flat £10, Mr. Hornsby.

For the best turnip-drill on the ridge £10, Messrs. Garrett.

For the best drop-drill for depositing seed and manure £10, Messrs. Garrett.

For the best manure distributor £5, Mr. Crosskill.

For the best portable steam engine applicable to threshing and other agricultural purposes £50, Messrs. Garrett.

For the second best ditto £25, Messrs. Clayton, Shuttleworth, and Co.

For the best portable threshing machine applicable to horse or steam power £25, Messrs. Garrett.

For the best corn dressing machine £10.

For the best grinding mill for breaking agricultural produce into fine meal £10, Messrs. Clayton, Shuttleworth, and Co.

For the best linseed and corn crusher £5, Messrs. Hurwood and Turner.

For the best chaff cutter £10, Mr. John Cornes.

For the best turnip cutter £5, executors of the late James Gardner.

For the best oil-cake breaker £5, Mr. Nicholson.

For the best one-horse cart £10, Mr. Crosskill.

For the best harvest cart £10, Mr. Crosskill.

For the best waggon £10, Mr. Crosskill.

For the best machine for making draining tiles or pipes £20 Mr. Whitehead.

For the best set of tools for general draining £3, Messrs Mapplebeck and Lowe.

For the best heavy harrow £5, Messrs. Williams and Taylor.

For the best light harrow £5, Messrs. Williams and Taylor.

For the best Norwegian harrow £5, Messrs. Stratton, Hughes, and Co.

For the best scarifier £10, Messrs. Ransomes and May.

For the best cultivator or grubber £10, Messrs. Smith and Co., of Stamford.

For the best horse hoe on the flat £10, Messrs. Garrett.

For the best horse hoe on the ridge £5, Mr. Busby.

For the best horse rake £5, Messrs. Williams and Taylor.

For the best hand dibbler £3, Dr. Newington.

For the best barrow hand-drill, to work with cups £3, Mr. Holmes.

For the best liquid manure distributor £5, Messrs. R. and J. Reeves.

For the best haymaking machine £5, Messrs. Smith and Co., of Stamford.

For the best gorse bruiser £5, Messrs. Barrett, Exall, and Andrewes.

For the best and most economical steaming apparatus for general purposes £5, Mr. Stanley.

SILVER MEDALS.

Corn dropping machine, Messrs. Ransomes and May.

Ribbing drill, Mr. Busby.

For his invention of depositing the manure on the ridge before the roller, and combining the two principles of the ridge and flat in the same implement, Mr. Hornsby.

A plough for general purposes, Mr. Downs.

For their universal plough, marked Y. U. L., Messrs. Ransomes and May.

Cart saddle, Mr. James Hunter.

Patent irrigator, Messrs. Wedlake and Thompson.

Digging fork, Messrs. Ransomes and May.

Churn, Mr. Whitehead.

Portable farm railway, Mr. Crosskill.

Circular saw bench, for making hurdles, &c., Mr. Burrell.

For improvements in cutting wires and dye plates, Mr. Scragg.

Highly commended—Machine for making drain pipes and tiles—Stand No. 39, article 2—Mr. Scragg.

Commended—Portable thrashing machine—Stand No. 107, article 2—Messrs. Hurwood and Turner.

CATALOGUE OF IMPLEMENTS EXHIBITED AT THE SHOW.

James Wilmot Newberry, Hook Norton, near Chipping Norton, Oxfordshire.

A five-rowed dibbling machine, invented and improved by Saunder and Newberry, of Hook Norton and Bloxham, and manufactured by the exhibiter, R. Clyburn, of Uley, and R. Hornsby, of Grantham (obtained the prize at Shrewsbury of £15); a one-rowed dibbling machine, invented by Saunder and Newberry, of Bloxham and Hook Norton, improved and manufactured by the exhibiter, Clyburn, of Uley, and Hornsby, of Grantham; a hand dibble, invented and improved by Saunder and Newberry, of Bloxham and Hook Norton, and manufactured by the exhibiter, Clyburn, of Uley, and Hornsby, of Grantham. (New implement) a barrow drill, invented by Wm. Burberry, of Hook Norton, and manufactured by the exhibiter.

James Phillips, of 116, Bishopsgate-street Without, London.

Specimens of glass milk pans, glass cream pots, and glass butter pots, improved by the exhibiter, and manufactured by J. Hartley and Co, of Sunderland; a lactometer with 12 tubes and stand, and a lactometer with 4 tubes and stand, invented by Geo. W. Kirkby, of London, and manufactured by the exhibiter; a lactometer for ascertaining the richness of milk, manufactured by the exhibiter; an assortment of propagating glasses, ditto of bee glasses, a specimen of tiles made of rough plate glass, a specimen of tiles made of sheet glass, and a specimen of corrugated glass tiles, manufactured by James Hartley and Co., of Sunderland; a wheel barometer, a pediment barometer, and a specimen of slates made of rough plate glass, manufactured by the exhibiter; a specimen of slates made of sheet glass, manufactured by James Phillips and Co.; an assortment of glass for agricultural and horticultural purposes; a mariottee steam pressure gauge, invented by Wolff, and manufactured by the exhibiter. (New implements) a steam pressure gauge, and a thermometric alarum, invented by Baker, of London, and manufactured by the exhibiter.

Stratton, Hughes, and Co., of Bristol.

A single-horse harvest cart, with wheels 3½ inches wide, invented by J. Hannam, Esq., of Burcot, Oxon, improved by the late Mr. Richard Stratton, of Bristol, and manufactured by the exhibiters (a silver medal was awarded to this cart at Southampton); a single-horse harvest cart, and a manure cart, body and shafts to fit the wheels and axle, invented by John Morton, Esq., of Whitfield, Gloucestershire, manufactnrered by the exhibiters; an improved single-horse spring cart, improved by the late Mr. Richard Stratton, of Bristol, and manufactured by the exhibiters; a farm cart, a meal or corn delivery cart, and a light agricultural cart, improved and manufactured by the exhibiters; a single-horse farm cart, and a pony cart, improved and manufactured by the exhibiters; cart for carrying bullocks and live stock, invented by the late Mr. Richard Stratton, and manufactured by the exhibiters; a patent waterproof cart cover, invented and manufactured by Edward Vergette, of Peterborough; a cranked axle spring cart, for carrying live stock, a cranked axle tipping manure cart, a patent cylinder water and liquid manure cart, and (new implement) a patent tumbler cart, invented by the late Mr. Richard Stratton, of Bristol, improved and manufactured by the exhibiters; a portable liquid manure pump, with stand and flexible Suction pipe, invented, improved, and manufactured by the exhibiters; (new implement) a patent wrought-iron cart, invented, improved, and manufactured by the exhibiters; York prize farm waggon, with patent iron wheels, invented, improved, and manufactured by the exhibiters (to this waggon the prize of the Royal Agricultural Society was awarded at York, in July, 1848); a tipping waggon, with patent iron wheels, invented by the late Mr. Richard Stratton, of Bristol, improved by P. B. Purnell, Esq., of Stancombe Park, Dursley, manufactured by the exhibiters. A one-horse waggon, with lock under fore-carriage; a meal or corn delivery waggon; a Gloucestershire farm waggon; a farm waggon, with double shafts; a corn delivery waggon, with patent axle, springs and pole; a spring van or break waggon; a strong farm waggon — improved and manufactured by the exhibiters. Several pairs of patent wrought-iron wheels and axle arms, invented, improved, and manufactured by the exhibiters; a section of Stratton, Hughes, and Co.'s patent iron wheel; three pair of improved cart wheels, with axle arms, manufactured by the exhibiters; a pair of oil-box iron naves, fitted with axle arms, invented and improved by the late Mr. Richard Stratton, of Bristol, and manufactured by the exhibiters; four Norwegian harrows, with bodkin and shafts; invented by George Edward Frere, Esq., of Roydon, and the exhibiters, improved and manufactured by the exhibiters (received a prize at Shrewsbury, and again at Newcastle); a Ducie's drag, or Uley cultivator, in wrought iron, invented by the Right Hon. Earl Ducie, of Tortworth, improved and manufactured by the exhibiters; a Read's patent sub-pulverizer, invented and improved by the late Mr. John Read, of London, and manufactured by the exhibiters (this implement has received prizes of the Society at Shrewsbury, Newcastle, Northampton, and York); a patent wrought-iron plough, invented, improved, and manufactured by the exhibiters; a patent machine for crushing linseed, invented, and manufactured by Messrs. Parsons and Clyburn, of Lambrook and Uley; a set of improved spanners or screw wrenches, invented and manufactured by Richard Clyburn, of Uley; a wrought-iron wheelbarrow, improved and manufactured by the exhibiters; a wrought-iron barrow with apparatus for heating gas tar, and sheet-iron buckets, manufactured by the exhibiters; a model of a family cart; a stand of models of carts and waggons; a drawing of a dog cart; a set of drawings of carts and waggons.

Henry Clayton, 21, Upper Park-place, Dorset-square, London.

Patent double-action hand-working machine, for the perfect screening of the clay, and entire manufacture of all sizes and shapes of draining pipes, draining, and other tiles, from 1-inch to 13-inch diameter, ridging tiles, hollow bricks, &c. (this machine, last season, had awarded the prize of the Royal Agricultural Society of Ireland, the prize of the Royal Highland Agricultural Society of Scotland, and the prize of the Royal North Lancashire Agricultural Society); an improved iron pug mill, for preparing the clay, viz., the thoroughly amalgamating of the different strata of clay, the reducing of hard lumps, and for rapidly and economically bringing the clay into the best state for the manufacture of draining pipes, tiles, and bricks, improved and manufactured by the exhibiter; plans, working drawings for the erection of kilns, sheds, hakes, &c., for tile and brick works; improved "patent" steel brick, and other moulds, for moulding all kinds and shapes of bricks, paving and roofing tiles, fancy goods, &c.; Clayton's "Cycloidal shape" cast-steel draining tools, with polished blades, or the ordinary black blades; Clayton's "spear-shape and tri-faced" cast steel draining tools, invented, improved, and manufactured by the exhibiter; Clayton's cast-steel draining tools, various, improved and manufactured by the exhibiter; (new implement) Clayton's cycloidal shape cast-steel draining tools, invented, improved, and manufactured by the exhibiter; (new implement) Clayton's "drain consolidator and chaser," invented and manufactured by the exhibiter; Clayton's cast-steel spades, and universal garden forks, improved and manufactured by the exhibiter.

Clayton, Shuttleworth, and Co., of Lincoln.

(New implements) a five, seven, and nine horse power portable steam engines, with improved tubular boiler, invented, improved, and manufactured by the exhibiters; (new implement) a portable thrashing machine, invented, improved, and manuactured by the exhibiters; (new implement) a portable straw shaker, improved and manufactured by the exhibiters; (new implement) a pair of portable mill stones, driven by steam power, invented, improved, and manufactured by the exhibiters.

Thomas Bigg, of Leicester House, Great Dover-street, Southwark.

Three specimens of sheep-dipping apparatus, invented, improved, and manufactured by the exhibiter.

John Eaton, of Woodford, near Thrapstone, Northampton.

(New implements) four one-horse carts for general farm purposes, invented, improved, and manufactured by the exhibiter (to this cart was awarded the prize of £5 by the Royal Agricultural Society of England, at their meeting at York, in July, 1848); (new implements) a one-horse harvest cart, and a waggon, invented, improved, and manufactured by the exhibiter; (new implement) a patent draining pipe and tile machine, invented, improved, and manufactured by Michael James Brown, of Oundle.

The Executors of the late James Gardner, of Banbury, Oxford.

A patent turnip-cutting machine, with 30, and another with 26 knives for sheep and 8 knives for beasts; and a patent chaff-cutter, with 2 knives; invented by the late James Gardner, of Banbury, and improved and manufactured by the exhibiters.

William Busby, of Newton-le-Willows, near Bedale, Yorkshire.

A two-wheeled plough; a two-wheeled plough, with Ransome's truss beam (the prize of £10 was awarded to this plough at the meeting of the Royal Agricultural Society held at Northampton in 1847), a light two-wheeled plough, and a two-wheeled plough, invented, improved, and manufactured by the exhibiter; a swing plough, and a double mould or ridge plough, invented, improved, and manufactured by the exhibiter; (new implement) a registered machine for ribbing, pressing, and drilling, and (new implement) a registered ribbing and drilling machine, invented by the Rev. Wm. Wharton, rector of Barningham, near Barnicastle, and manufactured by the exhibiter; several horse hoes, invented, improved, and manufactured by the exhibiter (a silver medal was awarded to these implements by the Royal Agricultural Society at York, 1848); a horse rake, a grass land cultivator and horse rake, and a set of undulating harrows, invented, improved, and manufactured by the exhibiter.

Lewis B. Elliot, of Chapel Brampton, near Northampton, Northamptonshire.

A two-wheeled plough for light land, a two-wheeled plough for general purposes, a horse hoe, (new implement) a double mould-board plough, and (new implement) a draining plough, invented by the exhibiter, and manufactured by William Langdell, of Kingsthorp.

John Shephard, of West Haddon, near Daventry, Northamptonshire.

A waggon and a cart, invented and manufactured by the exhibiter.

Corbett Whitton, of Tixall Heath, near Stafford, Staffordshire.

(New implement) a two-horse-power corn mill for grinding all kinds of grain for cattle, &c., invented by J. R. Remington, of Alabama, United States (now of Wolverhampton), and manufactured by the exhibiter.

Charles Burrell, of Thetford, Norfolk.

(New implement) a patent portable thrashing and dressing machine, invented by Mr. Walter Palmer, of Southacre, improved and manufactured by the exhibiter (a silver medal was awarded to this machine at the meeting of the Royal Agricultural Society of England at York, 1848; a four-horse-power and a six-horse-power portable thrashing machines, invented, improved, and manufactured by the exhibiter. An improved horse-works of two-horse-power; a chaff engine, adapted for steam or horse-power; a band chaff engine, and a double cake-breaker—invented, improved, and manufactured by the exhibiter. (New implement) a circular-saw bench or machine for making hurdles or gates, invented by Mr. Walter Palmer, of Southacre, and improved and manufactured by the exhibiter. (New implement) an improved corn-dressing machine, and (new implement) a furze or gorse-cutting and bruising machine, invented by Mr. Joseph Soulby, of Munford, and improved and manufactured by the exhibiter. A portable grinding mill for breaking agricultural produce into fine meal, invented, improved, and manufactured by Mr. Walter Palmer, of Southacre, Norfolk.

Egerton Harding, of Oldsprings, near Market Drayton, Salop.

A set of pair-horse whippletrees; a pair-horse cultivator; a pair-horse subsoil plough; a one-horse cart; a harvest cart, and a light harvest cart—manufactured by the exhibiter.

F. M'Neill and Co., of Lamb's Buildings, Bunhill-row, London.

The patent asphalted felt for roofing houses and every description of farm buildings, for lining damp walls, particularly of granaries, and the floors of granaries, as vermin will not touch it; a rick stand of very cheap construction, and an excellent check to vermin, invented by J. F. Williams.

Dr. Newington, of Knowle Park, Frant, near Tonbridge Wells.

(New implements) several descriptions of patent economic hand-seed dibbles, invented by the exhibiter, and manufactured by Mary Wedlake and Co., and Penfold, Ticehurst, Sussex; (new implement) a hand drill, hoe, cultivator, scarifier, and grubber, invented by the exhibiter, and manufactured by Noakes, Lamberhurst, Kent, and Penfold, Ticehurst, Sussex; (new implement) a patent hand drop drill, with six coulters, for any distance and depth, invented by the exhibiter, and manufactured by Penfold, Ticehurst, near Hurstgreen, Sussex; (new implement) a hand cup drill, for sowing all seeds, the coulters shifting to any distance, (new implement) a scarifier, cultivator, stubble cleaner, and sward parer, invented by the exhibiter, and manufactured by Noakes, ironmonger, of Lamberhurst, Kent.

John Benstead, of Burlington St. Andrew, Norwich Norfolk.

A one-horse cart, improved and manufactured by the exhibiter.

James Comins, of South Molton, Devonshire.

A horse hoe, improved by Mr. Willis, of Dennaton, near Swymbridge, and invented and manufactured by the exhibiter; (new implement) a paring plough, improved and manufactured by the exhibiter; a registered one-way turn-over or turn-rest plough for general purposes, a subsoil pulverizer, invented, improved, and manufactured by the exhibiter; (new implement) a plough adapted to heavy and light land, invented and manufactured by the exhibiter; a drain plough, and a plough to fill in the soil cast out of drains, invented, improved, and manufactured by the exhibiter.

James Hayes, Elton, Stilton, Huntingdonshire.

A six-horse patent peg thrashing machine, with straw shaker attached, for travelling, invented by Joseph Atkinson, Brayham Hall, and improved and manufactured by the exhibiter; a registered straw shaker, two grinding mills, and a crank appendent, invented and manufactured by the exhibiter.

Richard Read, 35, Regent Circus, Piccadilly, London.

A patent subsoil pulverizer (a prize of £10 was awarded for this implement at Southampton, July, 1844; at Shrewsbury, July, 1845; at Newcastle-on-Tyne, July, 1846; and at Northampton, July, 1847); a patent double-action agricultural fire engine and tubes complete, a patent agricultural fire engine, a domestic watering engine, a patent injecting instrument and tube (complete for horses, cattle, &c.), a hollow probang for relieving hoven or choked cattle, sheep, or calves; a patent hand watering machine, and a double-action watering engine (with tubes, &c., complete), all invented by the late John Read, of 35, Regent Circus, and improved and manufactured by the exhibiter.

William Stockings, of Blofield, Norwich, Norfolk.

(New implement) a turnip drill for drilling on the ridges, and (new implement) a scarifier, invented and manufactured by the exhibiter.

Edward Weir, 351, Oxford-street, London.

An improved circular saw table and boring machine, a portable wrought-iron liquid manure pump and stand, (new implement) a portable manure pump, a set of iron work for a liquid manure or water cart, and an improved draining level, invented and manufactured by the exhibiter; metallic churns, invented by Mr. Johnson, of London, and manufactured by the exhibiter; a curd-breaking machine invented and manufactured by the exhibiter; a cast-iron circular pig trough, a cast-iron rick-stand posts, rolls of iron wire sheep netting different heights, rolls of iron wire rabbit netting different heights, a roll of iron wire (diamond pattern) game netting, a roll of iron wire (square pattern) game netting, and several ornamental garden hurdles to exclude game, manufactured by the exhibiter.

Edward Hammond Bentall, of Heybridge, near Maldon, Essex.

Patent broadshare or scarifier and subsoil plough combined in one implement, patent surface plough or broadshare, patent mangel hoe, patent mangel hoe and moulding-up plough, (new implement) patent double Tom plough, patent ploughs (mark, N. G. H.), patent plough (mark, J. P. W.), all invented and manufactured by the exhibiter; a Bentall's plough (the old original Goldhanger or Essex plough), invented by William Bentall, of Goldhanger, and manufactured by the exhibiter; Bentall's patent iron ploughs (I. P., 5), Bentall's iron root or winrow plough, Bentall's improved double iron roll, and Bentall's improved double-right roll, invented and manufactured by the exhibiter; patent registered chaff-cutter (No. 6), invented by John Cornes, of Barbridge, and manufactured by the exhibiter; oilcake breaker, invented and manufactured by the exhibiter; a round hog's-trough, manufactured by the exhibiter.

Robert John Blyth, of Norwich, Norfolk.

A four-horse power thrashing machine, and a chaff-cutting engine, improved by R. J. and F. M. Blyth, of Norwich, and manufactured by the exhibiter.

Richard Burrows, of Ruddington, near Nottingham, Nottinghamshire.

An improved cultivator or grubber, improved and manufactured by the exhibiter.

William Crosskill, of the Iron Works, near Beverley, Yorkshire.

A patent serrated roller or clod crusher, invented, improved, and manufactured by the exhibiter (awarded a prize of £20 and silver medal at Southampton, £10 at Shrewsbury, and the gold medal at Newcastle); an improved ring roller, an iron field roller, improved and manufactured by the exhibiter; several pair or sets of patent cart wheels and axles, and three sets of patent waggon wheels and axles, invented, improved, and manufactured by the exhibiter; improved waggons, improved and manufactured by the exhibiter; a best spring Yorkshire waggon, a light one-horse spring cart, a one-horse harvest cart, improved and manufactured by the exhibiter; an improved Norfolk one-horse cart or harvest cart, improved by Mr. James Everett, of Fakenham, Norfolk, manufactured by the exhibiter; a Newcastle "model" one-horse cart or harvest cart (received the head prize at the Newcastle meeting), an Eaton's patent York one-horse cart or harvest cart, invented by John Eaton, of Woodford (awarded the prize of £5 at the York meeting); a Shrewsbury one-horse cart with self-acting tail-board, improved and manufactured by the exhibiter (received a prize of £2 at the Shrewsbury meeting); a Lincolnshire one-horse cart, improved by William Torr, Esq., of Riby, manufactured by the exhibiter; a combined harvest cart and Scotch cart, invented by J. Hannan, Esq., of Burcot Park, Oxon; improved iron liquid manure carts or distributors, invented, improved, and manufactured by the exhibiter (obtained a medal at Cambridge, since greatly improved); a portable liquid manure pump, with flexible pipe, &c., improved and manufactured by the exhibiter; a portable liquid manure pump and stand, improved and manufactured by the exhibiter; a fixture iron pump, with twelve feet of iron pipe, and winbore, invented by Mr. Beare, of London, improved and manufactured by the exhibiter; a portable farm railway, improved and manufactured by the exhibiter; a portable railway turntable, &c., and a portable farm-railway waggon, invented, improved, and manufactured by the exhibiter; a portable farm railway waggon, invented and manufactured by the exhibiter, improved by Thomas Fyson, Esq., of Barningham; (new implement) a portable bone mill, a broadcast portable manure drill, or distributor, for sowing soot, lime, salt, ashes, guano, &c., (awarded a prize at Bristol, and the prize of £10 at Northampton), invented, improved, and manufactured by the exhibiter; a two-horse power portable thrashing machine, a four-horse power portable ditto, improved and manufactured by the exhibiter; an improved corn-dressing machine, a two-horse power straw-cutter, improved and manufactured by the exhibiter; an Archimedian potato-washer, and Egyptian bean-washer, invented by Captain Carr, of Tuschenbeck, Germany, improved and manufactured by the exhibiter; an Archimedian root-washer, improved and manufactured by the exhibiter (awarded a silver medal at the York meeting); a patent universal crusher, or "V" mill, invented by Parsons and Clyburn, of Uley, a universal roller mill, a Yorkshire double-action turnip-cutter, an iron sack barrow, improved and manufactured by the exhibiter; a Gilbert's patent sack-holder, and a patent improved sack-barrow-holder, invented by H. Gilbert, Esq., of London, improved and manufactured by the exhibiter; (new implement) a patent improved sack-holder and elevator, invented, improved, and manufactured by the exhibiter; a patent iron fixture pig trough, invented by William Torr, Esq., of Riby; large circular iron pig troughs, improved and manufactured by the exhibiter; a drag harrow, or Uley cultivator and scarifier, invented by Mr. John Morton, of Whitfield, improved by Mr. Richard Clyburn, of Uley, manufactured by the exhibiter; an improved Norwegian harrow, improved and manufactured by the exhibiter (awarded the head prize at the York meeting, since greatly improved); a patent subsoil pulverizer, invented by the late Mr. John Read, of London, manufactured by the exhibiter (obtained a prize of 10 sovs. at Southampton, 1844; 10 sovs. at Shrewsbury, 1845; 10 sovs. at Newcastle, 1846; and 10 sovs. at Northampton, 1847); an iron stack pillar, manufactured by the exhibiter.

George Howe, of 119, Great Guildford-street, Borough, Southwark.

(New implement) a portable steam engine of six horse-power, invented, improved, and manufactured by the exhibiter; a patent transparent water gauge, for showing the exact level of the water in steam-boilers, invented and improved by the exhibiter, and manufactured by Frost, Noakes, and Vincent, of Brick-lane, London (a silver medal was awarded to this article at the York meeting in 1848); (new implement) an improved float for steam boilers, specimens of improved gun-metal fittings for steam and hot water apparatus, invented, improved, and manufactured by Frost, Noakes, and Vincent, of Brick-lane, London.

Robert Overman, of Burnham Sutton, near Burnham Market, Norfolk.

A hand drag rake, invented and manufactured by the exhibiter.

Richmond and Chandler, of Victoria Bridge, Salford, near Manchester, Lancashire.

An improved steaming apparatus, invented, improved, and manufactured by the exhibiters (obtained a premium of £5 at Derby, Southampton, and Shrewsbury); (new implement) a new tubular boiler and apparatus for steaming produce, chaff machines, corn crushers, a mill for kibbling beans, peas, malt, barley, oats, Indian corn, &c., improved linseed mills, an improved grain mill or linseed crusher, an improved machine for washing potatoes, turnips, &c., an improved turnip cutter, an improved churn, invented, improved, and manufactured by the exhibiters: a patent sack holder, invented by Henry Gilbert, of London, and improved and manufactured by the exhibiters; a patent sack holder truck, invented by Henry Gilbert, of London, improved by Joshua Cooch, of Northampton, and manufactured by the exhibiters.

Richard Robinson, Belfast, Antrim.

A steaming apparatus for general purposes, the boiler invented by Isaac Jennings, of New York, improved and manufactured by the exhibiter (awarded the prize of £5 at Newcastle-on-Tyne, 1846, £10 at Northampton, and silver medal at York, 1848); churning machines, with fly wheel and stand, invented by John Rowan and Sons, of Ballyclare, and improved and manufactured by the exhibiter (obtained the prize at Newcastle-on-Tyne of £5, and at Northampton £5, besides eight silver medals and £30 at different shows in Ireland and Scotland, being always the best); (new implement), a new and improved churning machine, invented by an unknown person in America, and improved and manufactured by the exhibiter.

Wm. C. Cambridge, of Lavington Iron Works, Cathay, near Bristol, Somersetshire.

A portable steam engine, of four horse power, invented, improved, and manufactured by the exhibiter (awarded a prize of £15 at Bristol in 1842, £10 at Derby, 1843, £5 at Southampton, 1844, £5 at Shrewsbury, 1845, and £50 at Northampton, 1847); (new implement), a portable bolting, thrashing, winnowing, and weighing machine, invented by T. Humphries, of Pershore, improved by the exhibiter, and manufactured by T. Humphries, of Pershore; a patent portable four horse power horse-work, a portable bolting thrashing part, invented and manufactured by the exhibiter; a patent press wheel roller and clod-crusher, invented and manufactured by the exhibiter (obtained a prize of £5 at the Farmers' Club Meeting at Preston, Lancashire, as the best implement for preventing the ravages of the wire-worm and slug, a prize at Exminster, Devon, for rolling pasture or meadow land, at Exeter, Devon, for preparing winter or spring fed turnip land to receive barley, &c., a prize at North Lincolnshire for clod crushing, and a silver medal at Edinburgh for its uses in producing good crops of mangel wurtzel, swedes, or turnips.

Richard Coleman, of Chelmsford, Essex.

Patent drag harrows and scarifiers, invented and manufactured by the exhibiter; a patent drag harrow and cultivator, invented, improved, and manufactured by the exhibiter; a patent expanding lever harrow, invented and manufactured by the exhibiter (awarded a prize of £5 at Newcastle, 1846); a patent expanding harrow, invented, improved, and manufactured by the exhibiter; a patent subsoil harrow or pulverizer, invented and manufactured by the exhibiter.

George Cottam and Samuel Hallen, of 2, Winsley-street, Oxford-street, London.

An iron pug mill, invented by George Cottam, of 2, Winsley street, and manufactured by the exhibiters; a tile machine, invented by John Hatcher, of Benenden, improved by George Cottam, of 2, Winsley-street, and manufactured by the exhibiters; a weighing machine, invented by George Cottam, of 2, Winsley-street; an improved liquid manure cart, improved by same person; (new implement), a patent perpendicular saw table, invented by George and Edward Cottam, of 2, Winsley-street; a saw table and boring machine, invented by George Cottam; (new implement), a winnowing machine, invented and improved by Samuel Wheatley, of Radcliff, and manufactured by the exhibiters (awarded a prize of £10 at Shrewsbury, 1845); a seed and manure drill, invented by George Cottam, of 2, Winsley-street; a serrated chain harrow and a serrated chain harrow, invented by James Smith, of Deanston, improved by George Cottam, of 2, Winsley-street, and manufactured by the exhibiters (awarded a silver medal at Derby); (new implement) a patent straw cutter for long or short lengths, a liquid manure pump, (new implement) a liquid manure pump, invented and improved by George Cottam, of 2, Winsley-street, and manufactured by the exhibiters; a steel flour mill on post, manufactured by the exhibiters; a draining level, invented by Mr. S. Paine, of Llanelly House, Carmarthen, improved by George Cottam, of 2, Winsley-street, and manufactured by the exhibiters; sack holders, invented by G. Gilbert, and manufactured by the exhibiters; an oilcake breaker, improved by George Cottam, of 2, Winsley-street, and manufactured by the exhibiters; an assortment of rick stands or stack bottoms, manufactured by the exhibiters; (new implement), a patent grinding mill, invented by George Cottam, 2, Winsley-street, improved by George and Edward Cottam, and manufactured by the exhibiters; a ventilator for stables, a stable pump, a stable bucket, metallic churns, invented by Johnson, of London; an assortment of cottage casements and window sashes, manufactured by the exhibiters; a curd breaking machine, invented by Robert Barlas, of Edinburgh, and manufactured by the exhibiters; an odometer or land measure, a dynamometer or draught gauge, (new implement) a strepsimeter or hand-power gauge, a rheiocline or patent spring bedstead, invented by Edward Cottam, of 2, Winsley-street, and manufactured by the exhibiters; several solid iron bedsteads, manufactured by the exhibiters.

William Dyball, of North Walsham, Norfolk.

Two self-acting chaff-cutters, invented and manufactured by the exhibiter.

James Fison, Wymondham, Norfolk.

(New implement) an apparatus for dipping sheep and lambs, invented by Bigg, of Great Dover-street, Borough, improved by the exhibiter, and manufactured by William Campe, carpenter, of Wymondham.

John Holmes, of Norwich, Norfolk.

(New implement) a six-horse power portable thrashing machine, with newly-invented straw-shaker and jog screen attached; (new implement) a four-horse power portable thrashing machine, invented, improved, and manufactured by the exhibiter (at the East Norfolk Meeting, in 1843, the prize of £4 was awarded to this machine); (new implement) a general-purpose drill, improved and manufactured by the exhibiter; a sixteen-row lever corn drill, invented, improved, and manufactured by the exhibiter; a twelve-row lever corn drill, a five, four, three, and two-row lever drill for turnips and mangold wurtzel, with manure, on the flat, improved and manufactured by the exhibiter; a two-row lever drill, with self-adjusting rolls, for manure, mangold wurtzel, and turnips on the ridge, invented, improved, and manufactured by the exhibiter; (new implement) a one-row lever drill for turnips and mangold wurtzel, with manure on the ridge or flat work, invented and manufactured by the exhibiter; (new implement) a two-row lever drill for turnips and mangold wurtzel on the ridge, a hand-barrow drill for turnips and mangold wurtzel on the ridge or flat, invented, improved, and manufactured by the exhibiter; (new implement) a hand drill for turnips and mangold wurtzel, on the ridge or flat, invented and manufactured by the exhibiter; a drill to fix to the plough for depositing turnips and mangold wurtzel, improved and manufactured by the exhibiter; a hand machine for turnips; (new implement) a registered broadcast manure distributor, for guano, nitrate of soda, salt, soot, and any other manure for top-dressing, invented and manufactured by the exhibiter; (new implement) a thirty-row lever seed drill, a broadcast grass-seed sowing machine with carriage complete, (new implement) a broadcast grass-seed sowing machine with lever harrow complete, a nine-share scarifier or cultivator, a broadcast barley, oat, or grass-seed sowing machine, invented, improved, and manufactured by the exhibiter; (new implement) a light lever harrow, a double-action weighing machine, improved and manufactured by the exhibiter; a weighing machine, manufactured by the exhibiter; (new implements) corn-dressing machines, a corn blowing-machine, improved and manufactured by the exhibiter; (new implement) a barley-aveller or hummeller, with blowing machine connected, invented, improved, and manufactured by the exhibiter; (new implement) a barley-aveller, or hummelling machine, improved by H. Taylor, Esq., of Dilham, and manufactured by the exhibiter; (new implement) an improved horse works for one or two horses, invented and manufactured by the exhibiter; (new implement) an improved chaff-cutting machine, invented, improved, and manufactured by the exhibiter; several other chaff-cutting machines, several improved rape and linseed-cake crushers and corn-bruising machines, improved and manufactured by the exhibiter; (new implement) a light hand lever drag rake, (new implement) an improved registered horse lever drag rake, (new implement) a horse hoe for flat work, invented and manufactured by the exhibiter; a simple and effective horse hoe on the flat, a simple and efficient turnip hoe on the ridge, a hoe for turnips or mangolds, manufactured by the exhibiter; a thirty-knife Gardner's patent turnip-cutting machine for sheep, invented, improved, and manufactured by Jas. Gardner, of Banbury; several turnip-cutters for beasts or sheep, improved and manufactured by the exhibiter; an iron fold hurdle, manufactured by the exhibiter; a three or four-horse two-feet iron cylinder land roll, a two-horse iron land roll, a one-horse jointed iron roll, improved and manufactured by the exhibiter; a press wheel roller or clod-crusher, manufactured by the exhibiter; (new implement) a drain-pipe-making machine worked by a lever; (new implement) an improved double-breasted expanding plough, an expanding double-breasted Northumberland or furrow plough, improved and manufactured by the exhibiter; a Rackheath or subsoil plough, invented by Sir E. Stracey, of Rackheath, and manufactured by the exhibiter; (new implement) a subsoil or pulverizing plough, a Norfolk double-handled plough for paring stubbles, invented and manufactured by the exhibiter; a Norfolk double-handled foot plough with wheels, a Norfolk single-handled foot plough, a single-handled plough with drill attached, manufactured by the exhibiter; several other Norfolk single and double ploughs; a sack barrow with double handles, an octagon pig-trough with feeding hopper attached, a round pig trough with revolving top, a pig-trough six feet long, a plough carriage, a skim coulter for plough, a wheel coulter for plough, a set of plough whippletrees, and a light harrow to follow behind turnip hoe, all manufactured by the exhibiter.

John Howard and Son, of Bedford.

A patent iron plough, with two wheels, invented and manufactured by the exhibiters. The following prizes were awarded to this plough: The first prize of £5 at the Liverpool meeting; the first prize of £5 at the Bristol meeting; the first prize of £10 at the Shrewsbury meeting; at Newcastle-upon-Tyne, the first prize of £10 for the best plough for light land, and the first prize of £10 for the best plough for heavy land, were both awarded to this implement; also at Northampton, 1847, and at York, 1848, the first prize was (for the seventh time) again awarded to it for the best plough tried on light land. A patent iron swing plough; an improved Northumberland or double breasted plough; invented and manufactured by the exhibiters. A patent subsoil plough, or sub-pulverizer, invented and patented by John Read, of London; improved and manufactured by the exhibiters. Prizes awarded to this plough by the Royal Agricultural Society: The first prize of £10, at the Southampton Meeting, in 1844; the first prize of £10, at the Shrewsbury Meeting, 1845; the first prize of £10, at the Newcastle-on-Tyne Meeting, in 1846; the first prize of £10, at Northampton, 1847. An improved wrought iron lever scarifier or cultivator. An improved wrought iron scarifier or cultivator, invented and manufactured by the exhibiters; several sets of patent iron harrows, with whipple-tree (the first premium of the Royal Agricultural Society was awarded to these harrows at the Derby Meeting; at the last meeting of the Royal Agricultural Society, held at York, the first prize was again awarded to the exhibiters for a set of the above harrows, furnished with joints in the centre of each harrow, which allow them to adapt themselves to any unevenness of the surface), a set of patent jointed iron harrows (the first prize for the best set of harrows was awarded to these at the last meeting held at York), a set of patent iron drag harrows, a set of patent two-beam iron harrows with whipple-tree, invented by W. Armstrong and J. Howard, of Bedford, and manufactured by the exhibiters; a patent horse drag rake, an improved iron horse hoe, an improved corn mill, and an improved bean mill, invented and manufactured by the exhibiters; a set of improved trussed whipple-trees, invented by Egerton Harding, Esq., of Old Springs, improved and manufactured by the exhibiters; a set of improved steelyard trussed whippletrees, improved and manufactured by the exhibiters; an improved one-horse Bedfordshire cart, improved and manufactured by Maynard and Son, of Bedford; an improved Norwegian harrow, improved and manufactured by the exhibiters; a sundry basket of castings, whippletrees, &c., for using the plough, &c.

H. J. James, of 24, Leadenhall-street, and 244, Whitechapel Road, London.

A machine for weighing loaded carts, live cattle, and farm produce generally, invented by William Clarke, of London, improved and manufactured by the exhibiter (this machine obtained the prize of £10 at Newcastle); a weighing machine, invented by the exhibiter and Mr. Henry Pooley, of Liverpool, and manufactured by Henry Pooley and Son, of Liverpool.

Thomas Scragg, of Calveley, near Tarporley, Chester.

A double-action tile and pipe-making machine, a single-action tile, pipe, and brick-making machine, and a single action tile and pipe machine, invented and improved by the exhibiter, and manufactured by Mr. James Hewitt, of Calveley.

John Wood Sharman, of Wellingborough, Northampton.

(New implement) a turnip, mangel wurzel, and carrot drill, invented by Mr. Robert Paxton, of Willaston, near Bicester, and improved and manufactured by the exhibiter; (new implement) a turnip, mangel-wurzel, or carrot drill, with manure-box, invented and manufactured by the exhibiter.

William Prockter Stanley, of Peterborough, Northampton.

An improved rape and linseed-cake breaker, improved and manufactured by the exhibiter; a farmer's registered steam cooking apparatus, invented, improved, and manufactured by the exhibiter; a Stanley's registered roller mill, improved and manufactured by the exhibiter; a roller mill; a small spirally-cut roller-mill, manufactured by the exhibiter; (new implement) a patent cottage grate, invented and manufactured by John Duley of Northampton; a patent grass-cutting machine, invented by E. Budding, of Dursley, and manufactured by Ransomes and May, of Ipswich; (new implement) a labour machine, invented, improved, and manufactured by the exhibiter; (new implement) a Chinese pagoda, circular watch-house, shepherd's-house, or summer-house, manufactured by the exhibiter; an improved turnip-cutter, known as the "Royal Albert," invented, improved, and manufactured by the exhibiter; an improved chaff engine, improved and manufactured by the exhibiter; (new implement) a sackbarrow, sack-holder, and lifter, combined in one machine, invented and manufactured by the exhibiter; an iron plough, invented by Messrs. Faux, of Yaxley, improved and manufactured by the exhibiter; (new implement) a patent chaffing, winnowing, and corn-dressing machine, (new implement) a patent smut machine and general corn-cleaner, (new implement) a blowing machine for corn, invented and manufactured by Mr. Royce, of Fletland, Lincolnshire.

Thomas Johnson, of Cheapside, near Leicester.

(New implement) a powerful hay-making machine, a seven-tined scarifier or scuffler, (new implement) a portable milk vessel, improved and manufactured by the exhibiter; a wrought iron turf-paring plough, invented by Thos. Glover, of Thrussington, improved and manufactured by the exhibiter.

Edward Upfill, of Smithfield, Birmingham, Warwickshire.

A sheep-feeding fold on wheels; an improved sheep hay rack; an improved lime screen; an improved sand and ashes screen; a wrought iron gravel screen; (new implements) improved malt or grain screens; a farmer's field gate; two wrought iron field gates; a wrought iron cow crib; a sheep trough on wheels; a three-bar iron hurdle, and several sheep and ox hurdles; a length of running fence; sheep and cattle tree guards; garden chairs, with one, two, three, and four seats; an oval flower stand in six parts, a garden arch, in two halves, a round garden-stool, a wire tree guard, garden gates, a roll wire lattice, a hay rack, and a corner hay rack; invented and manufactured by the exhibiter.

James Woods, of Stowmarket, Suffolk.

(New implement) a four-horse thrashing machine, improved and manufactured by the exhibiter; (new implement) a drill roll or land presser, a double roll for spring corn (the Royal Agricultural Society awarded their prize of £10 10s. to this implement at their Cambridge meeting in 1840), a new jointed roll for field and pasture; invented, improved, and manufactured by the exhibiter; a field roller, a mill for crushing linseed, malt, oats, barley, Indian corn and rice, improved and manufactured by the exhibiter; an improved harrow or cultivator, invented by Finlayson, improved and manufactured by the exhibiter; a mill for grinding peas and beans, a linseed cake crusher; invented, improved, and manufactured by the exhibiter; a horse works for chaff engine and other purposes, improved and manufactured by the exhibiter; a horse-works all iron, a horse hoe, invented, improved, and manufactured by the exhibiter; a chaff engine, improved and manufactured by the exhibiter; a universal plough or horse hoe, invented by John Clarke, of Long Sutton, improved and manufactured by the exhibiter; two swing ploughs, a double mill, for grinding peas, beans, and barley, invented, improved, and manufactured by the exhibiter; a corn stack frame, to cover 21 feet, improved and manufactured by the exhibiter.

Joshua Cooch, of Harleston, near Northampton.

An improved patent corn and seed dressing machine, invented by the late John Cooch, of Harleston, improved and manufactured by the exhibiter (this machine in its original shape obtained the prize of £10 at the Liverpool meeting, July, 1841, also a prize of £15 at the Northampton meeting, July, 1847); a barley hummeller, invented, improved, and manufactured by the exhibiter (this machine obtained the prize of £3 at the Derby meeting, July, 1843, and a silver medal at the Southampton meeting, 1844); a patent sack-holder, invented by Henry Gilbert, of St. Leonard's-on-Sea, and manufactured by the exhibiter; a patent carriage and wheels, a model of corn and seed dressing machine, invented, improved, and manufactured by the exhibiter.

William Crowley, of Newport Pagnell, Bucks.

(New implement) a light one-horse cart; (new implement) a cart for one or two horses, with machine for sowing pulverised manure broadcast; (new implement) an universal hoe, to be drawn by one horse—invented, improved, and manufactured by the exhibiter.

BENJAMIN EDGINGTON, of 2, Duke-street, London Bridge, Surrey.

A rick cloth; a marquee; an improved dressed waggon cloth; a shooting tent—invented, improved, and manufactured by the exhibiter; a valise of samples, containing sacks, horse cloths, flags, &c.

THOMAS EVERSON, of North Walsham, Norfolk.

An iron plough adapted for heavy land, a Norfolk iron plough complete adapted for general purposes, an iron cultivator with shafts, invented, improved, and manufactured by the exhibiter; a complete set of tools for general draining purposes, improved and manufactured by the exhibiter.

EDMUND MOODY, of Frome, Somerset.

A chaff cutting machine, a turnip cutting machine, invented and manufactured by the exhibiter.

ISAAC MORLEY, of Norton, near Woolpit, Suffolk.

(New implement) a lever horse rake, (new implement) an improved cultivator or scarifier, invented, improved, and manufactured by the exhibiter.

Messrs. PAGE and GIRLING, of Melton Foundry, near Woodbridge, Suffolk.

(New implement) a portable thrashing machine applicable to horse or steam power, a corn and seed dressing machine, invented, improved, and manufactured by the exhibiters; a bean crusher, invented by J. C. Seammen, of Melton, and improved and manufactured by the exhibiters; an oil cake breaker, an improved horse drag rake, (new implement) a wrought-iron scarifier, a horse hoe, a one horse cart, improved and manufactured by the exhibiters.

LAURENCE RANDALL, of Hindolverton, East Dereham, Norfolk.

A one-horse cart for general farm purposes, improved and manufactured by the exhibiter; a one-horse cart, invented by J. Taylor, of Melton, improved and manufactured by the exhibiter.

WILLIAM SMITH, of Kettering, Northamptonshire.

(New implement) an improved patent winnowing machine, invented by the late Nathaniel Smith, of Kettering, improved and manufactured by the exhibiter; (new implement) a newly-invented steerage horse hoe, invented, improved, and manufactured by the exhibiter; (new implement) an improved skim or paring plough, an improved chaff-cutting machine, improved and manufactured by the exhibiter.

ALFRED SPARKE, of Norwich, Norfolk.

A chaff-cutter, manufactured by the exhibiter; a bean and malt mill, a set of horse works, invented and manufactured by the exhibiter; a set of horse works, invented by Sparke and Co., and manufactured by the exhibiter; a barley haulmer, improved and manufactured by the exhibiter; a wheel plough and standards, a barrow drill, (new implement) a compost drill to sow manure broadcast, a horse hoe, invented and manufactured by the exhibiter; horse rakes, oil-cake breakers, (new implement) a seed-sower with harrow, invented and manufactured by the exhibiter; a chaff-cutter, manufactured by the exhibiter; a portable four-horse power thrashing machine, improved and manufactured by the exhibiter; a linseed mill of one-horse power, a corn mill, one-horse power, for reducing agricultural produce into meal, improved and manufactured by the exhibiter; manure drills with four levers for flat and ridge work, a foot or swing plough, and a foot plough, manufactured by the exhibiter.

CHARLES THOMAS, of Stratford-on-Avon, Warwickshire.

Flexible saddles, registered July 10, 1845, invented by Mr. A. Newland, of Stratford-on-Avon, and manufactured by the exhibiter.

HENRY ATWOOD THOMPSON, Lewes, Sussex.

(New implement) a paragon portable steaming apparatus, including Medworth's registered water bridge, which obtained a prize of £10 at the meeting of the Royal Agricultural Society at York, 1848, (new implement) a portable steam generating boiler for cattle, No. 2, invented, improved, and manufactured by the exhibiter; a revolving vegetable washer, invented by Stratton, of Bristol, improved and manufactured by the exhibiter; (new implement) a portable copper, (new implement) a portable copper with steamer, a wrought iron pale, (new implement) an iron cottage, or Scotch shooting box, a double cylinder iron land roller, (new implement) a combined one horse cart and liquid manure conveyer, a portable liquid manure pump, (new implement) a portable iron pump on tripod stand with flexible hose, a cast iron pump, invented, improved, and manufactured by the exhibiter; a cast iron pedestal pump, invented by John Beare, of London, improved and manufactured by the exhibiter; (new implement) an improved cottage range and cooking apparatus, a wrought iron garden wheelbarrow, a wrought iron navvy wheelbarrow, an iron sand or lime screen, an iron coal or rubbish screen, (new implement) a wood and iron field gate nine feet wide, a wood and iron entrance gate, a pair of cast iron cottage casements, a cast iron trough, a round cast iron pig trough with revolving partitions, invented, improved, and manufactured by the exhibiter; (new implement) a daisy rake, invented by W. B. Thomas, Esq., of Rattan, Sussex, improved and manufactured by the exhibiter; (new implement) a rick cloth combining two waggon covers, invented, improved, and manufactured by Mackintosh and Co., expressly for the exhibiter; (new implement) a patent rotary knife-cleaning machine, invented, improved, and manufactured by George Kent, of London; (new implement) a cast steel bushel measure, invented, improved, and manufactured by the exhibiter; (new implement) a cast steel half-bushel measure; (new implement) a steel malt gauge, invented, improved, and manufactured by the exhibiter; and a stand of models.

BARNARD and BISHOP, of Norwich.

Rolls of light japanned wire hare and rabbit-proof netting, rolls of strong japanned and tinned wire netting, rolls of extra-strong japanned and tinned wire netting, several rolls of double-mesh strong and extra strong japanned wire netting, rolls of japanned sparrow-proof wire netting, a strong plant or tree guard, an iron stake, a piece of ornamental wire garden-bordering, a six-feet iron hurdle, a four feet hare and rabbit-proof hurdle, a length of rabbit-proof fence, an improved iron standard, an improved iron sheepfold hurdle on wheels, a five-bar iron hurdle, a pair of iron steps or stile, a flat iron field gate, a strong flat bar iron field gate, invented and manufactured by the exhibiters; a patent self-rolling mangle, invented by Charlea Barnard, of Norwich, and manufactured by the exhibiters; a steelyard, with frame for weighing sacks, manufactured by the exhibiters; cast-iron pig troughs circular and otherwise, garden rollers, improved and manufactured by the exhibiters; an iron bedstead, invented, improved, and manufactured by the exhibiters; a zinc hand light frame, a flexible iron belly-band, (new implement) a vegetable steaming apparatus, invented and manufactured by the exhibiters; a six-feet length of four-inch cast-iron eaves gutter or spouting, a cast-iron stack pillar, improved and manufactured by the exhibiters; a set of patent four-beam diagonal iron harrows, invented by Mr. Samuel Taylor, of Cotton End, and improved and manufactured by W. Williams, of Bedford (these harrows obtained a prize of £5 at the Derby meeting, 1843; also at the Southampton meeting, 1844; and at Shrewsbury, 1845); a water filter, invented by Mr. Lucas, and improved and manufactured by Messrs. Ransome and Parsons, of Ipswich; a patent enamelled cast-iron manger, invented and manufactured by T. and J. Clarke, of Wolverhampton; a set of draining tools, invented and manufactured by W. A. Lyndon, of Birmingham.

BARRETT, EXALL, and ANDREWS, of Katesgrove Iron Works, near Reading, Berks.

A four-horse power thrashing machine, with patent gear work, portable; three-horse, two-horse, and one-horse power thrashing machines, with patent gear work to fix; a patent hand-power thrashing machine; a furze or gorse cutting and bruising machine with three-horse power patent gear (it gained a prize of £5 at the meeting of the Royal Agricultural Society of England at York in 1848); a registered hay making machine; a registered cam chaff cutting machine; ditto; invented and manufactured by the exhibiters. Chaff cutting machines, with registered feed rollers, invented by Mr. John Cornes, of Barbridge, manufactured by the exhibiters (this machine gained the prize of £10 at the Royal Agricultural Society's meeting at Shrewsbury in 1845, at Newcastle-upon-Tyne in 1846, at Northampton in 1847, and at York in 1848); hand power universal mills; one-horse power universal mills; a two-horse power universal mill; an oil cake crusher, No. 2; a G.A.B. two-wheel and swing plough; a D.P. one-wheel plough (this plough obtained the prize at the Liverpool meeting of the Royal Agricultural Society of England); a two-share subsoil plough; a grass and turnip seed machine; invented and manufactured by the exhibiters. A one-row ridge drill, for seed and manure, manufactured by the exhibiters. A narrow hand drill, with cups; a barrow hand drill, with brush for seeds; (new implement) a three-row drill, with cups; a horse-hoe on the flat, 4 feet 6 inches wide; invented and manufactured by the exhibiters. A model of three-horse power patent gear work; a model of a letter copying machine; manufactured by the exhibiters. A set of circular harrows, invented and manufactured by the exhibiters.

Sir George Cayley, Bart., of Brompton, near Pickering, York.

(New implement) a drop drill, invented by the exhibiter, and manufactured by Messrs. Myers, Allison, and Vick, of Brompton, near Scarborough, Yorkshire.

Thomas Cook, of Snainton, near Pickering, York.

(New Implement) a lever cultivator or grubber, a one-horse hoe with two double-edged knives to be regulated by two screws, twelve sets of improved hand hoes, invented and manufactured by the exhibiter; four sets of scythes, improved in shafting by the exhibiter, and manufactured by Robert Lindley, of Sheffield.

William Alfred Creak, of Burnham Westgate, near Lynn Regis, Norfolk.

A drill roller or clod crusher, improved by the exhibiter, and manufactured by Creak and Colby, of Burnham Westgate; a jointed field roller for heavy land, invented by Robert Beanell, of Burnham Westgate, and manufactured by Creak and Colby, of Burnham Westgate; a field roller for light land, improved and manufactured by Creak and Colby, of Burnham Westgate; a field roller for light land, improved by the exhibiter, and manufactured by Creak and Colby, of Burnham Westgate; a barley hummeller, improved by Robert Beanell, of Burnham Westgate, and manufactured by Creak and Colby, of Burnham Westgate; a cake crusher, improved and manufactured by Creak and Colby, of Burham Westgate.

Deane, Dray, and Deane, of Swan-lane, London.

A cesspool and tank cleanser, invented and manufactured by the exhibiters (received a silver medal at the York meeting in July, 1848); (new implement) a linseed and corn crusher, and a horse rake, invented, improved, and manufactured by the exhibiters; a hand dibbler, invented and manufactured by Jesse Ross, of Leicester; a hand dibbler, invented and manufactured by Dr. Newington, of Knole Park, near Tunbridge Wells; the farmers' fire engine, a yard or stable pump, and a portable engine for farm or garden purposes, invented, improved, and manufactured by the exhibiters; a machine for weighing, invented and manufactured by Mr. Craig, of Liverpool (awarded a prize of £10 at York in 1848 by the Royal Society of England, a premium at Shrewsbury, and a silver medal by the Liverpool Agricultural Society in 1847); a root washer, invented and manufactured by Chandler and Richmond, of Salford; two enamelled mangers, a stable pail, a stack pillar, and an iron wheelbarrow, invented and manufactured by the exhibiters; a hand dibbler, invented by Mr. Nicholls, and manufactured by the exhibiters; a plate glass safety stable lantern, invented and manufactured by the exhibiters; a Sussex churn, invented and manufactured by Green and Hale, of Lewes; a spud dibble, invented and manufactured by Jesse Ross, of Leicester; a registered churn, invented and manufactured by Thewlis and Griffith, of Warrington; a grinding mill for breaking agricultural produce, a circular pig trough, and a chaff box, invented and manufactured by the exhibiters.

John Gillett, of Brailes, near Shipston-on-Stour, Warwick.

Patent horse or hand power guillotine chaff engines, invented by James Ward, of Stratford, and improved and manufactured by the exhibiter; (new implement) a patent turnip cutter, a patent rick ventilator (obtained a silver medal at the Derby meeting), and a patent self-acting alarum gun, invented, improved, and manufactured by the exhibiter.

William Hensman and Son, of Woburn, Bedford.

A patent iron plough with two wheels, a patent eight-row cup drill for corn and seeds with independent steerage (the Royal Agricultural Society's medal was awarded to this implement at York, 1848, for its self-acting hopper), a patent eight-row corn drill with swing steerage, a patent steerage drill for turnips and manure, a four horse bolting thrashing machine, a one horse power patent Vandyke thrashing machine, a wrought iron cultivator, and a horse drag rake (awarded a medal at the York meeting in 1848), invented, improved, and manufactured by the exhibiters.

Richard Hornsby, of Spittlegate, near Grantham, Lincolnshire.

A drill machine for corn and general purposes (this drill received the society's prizes at Liverpool in July, 1841, £25; Bristol in July, 1842, £30; Derby in July, 1843, £10; at the subsequent trial of drills at Pusey in October, 1845, £15; Newcastle-upon-Tyne in July, 1846, £15; and at York in July, 1848, £15), an eleven-coulter corn and seed drill, a six-row drill for turnipseed, mangel-wurzel, and manure (this drill received the society's prize of £10 at the subsequent trial of drills at Pusey in October, 1845), a turnipseed, mangel wurzel, and manure drill (this drill had the prize of £10 awarded to it at the society's meeting at York in July, 1848; also £10 at the subsequent trial of drills at Pusey in October, 1845), a one row drop ridge drill for turnipseed, mangel-wurzel, and manure, a five row flat surface drop drill, a machine for distributing guano, soot, rapecake, and other pulverized manures broadcast (obtained a prize of £10 at the York meeting in 1848), a six horse power improved portable steam engine (this engine received the prize of £50 at the society's meeting at York in July, 1848), and a bolting or batting thrashing part, invented, improved, and manufactured by the exhibiter; a four horse power portable thrashing machine, improved and manufactured by the exhibiter; a double cranked or jumping straw shaker, an improved registered corn-dressing machine (this machine received the prize of £10 at the Society's meeting at York, July, 1841, and £3 at Newcastle-upon-Tyne, July, 1846), a double cake breaker (this machine had the prize of £5 awarded to it at the society's meeting at Derby, July, 1843; £5 at Southampton, July, 1844; and £3 at Shrewsbury, July, 1845), a cake-crusher on an improved principle, invented, improved, and manufactured by the exhibiter; an improved two knife chaff cutting machine, invented by John Cornes, of Barbridge, and improved and manufactured by the exhibiter.

James Hunter (late Waldie & Hunter), Saddler and Harness Maker, of Kelso, Roxburghshire, N.B.

Cart saddles, invented and manufactured by the exhibiter; complete sets of harness for one or two horses, improved and manufactured by the exhibiter.

Mapplebeck and Lowe, of Birmingham, Warwickshire.

(New implement) several of Fairbank's patent weighing machines for weighing loaded carts, live cattle, &c., improved and manufactured by W. and T. Avery, of Birmingham. A steelyard, with frame, for weighing sacks, &c.. manufactured by W. and T. Avery, of Birmingham; a set of new-patterned iron weights; a portable mill for grinding wheat for domestic purposes, with a set of sieves for dressing; a portable kibbling mill, on a cast frame; a portable bean-splitting mill, on a cast frame; a malt mill, with wheel and iron hopper; a kibbling mill, with wheel and iron hopper—manufactured by the exhibiter. (New implement) a registered churn, and (new implement) a registered cheese press, invented and manufactured by Thewlis and Griffith, of Warrington. An improved cheese press; (new implement) an improved scuffle harrow, with ten tines; a set of stall posts and rails, with trapped drain, and improved rack and manger; (new implement), an improved rack and manger; (new implement) enamelled centre mangers; a circular iron pig, dog, or sheep-trough; iron hurdles; a length of continuous cattle fencing, bundles of best fencing wire, and rolls of strong hare and rabbit-proof wire netting—manufactured by the exhibiters. A Budding's patent mowing machine, for cutting lawns, grass plats, &c., invented by E. Budding, of Dursley, and manufactured by John Ferrabee, of Stroud; an improved portable garden or house pump; a garden engine; a garden roller; an iron sack barrow—manufactured by the exhibiters. A patent wrought-iron corn rick stand, invented by the late J. Springall, of Ipswich, and improved and manufactured by W. A. Lyndon, of Birmingham; several sets of W. A. Lyndon's patent draining tools, invented by Josiah Parkes, Esq., draining engineer, of London, and manufactured by W. A. Lyndon, of Birmingham (the prize of £5 was awarded to the exhibiters for these tools at the Royal Agricultural Society's meeting at Northampton in 1847). A set of draining tools for clay land and for general purposes; several bright steel hay forks; dung forks with three prongs, and steel potato or cleaning fork, for couch, grass, &c., with five prongs; iron bedsteads—manufactured by the exhibiters; an instrument for straining wire, and a stand of models.

WILLIAM MASSINGHAM, of Heacham, near Lynn, Norfolk.

(New implement) a four-row dibbling machine; (new implement) a single-hand seed dibbler; (new implement) a pair of hand seed dibblers; (new implement) a barrow hand drill, to work with cups; (new implement) a liquid manure distributor; a registered portable folding garden chair, with arms; a portable folding garden chair; a folding garden bench or seat; a newly-invented post-office knocker—invented and manufactured by the exhibiter.

BENJAMIN MITCHELL, of Broughton Lodge Farm, near Huntingdon.

A new patent manure, invented and manufactured by the exhibiter.

FREEMAN ROE and WILLIAM HANSON, of 70, Strand, London.

(New implement) a portable steam engine, (new implement) a portable thrashing machine, (new implement) a chaff cutting machine, manufactured by the exhibiters; (new implement) a liquid manure pump, invented by Freeman Roe, of the Strand, and manufactured by the exhibiters; (new implement) an engineer's coach wrench, invented by George Davis, of 52, Bankside, London, and manufactured by the exhibiters; a deep well engine pump, manufactured by the exhibiters; models of glass pipes, &c.

JESSE ROSSE, of 73, New Walk, Leicester.

(New implement) a pair of patent hand dibbles, (new imlpement) a patent six-rowed hand dibble, (new implements) patent four-rowed wheat dibbles, (new implements) patent single spud dibbles for salt, invented and manufactured by the exhibiter.

JOHN SMITH, of Coven, near Wolverhampton, Stafford.

A portable steam engine for thrashing and working grain mills, invented and manufactured by John Smith, junior, of Coven; a patent portable farmer's and grazier's mill, invented by Mr. Remington, of Stafford, and improved and manufactured by the exhibiter; a corn mill, and a corn-thrashing machine, driven by steam engine.

W. H. VINGOE, of Penzance, Cornwall.

Patent seed planting and liquid or dry manuring machines, invented, improved, and manufactured by the exhibiter (obtained a prize of £10 at Shrewsbury, in 1845).

WILLIAM FREDERICK WHITE, of Brinton, near East Dereham, Norfolk.

(New implement) a model of an article designated White's stack protector, invented by the exhibiter, and manufactured by Peter White, of Norwich.

JOHN WHITEHEAD, near Preston, Lancashire.

Tile making machines, invented and manufactured by the exhibiter (awarded the prize of £20 at York, 1848); a wrought iron plough for heavy land, a wrought iron plough, and a double-rested plough, improved and manufactured by the exhibiter; (new implement) a registered churn, four rolls of hare proof wire fencing, manufactured by the exhibiter.

JOHN BAKER, of Acle, near Norwich, Norfolk.

A one horse cart, improved by B. H. Baker, of Acle, and manufactured by John Fowler, jun., of Acle.

BAYLIS and GLOVER, of Godmanchester, Huntingdon

A patent pipe and tile machine, and a patent land cultivator, invented by Robert Beart, of Godmanchester, and manufactured by the exhibiters.

JOHN CORNES, of Barbridge, near Nantwich, Chester.

Several chaff cutting machines with two knives, a registered chaff cutting machine with three knives (obtained a prize of £10 at Shrewsbury in 1845, at Newcastle-upon-Tyne in 1846, at Northampton in 1847, and the Society's silver medal at York in 1848), and a turnip-cutting machine, invented and manufactured by the exhibiter.

HENRY CORNISH, of Walsingham, near Fakenham, Norfolk.

A four horse power portable thrashing machine, invented by John Cornish, of Wilby, Suffolk, improved and manufactured by the exhibiter; a ten coulter corn drill, invented by William Botright, of Wilby, Suffolk, improved and manufactured by the exhibiter; a corn dressing machine, a pair of cast iron wheels, and a one horse cart, improved and manufactured by the exhibiter.

GEORGE CUBITT, of North Walsham, Norfolk.

One horse carts with or without harvest frames, iron land rolls, chaff cutters, improved and manufactured by the exhibiter; (new implement) a set of 1 or 2 horse works, (new implement) a plough and stands, a double breast plough, invented, improved, and manufactured by the exhibiter; a turnip and mangel drill, improved and manufactured by the exhibiter; a water tank or trunk, invented and manufactured by the exhibiter.

RICHARD GARRETT and SON, of Leiston Works, near Saxmundham, Suffolk.

A stand of models, manufactured by the exhibiters; a drill for general purposes, invented and manufactured by the exhibiters (the exhibiters were awarded prizes by the Royal Agricultural Society for this drill at Liverpool, 1841, £10, at Derby, 1843, £30, Southampton, 1844, £20 and a medal, and at Northampton, 1847, £15); a registered Kent drill (a prize of £5 was awarded to the exhibiters for this drill at Newcastle, in 1846); a broadcast manure distributor; a drill for turnips and manure on the flat (this drill was awarded a prize of £10 at the Society's Meeting at Cambridge, 1840, £10 at Northampton, 1847, and £10 at York, 1848; a drill for turnips and mangold wurtzel with manure on the ridge (this drill was awarded a prize at the Society's Meeting at Bristol of £20, in 1842; and £10 at Northampton, in 1847); a patent drop drilling machine for flat and ridge work, invented and manufactured by the exhibiters; an 11, 12, 13, and 15-row lever corn drills, improved and manufactured by the exhibiters. (New implement) a barrow hand drill; a horse-power seed engine; patent horse-hoes for flat-work (this implement was awarded prizes by the Royal Agricultural Society at Liverpool, 1841; at Bristol, 1842; at Derby, 1843; at Southampton, 1844, at Northampton, 1847, and at York, 1848); six-horse power portable steam engines; a bolting thrashing machine for steam or horse-power; a steam power bolting thrashing and blasting machine; a four-horse power bolting thrashing machine (the Society's prize of £25 was awarded the exhibiters for this machine at Newcastle, 1846; £20 at Northampton, 1847; and £20 at York, 1848); a four-horse power open drum thrashing machine; a two-horse power thrashing machine; a corn dressing machine; a smut machine—invented and manufactured by the exhibiters. A horse power chaff cutter; a chaff cutter for hand power; a linseed, malt, and oat mill; a linseed cake crusher; a rape and linseed cake crusher (prizes were awarded the exhibiters by the Royal Agricultural Society, at Cambridge, £5, at Liverpool, £5, and at Bristol, £3, for this machine); another rape and linseed cake crusher—improved and manufactured by the exhibiters. A turnip cutter, invented by the late James Gardner, of Banbury, and manufactured by the exhibiters (a prize of £5 was awarded for this machine at Southampton Meeting, and a medal at Northampton); a patent subsoil pulverizer, invented by the late Mr. John Read, of London, and manufactured by the exhibiters (prizes were awarded for this plough by the Royal Agricultural Society, at Southamton, £10, Shrewsbury, £10, Newcastle £10, Northampton, £10); (new implement) a wheel subsoiler, improved by the Hon. R. H. Clive, M.P., manufactured by C. Hodges, of Ludlow; a patent lever drag rake, an iron field roll, improved and manufactured by the exhibiters; a jointed iron field roll, invented and manufactured by the exhibiters; a patent clod crusher, improved and manufactured by the exhibiters; (new implement) a wrought iron scarifier, and a waggon for general purposes, improved by the Rev. Augustus Cooper, of Syleham, and manufactured by S. Edwards, of Weybread; a skeleton cart for general purposes, improved by the Rev. E. R. Benyon, of Culford Hall, and manufactured by Henry Higgins, of Culford, near Bury St. Edmunds; a patent drain pipe and tile machine, invented by Richard Weller, of Capel, near Dorking, and manufactured by the exhibiters (a prize of £5 was awarded for this machine at Newcastle, in 1846); (new implement) a pug mill, invented and manufactured by the exhibiters; a patent wrought iron corn rick stand, invented by the late J. Springall, of Ipswich, and manufactured by the exhibiters (a medal was awarded at Southampton for this rick stand); (new implement) a portable stone mill, invented and manufactured by the exhibiters.

JOHN GILLETT, of Brooke, near Norwich, Norfolk.

(New implement), a pair of hand dibbles for making hole and dropping wheat at the same time, invented by the exhibiter, and manufactured by Messrs. Barnard and Boulton, of Norwich.

J. and E. HEADLY, of Cambridge.

(New implement), a portable steam engine for thrashing, &c., invented and manufactured by the exhibiters.

EDWARD HILL and Co., of Brierley Hill Iron Works, near Dudley, Worcestershire.

A wrought iron skim (this implement obtained the 1st prize of its class at the Derby meeting of this society); an iron granary crane (this implement, in its original state, obtained a prize of £2 at the Shrewsbury meeting of this society); a wrought iron heating barrow; a wrought iron garden or stable barrow, invented and manufactured by the exhibiters; a patent sack holder, invented by Henry Gilbert, Esq., of St. Leonard's, and manufactured by the exhibiters. A wrought iron field gate and posts (this gate and posts obtained a silver medal at the society's meeting at Derby, 1843); a wrought iron rick staddle on cast iron pillars; wrought iron tree guards; wrought iron farmer's hurdles; wrought iron sheep hurdles; wrought iron cattle hurdles; (new implements), a set of wrought iron harrows; continuous sheep, cattle, ox, and deer fencing (the sheep fencing obtained a prize of a silver medal at the Shrewsbury meeting of the society); (new implement), strained wire fencing for oxen or cattle; wire peg lattice or netting; ox hurdles, ornamental and proof against game; a wrought iron ornamental garden seat—invented and manufactured by the exhibiters. A specimen of black varnish on wood and iron; (new implement), a set of wrought iron whippletrees, invented and manufactured by the exhibiters.

PHILLIPS FOWLER HODGKINS, of Chipping Norton, Oxfordshire.

A patent self twisting single hand seed dibbler, invented, improved, and manufactured by the exhibiter; (new implement), a seed planter, invented and manufactured by the exhibiter.

GEORGE KILBY, of Queeniborough, near Leicester.

(New implement), a winnowing machine, invented and manufactured by Abraham Pridmore and Son, of Thorpe Satchville, near Melton Mowbray, Leicestershire; a turf and stubble paring plough, invented and manufactured by Thomas Glover, of Thrussington, near Leicester (this implement gained a prize of £4 at the society's show at Liverpool in 1843, a prize of £5 at the Derbyshire Agricultural Show at Chatsworth in 1843, a prize of £5 at the society's show at Northampton in 1847, a prize of £2 and a silver medal at the Yorkshire show at Scarborough in 1847, a prize of £5 at the society's show at York in 1848); (new implement), a drill and hand drill to sow all kinds of corn, turnips, and mangold-wurtzel, invented and manufactured by William West, of Leicester.

WILLIAM ROTHWELL LOMAX, of 85, Digbeth, Birmingham, Warwickshire.

(New implements), patent universal chaff, gorse, &c., cutting machines, invented and manufactured by the exhibiter.

ROBERT MAYNARD, of Whittlesford, near Cambridge.

A portable chaff engine for three horse power, invented, improved, and manufactured by the exhibiter; a thirteen coulter drill for general purposes; improved and manufactured by the exhibiter; (new implement) a machine for crushing oilcake, and several weighing machines, invented and manufactured by the exhibiter.

CHARLES PHILLIPS and Co., of the Baptist Mills Iron Foundry, Bristol.

A turnip cutter, invented and manufactured by the exhibiters (a prize of £5 was awarded to this machine at the Shrewsbury meeting, in July, 1845); two turnip cutters, improved and manufactured by the exhibiters; (new implement), a grate suspended in a frame to show the mode of fixing it, invented and manufactured by the exhibiters.

ROBERT and JOHN REEVES, of Bratton, near Westbury, Wilts.

(New implement) a liquid manure distributor, a patent liquid manure drop drill, invented by Thomas Chandler, of Stockton, improved and manufactured by the exhibiters (to this implement was awarded a silver medal at the York Meeting of the Society, July 1848); (new implement) an iron plough, with one wheel, invented and manufactured by the exhibiters.

JOHN SAINTY, of Burnham Sutton, near Burnham Market, Norfolk.

(New implement) a one horse roll, for barley and other purposes; (new implement) a cast-iron sheep trough, invented and manufactured by the exhibiter.

ROBERT SARGISON, of New Walsoken (near Wisbeach), Norfolk.

(New implement) two registered straw shaking machines, nvented and manufactured by the exhibiter.

JOHN SCOTT, of Belfast, Antrim.

A two-horse power thrashing machine, a portable one-horse power gear work, improved and manufactured by the exhibiter; a set of cast-iron pillars, for a corn or rick stand, a cast-iron manger, manufactured by the exhibiter.

ROBERT SCRIVENER, of Alperton, near Acton, Middlesex.

(New implement) a hand tile machine, invented by Mr. J. Ainslie, of London, improved by the exhibiter, and manufactured by George Howe, of 119, Great Guildford-street, London; and a model of the Ainslie Company's patent economic kilns.

SMITH and Co., of Stamford, Lincolnshire.

Smith and Co's patent improved hay-maker, having reverse motion and double-action, invented, improved, and manufactured by the exhibiters (this machine obtained the prize of £5 of the Royal Society, 1846, and was noticed most favourably at that and every subsequent meeting, as see the Society's reports, 1846, 1847, and 1848, no prize being given for haymakers, 1847—it received again the Society's medal at York, 1848); two patent balance lever horse rakes, a patent lever wheel hand-rake, improved barley awn cutter and cleaner, patent two-horse cart, and patent one-horse cart, invented improved, and manufactured by the exhibiters; improved cultivator or grubber, invented by S. Smith, of Northampton, improved and manufactured by the exhibiters (a silver medal was awarded to this implement at the Royal Society's Meeting at Newcastle in 1846); improved scarifier, patent chaff machines, set of horse works, (new implement) a patent manure spreader, attached to a cart, and (new implement) a patent corn and seed drill, invented, improved, and manufactured by the exhibiters; a wrought-iron plough for heavy land, and a wrought-iron plough for light land, invented, improved, and manufactured by John Bird, of Casterton.

TAYLOR and DEAN, of Birmingham, Warwickshire.

A six-horse portable steam engine, invented and manufactured by the exhibiters; powerful universal crushing mills, a hand corn crusher (registered), a horse gear suitable for one or two horses, a revolving pedestal, a corn mill fitted with grey stones, a hand corn mill fitted with French stones (a silver medal was awarded to this mill at the Southampton meeting of the Royal Agricultural Society in July 1844), and a patent hand flour dressing machine, invented and patented by Alexander Dean, of Birmingham, and manufactured by the exhibiters; (new implement) a patent chaff-cutting machine, invented and patented by W. R. Lomax, of Birmingham, and manufactured by the exhibiters; a hand mill and post mill for splitting beans, invented by Alexander Dean, of Birmingham, and manufactured by the exhibiters; a patent sackholder, invented by Mr. Gilbert, and manufactured by the exhibiters.

ROBERT THOMPSON, of Norwich, Norfolk.

An iron land roller, improved and manufactured by the exhibiter; a potato steaming apparatus, invented and manufactured by Sandford and Owen, of Rotherham; a seventy gallon iron furnace pan, manufactured by Robertson and Co., of Berwick; a cattle trough, manufactured by the exhibiter; patent treaded garden spade, shovels, clay tools, grafting and casting tools, and draining tools, and several improved forks, for potatoes, manure, hay, pitching, &c. &c., improved and manufactured by W. A. Lyndon, of Birmingham; several cart and waggon covers, invented, improved, and manufactured by E. Vergette, of Peterborough; several patent india rubber waterproof cart, waggon, and horse covers, and samples of vulcanized india rubber washers for flange and socket pipes, suction and delivery hose, &c., invented and manufactured by Charles Macintosh and Co., of Manchester; patent grafting tool, Norfolk furrow shovel, treaded grafting tool, narrow bottoming tool, swan-neck shovel, and other grafting tools, invented, improved, and maunfretured by W. A. Lyndon, of Birmingham; Milner's patent fire resisting boxes and safes, invented, improved, and manufactured by Thos. Milner and Son, of Liverpool; specimens of Milner's safe and contents after being burnt; a steelyard, with frame for weighing sacks, manufactured by W. and T. Avery, of Birmingham; weighing machines, manufactured by J. Garland, of Birmingham, Rocks and Blakemore, of Birmingham, and Burchfield and Son, of London; a set of iron weights, iron garden rolls, manufactured by the exhibiter; an iron sack barrow, improved and manufactured by the Coalbrookdale Company, of Shropshire; a patent sack-holder, invented by Gilbert, of St. Leonard's; a long-bolt mail patent axle, manufactured by Wilson, of London; several pair of cart arms and boxes, manufactured by Forbes, of Birmingham; sheep and cattle hurdles, manufactured by the exhibiter; rolled iron field gates, and a rolled iron hay rack, invented by J. Boydell, of Dudley, and manufactured by the Oak-farm Company of Dudley; a Scotch axle, manufactured by Forbes, of Birmingham; cast-iron hay racks, invented and manufactured by the exhibiter; an enamelled iron manger, manufactured by Kenrick and Son, of West Bromwich; pig-troughs, manufactured by the exhibiter; a cast-iron pump, manufactured by the Colebrookdale Company, of Shropshire; a cast-iron garden chair, manufactured by the Carron Company, of London; a wrought-iron garden seat, a wrought-iron bedstead, manufactured by the exhibiter; an improved drain or street grate, manufactured by Cort and Bell, of Leicester; iron eave spoutings and pipe, manufactured by Robertson and Co., of Berwick; a Romford stove, manufactured by the exhibiter; a pair of plough traces, and a pair of cart traces, manufactured by J. G. Walker, of Dudley.

WILLIAM BELL, of Rothwell, near Kettering, Northampton.

An iron plough for heavy land, invented, improved and manufactured by the exhibiter; an iron plough, marked "criterion plough," for light land, invented by the exhibiter, and improved by Mr. James Biggs, of Desborough; an iron swing plough, an iron scarifier, invented, improved, and manufactured by the exhibiter; a waggon, a set of iron harrows, an iron paring plough, invented, improved, and manufactured by the exhibiter; a one-horse cart, improved and manufactured by the exhibiter; an iron horse hoe, improved by the exhibiter.

JOHN HENRY CHARNOCK, of Copmanthorpe, near York.

A drain cutter, invented by the exhibiter, and manufactured by Nicholas Gascoine, of Wetherby.

JOHN FERRABEE and SONS, of Phœnix Iron Works near Stroud, Gloucestershire.

A six-horse power portable steam engine, improved and manufactured by the exhibiters; thrashing, shaking, and winnowing machinery combined, a barley hummeller and winnower combined, invented and manufactured by the exhibiters; a corn separater, a bolting thrashing machine or barn work for four-horse power, a portable four-horse power, improved and manufactured by the exhibiters; a lifting jack, invented and manufactured by the exhibiters; a thrashing machine, or barn work for four horse power, invented, improved, and manufactured by the exhibiters; a twelve inch Earl Ducie's patent spiral chaff cutter, invented by Earl Ducie, of Tortworth Court, improved and manufactured by the exhibiters (prizes have been awarded to this machine by the Royal Agricultural Society); a twelve inch and nine inch registered chaff cutter, a corn and linseed crusher, invented and manufactured by the exhibiters; a "Ducie" cultivator, cast iron, with seven tines, invented by John Morton, of Whitfield, and manufactured by the exhibiters; an adjusting horse hoe, a lever expanding horse hoe, manufactured by the exhibiters; a hay making machine, improved and manufactured by the exhibiters; a one horse cart, with harvest body, invented by John Morton, of Whitfield, and manufactured by the exhibiters; a one horse cart with harvest rathes, and a four horse power for driving machinery, improved and manufactured by the exhibiters.

JOHN FRANKLIN, of 10, Lucas-place, Commercial-road East, London; and HENRY FRANKLIN, of Marston, near Ampthill, Bedford.

Three patent machines, for manufacturing all kinds of draining pipes, tiles, and bricks, invented and improved by the exhibiters, and manufactured by J. Franklin, of 10, Lucas Place, Commercial Road East, London; a specimen of sewerage or water pipes, manufactured by S. B. Sweetman, of Rotherithe, London; an improved roofing tile press, invented by Christopher Edward Dampier, of Gloucester Terrace, Hyde Park Gardens, and manufactured by George Springall, of 14, Wych Street, Strand, London.

T. and C. GARROOD, of Fakenham, Norfolk.

A four-horse-power portable steam engine, a thrashing machine, a double-breasted 4-ton spring waggon, a harvest waggon, improved and manufactured by the exhibiters; and an improved corn rick stand, invented, improved, and manufactured by the exhibiters.

JOHN GOUCHER," of Woodsetts (in the county of York), near Worksop, Nottingham.

A four-horse-power thrashing machine; invented and manufactured by the exhibiter.

JOSEPH COOKE GRANT, of Stamford, Lincoln.

Patent lever horse and pony rakes, patent hay-making machines, invented, improved, and manufactured by the exhibiter; several weighing machines, sets of improved pair-horse wood whipple-trees, (new implement) an iron crane for lifting millstones, &c., a wood sack truck, an iron sack truck, two-horse-power machine for driving chaff machines, mills, &c., a manifold connecting motion for driving two or more machines at the same time, improved and manufactured by the exhibiter; (new implement) a linseed and corn-crushing machine, invented, improved, and manufactured by the exhibiter, a double-action cake mill, several improved chaff engines, improved and manufactured by the exhibiter; wrought iron Uley cultivators, invented by Lord Ducie, of Uley, and improved and manufactured by the exhibiter; a horse hoe and moulding plough, a wrought iron expanding horse hoe, a wood beam expanding horse hoe, a cast iron expanding horse hoe, an improved G P iron plough, invented, improved, and manufactured by the exhibiter, patent turnip cutter, invented by James Gardner, of Banbury, and manufactured by the exhibiter; a hand thrashing machine, a stand of models, and a garden drill, improved and manufactured by the exhibiter.

R. Gray and Sons, of Uddingston, near Glasgow, Lanarkshire, N.B.

An improved one-horse Scotch farm cart, improved and manufactured by the exhibiters; a parallel lever subsoil pulverizer, a plough for general purposes, a two-horse swing plough for light or heavy land, invented and manufactured by the exhibiters; an improved two horse wheel plough for light or heavy land, manufactured by the exhibiters; a parallel expanding horse hoe for green cropping, a parallel five tined drill grubber, a drill plough and scuffle combined, an improved set of equalising compensating lever three-horse yoke for working abreast, a plough for filling in drains, a drain plough, invented and manufactured by the exhibiters.

Edwin Mills Hanford, of Hathern, near Loughborough, Leicestershire.

(New implement) a registered double-acting draught iron plough; invented and manufactured by the exhibiter.

Hurwood and Turner, of St. Peter's Foundry, Ipswich, Suffolk.

(New implement) a portable steam engine, and a portable thrashing machine, invented and manufactured by the exhibiters; a roller mill for crushing corn and linseed, improved and manufactured by the exhibiters.

Charles Lampitt, of Banbury, Oxfordshire.

A horse seed dibbler; invented, improved, and manufactured by the exhibiter.

Thomas Lloyd and Sons, of 15, Old-street-road, London.

A domestic flour mill, a flour dressing machine, a kibbling mill to work by hand power, a bean splitting mill, and a grocer's portable stand coffee mill, manufactured by the exhibiters.

Robert Murton, of Keminghall, near Market Harling, Norfolk.

A corn drill for ten furrow or flat work, improved and manufactured by the exhibiter; a manure distributor, and a one-horse roll for barley or ridge work, invented, improved, and manufactured by the exhibiter.

John Nelson, of Sheffield, York.

A set of parturition forceps, invented, improved, and manufactured by the exhibiter; a portable or pocket bull-ring, and a set of forceps for giving balls to horses without introducing the hand, invented and manufactured by the exhibiter.

Henry Nicholson, of Peterborough, Northampton.

Specimens and samples of English linseed-cake of various manufactures, and of foreign cake imported by the exhibiter from America, North and South of France, Belgium, Germany, and other continental ports, also of rape and other cake used for tillage purposes; of linseed and flaxseed of various kinds; of the various kinds of guanos; of concentrated liquid guano; of saline and mineral substances used as fertilizers, and various chemical manures and fertilizers, manufactured by the exhibiter.

William Neuzam Nicholson, of Newark-upon-Trent, Nottingham.

Several machines for breaking oil-cake for beasts and sheep, a machine for grinding beans, oats, malt, barley, &c., (new implements) machines for crushing linseed and other small grain, invented and manufactured by the exhibiter; a barley awning or hummelling machine, a winnowing or corn-dressing machine, improved and manufactured by the exhibiter; a chaff engine, invented by John Cornes, of Barbidge, improved and manufactured by the exhibiter, (new implement) a six-horse power portable steam engine, invented and manufactured by the exhibiter; a six-horse power portable thrashing part, improved and manufactured by the exhibiter; several cottage ranges (with registered improvements), invented, improved, and manufactured by the exhibiter (these implements had a prize of £5 awarded to them at the York show); a set of patent tube whipple-trees, manufactured by the exhibiters, and specimens of cart and waggon covers, invented and manufactured by C. Macintosh and Co., of Manchester.

Mr. H. Nicholls, of 12, Clifford's Inn, Chancery-lane, London.

A hand dibble, invented and improved by the exhibiter, and manufactured by Mr. Stocker, of 112, High Holborn.

Joseph Paul, of Thorpe Abbot's Hall, near Scole, Norfolk.

(New implement) a patent deep draining and subsoil-raising machine; (new implement) a patent plough for filling up the drains; and (new implement) a patent machine for deep subsoiling and pulverizing the land—invented, improved, and manufactured by the exhibiter.

Messrs. Ransomes and May, of Ipswich, Suffolk.

(New implement) a portable and locomotive steam engine, invented by E. B. Wilson and Co., of Leeds, and the exhibiters, and manufactured by E. B. Wilson and Co.; a thrashing machine barn work (the prize of £30 was awarded to this machine, in connection with a portable steam engine, at the Royal Agricultural Society's Meeting at Bristol in 1842); a four-horse bolting barn work, a patent iron chaff engine, a spiral bean mill, a spiral oat mill, a linseed mill, machinery to connect the mills, &c., a four-horse portable thrashing machine, four and three-horse bolting barn work, a horse power for one or three horses, an intermediate motion, an iron universal intermediate motion, patent iron chaff engines, (new implement) a patent straw cutter by one-horse power or hand power, spiral bean and oat mills, and a linseed mill No. 1, for one-horse or hand power, (new implement) an oat mill, for horse power, (new implement) a linseed mill, for hand or one-horse power, (new implement) a bean mill, and several other mills, (new implement) a patent cylindrical winnowing machine, dressing machines, large size, invented, improved, and manufactured by the exhibiters; (new implement) a registered riddling machine, invented by J. W. and G. Stevens, of Stowmarket, and manufactured by the exhibiters; (new implement) a barley awner, invented and manufactured by the exhibiters; Gardner's turnip cutters, invented by J. Gardner, of Banbury, and manufactured by the exhibiters; a barrow turnip cutter, an oil-cake breaker, (new implement) a patent universal corn and seed dropping machine, invented and manufactured by the exhibiters; a Biddell's patent scarifier, grubber, or cultivator, with seven wrought-iron tines, No. 2, invented by Arthur Biddell, of Playford, improved and manufactured by the exhibiters (this implement obtained the Royal Agricultural Society's prizes of £10 at Liverpool in 1841, £10 at Northampton in 1847, and £10 at York in 1848); an Indian cultivator, (new implement) a suspension harrow, light scarifier, and grass cleaner, invented and manufactured by the exhibiters; self-cleaning harrow, invented by Finlayson, of Cheltenham, manufactured by the exhibiters; a wrought-iron Indian scuffler, a wrought-iron expanding horse hoe, a set of six light seed harrows, invented and manufactured by the exhibiters; a set of six heavy harrows, improved and manufactured by the exhibiters; a patent lever horse rake, invented by Smyth and Co., of Stamford, and manufactured by the exhibiters; a hand drag rake, invented and manufactured by J. W. Sharman, of Wellingborough; a patent double action hay maker, invented, improved, and manufactured by H. Smyth and Co., of Stamford (this obtained the prize of £5 as the best hay-maker in use at the meeting of the Royal Agricultural Society of England, held at Newcastle, July, 1846); patent corn gatherer, invented by Arthur Biddell, of Playford, and manufactured by the exhibiters; an iron three cylinder field roller, a jointed barley roller, manufactured by the exhibiters; Crosskill's clod crusher, invented by Wm. Crosskill, of Beverley, and manufactured by the exhibiters; a Norwegian harrow, invented by Frere and Stratton, of Bristol, and manufactured by R. Stratton, of Bristol (a prize of £10 was awarded to it at Shrewsbury as a new implement, also a prize of £5 at Newcastle); (new implement) a scarifier and pulverizer, invented and manufactured by the exhibiters; a wrought-iron corn rick stand, invented by J. Springall, late of Lowestoft, improved and manufactured by the exhibiters; a twenty-two inch Budding's grass cutter, invented by Budding, of Dursley, and manufactured by Ferrabee and Son, of Stroud; a set of patent trussed whippletrees and pomeltrees, invented and manufactured by the exhibiters (the whippletrees obtained the Royal Agricultural Society's silver medal at Southampton); a patent water purifier and filter, invented and manufactured by Ransome and Parsons, of Ipswich; a great number of patent trussed beam iron ploughs, invented, improved, and manufactured by the exhibiters (this implement was awarded the prize of £10, and a silver medal, as the best heavy land plough, a prize of £10 and a silver medal as the best light land plough, at the Southampton meeting of the Royal Agricultural Society of England, also a prize of £10 at the meeting of the same society held at Northampton, in 1847); several other descriptions of ploughs with handles of both wood and iron; a model of four-horse thrashing machine, a model of patent trussed beam iron plough, invented and manufactured by the exhibiters; a model of Budding's patent grass-cutting machine, invented by E. Budding, of Dursley, and manufactured by J. Ferrabee, of Stroud; a working model of universal seed-dropper, invented and manufactured by the exhibiters; a patent sack holder, invented by Henry Gilbert, of St. Leonard's, Sussex, and manufactured by the exhibiters; a digging fork, invented by J. Sillett, of Kelsale, and manufactured by the exhibiters; a sack barrow, invented and manufactured by the exhibiters; models of implements; and a basket of plough fittings, various.

JOSEPH SIMMONS, of Rainham, near Sittingbourne, Kent.

(New implement) an improved Kent plough, invented by W. C. Selby, Esq., of Ightham, improved and manufactured by the exhibiter, (new implement) an improved two-wheel hand carrot drill with coulter; (new implement) an improved hand carrot drill with one wheel, invented, improved, and manufactured by the exhibiter.

JAMES SKOYLES, of Filby, near Great Yarmouth, Norfolk.

(New implement) a turnip and mangold seed drill, a plough and wheels for deep ploughing, improved and manufactured by the exhibiter; (new implement) a light land plough with wheels, a plough for general purposes, a one-horse cast-iron roller, a four-horse power thrashing machine, a tumbril for general purposes, a round hogs' trough, a two-sized hogs' trough, a double-hoppered hogs' trough, a two-horse cast-iron roller and spring cleaner, invented and manufactured by the exhibiter; a lever horse-tree, invented by the Rev. Charles Lucas, of Scotland, and manufactured by the exhibiter; two zigzag harrows, invented by William Armstrong, and manufactured by the exhibiter.

JAMES SMYTH, of Witham, Essex; and of Peasenhall, near Yoxford, Suffolk.

Several patent corn and seed drilling machines, and a turnip seed drill, invented, improved, and manufactured by the exhibiter.

JOHN WEATHERSTONE, of Islip, near Oxford.

A dibbling machine, one-horse power, invented and improved by the exhibiter, and manufactured by Richard Allen, jun., of Islip.

ROBERT WEDLAKE and ANN THOMPSON, of Union Foundry, Hornchurch, near Romford, Essex.

(New implements) patent irrigators, invented by George Coode, Esq., of Haydock Park, Lancashire, and manufactured by the exhibiters; two hand power chaff cutters, improved and manufactured by the exhibiters; a steam or horse chaff cutter, invented by Robert Wedlake, of Hornchurch, improved and manufactured by the exhibiters. Two oil cake crushers, invented and manufactured by the exhibiters; a broad-cast seed machine; a weighing machine for potatoes; a double action barrel turnip cutter; a turnip cutter with horizontal plate; a one horse power gear work; a horse hay or barley lever rake; a double motion corn and seed winnowing or dressing machine; a hoed scarifier or horse hoe; a double breasted or moulding-up plough; a lever scarifier or grubber, with thirteen hoes or tines; a four horse power thrashing or bolting machine; a weighing machine; a land-ditching or draining plough; a subsoil plough; a pea drill plough for sowing on the ridge, improved and manufactured by the exhibiters. (New implement) several specimens of the patent economic hand dibble, invented by Dr. Samuel Newington, of Knole Park, Frant, near Tunbridge Wells, and manufactured by the exhibiters; a hay making machine, with double cylinder and reverse motion, invented by Robert Wedlake, of Hornchurch, improved by Henry Hankinson, of Hornchurch, and manufactured by the exhibiters (this implement obtained the prize at the Royal Agricultural Society's Meetings at Derby and Shrewsbury, previous to the improvements).

WILLIAM WILLIAMS, of Bedford, and LAWRENCE TAYLOR, of Cotton End, near Bedford, Bedfordshire.

Specimens of several sets of patent four beam diagonal iron harrows, invented by Samuel Taylor, of Cotton End, improved and manufactured by William Williams, of Bedford (these harrows obtained a prize of £5 at the Derby meeting in 1843, also at the Southampton meeting in 1844, at Shrewsbury in 1845, and Northampton in 1846); a patent horse rake, invented by Samuel Taylor, of Cotton End, and improved and manufactured by William Williams, of Bedford (a prize of £5 was awarded in Southampton in 1844 for this implement); a wrought iron scuffler or scarifier, registered three and two-knife chaff engines, and a patent wrought iron plough with two wheels, invented, improved, and manufactured by William Williams, of Bedford; a machine for making draining pipes and tiles, invented by Sanders and Williams, of Bedford, and improved and manufactured by William Williams, of Bedford (a prize of £25 was awarded to this machine at the Northampton meeting in 1847); (new implement) a registered newly-invented dressing machine, with barley cutter or hummeller, invented and manufactured by John Guest, of Bedford; (new implement) a patent land cultivator, invented by John T. Haradine, of Needingworth, and manufactured by Wm. Williams, of Bedford; a mill for grinding beans, peas, barley, and oats, improved and manufactured by Wm. Williams, of Bedford.

CHARLES D. YOUNG & Co., of 22, Parliament-street, Westminster, Middlesex.

A complete working model of a set of simultaneous-acting iron gates for railway level crossings; several specimens of carriage and field gates, complete with wickets and handsome cast-iron posts; a wrought-iron wicket, with cast-iron pillars, specimens of strong wrought-iron hurdles, and light iron hurdles, for cattle and sheep, made hare and rabbit proof, with wire netting; four webs of strong wire netting, for excluding hares, rabbits, and poultry from gardens, young plantations, nurseries, &c.; twelve specimens of strong wire net plant guards, for protecting plants, shrubs, and trees from the ravages of hares and rabbits; two specimens of strong premium wire netting, for sheep, dogs, &c.; four strong and handsome wrought-iron garden seats; four specimens of light and strong iron wire chairs; twelve specimens of strong wrought-iron flower stakes, for supporting standard roses, dahlias, &c.; twelve specimens of wrought-iron flower stakes, single prong; two specimens of iron and wire archways, for cottage doors, &c.; two specimens of strong wrought-iron tree guards against horses, cattle, and sheep; invented, improved, and manufactured by the exhibiters. Two cast-iron pheasant feeders, manufactured by the exhibiters. A column archway of iron and wire; four specimens of flower stands, for rooms and gardens; and four other specimens of flower stands; invented, improved, and manufactured by the exhibiters.

THOMAS DAWSON, of Stafford.

A portable two-horse power farmer's mill; invented by Remington, of Stafford; improved and manufactured by the exhibiter. A two-horse power engine; invented and improved by R. R. Carthy, of Stafford, and manufactured by the exhibiter.

RICHARD DOWNS, of Ryhall (near Stamford), Rutlandshire.

A plough for general purposes, with subsoil attached to it; a plough for general purposes, either light or strong land; invented and manufactured by the exhibiter.

JOHN FINCH, of 24, Wilmington-square. London, Middlesex.

(New implement) a horse-power screening and pugging mill; (new implement) a patent hand-working drain tile and pipe machine; invented by the exhibiter, and manufactured by Messrs Hancock and Son, of Fenton, Staffordshire. (New implement) a specimen of improved blue metallic Staffordshire pipes; (new implement) specimen of ornamental flooring tiles; invented, improved, and manufactured by the exhibiter. (New implement) a specimen of porcelain and other baths, washtubs, and appendages; manufactured by Mr. Rufford, of Stourbridge, and Mr. Mayer, of Burslem.

CHARLES WILLIAM FIRCHILD, of Stourbridge, Worcestershire.

(New implement) a masticator of gorse for cattle and horses; invented and manufactured by the exhibiter.

DAVID HARKES, of Mere, near Knutsford, Cheshire.

A plough for light or heavy land and general purposes; a horse hoe; (the prize of £5 was awarded this implement at the Southampton meeting, and the prize of £2 at the Shrewsbury meeting); a drain plough; (new implement) a machine for screening clay and making tiles; and a cultivator or scarifier; invented and manufactured by the exhibiter.

JAMES HART, of St. James' Road, Old Kent Road (late of 41, Bermondsey Square), Southwark, Surrey.

(New implement) a brick machine; invented and manufactured by the exhibiter.

JAMES KIRKWOOD, of Tranent Foundry, near Tranent, East Lothian.

A swing plough for heavy land; a swing plough for general purposes; a large cultivator or grubber; a two horse cultivator or grubber; a light cultivator or grubber; a subsoil pulveriser; a heavy subsoil pulveriser; a green crop cultivator; a horse hoe for hoeing on the ridge; invented, improved, and manufactured by the exhibiter.

WILLIAM WHITE, of Queen-street, Church-street, Mile-end New-town, near London.

(New manures) a manure for grass, clover, cereals, hops, turnips, mangold-wurtzel, and potatoes; invented and manufactured by the City of London Portable Manure Company, of London.

The Rev. GEORGE WILKINS, of Wix, near Manningtree, Essex.

(New implement) a seed and manure drill; invented and manufactured by the exhibiter.

WILLIAM DUDLEY, of Thrapston, Northamptonshire.

(New implement) a one-horse for cart general farming purposes; invented, improved, and manufactured by the exhibiter.

THOMAS WALKER, of Wootton, near Barton-upon-Humber, Lincolnshire.

A two-rowed ridge drill, improved and manufactured by the exhibiter (this implement was awarded a prize of £10 at the Royal Agricultural Society's meeting held at Newcastle-upon-Tyne in 1847); a two-rowed press drill, improved and manufactured by the exhibiter (this implement was awarded a prize of £10 at the above meeting to Mr. Hornsby, of Grantham, Lincolnshire, a heavy harrow, a cultivator or grubber, and a set of light harrows, invented, improved, and manufactured by the exhibiter (these harrows had a prize awarded to them at Lincoln in 1848, and were highly approved of at York.

JOHN WRIGHT, of Buxton, near Norwich, Norfolk.

(New implement) a corn and hay-gathering machine, invented by the exhibiter, and manufactured by Stephen Goodwins, of Lammas, Norfolk.

THOMAS GIBBS and Co., the Seedsmen to the "Royal Agricultural Society of England," and to the Honourable Boards of Agriculture of England and Sweden, Corner of Half-Moon Street, Piccadilly, London.

A collection of agricultural seeds, roots, specimens, &c., &c.

GEORGE GIBBS and Co., Seedsmen, &c., to the Royal Agricultural Department of Belgium, and Corresponding Member and Seedsmen to the Agricultural Society of Zeeland, in the Netherlands, 26, Down-street, Piccadilly, near Hyde Park Corner.

A collection of agricultural seeds, roots, &c., &c.

THOMAS TAYLOR, of Banbury, Oxfordshire.

A patent inflated saddle; a patent moveable pannel hunting saddle, invented, improved, and manufactured by the exhibiter, an improved ladies' side-saddle, improved and manufactured by the exhibiter; a registered bit for riding and driving bridles, a winker shade to prevent horses shying, invented, improved, and manufactured by the exhibiter.

JOHN and JAMES TURNER, of Mulbarton, near Norwich, Norfolk.

A set of draining tools, the tongs for placing tiles and pipes in drains, invented and improved by the exhibiters, and manufactured by Levine, of Norwich.

EDWARD JARMAN LANCE, of Blackwater, near Bagshot, Surrey; and LEWIS JUDAH COOPER, of Leeds, Yorkshire.

A collection of Lance's granulated manures, invented and manufactured by the exhibiters; a collection of soils, being the sites of agricultural meetings of the Royal Agricultural Society, arranged by the exhibiters; a hand seed machine (model one-third the size), invented by John Bennett, of Farnham, improved and manufactured by the exhibiters; marking-ink powders for sacking, &c.; agricultural pens and ink powders, invented by Lewis Judah Cooper, of Leeds, and manufactured by the exhibiters; agricultural books; specimens of the diseases to which corn crops and the potato plant are subject; specimens of corn, the effects of labour and manure, on a poor sand soil; a geological map of England and Wales; a geological map of the British isles and part of France; specimens of mineral matters that are taken up as food by growing crops, arranged by the exhibiters on trays for purchasers.

JAMES CHADNOR WHITE, of Tewkesbury, Gloucestershire.

A set of pair-horse carriage harness, a set of gig or phaeton harness, and a small double swivel to prevent reins twisting, invented, improved, and manufactured by the exhibiter.

S. WEBBER, J. H. HEDGE, and Co., of Ipswich Oil Mills, Ipswich, Suffolk.

A case containing linseedcake, of various qualities; a case containing cakes and seeds from which they were made, and oil, manufactured by the exhibiters; and six sacks of linsced and rapeseed, imported by the exhibiters.

H. W. CANSDELL, of Tolleshunt D'Arcy, near Maldon, Essex.

A collection of seeds, roots, &c.

GEORGE HAMMOND and Co., of Lynn Regis, Norfolk.

Samples of manures, in small bags, manufactured by Messrs. Richardson, Currie, and Co., of Newcastle.

JABEZ HARE, of 108, Fleet-street, London.

A model of a farmer's fire engine, drainer, and irrigator, invented by William Badeley, of 29, Alfred-street, Islington, and manufactured by M. Merryweather, of Long-acre, London; a model of a horse's hoof and shoe, showing an improved method of fastening the latter, invented by William Parry, Esq., of Plymouth.

NEWCASTLE FARMERS' CLUB.—JULY MEETING.

"*What is the Cost of Cultivating an Acre of Fallow Land for Wheat*, exclusive of rent and manure, but including every other expense?" On this subject a communication had been received from Mr. Hugh Taylor, which was in these words:—

"The following calculation is intended to show the present cost of production on the clay soils of South Northumberland, under the *present* system of management, and on an average of years; though no doubt, in a short time, by taking advantage of those improvements already practised in other districts, and those which every year is introducing, that cost must be considerably reduced. As it does not seem just that the whole expense of the bare fallow should be borne by the wheat (the method usually followed), an average amount of labour has been given to that crop, and the cost of the extra working divided over the course; the wheat crop being charged with half the amount, as it occupies the land for a longer period, and gets the full advantage of the labour and manure which has been given to the fallow. The wages of a man is supposed to be 13s. per week, and in harvest 18s.; of a boy, 1s. per day; of a woman, 10d.; and the value of a horse, 3s. per day all the year round.

EXTRA WORK DONE IN THE YEAR OF FALLOW.

Five ploughings, one acre per day	£2	0	10
One rolling	0	1	0
One four-horse harrowing	0	2	0¾
Two double harrowings	0	4	1
Three women quickening one acre	0	2	6
One ditto spreading dung	0	0	10
One lad leading quickens off five acres	0	0	9
Four men, three lads, and five horses dunging six acres	0	4	5½
Twelve tons of dung, at 2s. 6d.	1	10	0
Interest of capital, and wear and tear for four years	2	0	0
Rates	0	2	6
Total	6	9	0
One-fourth	1	12	3

REMAINDER OF WORK TO ACCOUNT OF WHEAT.

One ploughing	£0	8	2
One ribbing, two acres per day	0	2	7
Two double harrowings	0	4	1
One man sowing twelve acres, at 2s. 6d.	0	0	2½
One man water-furrowing twenty acres	0	0	5
Cutting out land	0	0	6
Two bushels of wheat seed	0	12	6
Rates	0	2	6
Four women shearing one acre, at 2s. per day	0	8	0
One man binding two acres	0	1	6
Five men, one woman, and six horses will lead and stack fifteen acres	0	2	3
Four men, four women, and six horses to thrash and dress four acres	0	7	8
Delivery, including all tolls	0	6	0
Covering and roping stacks	0	0	7
Total	£2	16	11½
Add one-half cost of fallow	3	4	6
Total	£6	1	5½
Cost per quarter (yielding three quarters per acre)	£2	0	5¾
Rent of land 30s. per acre, and half of a fallow year's rent, per quarter	0	15	0
Cost per quarter	£2	15	5¾

EXPENSES OF HAY CROP.

Rolling and sowing	£0	1	0
Brushing	0	1	0
Cost of seeds	0	6	0
Hay harvest	0	12	0
Rates	0	2	6
Total	£1	2	6
One quarter of the cost of fallow	1	12	3
Fog taken into account as extra hay (tons, two)	£2	14	9
Cost per ton	£1	7	4½
Rent of land, and quarter of fallow year's rent, per ton	0	18	9
Cost per ton	£2	6	1½

EXPENSES OF OAT CROP.

One ploughing, three-quarters of an acre per day	£0	10	0
Two double harrowings, four acres per day	0	4	1
Four bushels of oat seed	0	10	0
Sowing	0	0	2
Harvest	0	18	0
Rates	0	2	6
Total	£2	4	9½
One quarter of the cost of fallow	1	12	3
Land will yield per acre five quarters	£3	17	0½
Cost per quarter	0	15	4¾
Rent of land, and quarter of fallow year's rent, per quarter	0	7	6
Cost per quarter	£1	2	10¾

Mr. WEEKS observed, that Mr. Taylor made the cost per acre of cultivating fallow land for wheat to be only £1 12s. 3d.; but he had found his land to cost him £3.

Mr. ROBSON said, few farmers took the trouble to ascertain the cost of cultivation. It would be found, he believed, to exceed what most of them, off-hand, guessed it to be. It varied, too, according to the tenacity of the land, its cleanliness, &c. On strong land he had calculated the cost of a bare fallow to be £4 12s. per acre, exclusive of rent-charge or tithes, rates or taxes, or manure, which would bring it up to £7 12s. 6d. The following were the items:

Five ploughings, at 7s.				£1	15	0
Five harrowings, at 2s.				0	10	0
Rolling				0	2	6
Hand-picking				0	2	6
Laying on dung and spreading				0	10	0
Drilling, or sowing broadcast, and harrowing seed				0	2	6
Reaping, binding, leading, stacking, thatching, thrashing, winnowing, and marketing				0	17	6
Seed				0	12	0
				£4	12	0
Rent (two years) at 25s.	£2	10	0			
Rent-charge (ditto) at 4s.	0	8	0			
Rates and taxes	0	2	6			
				3	0	6
				£7	12	6

Mr. Colbeck next read a table of cost, of which the following is a copy:—

Ploughing in autumn	£0	7	0
Cross-ploughing in spring	0	5	0
End-long ploughing	0	5	0
Harrowing with large harrow	0	1	9
Ditto with small harrow	0	1	6
Rolling	0	1	0
Harrowing with small harrow	0	1	6
Cleaning land	0	2	6
Carting manure	0	7	0
Spreading ditto	0	1	0
Ploughing	0	5	0
Harrowing	0	1	0
Cleaning land	0	1	0
Seed furrow	0	4	0
Sowing	0	3	0
Woman sowing seed	0	0	1
Seed (say)	0	12	0
Harrowing	0	1	6
Water furrowing	0	0	6
Cutting, &c.	0	0	0
Rolling in spring	0	0	0
Reaping	0	6	0
Binding	0	1	6
Carting and stacking	0	2	6
Covering and roping	0	2	0
Thrashing and winnowing	0	7	6
Marketing, gates, and toll, &c.	0	5	0
	3	15	10
Two years' rent-charge	0	10	0
,, poor's rate	0	6	0
,, highway and church	0	2	0
,, income tax (say)	0	2	0
	£1	0	0

A brief conversational discussion succeeded the reading of these statements, and the meeting then broke up.

The remaining questions on the card relate to the best method of improving grass land when it has become hide-bound; whether it is more profitable to fallow after beans when they are substituted for grass seeds, so making a seven years' course, or to take a white crop after beans, making an eight years' course, due regard being paid to the non-deterioration of the land; the reason of the failure of the broad clover, and the means of prevention; and the best manure for the turnip crop on clay soils and lighter soils respectively.

ON THE COMPARATIVE MERITS OF SALVED AND UNSALVED WOOL.

The salving of sheep is an operation which has been annually performed upon our mountain flocks from time immemorial, and has for its object not only the protection of the animal but also of the fleece. A few remarks, therefore, on a subject of such vital importance as that of the staple commodity of our country, cannot fail to be read with some interest, not only by our wool growers and manufacturers, but also by those who take an interest in the prosperity of the pastoral districts of auld Scotland. The salve we would with most confidence recommend, is the "Artificial Yolk Salve," which has been extensively used in the border counties for a number of years past, and has been found admirably adapted for repelling external moisture, preventing cutaneous diseases, and killing instantly all the insects with which sheep are infected. It is now a well-ascertained fact, that all fatty matters, whether animal or vegetable, when used in the salving of sheep, ought to be saponified, as it very materially lessens the conducting power of heat, in consequence of the porous nature of the composition, and thereby preventing the heat of the animals from making its escape, and, consequently, adds greatly to the comfort of our mountain flocks during a storm or protracted winter. From the nature and properties of the composition, it has not only the effect of preventing the gilting or discoloration of the fleece, but improves its felting properties in a very eminent degree, and, at the same time, communicating to the wool an undescribable kindliness to the touch, which the unsalved fleece, or that produced in the absence of an oily or saponaceous substance, cannot possibly possess. As it may not be generally known the cause which produces the gilting or discoloration of the fleece, it may not be considered out of place to mention the fact that oily and fatty matters are composed of proximate principles, which, upon being exposed for a certain time, and to a particular temperature, gradually assume a different condition, and instead of being found mild and harmless, they acquire an acid nature from the absorption of oxygen from the air. The names of these proximate principles of such matters are, *Stearine*, *Oleine*, and *Margerine*; and by this absorption of oxygen from the air, corresponding acids are formed, which produce the colour, technically called gilting, which is so much dreaded by the manufacturers of white goods. The sole object that the woollen manufacturers have in mixing the oil with a slight quantity of tar, previous to its being administered to the wool, is to prevent the decomposition which is effected by the action of the creasote and other anti-putrefactive substances which it contains. This is so far proved from the fact that even tar loses the property of preventing the discoloration of the wool after a certain time, which can alone be imputed to the evaporation of these volatile substances, contained in the tar, which are known to be the most certain preventives of either animal or vegetable organized matter.

Notwithstanding that sheep are allowed to be the most useful of all domestic animals on account of their wool, and because they can be kept in situations where other stock cannot, it is somewhat remarkable that the fleece—a subject so closely connected with agriculture—should still continue to be so very imperfectly produced in many districts of Scotland. We have frequently heard some farmers state, by way of palliation for the crime of slovenliness, that, from the small price obtained for Scotch wool, there was really no inducement to be in any degree more particular than they had hitherto been in the general management of their clips. With regard to the price obtained for Scotch wool, there can exist but one opinion amongst those who have a knowledge of the nature and properties of the fleece—that of all wool-producing countries with which we are acquainted, the home-grown fleece, when quality and general management are taken into account, decidedly fetches the highest price. The landed proprietors and sheep farmers of Scotland have, therefore, every encouragement to adopt those measures which are best calculated to produce a fleece, in no degree inferior, as regards management, to the wool grown in any other country on the face of the globe. It is, however, but justice to state, that, during the last ten or fifteen years, a very marked improvement has taken place on the fleece in various counties, in particular in the salving. From the innumerable rivers and mountain streams which traverse our pastoral districts, no nation in the world possesses greater facilities for the washing of sheep than Scotland; yet true it is, and of verity, that notwithstanding these advantages, the washing of the fleece is, in too many instances, more imperfectly performed than any other department connected with the management of stock. To remedy this evil, we would strongly recommend that the river washing of sheep should be abandoned, and that for ever, and that pond washing should invariably be substituted in its place. We have ourselves seen unsalved sheep, and sheep salved with the composition here recommended, both belonging to the same hirsel, washed in the same pond, and after being clipt, their fleeces were carefully weighed, and, afterwards, not less carefully scoured with soap and water; and, after being dried, they were again accurately weighed, when it was found that the salved fleece had not suffered a greater reduction in the scouring than the unsalved, and upon comparison was found equally pure in colour, while at the same time it possessed many valuable properties which the other did not possess, rendering it more eminently fitted than the unsalved for all the various descriptions of goods into which our native fleece is generally fabricated; and although last, not least, it was found that the salved fleece, after being relieved of all its impurities, weighed considerably heavier than the other. From these results, and from many others which can readily be mentioned, there cannot possibly exist a doubt in the mind of those whom information enables to look at the subject in all its bearings, that the salved fleece is not only more profitable to the grower than the unsalved, but of greater value to the manufacturer.

It was on account of the healthy and vigorous nature of the staple commodity of our country that the Parisians were induced to become all but our best customers. A single trial was only necessary to convince them that our Scottish fleeces were not less true in staple, than they had ever found the sons of our mountains true to their king and to their country. It would be unfair to charge the wool-growers with the crime of slovenliness, without noticing how very little encouragement the buyers have hitherto given, to induce them to make any improvement whatever in the general management of their wool; in fact, they seem alarmed at the idea of giving anything like the value of a well-managed clip, in case that it might act as a precedent in the purchasing of other lots, very differently managed. It is consistent with our knowledge, that many farmers, after having for a series of years produced a clip of wool of a most perfect nature, were again induced to adopt those slovenly practices, so rigidly adhered to by their forefathers, in the producing of the fleece, solely from the circumstance of their neighbours (whose clips had invariably been ill-managed, both as regarded salving and washing), having obtained, from year to year, for their wool, a price per stone equal to what they could command for wools of the most perfect description. This is really a sad state of matters, and such as cannot too soon be set right; and, with a view to accomplish so desirable a purpose, I would beg to suggest that our wool should, in future, be sold by auction, in the same way as the London sales of foreign wool are conducted; in place, however, of having the wool brought to the place of sale, I would propose that the various clips should be duly advertised, mentioning the day and place of sale. The advertisement should appear at least a month before the sale, so that intending purchasers might have an opportunity of examining the lots of wool advertised for sale. Could this system be adopted, which I think might easily be done, a superior clip would be sure to bring a corresponding high price; and the painstaking farmer would, without fail, obtain a remuneration for his trouble. Moreover, the competition among buyers would be thereby increased, instead of being diminished. It frequently happens, under the present system, that the purchaser is permitted to obtain clips at his own price, merely because he has been in the practice of purchasing them; his neighbour purchasers feeling a delicacy in giving an offer for what he considers his own *hereditary* parcels. In a sale by public auction, no such delicacy would exist, and the *lot* would be knocked down to the highest bidder, without exciting any unfriendly feeling in the minds of those who refused to give what their neighbour had publicly offered.

R. Boyd.

Innerleithen, July 5, 1849.

CALENDAR OF HORTICULTURE.—AUGUST.

Retrospect.

Ever since the day when the last calendar was compiled, June 21st, which was the summer solstice, our vicinity has been visited by one shower only, and that on the night of the 30th of June, previous to which the weather had been almost entirely dry for a full month. The consequences must be evident; the market gardens are droughted. The soil about Croydon, in a semi-circle from the west by the south, to the east, of considerable extent, abounds with flinty gravel over chalk, or deep greenish sand; hence the ground speedily becomes dry. Clay, of great depth is abundant on the northern side. The berry-bearing shrubs produce little fruit this year, but importation partly makes up for the deficiency. Strawberries have been abundant and cheap; but the plants are suffering from aridity. Plums and pears, it is believed, will be scarce generally. Apples are locally deficient, but, on the contrary, abound in some places. All vegetables have proved ample in supply, though the early hearting cabbages were complained of. Potatoes, so far, are sound, yet small in yield, and, if recollection of bygone years be trustworthy, very much deteriorated in flavour and texture. The leguminous vegetables are good, but are rapidly drying up. Kidney beans will be fine if rain come soon; and as appearances are promising, we postpone further remarks to the closing paragraph.

Operations in the Kitchen Garden.

Cabbage coleworts.—Mention was made of these best of greens in the last calendar, but still in many localities it will not be too late to prepare them. First dig the ground for a bed in an open site—loam of sound, but free, temperament is to be preferred—manure it fairly, and make the texture fine; tread or press the surface firmly enough to draw drills 9 inches apart (always premising that if the dry weather continue, the soil must be soaked and kept moist for three days by mats). In those drills sow seeds of a small hearting York, about half an inch deep. Water the drills, put the covering earth evenly, and return the mat covering, daily, till the plants appear. Adopt these precautions with all the cabbage tribes, and with *spinach*, otherwise the seeds may entirely fail. For coleworts thin out to 2 inches apart so soon as the plants shall be 2 or 3 inches high; the rows will then receive benefit by being watered in the rows overnight with a weak solution of good guano—1 oz. to the gallon. Another bed ought to be made ready, rather more enriched, to receive the second thinnings after the plants have attained double their size. These are to be planted in shallow drills—6 inches by 9—leaving the seedling beds to stand at similar distances. Showery weather will be favourable, and then in the space of a month a fine set of young greens will be in a promising condition. For hearting spring cabbage it is usual to sow thickly (to be thinned out to 3 inches) about the 10th of August; but locality and situation must guide the operator. Theory says that plants raised from seed in the last week of July are apt to run up; whereas those raised early in August will generally "cabbage" without running.

Winter spinach, or rather the broad-leaved Flanders, ought to be sown by the 7th to 15th. G. Lindley writes on this variety, that the seeds are round and not prickly, the leaves doubly hastate, somewhat rugose, the lower ones 12 to 14 inches long, and 6 or more inches broad. When the plants have 3 or 4 leaves they should be first thinned to 3 inches, then to 5 inches apart, "cutting out every alternate plant, when the first crop is gathered." The prickly will occupy smaller spaces.

Sow also in the first week Strasburgh and Welsh *onions*, to supply from the early winter to the spring; the last-named do not bulb, but are very hardy. Plant out *leeks* directly, if all are not already out.

For early Cape and spring *broccoli* prepare an open spot of ground, dig-in plenty of manure, and plant in rows 2 feet asunder, filling each hole with water. French planting would tend much to guard the plants from early frosts.

Sow a crop of *turnips*, a few drills of curled *parsley*, some tennis-ball or Gotte *lettuces*, and all the varieties of turnip-rooted *radish*.

Transplant *celery* in manured trenches, removing every side-shoot. In earthing-up we are now recommended to employ coal-ashes, a layer of an inch or two being put round each plant by means of a board, or other support, placed temporarily between them and the earth; thus the plants are kept clean and guarded from worms—it is well to try for oneself.

Prepare for *mushrooms* by spawning melon-beds.

Endive—Sow for the main crop to be transplanted in September.

Small salads—Sow for succession once a week in a shady border, or protect during the heat of the day by an awning of mats: the seeds of mustard and cress require little covering soil; for if the earth be merely raked and a little moist it will suffice to put the seeds in, after sowing, with the spade, when a moderate watering with shade will bring the plants up without that ugly mass of earth which requires to be whisked off.

Sow the hardy *lettuces*—brown Dutch and Cos—about the third week.

Cauliflower seed is usually sown about the 21st, in a clean and rich spot of ground, about 3 or 4 feet wide; sow in drills made a few inches asunder, half an inch deep; rake it in, and put the covering earth level—always remembering the precautions often given to moisten and keep the earth moist if the weather be dry. As the plants grow, thin to regular distances.

Artichokes are fruiting, and numbers of small secondary heads appear on strong plants—most of these and their shoots ought to be removed.

Examine the bulbing *onions*, for when the stalks begin to wither, the bulbs are ready to be taken up and dried, as should *garlic* and *shallots* likewise.

Cut down the flowering stems of aromatic herbs, and shorten straggling young shoots to induce the plants to form compact heads.

Attend particularly to the destruction of *weeds* by hand and hoe.

Melons and *cucumbers* require only protection from slushing rains—the former ripen fast—see the former remarks.

Fruit Department.

Strawberries require care to increase the plants for new beds. We object to the careless practice of permitting the runners to ramble as they like; and therefore suggest that no runners whatever be left, unless such as are produced by a proved fruitful stock, and from that two or three strings only may be trained, in regular order, and pegged down at the plantlet which is nearest to its parent; roots will soon form, and thus it will acquire the utmost strength—far greater than that which could be attained by nursery beds now made. Such young plants, if moved carefully in March, will generally prosper. If designed for pot culture, the young plant ought to be fastened down to a 60-size pot.

Wall-trees are to be looked over to protect, and timely gather the ripening fruit, and lay and secure the year's shoots regularly to the wall; all wild or straggling shoots ought now to be displaced. *Vines* must have all the sun possible; but unless the situation be very favourable there will be little fine ripe grapes this year, and therefore it may be preferable to collect the full grown green fruit for wine; and this, at the present price of good lump sugar, can be made of fine quality at about 1s. 6d. per gallon.

Clear all the fruit-tree borders. Gather the first formed figs immediately, to promote a second development, and train the branches in correct order.

Continue the *budding* of all fruit trees, and go over the stocks previously budded to loosen the bandage in some degree.

Fruits under Glass.

Pines.—A prudent supply of clear manure-water made from sheep's or pigeon's dung, or it may be a solution of guano, will assist the fruits that are swelling, but give it seldom and cautiously; maintain a full temperature with abundance of air.

Vines now ripening require much air by opening at the front and back wall, not by the sliding roof-sashes, which would admit rain, flies, and wasps.

Ornamental and Flower Departments.

Roses—Bud in moist weather, the best "show" and "perpetual" varieties, using the single slit, and tie with Cuba bass (which never breaks), or with 5 or 6 threads of coarse worsted for each tie. Ease the binders of such buds that have already succeeded. Gather, by scissors, all fading flower-stalks everywhere, also seed vessels preserved for the purpose; but bear in mind that when seeds naturally fall on the ground, if the plant will bear the winter, the seedlings so produced will always be preferable to others artificially sown.

The early part of August is the best season wherein to propagate all the *pelargoniums*, *verbenas*, and a great portion of the *parterre* and "bedding-out" varieties. In general, make use of white sand and leaf-mould mixed. Shelter from sun and air in frames over very gentle bottom heat, till growth be established; supplying water as needed, but by the bottom rather than the surface: remove every decaying leaf. The scarlet geraniums, and those with variegated leaves, require little heat, and may be rooted by numbers in the same pot.

Continue to layer *carnations*, *cloves*, and *picotees*. Plant out in beds or rows rooted layers of *pinks*. Keep box-edgings, walks, lawns, and shrubberies, in the neatest condition, and carry the litter to the compost heaps, where vegetable mould, decayed leaves, and compost, are, and should ever be, laborating substances for the future enrichment of the floral departments.

Final Remarks.

Rain came on the 17th, and showers more or less have visited this locality every day since. There was distant thunder on the 19th, and two successive storms (dry however) occurred on the afternoon of the 20th. The surface has been nicely sprinkled, but as yet water has not reached far below it. Much wet would be useful to the gardens; but as the corn ripens fast a continuance of rain is not desirable. The safety or injury of potatoes, so far as rain may be concerned, will now be brought to the proof. J. Towers.

Croydon, July 21.

AGRICULTURAL REPORTS.

GENERAL AGRICULTURAL REPORT FOR JULY.

During the first fortnight of this month the weather in all parts of the United Kingdom was extremely warm and dry. Although the want of moisture for spring corn was severely felt on most of the light lands, the accounts which reached us, respecting the general appearance and progress of the crops, were on the whole favourable, especially as respects the wheats. From the 17th to the 27th we were visited with daily and copious showers of rain; and on the 26th a very severe storm visited the metropolis and neighbouring counties, causing considerable damage to the heavy wheats, which were laid to some extent in various quarters, and almost inundating the low lands. That the crops have been benefited by these rains not a doubt can exist; and it must be self-evident that had the temperature continued high up to the close of the month, a great deficiency would be found to exist in the produce of barley, oats, beans, and peas, particularly in the former.

Regarding the probable yield of the wheats, opinions are pretty well agreed that it will prove a full average one, and considerably larger than that produced in 1848, or perhaps in 1847. That of spring corn will not, we conceive, be heavy, as it is evident that the quantity of land under barley and oat culture is not so large as in some previous years.

It is now well ascertained (notwithstanding the small deliveries going on during the last three or four months) that the stocks of old wheat in the hands of the farmers in our principal grain districts, but more especially in those south of the Humber, are unusually small, the time of year considered. This important fact has, however, failed to have its accustomed influence upon the demand. The falling off in the importations in the early part of the month produced some firmness in the trade, at slightly improved currencies; but the dispute between Denmark and the duchies of Schleswig-Holstein having at length been settled (and which will increase our supply of wheat from abroad to nearly or quite half a million of quarters prior to the close of the shipping season), millers have become cautious in their operations, and prices have receded to about their former level. While the importers of foreign grain continue to dispose of their cargoes, on arrival, at market prices, it is scarcely to be presumed that any important changes will take place in the value of corn: certainly the chances are more in favour of a decline than an advance in the quotations.

It is gratifying to observe that the potato crop is progressing favourably. We can scarcely presume that the disease so prevalent in 1847 has wholly been eradicated, and that losses will not be sustained in some localities; nevertheless nearly the whole of our correspondents intimate that, in all probability, the number of diseased potatoes as yet to be met with is very small. Still we must not forget that much will depend upon the weather, and that no accurate estimate can be made of the quantity produced, together with its quality, for the next six weeks. A dry atmosphere will doubtless assist materially in securing us good quality, if not a large quantity.

Up to the time we are now writing, no corn, if we except a few patches of rye, has been cut, even in the south; but harvest operations were expected to be commenced in parts of Cornwall and Devonshire by the 30th. They will possibly be pretty general in the other forward counties about the 10th or 15th of August, which will be about a week later than last year.

The hay crop has turned out remarkably fine. The produce has exceeded that of even 1848, one of the heaviest ever known; and that of the aftermath is expected to be very nearly equal to a first-cut in some seasons. The supplies of old hay on hand are still large, and great difficulty is experienced by the farmers in finding purchasers for them. Straw has sold briskly, at a rise of fully 5s. to 6s. per load.

The produce of the crop grasses, as well as that of most kinds of seeds, is turning out good. Samples of new rape, carraway, and some other seeds, have been disposed of at Mark Lane. The former has produced £27 to £28 per last, which may be considered fair opening prices.

The operations of the new Tariff have more fully developed themselves this season than since the passing of the measure. From all quarters of the globe, almost continuous importations of food in some shape or other have taken place. The effect has been to keep down the prices of most commodities; but we much question whether present rates are remunerative to the foreign producer.

The quantity of wool as yet disposed of by the English growers has, undoubtedly, been small.

The public sales of foreign and colonial now holding in London, and at which from 40,000 to 50,000 bales will be offered before their close, have, from prices having advanced 1d. per lb., inspired confidence amongst the holders. The comparative activity in the manufacturing districts will doubtless tend to keep up the price of wool during the remainder of the season.

Such has been the foul state of the hop bine that the duty on hops has been done as low as £50,000. Our opinion is that that is too low an estimate, and we should not be surprised were the betting, now that the bine has been well "washed," to run up to £100,000 within the next two or three weeks.

Letters from Ireland and Scotland state that the corn trade has been far from active, the time of year considered. In prices, however, no materiel change has taken place.

REVIEW OF THE CATTLE TRADE DURING THE PAST MONTH.

We have long maintained that the available supplies of home-fed stock in the country are large. That we have been correct in our opinion, is evident from the state of the leading cattle markets in the month just concluded. The numbers of beasts brought forward and disposed of, in Smithfield, have been full average ones; while those of sheep have been again on the increase; yet the general demand has continued tolerably steady, and prices have been fairly supported.

Although the importations of foreign stock have slightly increased, they have not equalled those at some previous corresponding periods, arising, in some measure, from the blockade of the German ports, and the low prices ruling in this country. A slight advance in the quotations would speedily increase the arrivals, as we understand that stock is still very abundant in all parts of Holland. Not that we are looking forward to any material rise in value, from the fact that most farms are rather overstocked than otherwise.

The epidemic has made but few ravages amongst the beasts since our last; nor have any serious cases of disease presented themselves amongst the Sheep.

The foreign importations into London have been as under:—

Beasts	1,961	Head.
Sheep	11,803	
Lambs	761	
Calves	1,783	
Pigs	104	
Total	16,412	
Same time in 1848	12,379	
Difference	4,033	more.

In July, 1846, we received 2,900 beasts, and 10,800, sheep and lambs; in 1847, 3,304 beasts, and 12,091 sheep.

At the outports, 3,100 head of beasts, sheep, lambs, calves, and pigs have been landed in good condition; and the principal feature in the arrivals into London has been the receipt of nearly 500 sheep from Lisbon. At Southampton, 20 oxen have been received from Spain; but no supplies of consequence are expected from that quarter during the present year, owing to the heavy freight.

The annexed statement shows the total supplies of stock exhibited in Smithfield:—

Beasts	15,576	Head.
Cows	470	
Sheep and lambs	162,900	
Calves	2,615	
Pigs	2,044	

SUPPLIES AT CORRESPONDING PERIODS.

	July, 1846.	July, 1847.	July, 1848.
Beasts	15,876	15,773	16,878
Cows	577	586	495
Sheep and lambs	184,510	153,290	147,290
Calves	2,837	3,693	4,033
Pigs	1,727	2,228	2,350

The receipts from Ireland, direct by sea, for the London market, have amounted to 401 beasts, and 589 sheep.

The bullock droves have been thus derived:—

	Head.
Northern districts	3,000
Norfolk, &c.	4,400
Western and midland counties	2,000
Other parts of England	1,500
Scotland	800

COMPARISON OF PRICES.

Per 8 lbs., to sink the offal.

	July, 1847.	July, 1848.	July, 1849.
	s. d. s. d.	s. d. s. d.	s. d. s. d.
Beef from	3 8 to 5 0	2 8 to 4 2	2 8 to 4 0
Mutton ,,	4 0 to 5 4	3 8 to 5 0	3 0 to 4 0
Lamb ,,	5 2 to 6 4	4 6 to 5 6	4 0 to 5 0
Veal ,,	4 4 to 5 4	3 4 to 4 4	3 0 to 3 10
Pork ,,	4 0 to 5 0	3 6 to 4 6	3 2 to 4 0

Newgate and Leadenhall markets have been very moderately supplied; yet the general demand has ruled somewhat inactive, on the following terms:— Beef from 2s. 2d. to 3s. 6d.; mutton, 3s. to 3s. 10d.; lamb, 4s. to 5s.; veal, 3s. to 3s. 8d.; and pork, 3s. 2d. to 4s. per 8lbs., by the carcass.

A subscriber asks whether buck-wheat may be sown as feed for sheep to be eaten green, and whether hares and rabbits will eat it in the like state, and also what quantity per acre should be sown, drilled, or broadcast, and what time of the year is the latest period?

METEOROLOGICAL DIARY—1849.

Barometer.			Thermometer.			Wind and State.		Atmosphere.			Weather
Day.	8 a. m.	10 p.m.	Min.	Max.	10 p.m.	Direction.	Force.	8 a. m.	2 p.m.	10 p.m.	
	in. cts.	in. cts.									
June 21	30.09	30.10	53	71	61	W. by S. by N.	gentle	fine	sun	fine	dry
22	30.16	30.05	51	76	60	W. by N., S.W.	gentle	fine	sun	fine	dry
23	30.00	29.88	55	78	65	W. by N.	gentle	fine	sun	cloudy	dry
24	29.88	29.94	59	80	62	E., N.W., Ely.	airy	fine	sun	fine	dry
25	29.98	29.90	56	75	61	Var., S. by E.	gentle	fine	sun	cloudy	rain
26	29.94	30.00	56	74	62	W. by N. by S.	lively	fine	sun	fine	dry
27	30.00	29.97	56	75	61	W. by N. by S.	brisk	fine	sun	fine	dry
28	29.98	30.07	54	70	57	N. by West	gentle	fine	sun	fine	dry
29	30.11	29.90	54	67	57	Southerly	airy	fine	cloudy	cloudy	rain in
30	29.90	30.15	56	64	54	North	gentle	cloudy	cloudy	fine	nights
July 1	30.16	30.00	45	68	62	Westerly	lively	fine	sun	cloudy	dry
2	29.99	30.01	57	74	60	W. by S.	lively	cloudy	sun	cloudy	dry
3	29.77	29.70	56	60	60	W. by S.	forcibl.	cloudy	cloudy	cloudy	dry
4	29.70	29.70	55	63	56	W. by S.	gentle	cloudy	cloudy	fine	dry
5	29.86	30.00	56	72	62	N. West	gentle	fine	sun	fine	dry
6	30.69	30.10	53	75	62	S. West	fresh	fine	sun	fine	dry
7	30.10	30.03	58	82	68	S. West	fresh	fine	sun	fine	dry
8	30.04	30.16	63	83	69	W., or by N.	lively	fine	sun	fine	dry
9	30.20	30.30	58	84	67	W. by N., N.E.	fresh	fine	sun	cloudy	dry
10	30.33	30.32	58	80	62	N. Easterly	gentle	fine	fine	fine	dry
11	30.34	30.34	53	81	64	N. Easterly	airy	fine	sun	fine	dry
12	30.34	30.27	55	81	65	N. East	airy	fine	sun	fine	dry
13	30.27	30.20	57	81	64	E., N.E.	lively	fine	sun	fine	dry
14	30.20	30.17	57	82	65	N. East	lively	fine	sun	fine	dry
15	30.16	30.12	58	79	63	East	airy	cloudy	sun	fine	dry
16	30.14	30.00	59	84	68	Variable	gentle	cloudy	sun	cloudy	dry
17	29.91	29.77	60	68	60	S. West	airy	cloudy	cloudy	cloudy	a shower
18	29.77	29.65	53	68	55	S. by W.	var. c.	fine	sun	fine	several
19	29.60	29.60	51	64	53	W. by S. & N.	variabl.	cloudy	sun	cloudy	several
20	29.54	29.69	50	69	55	W. by N., Ely.	gentle	fine	sun	fine	some rain
21	29.87	29.99	60	67	57	W. by N.	gentle	cloudy	sun	fine	a mist

ESTIMATED AVERAGES OF JULY.

Barometer.		Thermometer.		
High.	Low.	High.	Low.	Mean.
30.30	29.390	76	42	61

REAL AVERAGE TEMPERATURE OF THE PERIOD.

Highest.	Lowest.	Mean.
74.0	55.2	64.5

WEATHER AND PHENOMENA.

June 21.—Airy and sunny; gorgeous setting; summer solstice. 22, 23, and 24.—Three superb days. 25.—A hint of rain. 26, 27, and 28.—Beautiful. 29 and 30.—Shower in the intermediate night. July 1.—Very much cooler after the rain. 2.—Beautiful day; cool; clouds early and late. 3.—Quite overcast. 4.—Generally cloudy; threatning; much clearer at night; great rain in parts of Sussex and Kent. 5.—Fine summer day. 6.—Fresh air and beautiful sky. 7.—Perfectly clear. 8 and 9.—Same; a few white cumuli. 10.—Hazy above; occasional clouds and hot gleams. 11 and 12.—Splendid, stirring, easterly breeze. 13.—Same. 14 and 15.—Some clouds and a hint of rain. 16.—Clouds begin to form. 17.—Two showers. 18.—Profuse showers, gusts of wind, fine gleams. 19.—Alternate gleams and clouds; a thunder shower. 20.—Finer; alternating gleams. 21.—Scarcely a hint of rain.

LUNATIONS.—June: New moon, 20th, 2 h. 19 m. afternoon; first quarter, 27th, 10 h. 44 m. morning. July: Full, 5th, 1 h. 29 m. afternoon; last quarter, 13th, 7 h. 8 m. morning; new moon, 19th, 9 h. 1 m. afternoon.

REMARKS REFERRING TO AGRICULTURE.—Notwithstanding the dry weather, many hay farmers hurried on their ricking, and thus injured their vast crops. The bulk of all grasses is enormous. Wheat is beautiful, and ripening fast. Spring corn and turnips have felt the drought. Late showers may give a chance to the sowers of the latter.

J. TOWERS.

Croydon, July 21.

REVIEW OF THE CORN TRADE

DURING THE MONTH OF JULY.

The dry, warm weather, with which June closed, continued during the first half of July, and serious fears were beginning to be entertained respecting the probable effects of the protracted drought on vegetation. The 15th inst. (St. Swithin's) passed over without rain in many parts of the country, but to the southward of London a few drops fell; the following day more copious showers were experienced, and during the greater part of the week which succeeded, we had frequent and heavy showers. This welcome supply of moisture has been followed by periods of rain and sunshine alternately, and the effect on the growing crops has hitherto been most beneficial. In all the later districts, the yield of corn will unquestionably be greater than it could have been if the drought had continued; and though the crops were too far advanced in the south to profit to the same extent by the rain, still the aggregate produce of the kingdom will no doubt be materially increased thereby.

Haymaking was finished under highly favourable circumstances, and the crop is unusually good, both as regards quantity and quality: as yet, however, there is very little after-grass. The dry weather at the end of June, and during the first fortnight of the present month, caused the meadows to present a very bare, parched appearance; and though they have since recovered, and now promise to afford a fair amount of feed, there is little prospect of a second crop being secured.

In regard to the probable result of the approaching harvest, opinions, as usual, vary materially; but after a careful examination of all the information collected from the most authentic sources, we are inclined to regard our prospects as decidedly good. That the weather was somewhat inauspicious during the blooming time cannot be denied, and that the wheat may from that cause be less productive than would otherwise have been the case, we are ready to admit; still, a careful examination satisfies us that if well secured there will be a good average crop. Taking the kingdom generally, harvest will probably be from ten days to a fortnight later than in ordinary seasons; as yet, only a few fields of wheat have been cut in the early districts, but the sickle will probably be in active operation before what we are now writing shall have been put in print; and we should not be surprised if a sample or two of new wheat were to be exhibited at Mark Lane on Monday, the 30th inst. In the south, most of the rye, and some quantity of early peas have been secured in excellent order: the yield of the former is good; but peas, though of fine quality, are rather short in yield.

Barley and oats have suffered more or less from the protracted drought, but the late rains have done much to repair the mischief, and it is probable that the quantity of these sorts of grain will not fall much short of the average produce of favourable years.

At one period there were serious complaints in regard to beans, but the accounts have lately become much more favourable, and we believe that there is every prospect of a good return.

We now come to the consideration of the crop next in importance to wheat—the potato. That every effort has been made to counteract the disease which has of late years proved so destructive to this root, is certain; and that the remedies adopted have in a great measure proved successful is, we are happy to say, more than probable. We are now approaching the close of July, and as yet symptoms of the blight are comparatively rare. That this has been wholly the effect of extra care in the cultivation, we do not believe; but that a better selection of seed and other precautions to guard against disease have assisted to check its ravages, we have no doubt. We are inclined to attribute the present sound appearance of the potato plant to atmospherical influences, and think that the prevalence of dry weather in June and July has done more to prevent the rot than any other circumstance. If our expectations should be realized, and a good crop of sound potatoes be secured in this country and in Ireland, it would of course have a great influence on the future value of all other articles of food. Even in England the potato forms an essential part of the daily food of the poorer classes, whilst in the sister isle it is the chief support of the bulk of the inhabitants. The scarcity of this universal article of food since 1845 has been the primary cause of the immense consumption of foreign grain which has taken place. Last year the deficiency of the corn crops added to the necessity to import from abroad; and of the enormous quantities which have reached our shores scarcely anything is now left. The supporters of free trade are very fond of using this as an argument in favour of their theories; but they wholly overlook the fact that under the sliding scale of duties, free imports.

tion was allowed, whenever the necessity for such a measure was evinced by a rise in prices to a certain point. Disastrous as have been the effects of the new order of things to the British farmer, we much fear that the worst has not yet been felt. Supplies of foreign produce will certainly not cease, though the necessity for importing may. We do not say that the price will not, to a certain extent, govern the matter; but if our crops of grain and potatoes should prove adequate or nearly adequate to provide for the consumption, and Russia, America, and other foreign countries should have a surplus for export, the absence of duties would be sure to cause such surplus to find its way here; and the effect would inevitably be, to depress prices in the British markets to a point ruinous to the home producer. Entertaining these opinions, and believing that the prospects for the harvest are good, if not particularly brilliant, we can come to no other conclusion than that the value of agricultural produce will suffer a further depreciation.

The trade in wheat has, since we last addressed our readers, maintained a tolerably firm tone. In the early part of the month prices tended upward in all parts of the kingdom, owing principally to the extreme shortness of the supplies from the farmers, during the time they were engaged securing the hay crop. Since then, some increase having taken place in the deliveries from the growers, and the long pending negociations between the Germans and Danes having at length terminated in the conclusion of an armistice, the expected scarcity which was the grounds on which prices advanced, not being likely to be experienced, a reaction has taken place; and within the last week or two, prices, which had crept up about 4s. per qr. in June and July from the lowest point, have again receded 2s. per qr. at the principal provincial markets. At Mark Lane business has not been active at any period of the month. The arrivals of wheat coastwise into London have been scanty in the extreme, and the quantity brought forward by land-carriage samples from the home counties has likewise been small. This no doubt operated in causing the upward movement in prices which occurred in the early part of the month; for though the millers were not dependent on English wheat for supplies, still in proportion as the finer descriptions of foreign became scarce they were under the necessity of using small quantities of the former. On the first Monday in the month (2nd July) an advance of 1s. per qr. was realized at Mark Lane for the best runs of Essex and Kent wheat. A further rise to about the same extent was established during the succeeding fortnight, but afterwards a re-action took place, and quotations are now much the same as they were at the close of June. The town millers are certainly short of stocks; but so long as the weather continues tolerably propitious, and nothing occurs to give rise to uneasiness in regard to the probable results of the harvest, they will most likely confine their purchases to as narrow limits as their pressing wants may allow, the notion that prices will be lower hereafter being at present very prevalent. Good runs of red wheat may now be quoted 43s. to 46s., and the highest price for white is about 54s. to 55s. per qr. The arrivals from abroad have been on rather a moderate scale, and only a small proportion of the supply has consisted of fine qualities. The bulk has been from the Black Sea and Danube, and many of the vessels having made long passages, the cargoes have become more or less heated on the voyage. The quantity of really fine foreign remaining in warehouse at this port is by no means large, the scanty manner in which the market has for months past been supplied with English having caused the better descriptions of foreign to be largely used by our millers, whilst a steady though not an extensive country demand has been experienced for the commoner sorts. Latterly the inquiry from the country has slackened, and the advance of 1s. per qr. established in the commencement of the month has since been lost. Polish Odessa may now be bought at Mark Lane at from 38s. up to 42s. per qr., according to condition, weight, &c. The best kinds of Baltic, French, and Belgian red vary in value from about 44s. to 48s. per qr. Of Danzig we have scarcely any fine on the market, and prices are therefore relatively high, say from 48s. up to 53s. per qr. The total importation into London during the month, from abroad, has amounted to about 40,000 qrs., and we are disposed to think that the stock in granary has rather diminished than increased since the end of June.

The nominal top price of town made flour has remained stationary at 44s. per sack; household has also been pretty steady in value, and at one period there was rather a large sale for fresh-ground qualities of the latter—without, however, leading to any improvement in its value. The highest price paid for prime marks of French was 35s. to 36s. per sack in the early part of the month, but this rate is no longer obtainable. The inferior kinds may be quoted from 30s. to 33s. per sack. The arrivals of flour from the United States and Canada have hitherto been small, and quotations have undergone very little change; fine brands are still held at 24s. per brl.—a price which has at no time been exceeded.

The arrivals of home-grown barley have been so insignificant as scarcely to be worth naming; indeed, the last crop appears to be completely exhausted. The want of English has, however, been comparatively little felt, owing to good supplies from abroad. The business in this grain has been confined to qualities suitable for feeding purposes, the finer kinds having met with little or no attention. The best heavy samples of foreign rose during the dry weather about 1s. per qr., in consequence of the probability of the growing crop suffering injury from drought. The refreshing showers which have fallen since the 16th inst. have, however, dissipated the fears on that head, and quotations are certainly not higher at present than they were when we last addressed our readers. Tolerably sweet but light foreign may at present be purchased at 18s. to 20s., and heavier sorts at from 22s. to 24s. per qr. The quantity here, though not particularly large, is likely to prove sufficient for our wants until the new begins to come forward. In addition to what is in warehouse and still on board ship at this port, some quantity is known to be on passage from the Danish islands, from Memel and other ports which have not been blockaded by the Danes; and any rise in quotations does not, therefore, appear likely to occur unless the harvest should prove less favourable than anticipated.

The operations in Malt have been on quite a retail scale; stocks being, however, small, and holders having manifested much firmness, the small brewers who have been compelled from time to time to purchase have had to pay previous prices.

The arrivals of oats from our own coast and Scotland have been moderate, and from Ireland only a few cargoes have come to hand. In the early part of the month the supplies of foreign were also small; but within the last fortnight we have again had liberal receipts from abroad. The long protracted drought being regarded as inauspicious for the crop, caused fine oats to be more sought after during its continuance, and prices gradually crept up 1s. to 1s. 6d. per qr. At this time good Danish and Swedish oats realized 18s., and other sorts proportionate rates; but the dealers did not pay the advance very willingly, and the trade was therefore not by any means active. The increase which has within the last fortnight taken place in the arrivals from abroad, together with the showery weather, have induced additional caution on the part of buyers, and the improvement in prices has been partially lost. Among the recent arrivals from Russia, one small lot from Riga has engaged a good deal of attention; the quality is very superior, being grown from Poland seed, probably procured from this country; the weight by bushel is estimated at 46lbs. This little parcel, as a fancy article, realized a high price, we believe 25s. per qr. With the encouragement which free trade must hold out to the foreign grower, a great improvement is likely to be made in agricultural pursuits abroad, and this shipment of oats may be taken as an instance what may be accomplished.

Very little change has taken place in the value of beans: the few samples of English which have been brought forward have sold at much the same prices as before, and the value of Egyptians has remained perfectly stationary.

The demand for peas has been of the most retail character, and quotations have undergone little or no variation. A few samples of the early varieties have appeared at market, of capital quality, and in dry condition, harvested previous to the breaking up of the dry weather.

The inquiry for floating cargoes of Indian corn has almost ceased, and its value has given way materially in the Irish markets since new potatoes have begun to come forward.

The news from the north of Europe is important, the latest accounts from Germany confirming what had previously been said respecting the conclusion of an armistice between the Prussian government and Denmark. This matter may, therefore, now be considered as settled. The blockade of the Baltic ports, and that of the rivers Elbe, Jahde, and Weser, will probably be forthwith raised, and the impediments which have existed since the 30th April last, to shipments being made to Great Britain, are likely to be immediately removed. Under these circumstances we may calculate on soon receiving supplies of corn from some of the nearer ports; not perhaps in the first instance on an extensive scale (owing to the want of vessels on the other side), but sufficiently large to produce some influence on prices here. Though it has been impossible to send off what has been bought, in consequence of the war in which the Danes and Germans have been engaged, still purchases to some extent have been made at continental ports on English account, from time to time; these will have to come forward whether prices fall or rise here; and even if the foreign merchants should be deterred by the unpromising position of the trade from making consignments to the British markets, the receipts from abroad are likely to prove rather large towards the end of August. The knowledge of this fact will tend to render the receivers of such cargoes as may in the interval come to hand from the Mediterranean, and elsewhere, desirous of realizing from on board ship, and tend to cause more or less pressure on our markets.

The weather appears on the whole to have been auspicious over the greater part of continental Europe, and though the crops are not very highly spoken of, neither are there any serious complaints. Harvest is likely to be rather later than usual in the northern countries, owing to the backwardness of the spring, and we cannot calculate on receiving supplies of consequence, of the new produce, from the Baltic this season. Stocks of old wheat, barley, and oats are certainly not large abroad, and we do not therefore expect any overwhelming supplies till next spring from the north of Europe.

Prices of wheat are just now relatively higher abroad than with us, which must have the effect of checking consignments. At Danzig fine high mixed wheat was, according to the most recent advices, still held at 43s. to 44s., and superior mixed samples at 41s. to 42s. per qr., free on board. Some speculation appears to have taken place there, based probably on the notion that the raising of the blockade would lead to increased foreign orders.

The accounts from the Lower Baltic ports generally speak well of the prospects for the harvest; but stocks being everywhere reduced into a narrow compass, holders of that remaining on hand seem to have made up their minds to speculate on future contingencies, and have generally manifested a disposition to raise their pretensions.

At Rostock good wheat was, on the 24th inst. held at 42s. to 43s per qr., and several parcels had changed hands at those rates.

The latest advices from Stettin give similar quotations, and it would be difficult to buy fine 61 to 62 lbs. red wheat at any of the northern European ports below 42s. per qr. free on board.

The latest reports from Hamburgh give a somewhat more subdued account of the trade; the rise which occurred in prices here in the early part of the month led to a corresponding advance there, and both wheat and barley rose in value. For good 61½lbs., Upland red wheat equal to 42s. to 43s. per qr. free on board, was at one period obtained; afterward the demand fell off, and similar quality was, by the most recent accounts, obtainable at 41s. to 42s. per qr. free on board.

In the Dutch markets prices have likewise been more or less influenced by the changes which have taken place here. The crops in Holland, as well as in Belgium and the Rhine provinces, are on the whole tolerably well spoken of; but in those countries, as with us, harvest will be somewhat later than usual, which must always involve additional risk.

In the more forward portions of France, a considerable proportion of the wheat and rye has been harvested in good order. The reports as to the yield vary materially: in some departments a decided deficiency is complained of, whilst in others the quantity and quality are alike well spoken of.

In the Italian States harvest has been concluded, and as we have hitherto heard few complaints relative to the result, we are inclined to think that the crops have on the whole proved satisfactory over the south, though the hot weather experienced there may perhaps have done more or less mischief. Further to the eastward the heat in June was very intense, and we may calculate on mischief having been done to the wheat and rye crops in that direction, though not to such an extent as to prevent shipments being hereafter made to Western markets.

The latest advices from America speak well in respect to the prospects for the harvest, as well in the United States as in Upper and Lower Canada, and as farmers had still considerable quantities of corn of last year's growth on hand, it can hardly be expected that prices will be maintained on the other side of the Atlantic, unless a demand for bread stuffs on an extensive scale should be experienced from Europe. Meanwhile holders had remained firm, and flour was worth relatively as much at New York as at Mark Lane.

CURRENCY PER IMPERIAL MEASURE.

	Shillings per Quarter. OLD.		NEW.	
WHEAT, Essex and Kent, white	43 to	51	45 to	53
Ditto, fine selected runs	—	—	47	55
Ditto, red	41	45	39	45
Ditto, extra	45	49	45	49
Ditto, Talavera	—	—	—	—
Norfolk, Lincolnshire and Yorkshire	—	—	41	46
Ditto, white	—	—	44	48
BARLEY, English, malting and distilling	—	—	26	28
Ditto, Chevalier	—	—	29	31
Ditto, grinding	—	—	23	25
MALT .. Essex, Norfolk and Suffolk	—	—	58	59
Kingston, Ware, and town made	—	—	58	62
OATS, Essex and Suffolk	—	—	15	18
Lincolnshire and Yorkshire (Polands)	—	—	16	20
Ditto, feed	—	—	14	17
Devon & West Country, feed	—	—	15	17
Northumberland and Scotch, feed	—	—	20	23
Dundalk, Newry, and Belfast, potato	—	—	17	21
Limerick, Sligo, and Westport, potato	—	—	16	20
Ditto, feed	—	—	15	18
Cork, Waterford, Dublin, Youghal, and Clonmel, black	—	—	13	18
Ditto, white	—	—	15	18
Galway	—	—	12	14
BEANS, Mazagan	—	—	29	31
Tick	—	—	28	31
Harrow	—	—	31	36
Pigeon, Heligland	—	—	34	37
Windsor	—	—	30	40
Long pod	—	—	28	30
PEAS, non-boilers	—	—	26	27
White, Essex, and Kent, boilers	—	—	28	30
Ditto, fine Suffolk	—	—	32	34
Maple	—	—	34	35
Hog and grey	—	—	30	32
RYE	—	—	22	24
FLOUR, best marks (per sack of 280 lbs.)	—	—	39	44
Norfolk and Suffolk, ex-ship	—	—	33	34

FOREIGN GRAIN.

	Shillings per Quarter.	
WHEAT, American	45 to	49
Canada	41	47
Dantzic and Konigsberg	47	51
Dantzic, fine white, extra quality	51	55
Stettin and Hamburgh	44	47
Danish	40	44
Rostock, Pomeranian and Rhine	44	47
French and Belgium	44	47

Mediterranean, Odessa, and St. Petersburgh ..	39	42
Black Sea (nominal) hard to soft	38	43
Spanish	47	53
Buck or Brank	24	32
Barley, malting	23	25
Grinding and distilling	19	23
Hamburgh, Dantzic, Konigsburgh, and Riga ..	19	23
Danish, Mecklenberg, and Pomeranian	19	23
Oats, Dutch, brew, Poland, Friesland, and Groningen	16	20
Danish and Swedish	15	18
Russian	15	18
Beans	—	—
Small	30	33
Egyptian	21	23
Peas, white boilers	28	32
Yellow ditto	29	32
Non-boilers	25	28
Maize, white	30	35
Ditto, yellow	30	35
Flour, American, sweet	23	24
Ditto, sour	21	23
Canadian, sweet	22	24
Ditto, sour	21	22
Dantzic and Silesia, extra superfine	23	24
French, per sack	30	35
Rye Meal (per ton)	£6 0s. to	£6 10s.
Indian Corn Meal (per brl. of 196 lbs.) ..	16s. 6d. to	17s.

An Account of the Total Quantities of Foreign Corn imported into the principal ports of Great Britain (viz., London, Liverpool, Hull, Newcastle, Bristol, Gloucester, Plymouth, Leith, Glasgow, Dundee, and Perth) in Twenty-two Weeks ending July 11th, 1849, since the 8th of February preceding (including the quantity of Wheat and Wheaten Flour loosed from bond on that day), and the amount that would be available for revenue, if the Tariff proposed by Lord John Russell in 1841 was levied on this supply.

	Quarters.	Tariff per qr.		Amount for Revenue.		
Total Importations from Feb. 8 to July 4, 1849:		s.	d.	£	s.	d.
Wheat and Wheaten Flour...	2,824,717	8	0	1,129,886	16	0
Rye and Rye Meal	52,179	5	0	13,044	15	0
Barley and Barley Meal	401,550	4	6	90,348	15	0
Oats, Peas, and Beans	760,595	3	4	126,765	16	8
Imported during the week ending July 11, 1849:						
Wheat and Wheaten Flour...	63,778	8	0	25,511	4	0
Rye and Rye Meal	266	5	0	66	10	0
Barley and Barley Meal	8,057	4	6	1,812	16	6
Oats, Peas, and Beans	25,806	3	4	4,301	0	0
Total	4,136,948	..		1,391,737	13	2

IMPERIAL AVERAGES

For the last Six Weeks.

	Wheat.		Barley.		Oats.		Rye.		Beans.		Peas.	
Week Ending:	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
June 16, 1849..	44	2	26	5	18	0	26	3	30	3	30	4
June 23, 1849..	44	6	26	5	18	9	25	9	30	10	31	5
June 30, 1849..	45	4	25	6	17	11	27	9	31	9	31	5
July 7, 1849..	47	1	25	11	17	11	28	1	32	1	33	10
July 14, 1849..	48	2	25	3	18	9	26	11	32	1	30	9
July 21, 1849..	48	10	26	7	19	4	28	6	32	1	32	4
Aggregate average of last six weeks	46	4	26	0	18	5	27	2	31	6	31	8
Duties	1	0	1	0	1	0	1	0	1	0	1	0

PRICES OF SEEDS.

BRITISH SEEDS.

Cloverseed, red 35s. to 40s.; fine, 45s. to 63s.; white, 34s. to 48s.
Cow Grass (nominal) .... —s. to —s.
Linseed (per qr.).. sowing 54s. to 60s.; crushing 40s. to 46s.
Linseed Cakes (per 1,000 of 3 lbs. each) £8 10s. to £10 0s.
Trefoil (per cwt.) .... 14s. to 21s.
Rapeseed, new (per last) .... £27 to £28
Ditto Cake (per ton).......... £4 15s. to £5
Mustard (per bushel) white .. 5s. to 10s.; brown, (nominal.)
Coriander (per cwt.).......... 16s. to 25s.
Canary (per qr.)........ 110s. to 120s.; fine, 130s. to 150s.
Turnip, white (per bush.) —s. to —s.; do. Swedish, —s. to —s.
Tares, Winter, per bush.......... 0s. 0d. to 0s. 0d.
Carraway (per cwt.)........ 28s. to 29s.; new, 30s. to 31s.
Rye Grass (per qr.) .... 17s. to 46s.

FOREIGN SEEDS, &c.

Clover, red (duty 5s. per cwt.) per cwt.......... 30s. to 40s
Ditto, white (duty 5s. per cwt.) per cwt.......... 24s. to 42s.
Linseed (per qr.) .. Baltic 38s. to 46s.; Odessa, 40s. to 46s.
Linseed Cake (per ton).......... £6 0s. to £8 0s.
Rape Cake (per ton).......... £4 15s. 5d.
Coriander (per cwt) .... 16s. to 20s.
Hempseed, small, (per qr.) 32s. to 35s., Do. Dutch, 35s. to 36s.
Tares, (per qr.)........ small 24s. to 26s., large 28s. to 33s.

HOP MARKET.

BOROUGH, Monday, July 23.

Although a partial improvement has taken place in some districts, the prospects even of a moderate crop are very precarious. Prices continue firm at the recent advance. Duty £65,000 to £70,000.

Horton & Hart.

TIMBER.

	£	s.	d.		£	s.	d.
Baltic Timber, per load of 50 cubic feet ..	3	0	0	to	4	0	0
Yw. Deals, per standard hundred ..	11	10	0	..	16	0	0
Deck Deals, per 40 feet 3 in.	0	18	0	..	1	4	0
Pipe Staves, per mille	110	0	0	..	125	0	0
Lathwood, per fm. of 4 feet	5	10	0	..	6	10	0
Petersburgh, Riga, and Archangel .... Yw. Deals, per stand. hundred ..	13	0	0	..	15	0	0
White	11	0	0	..	12	0	0
Yw. Battens	13	0	0	..	15	0	0
Riga Logs, for 18 feet cube	3	0	0	..	4	0	0
Stettin Staves, per mille of pipe	75	0	0	..	130	0	0
Swedish Timber, per load	2	10	0	..	2	15	0
Gothenb. Yw. Deals, per 100 12f. 3in. 9in...	18	10	0	..	23	0	0
White ditto	16	0	0	..	19	0	0
Yw. Battens, per hd. 12 ft. 2½ in. 7 in.	11	0	0	..	14	0	0
Christiania Yw. Deals, per hd. 12ft. 3in. 9in.	24	0	0	..	25	0	0
White ditto	21	0	0	..	22	0	0
Quebec and St. John's Spruce Deals.. per 100, 12 ft. 3 in. 9in.	14	0	0	..	16	10	0
1st qual. yw. Pine Deals, per st. hd.	13	0	0	..	16	0	0
Second do. do.	9	0	0	..	10	10	0
Third do. do.	7	10	0	..	8	10	0
RedPine Deals, per hd. 12ft. 3in. 9in.	17	0	0	..	21	0	0
Red Pine Timber, per load	2	17	6	..	3	12	6
Yw. ditto ..	2	15	0	..	3	15	0
Birch ditto	3	0	0	..	3	10	0
Elm ditto	3	10	0	..	3	15	0
Oak ditto	5	0	0	..	5	10	0
Standard Staves per mille standard	65	0	0	..	75	0	0
Puncheon Staves, per mille	17	0	0	..	19	0	0

MAHOGANY, &c.

Mahogany,	St. Domingo	5½d. to	1s.	9d. per foot.
	Cuba	5¾	1	
	Honduras	4¾	1	
	African	5	0	7
Cedar	Havana	5	0	6½
Rosewood.	Rio	12*l*. 10s. to 18*l*. per ton.		
	Bahia	9 0	14	

HIDE AND SKIN MARKETS.

			s.	d.		s.	d.	
Market Hides,	56 to	64lbs.......	0	1½	to	0	1¾	per lb.
Do.	64	72lbs.......	0	1¾		0	2	"
Do.	72	80lbs.......	0	2		0	2¼	"
Do.	80	88lbs.......	0	2¼		0	2½	"
Do.	88	96lbs.......	0	2¾		0	3	"
Do.	96	104lbs.......	0	3		0	3¼	"
Do.	104	112lbs.......	0	3½		0	4	"
Calf Skins			4	6		5	0	each.
Lamb Skins			1	6		2	6	"
Horse Hides			7	6		0	0	"
Polled Sheep			0	0		0	0	"
Kents and Half-breds...........			0	0		0	0	"
Downs..........................			0	0		0	0	"
Shearlings			0	7		0	10	"

BARK.

Per load of 45 cwt.

English, Tree...............	£15	0	0	to	£15	10	0
Coppice....................	15	0	0		17	0	0

FLAX.

BELFAST, (Friday last.)—Flax: fine, 60s. to 65s.; good, 56s. to 58s.; good middling, 49s. to 52s.; middling, 40s. to 45s.; coarse, 34s. to 40s. per cwt.

WOOL MARKETS.

BRITISH WOOL.

DONCASTER, (Saturday last.)—There has been a good show of Wool to-day, the principal portion Lincolnshire; last week's prices were in most instances obtained, but there was less briskness in the demand than at any of the markets held here this year. Super clips, 12s. to 12s. 6d.; Lincolnshire ⅓ to ½ hog, 10s. 6d. to 11s. 6d.; and Cotts, 6s. to 9d.

DEVIZES.—At our wool fair there was a large supply, with a full attendance both of buyers and sellers. In the early part of the day but little business was done, at prices for ewe fleeces 10d. and mixed lots, one-third teg, 10½d.; one or two very superior lots, however, realized 1s. There appears to be an unwillingness on the part of the dealers to give the prices asked, and in consequence it is expected that but little business will be transacted.

HULL, July 17.—There was not quite so good a show of wool at to-day's market, as the season is getting advanced. Most of the parcels were sold at 3d. per stone above last week.

KELSO.—There was a good attendance of buyers, and we understand a good many sales were made in the afternoon. The prices were from 1s. to 2s. advance upon those of last year, according to the quality. Half-bred wool, all hog, sold at from 21s. to 22s. per stone of 24lbs.; half-bred, half ewe and half hog, from 20s. to 22s. 6d.; bred, all hog, 20s. 6d. to 21s.; bred, half hog and half ewe, 19s. to 20s.; bred and half-bred ewe 18s.

LEWES WOOL FAIR.—The annual fair was held yesterday. There was a fair amount of wool offered, and a pretty good attendance of buyers. The annual dinner took place at the White Hart Hotel, and we need scarcely say that the dinner was in every respect excellent. Sir Henry Shiffner, Bart., occupied the chair, and Mr. E. Chatfield, the vice-chair. The Chairman was supported on the right by Mr. Legge, sen., and Mr. Adams; and on the left by Mr. John Ellman, Mr. Fullagar, and Mr. H. Ellman. Amongst the buyers present we noticed Messrs. Legge, sen. and jun., London, Mr. White, Hailsham, Mr. Breach, Steyning, Messrs. Wallace, sen. and jun., Framfield, Mr. Adams, Willingdon, Mr. Chatfield, Lewes, Mr. H, Gurney, Hounslow, Mr. Moore, Epsom, Mr. Powell, London, Mr. Huntress, Halifax, Mr. Hother, Lewes, Mr. Cooke (for Mr. Godlee), Lewes, Mr. Gibbs, Bermondsey, &c. Previous to the fair, we heard of several of our large flock-masters having sold their wool at 10d. per lb., which was before the rise; but on this day, before the dinner, 1s. per lb. was freely offered for good parcels.—*Sussex Express of Saturday last.*

LEEDS, July 20.—We have not any change of moment to report this week, either in the demand or prices. The manufacturers are fully employed, but their recent purchases of wool having replenished their stocks, they do not seem disposed to give an advance here in proportion to the prices recently obtained by the growers in the country.

YORK, Thursday.—Our show of wool to-day was very good, taking into consideration the large quantities which have been sold at previous markets. The quantity shown was between two and three hundred sheets, the whole of which changed hands at an advance upon last week's prices. Hogs and ewes 10s. 6d. to 11s. 6d., hogs 11s. to 11s. 9d., ewes 9s. 6d. to 10s., Cheviot hogs 11s. 6d. to 12s. 6d., Masham do., 10s. to 10s. 6d., locks and cots 8s. to 8s. 6d., moor wool 5s. 9d. to 6s. per stone. In future the market will be held once a fortnight.

LIVERPOOL, July 21.

Scotch.—The reports of the sales having gone off rather high at the fairs, have had no effect yet on our market, and we are without any transactions of consequence in any class this week.

		s.	d.		s.	d.
Laid Highland Wool, per 24lbs....		6	6	to	7	0
White Highland do.................		8	6		9	0
Laid Crossed	do.. unwashed....	7	9		9	0
Do.	do.. washed	9	0		10	6
Do. Cheviot	do... unwashed....	8	0		10	0
Do.	do.. washed	12	0		15	0
White Cheviot	do... do.	18	0		22	0

Foreign.—The sales are progressing favourably in London, which gives a firmer tone to our market generally.

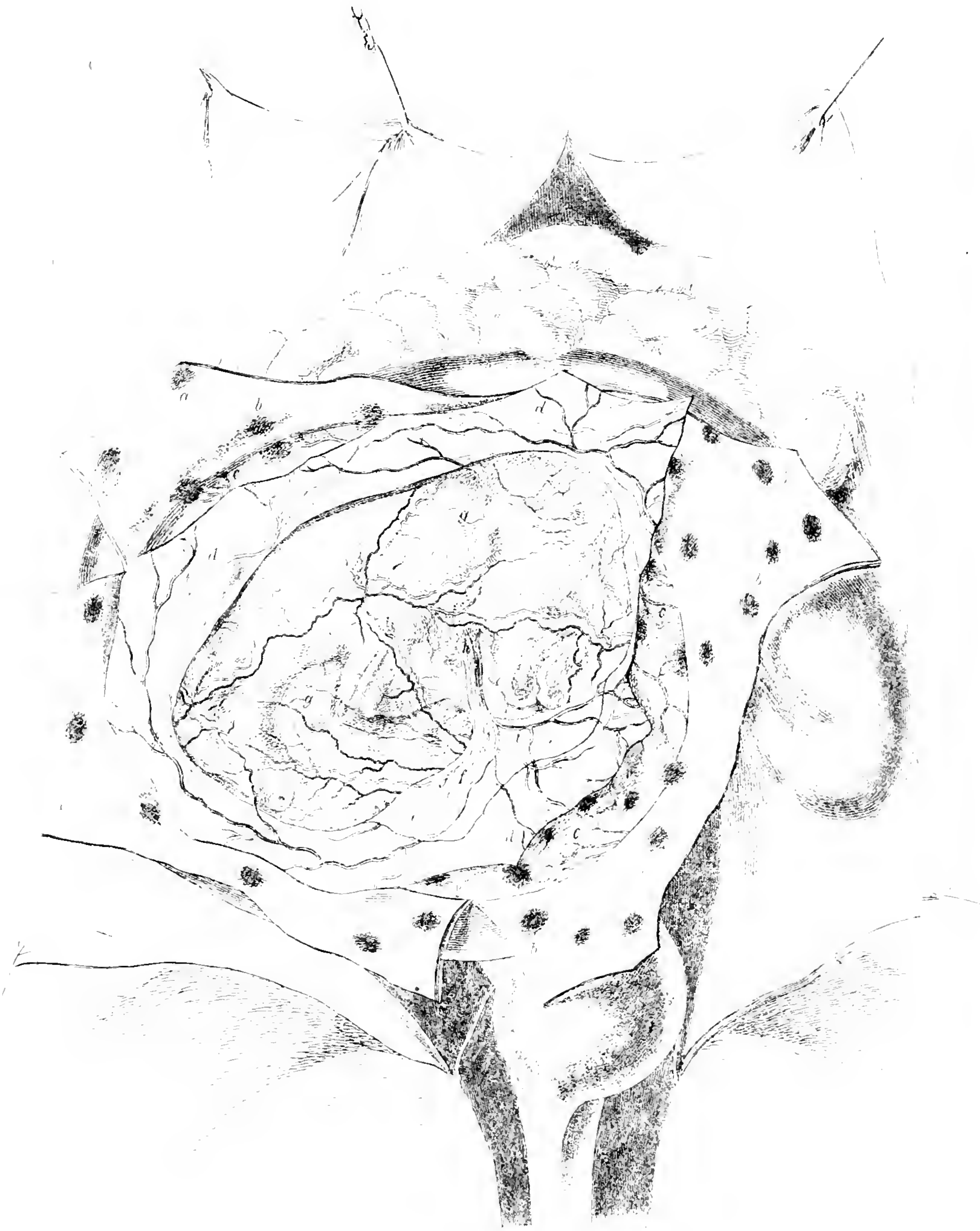
FOREIGN WOOL.

The Wool auctions continue, and large quantities are finding purchasers, only a few parcels of the inferior foreign being withdrawn.

LEEDS, July 20.—A fair average business continues to be done in this branch of the wool trade, and prices show somewhat of an improving tendency.

BRESLAU, July 18.—We enjoy a continued briskness in our trade, and very extensive quantities are weekly disposed of at very good prices. The chief demand is for the lower descriptions, at from 40 to 48 thalers, the whole stock of which has been purchased by home manufacturers. Some hundred cwts. of Posen and Silesian wools, at from 65 to 78 thalers, have been bought by an English firm; and skins at from 45 to 55 thalers for Hamburgh and Saxon account. Netherland and Belgium commissioners took some flocks of good refuse at from 45 to 56 thalers, and the Zollverein spinners many hundred cwts. of combing wools at from 50 to 54 thalers. Lambs' wool is much neglected; and notwithstanding a very great choice in this article, nearly nothing has been produced for export. The whole quantity which has been sold since the June fair amounts to about 4,500 cwts.

Printed by Joseph Rogerson, 24, Norfolk-street, Strand, London.



FOETUS IN UTERO

surrounded by its membranes

THE FARMER'S MAGAZINE.

SEPTEMBER, 1849.

No. 3.—Vol. XX.] [Second Series.

PLATE I.

A SOUTH DOWN RAM.

The first Plate represents in two positions, a South Down Ram, the property of Mr. William Sainsbury, of West Lavington, near Devizes, which obtained the First Prize of Thirty Sovereigns at the Royal Agricultural Society's Show at York, in July, 1848.

PLATE II.

FOETUS IN UTERO, Surrounded by its Membranes.

(For description see page 211.)

OF GREEN VEGETABLE MANURE.

BY J. TOWERS, MEMBER R.A.S., H.S. OF LONDON.

"Necessity is the mother of invention." An old trite saying this, but not void of meaning; and, on the present occasion, as I hope to show, extremely apposite. During the many years that I was favoured and instructed by the correspondence of the late Thomas Andrew Knight—which was continued till about a year prior to his decease—many opportunities occurred to ascertain his modes of practice with vegetables and fruits, wherein he eminently excelled: thus, in the culture of the potato, upon a soil spread thinly over a rock, he was able to produce more than a dozen fine new varieties, very prolific, and of choice quality, all of which were by his experiments prevented almost entirely from developing perfect blossoms or fruit. *What* that great man could have thought or said of the late destructive visitations—he that had thus expressed himself to me—"Of the powers of the potato to supply us with animal food, no person has yet formed anything approaching a fair estimate"—I cannot conjecture; but now, at a period when, unless some sudden and violent seizure occur, we may hope that convalescence, at the least, is to appearance established, it will not be out of place to notice impressively an operation which corresponds with one that Mr. Knight had adopted and strongly recommended. It consisted in employing *green vegetable* matter as manure. Were my own practice deemed of any weight, either in agriculture or gardening, I might observe that for years I have returned such matters to the soil, always placing them rather deep below the surface. W. Cobbett was averse from it, because he believed that worms and vermin were fostered; but earth worms (*lumbrici*) are no enemies except to lawns and gravel, and the fact in itself is not borne out by experience. Indeed, when green crops are deposited at once, their entire substance and moisture act favourably; because, as decomposition takes place slowly and by degrees, the gases and vapour evolved pass into the soil, and are there retained or seized by the roots of any plants to which they may be suitable. Another principle is called into operation which cannot be inert: it is that of self-manuring, by which specific matters are returned to the staple; and, whether the new theory of the absorption of carbonic acid and other aërial gases, by the leaves, be borne out or not, the question of general utility cannot be impugned, because gaseous fluids are yielded by the earth to the atmosphere perpetually, and particularly whenever the surface is disturbed by ploughing, digging, or hoeing.

I found an article in the "North British Agriculturist" so apposite that I determined to present the following extract at full length. I never before observed any remarks on the subject so practically conclusive.

"If farmers do not economise liquid manure, the press is not to blame; but we have long thought that what may be called *green manure* has not by any means received the rttention which it merits.

"Of this we have long availed ourselves with much advantage on a farm which we occupied during the past 28 years, at an elevation of from 400 to 500 feet above the sea level, and on the lower parts of which only could wheat be grown with advantage.

"In the days when the potato disease was unknown, we invariably took up our potatoes as near as might be on the 10th October; and before ploughing them up, the stems, still green and succulent, we caused to be pulled, and carted to the field intended for wheat, either after clover or peas. We generally allowed 20 tons to the acre, as far as the stems would go. A person went alongside every plough with a prong, laying the stems as much as possible in the bottom of the furrow, that they might be fairly covered. The rest of the field was generally manured with about 15 tons of farm-yard dung an acre; *but the wheat manured with the potato stems was uniformly about a foot taller in the straw*, with a corresponding length of ear, above that on the wheat in that part of the field manured with the farm-yard dung. There was no mistaking the difference of luxuriance in favour of potato-stem manure.

"The too general practice is to leave the stems or shaws exposed on the field till their juices are dissipated; then the dried and sapless skeletons are mixed up in the manure heap, to which, in that state, they will add very little bulk.

"There is a great breadth of potatoes this season; the stems and foliage remaining so far healthy (August 1); and some enterprising readers will perhaps act on the above principle, and turn them to account. On swampy and low grounds, where the potato herbage is endangered by early hoar frost, which injures its qualities, it is to be taken in the autumn as soon as possible."

Such is the substance of the paper, so far as concerns the potato: some remarks of value follow, on the appropriation of weeds in tillage:

"In Holland the Dutch farmers sow some of their light lands with broom, to be ploughed down the next year as manure for potatoes. We were induced to try broom tops this season, on a pretty extensive scale, as green manure. In one place alternate rows were manured with broom, guano, charcoal, farm-yard dung, using no manure in a fifth. In the middle of a potato field manured with prepared farm-yard dung laid in drills, we manured some with broom. The result has been so decidedly in favour of the last-named manure, in a taller stem, more ample foliage, and a darker rich colour, that, since hoeing time, all the labourers, who at first had smiled at the attempt, have become decided converts to the Dutch practice. If the disease keep away, the results may be given at taking-up time."

The paper closes by calling the attention of farmers to a plant, not long since introduced, called the gigantic cow-parsnip—(*Heracleum giganticum*). I had the seed sent to me some years since by Mr. Samuel Taylor, then of Stoke-Ferry, under the specific name *Caucasicum*—it is a most extraordinary plant.

"In the beginning of May the foliage of one plant manured 12 yards of a potato drill, with success equal to that of broom. In June the foliage of the same plant would have manured 18 yards for turnips, but we have reserved the plant for the sake of the seeds."

I have thus trespassed upon the original paper, because, in the first place, the facts stated square with my own practice, and appear to be based upon genuine experiments. I am confident of this safety; and believe that, as yet, few persons are practically aware of the great utility of converting the ground into a laboratory of pure vegetable matter. Recent hot dung, that evolves much pungent ammonia, might be exceptionable; though even that, if buried deep in trenches, might prove a most economical mode of enrichment, one also extremely permanent in its efficiency. Mr. Knight grew the best of pine-apples in chopped green turf; he also exhibited a cockscomb of then unimitated richness, in such turf, mixed with fresh horse droppings; *his* experience was assured; and, were great judgment, aided by close observation, exercised, farmers might soon find reason to believe that their resources are very great, and remain absolutely in reserve. The present prices of corn are, and have all along been, much above those obtained in 1835, and other years, when the sliding scale ruled absolute. Still, there are many causes of solicitude, and these can only be removed, or qualified, by wise and judicious practice and covenants. Yet whatever economises is certain gain; and among the positive agents of economy, nothing is more promising than the liberal application of green vegetables, and the preparation of peat as suggested by Mr. Jasper Rogers, and so pointedly alluded to in the House of Commons.

Aug. 10.

THE USE OF SEWER FLUID IN IRRIGATION A SECOND TIME.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

In the use of sewer fluid, for the purposes of irrigating water meads, a new advantage presents itself. It may be used a second time with very considerable advantage. This is an advantage of great importance; it is one not enjoyed by the irrigator who uses only the clear and bright water of upland streams, or of the copious and clear rivers such as those which rise in the chalk formation. This fact is stated on the authority of more than one practical farmer. Mr. Simmons, for instance, of St. Croix, near Winchester (*Johnson, on the Fertilizers*, p. 239), gives material evidence on this head; he is perfectly aware of the value of the addition of the city drainage of Winchester to the fertilizing qualities of the Itchen River water, and of its superiority for irrigation after it has flowed past the town, having meadows both above and below the city. He finds, too, that if the water has been once used for irrigation, its fertilizing qualities are so materially reduced that it is of little value for again passing over the meadows. So convinced by long experience is he of the fact, that having long enjoyed, for the purposes of irrigation, the exclusive and valuable use of a branch of the waters of the river Itchen for some grass land, a neighbour higher up the stream followed his example, constructing some water meadows, and using the water before it arrived at the land of our informant, who, in consequence, found the water so deteriorated in quality (though not sensibly diminished in quantity) that he once thought of disputing the right with his more upland neighbour. The experience of other irrigators tends to the same conclusion.

The reason why sewer water may be usefully employed in irrigation a second time is to be found in the mass of organic and saline matters which it contains—a proportion too copious to be exhausted by passing it once only over a meadow. It would enable us better to understand the difference in their respective action, if we compare the analysis of some river water with that from a town sewer. The water of several springs and rivers has been examined by Professor Johnston (*Trans. High. Soc.*, 1847, p. 50.; *Johnson and Shaw's Farmers' Almanac for* 1848, p. 27.)

In an imperial gallon of various spring and brook waters he found—

Locality.	Solid matter.	Silica.
Renfrewshire	7·44 grains.	0·16 grains.
"	10·64 "	0·88 "
Montrose (near)	11·36 "	1·76 "
"	22·32 "	2·56 "
Alloa (near)..........	12·75 "	1.56 "
Edinburgh (near)	16·20 "	0·60 "
"	23·40 "	2.20 "
Durham (county)	26·80 "	1·15 "
"	15·56 "	0·32 "
"	17·08 "	1·20 "
Inverness	5·60 "	0·40 "
Berwickshire	23·40 "	1·0 "

It will be seen from this table that the most impure of these only held in solution 26·80 grains of solid matters.

The following table gives the nature of the solid substances found in river water:—

	Ale.	Eye.	Wear.
Organic matter......	1·75	1·64	0·92
Sulphate of potash ..	1·68	0·80	} 1·50
Soda and chlorides ..	..	0·44	
Gypsum..............	0·64	1·46	0·88
Carbonate of lime....	5·28	3·48	7·92
Carbonate of magnesia	1·00	1·24	2·04
Chloride of magnesia	1·82	0·80	..
Oxide of iron........	0·56	0·48	0·56
Sulphuric acid	1·44	0·98	0·96
Chlorine............	0·36	0·70	1·10
Silica	0·24	0·08	1·20

The superior richness of sewer waters will be seen from the next statement of the results of their analyses (*Report of the Metropolitan Sewage Committee*).

In an imperial gallon of the sewage fluid of

Mansfield was found	77·3 grains
King-scholar Pond, London ..	85·3 "
Edinburgh	78·0 "

The 85·3 grains of the London sewer water was found to be composed of—

Ammonia	3·29
Sulphuric acid	0·62
Phosphate of lime	0·29
Lime	6·05
Chlorine........................	10·00
Sulphate of lime	2·32
Carbonate of lime................	1·94
Silica	6·28

These observations will usefully precede the following recent report of Mr. George Buchanan, engineer for the irrigated meadows of Craigentinny, dated May 1, 1849, to the metropolitan commissioners of sewers (*Report of Sewage Manure Committee, May* 21, 1849, p. 5), in which he observes, "By a report of mine, dated August 23, 1845, I calculated, from numerous observations, that the average supply of water running in the sewage burn at Craigentinny was 220 cubic feet per minute, or that the extent of meadows irrigated by this quantity was about 180 imperial acres, making about $1\frac{1}{3}$ cubic feet per minute to each acre. But on observing the operations at different times, I was satisfied that this water might have irrigated a much larger extent, because a great proportion of the water, I should say nearly one half, after irrigating and saturating the meadows, was found running to waste in the watercourses towards the sea; and it was partly this consideration which led me to advise the system of pumping, by which the water, being let on at a higher level, could be made available in irrigating a large extent of new meadow on this level, and afterwards the waste water employed in irrigating the lower meadows then existing. In some parts of the season also there was not one-fourth or one-half of this supply in the burn, and still the meadows were fairly watered. There can be no doubt, therefore, that $1\frac{1}{3}$ cubic feet per minute affords a prodigal supply for irrigating each acre, such as the meadows here referred to; and less than one-half would be in many cases sufficient: but in such extensive meadows it is not practicable, nor would it be proper, to distribute the water continually over the whole land. It is found best to concentrate it on different districts so as to employ the whole water running over each for about a fortnight or three weeks, and embracing about ten or fifteen acres each day. This of course would give in proportion a larger flow per minute for each acre during the period of actual watering.

"In was the consideration of the loss of the waste water which led to the extension of the meadows, and to the erection of the pumping machinery for lifting the water, which was all done by my advice and direction; and besides the water from the burn, a small additional supply was obtained from an Artesian well bored to a considerable depth into the rock at the farm-house, and also from springs and drainage found in the mine, which was run for a considerable extent from the irrigating feeder twenty feet under the surface of the ground, to the farm-house, where the engine and pump are situated. The result of the pumping operations, so far as it has gone, has been very satisfactory, and shows that the land may be irrigated with a much less supply of water than what is used in the lower meadows, although, at the same time, no doubt a larger supply would be still more beneficial.

"The additional extent of meadow to be brought in by a 15-feet lift of water was calculated at 90 acres, which would have required, at the rate of $1\frac{1}{3}$ cubic feet, 120 cubic feet per minute; but allowing 20 or 30 for waste, I considered that 80 or 90 feet per minute would be an ample supply, and designed the pumping machinery with the view of lifting this quantity, and having a six-horse engine already on the farm for working the thrashing mill, I considered this would be sufficient for lifting the water, by making the pumps of suitable capacity, and this was 16 inches diameter, and nearly four feet stroke, making 15 strokes per minute. The process of watering for the season is now going on, and during the last fortnight 37 imperial acres have been watered by the pumps going 10 hours per day for 12 days, and drawing at the rate of 120 cubic feet per minute. This is at the rate of $3\frac{1}{4}$ cubic feet per acre during the period; but of course more or less can be thrown on at pleasure by concentrating the water over a smaller extent, and continuing the pumping for a longer period to embrace the whole."

"In some parts," concludes Mr. Buchanan, "the soil consists of very stiff clay resting on a similar substratum, and other parts of a bed of sand. The sand requires nearly twice as much water for saturation as the clay."

That the application of a much smaller proportion of sewage water than that employed at Edinburgh is productive of very great advantage has been proved by various trials.

The following letter from Mr. Roe to Mr. E. Chadwick, dated June 6, 1849, is only one report of many, all tending to prove the same facts. Mr. Roe (writing from Middlesex) remarks:—

"My land (meadow) is drained to a depth of 2 feet, and the outlet for the drains is into a tank from whence I again pump the water for use a second time (the tank has an overflow drain). Soon after the irrigation commences I find the water in my drains run freely, and the water still exceedingly good. The tank need not be very large if the water is pumped out as it flows in. This land has an understratum of clay, having a depth of 18 inches of alluvial soil on the top. I cut my crop in April and the beginning of May, and began cutting my second crop the last week in May. Last year I cut five crops, and left a good feed after. A quarter of an acre kept my horse thirty weeks, with only two trusses of hay in addition. I have not the least doubt but that I shall cut seven crops this year, worth to cowkeepers at least from £6 to £7 per acre each crop. The quantity of water I used to each irrigation last year was 50 cwt. to each four poles of ground, or 100 tons to one acre. This spring I have used at the rate of 200 tons, and the result has been on that portion that in one month after the first cutting the grass is what is termed lodged. I have only irrigated twice in the winter and once immediately after each cutting. The water I use passes partly through the dung pit; the contents of a water closet used by three people, and the urine from one horse, pass to the tank, so that sewer water (unmixed with rain water) is much stronger than the water I use."

All these facts will be studied with advantage by the larger majority of our agricultural readers. They all tend to the better understanding of the too long generally neglected irrigation of English meadow land—a system of cultivation, which, I feel assured, will ere long be productive of very great advantage to many districts where it is at present entirely neglected.

NEWCASTLE FARMERS' CLUB.

AUGUST MEETING.

W. Anderson, Esq., V. P., in the chair.

The Secretary, Mr. W. Glover, announced that an offer had been made by the Committee, to members of the Club, and residents in Northumberland and Durham, of a prize of £10 for the best essay "On Draining Strong Clay Lands." The essays to be sent in to him (Mr. Glover) before the 1st of December next, and the sealed note of the successful competitor to be opened at the aniversary dinner.

The Club proceeded to the consideration of the questions of which notice had been given.

HIDEBOUND LAND.

The first was—"Which is the best method of improving grass land when it has become hidebound?"

Mr. Glover announced that he had received several communications without signatures, which, therefore, could not be read. He had, however, one from Mr. Hugh Taylor, of Cramlington, and another from Mr. D. F. Jones, a Fifeshire Farmer, both of which he would read. Before doing so, he would just take the liberty of saying, that it was little to the credit of a Club possessing 200 members to send only two communications in connection with the subjects for to-day's discussion. Mr. Taylor wrote as follows:—"The idea conveyed to me by the term hidebound is, that the roots of the grass are so interlaced, and so firmly matted together, as to resemble peat; that the blades of grass sent up are so puny as scarcely to be able to penetrate the thick covering of dead though undecomposed vegetable matter; and that the roots and dead blades together form so impenetrable a thatch that the access of air and moisture is all but entirely prevented. Last autumn, after a continuance of wet weather, I examined a grass field near Cramlington, laid out in the high, old-fashioned ridges. Whilst the furrows were so wet that every passing animal left its impress, the tops of the ridges were as hard and dry as in the height of summer. In fact, upon the removal of the turf, it was found that the rain had not penetrated the soil—that each ridge had turned off the water as well as any well-built and carefully covered corn stack. The consequence of this state of things need scarcely be mentioned. The rains not only bring down many substances fitted to promote the growth of plants, but, by percolating the soil, open a passage for the air; and then follow all those chemical changes in the soil without which vegetation must soon be at a standstill. In attempting to restore to hidebound land its proper degree of productiveness, all our endeavours must tend to the breaking up of this thatch, that air and moisture may be admitted, to promote the decomposition of the organic matter. Seeing a description of a scarifier in the *British Husbandry* of the *Library of Useful Knowledge*, I had one constructed according to the plan there laid down, and tried it upon one portion of a field completely hidebound. After the land had been well *combed* and scarified, the whole field was top-dressed with lime and soil at the rate of about 25 tons per acre. The produce was not weighed, but every one who saw it was of opinion that the scarified—that which was the worst part of the field—carried twice as heavy a crop as the better, but unscarified portion. Scarifying was tried subsequently on several occasions, and in each with marked good effects. This implement is now in the possession of Mr. Stephenson, of Throckley, who has, I have no doubt, found it equally useful in improving his grass lands. I hope other members of our Club will give this, or some other implement on the same principle, a trial, and let us know the results. The answer that I should be inclined to give to this question is—That after the land has been well scarified, a heavy dressing of caustic lime (or of other substance tending to promote the rapid decomposition of organic matter) be given in the autumn or early spring, and this well harrowed in."

—Mr. D. F. Jones, a Fifeshire farmer, (continued Mr. Glover,) had written as follows :—" Hidebound grass land, if I understand the term properly, is where there is, from a long continuance of pasturage, an accumulation of undecomposed or partially decomposed vegetable matter, which remains in this state from the want of free access of air, and its consequent decomposing effect. Undecomposed vegetable remains, instead of acting as a manure, act as a poison to the growing plants. Instance, peat. But when the various chemical elements which compose or build up these organic remains are freed from the organic combinations in which they existed when forming a part of an organized being, and on decomposition enter into other chemical (inorganic) combinations, they form a most valuable source of food for the living plant. Many of the members of the Newcastle Farmers' Club are well aware of one of the great distinctions between the vegetable and animal kingdoms—that the former requires that its food should be entirely of an inorganic nature, either derived from the mineral world or from organic decomposition. It is still doubtful if the parasitic plants are exceptions to this rule; but with this we have nothing to do here. The latter, the animal kingdom, requires that its food should be in an organized state. The food of animals consists of but a few of the chemical elements; and these must be presented in an organized form, whether animal or vegetable. Were it not so, a lump of charcoal, moistened with a few drops of spirit of hartshorn, would be nearly all that a man would require as food—a dinner the members of the Newcastle Farmers' Club would not much fancy to find on the table when they enter the dining room. If the hidebinding be caused by the accumulation of imperfectly decomposed vegetable matter, the remedy will be simple—namely, admit the air, and employ such manures as will exercise a decomposing effect on the organic matter. To admit the air, I would recommend the use of a most efficient implement made by Mr. Slight, of Edinburgh—a subsoil-stirrer, worked by two horses. Harrows may also be used with advantage. Added to these mechanical operations, a dose of quicklime, or lime and salt; and if the pasture be very old, a dose of bone dust. In recommending the subsoil-stirrer, I am supposing that the land is thoroughly drained. If not, let this be the first operation performed."

Mr. Stephenson said, in reply to the Chairman, that the scarifier named by Mr. Taylor, and which was now in his (Mr. S.'s) possession, consisted of twelve or fourteen coulters, fixed in a frame, with a large wheel before it. These coulters could be driven five inches into the turf; and by using it first in one direction, and then crosswise, the ground was effectually cut up. He made use of it last spring. The season, since, had not been favourable, and he could hardly yet make any report of the result. He considered the question under discussion to be one of very great importance. A great portion of the grass land in this district, owing to the fog not being destroyed, did not produce one-third of the grass which it was capable of yielding. He had tried different ways, and had come to the conclusion that the most effectual method of destroying the fog was to pare and burn. He had repeatedly limed hidebound land—one field three times over—and had at last obtained a good herbage; but it had taken nine years to accomplish this—three successive dressings every three years. He had applied guano, and that method had failed. He had applied soot at the rate of fifty bushels per acre, which completely destroyed all vegetation for two years; but now the pasture was much improved. He found that paring and burning, and giving six loads of lime to the acre, was the most effectual method. You only lose one year's grass by so doing. After the ashes and lime were applied to the land, and it was properly harrowed, the grass and cloverseed should be sown, and the following year there would be a splendid pasture. He spoke from experience. He was aware that several members of the Club would condemn this plan, because the best of the land was for a time destroyed by the burning. But what of that, if by so doing you eventually made the land of greater value? He was quite satisfied, he repeated, that there was a large breadth of land not producing a third of what it would do, if the top soil were removed.

Mr. John Robson observed that the nature of the disease had been well explained by a Fifeshire farmer. It causes were various. It might be produced by overstocking, by too frequent mowing, or by excessive wet. If by wet, then the remedy was thorough-draining, and manuring in the autumn. He had known bones applied to pastures with good effect. If sheep were pastured on hidebound lands, and fed on oilcake, good results would ensue. He could not altogether agree with Mr. Stephenson. A park, for instance, would be much disfigured by his remedy.

Mr. Stephenson: It would soon give you a better pasture than you'll see in many gentlemen's parks.

Mr. W. Kell remarked, that paring and burning had this recommendation: he understood that it destroyed the *ova* of the insects injurious to the crops.

The Chairman said, it was certainly a staggering remedy for hidebound land, to take the hide off altogether. What had Mr. Matthews to say on the subject?

Mr. Matthews said paring was the most effectual remedy. Five acres of land were now under experiment at Beamish, by burning and other modes, and he would communicate the result at a subsequent meeting. There was a subsoil plough of Ransome's, which was an excellent instrument, disturbing the whole of the soil, without removing it. He must support the views of Mr. Stephenson. By his method you got a more thorough change of herbage, and quicker, and could apply whatever seeds you thought proper.

BEST CROP AFTER BEANS.

The second question on the card was now taken: —"Whether is it more profitable to fallow after beans, when they are substituted for grass seeds, so making a seven years' course, or to take a white crop after beans, making an eight years' course, due regard being paid to the nondeterioration of the land?"

The Secretary again read a communication from Mr. Hugh Taylor. "The finishing the course of cropping at the seventh instead of the eight year," he said, "would be *at once* set down as a complete sacrifice of a crop, were it not that many good and *money-making* farmers consider the former course more profitable. The grounds of this preference I find it impossible to discover. It is acknowledged that land can be kept in condition under the usual four-course of cropping, provided we insure against the failure of the grass seeds, by the substitution, occasionally, of some crop *which shall neither impoverish the soil nor allow of its being overrun with weeds.* Since the eight-years course is merely that of the four-years repeated, beans being substituted the second time over for grass seeds, the bean crop, since we are unable to continue the course by taking the usual white crop after it, *must* either impoverish the soil or render it foul. If either of these conclusions has any foundation, then the advocates of the seven-years course may be in the right. Does, then, the bean crop leave the land in a foul condition? There can be no doubt that when beans are sown on foul land, in spite of the character they have for smothering weeds, they will leave the land in as bad (if not worse) condition than when they were sown, if the usual broadcast method is followed. But under these circumstances the hay crop would be equally liable to the objection. When, however, as in the Lothians of Scotland and in some parts of our own county, the bean crop is drilled at intervals of two feet or more, repeatedly horse-hoed, hand-weeded, and set up in the same manner as potatoes, it must, so far from leaving the land out of order, be one of the crops best adapted to the cleaning of it. In fact, on soils much addicted to the growth of weeds, the hay crop is found so much to encourage this tendency that the bean crop is often substituted, for the sake of keeping the land clean. This, then, cannot be a sufficient reason for the omission of the white crop. Does the bean crop exhaust the land more than the hay crop? From data afforded by *Johnston's Lectures on Agricultural Chemistry*, I have calculated that the following is the total amount of substances taken up by the crops in the usual four-course of husbandry:—

	Inorganic. Matter.	Organic. Matter.	Total.
Fallow, Wheat, Oats,	536lbs.	8364lbs.	13,400
Hay,	209lbs.	4291lbs.	

Substituting beans for hay:—

Fallow, Wheat, Oats,	536lbs.	8364lbs.	13,450
Beans,	210lbs.	4340lbs.	

We have, then, a balance of 50lbs. per acre, or three-tenths per cent. on the gross produce, against the bean crop—an amount scarcely appreciable at any time, but utterly lost sight of when we consider that this excess is in the organic constituents, and call to mind that the whole of the organic matter of plants *may* be derived from the atmosphere. It must, too, be of still less consequence in the neighbourhood of Newcastle, throughout which so great an amount of organic elements—in the forms of chloride and sulphide of ammonium, carbonic acid, &c.—is sent into the atmosphere by the combustion of coal and refuse from the mines, and which must be brought down again, in quantity, by every shower. No account has here been made of the aftermath of the hay. I think we may say that it exhausts the land to at least one quarter of the extent of the crop of hay. If we take this view we shall have then:—

Course with hay	14,525
——— beans	13,450

Or the hay crop exhausts the land to the amount of 1000lb. more than the bean crop. There is no doubt that though the total amount varies so little, yet the different constituents combined to form this total vary in the two crops. But even this is in favour of the bean crop; for it deprives the land of a less weight of substances useful to the grain crops than does the hay. This may be seen by comparing the analyses of the two crops. Neither, then, can this ground of preference be sustained. In cases where an actual comparison of the two methods has been made, the sole evidence taken has probably been the succeeding wheat crop. That this should be better by fallowing after beans is only to be expected; since the great bulk of that nutritive matter in the soil, which might have been assimilated by the oat crop (and this more espepecially of the soluble silicates, which would have been used in the building up of the stem and husk of the oat), has been left in the soil as so much extra manure for the crop of wheat. But let us try each course fairly, remembering that the manure must be proportional to the number and description of crops, and the land treated in a husbandlike manner when under the bean crop, and I think I may venture to say we shall hear little more of fallowing after beans."

Mr. Colbeck said, the question was easily answered, as not being applicable to this district, where the farmers generally were so poor, and obliged to sail so very near the wind, that they could not afford to lose a crop. It was also another objection, that there was not much land worth anything, in that neighbourhood, after a second year's grass. He could not agree with Mr. Taylor's views, which were based on the insecure foundation of Professor Johnston's data. A less gifty crop of oats was obtained after beans than clover.

Mr. Robson said, one course would be more profitable than another according to circumstances. On land naturally good, and in rich condition, like Mr. Stephenson's, no doubt an eight-years course was the most profitable; but on poor land it was advisable to fallow after beans, and not to take a white crop, or you would make your poor land still poorer.

Mr. Stephenson differed from the last speakers. They seemed to think that he lived in the land of Goshen. Let them only exert themselves, and they would bring their land into as high condition as any in Tyneside, if they would only expend capital. He considered that to fallow after beans was farming land to perfection. By taking a crop of wheat or oats you were extracting from the land what was essential to the green crop. The method he would recommend was to fallow after beans, then have a green crop—then wheat, seed, two years grass and oats, fallow, wheat, beans, making an eight-years course. By pursuing this method you always had your land in good heart, and your crops would be considerably improved, particularly clover, of which instead of having only a ton to the acre, and nothing but rye-grass, you would, in a favourable year, have nearly three tons, and full of clover. He had this year had a field in clover which was fallowed after beans, and the first cut weighed $2\frac{3}{4}$ tons per acre. The best way, he would repeat, to keep land in good heart, was to fallow after beans.

Mr. Matthews said, in the south of the county of Durham, where the pernicious system was pursued of taking two white crops in succession, the farmers took a green crop after beans, and then fallowed: they found it necessary.

Failure of the Broad Clover.

Mr. Weeks, addressing himself to the third question—"What is the reason assigned for the failure of the broad clover, and what means ought to be taken to prevent this loss"—said the cause of the failure, according to the general opinion, was that the land grew tired of growing the crop. Yet there were two fields near him—one of which had grown clover every four years from time immemorial, and the other had only been sown with clover this year—and the former had yielded an abundant crop while the latter was almost a total failure.

The Chairman said the common notion was that the crop exhausted the land of some of the constituents that were essential to its growth, and until these were restored you would have no more produce. It was also said that the frosts of winter destroyed the clover. He was inclined to think, however, that the former was the true solution.

Mr. Colbeck observed that the question was one of great difficulty. A neighbour of his, who had been sorely baffled with his clover, said he would *mak'* the land grow it, but he had been obliged to give in: the land beat him. He (Mr. Colbeck) had tried various experiments, but without arriving at any satisfactory conclusion. He did not think that the failure arose from the absence of inorganic constituents in the soil. The same land that could not be made to grow broad clover would grow beans, and the two crops required as nearly as possible the same constituents. A French writer on agriculture ascribed the failure to a parasitical plant, the lesser Broomrape (or *Orobanche Minor*). He said that in Flanders it had been found that this plant, whose seed resembled that of the clover, destroyed the crop. Perhaps the members of the Club would keep a look out, and see if they could detect it among their clover. There was also another parasitical plant—the Clover Dodder (*Cuscuta Trifolii*)—which might be a cause of the failure.

Mr. John Cookson said the general opinion was that the land became what was called "clover-sick." If the failure was caused by a parasitical plant, how came it that the same seed would give you a good crop on fresh land, although it gave you little or none on the old land?

Mr. Colbeck said he could not answer the question. He had simply quoted the explanation of this French writer, which was new to him. The problem was beset with difficulties.

Mr. Matthews doubted the Frenchman's explanation. In the same field you would have a luxuriant crop here, and a failure there. Red clover was the most capricious plant that was known.

The Chairman said he should like to have the opinion of Mr. Johnson, of Prudhoe, who had had considerable experience.

Mr. Johnson said, he only knew that a crop of clover was often very bad to come at. He had ploughed a field that had been in grass fifty years or more, and sown it with clover; and he had not a stem to cut. The field would not grow clover. It was rather better the second year, certainly; but it was not so good as he looked for.

Mr. J. Stephenson: What kind of soil is it?

Mr. Johnson: A light soil.

Mr. J. Stephenson: A strong soil is the best for clover; and one cause, probably, of the failure, is when the soil is too dry at the time of sowing.

Mr. W. Stephenson said, he never wanted clover: he always had plenty. But he only sowed it every eight years, and with beans between. They might talk of chemistry as they liked, which had undoubtedly done much for us, but had enlightened us little as to the failure of the clover; he was convinced that the principal cause of failure was from such frequent repetition.

The club then adjourned.

ON DAIRIES.

This pamphlet on "Dairies" contains very useful information on the subject, and we admire it more particularly because we believe the statements made by Mr. Holbert in reference to his dairy, and the produce of his cows, to be perfectly correct, from our own experience in this country for many years, when we kept about the same number of cows as Mr. Holbert. A report like Mr. Holbert's is calculated to do more good than fifty exaggerated statements about dairies and cows' produce, that every farmer of experience in such matters must know to be a mistake or mis-statement. There is nothing more injurious to agricultural journals or books, or indeed to the progress of improvement in husbandry, than the wonderful reports of the produce of crops and of stock that sometimes are published. It attaches discredit to all that appears in such publications, and we conceive it the duty of editors not to give insertion to any reports which they do not believe to be correct. We, of course, conclude that all editors of agricultural papers shall understand theoretically and practically the subject they write upon, otherwise they cannot conduct such a publication advantageously for farmers, however well they may be educated or disposed to do good; every man not practically acquainted with his subject is liable to be imposed upon, and may give insertion to articles that will injure instead of serve the cause he desires to advocate. We give the following extract from the article on Dairies—

"The Dairymaid.—The all-important work to be performed by the dairymaid has a bearing on the quality of the butter which every dairyman understands. Her duty rightly performed, brings success to her employer and credit to herself. The utmost order and neatness in everything appertaining to her work, great watchfulness to have the work performed at the right moment, the milk or cream at the proper temperature, the careful and thorough preparation of the butter, require no ordinary person. When such a person is found, and there are multitudes of them among the wives and daughters of our farmers, the success of the dairyman will be complete, and he will be enabled to bring to market year after year, butter even and excellent in quality, always acceptable to the purchaser.

Mr. Holbert's Dairy.—Mr. Holbert's farm is located in Chemung Co., adjoining the State line, at an elevation of 800 feet above tide water; contains 200 acres; soil a gravelly loam, with a slight mixture of black sand; the subsoil the same. His dairy the past year has consisted of 40 cows (including 3 heifers which came in last spring). They are of the common breed mostly, a slight mixture of the Durham, from 3 to 12 years old. His feed is hay, grass, and corn stalks; no slops or roots to his cows; pastures are of clover and timothy, and his meadows the same; he changes his pastures often, and thinks it advisable to change twice a week. Commenced making butter about the 1st of April, and made up to the 4th of May, 512lbs. On the 5th of May, commenced packing for fall market, and closed 15th December. In May, 26 days, made 747lbs.; June, 30 days, 1,186 lbs.; July, 31 days, 1,079 lbs.; August, 31 days, 1,016 lbs.; from September 1st to December 16th, 1,948lbs. Whole amount of butter made, 5,034lbs.; besides spring butter and butter sent to different fairs, which amounted to 1,454lbs. The butter was sold in New York at 23 cents. per lb., realising in cash over and above butter for family use, 1,492 d. 24c., and an average of 37 d. 30c. per cow. Mr. Holbert's cows came in from March to 20th June. He raises only such calves as promise to be valuable for his purposes, and keeps swine to consume his butter milk.

	lbs.
On 15th June drew morning's milk from 37 cows	527
Do., evening's	632
	1159

which made 3¼lbs. of butter to each 100lbs. of milk. Milk from 5 cows for 30 successive days, commencing 28th of May, made 248lbs. of butter. On the 11th of June drew from 5 cows 187lbs. of milk, which made 8½lbs. of butter. On the 8th of Aug. drew from 40 cows in the morning 508lbs., in the evening 519lbs.—in all 1,027lbs., which when churned made 39lbs. of butter. The morning's mess made three 3lbs. 14 oz. from 100lbs. milk, and the evening's mess 3lbs. 10 oz. from 100lbs. The morning's milk made 4 oz. more than the evening's from 100lbs. milk. The difference not as great as in his dairy last year, owing to the messes being more nearly alike in quantity. On the 11th of August the milk was drawn from 20 cows, and weighed and churned separately, and produced a result showing the difference between the milk of different cows. One of his best cows made as much butter as three of his poorest, from the same quantity of milk. It can be at once seen that a great loss arises from the keeping of three cows yielding no more than one. 100lbs. of milk drawn from his best cows made 1lb. more butter than 100 lbs. of milk from his whole herd; and the difference in *quality* was greater than in quantity. These experiments are important, and we would urge upon every dairyman to test carefully the milk of his cows, and ascertain their adaptation to the uses of the dairy. We do not desire to pursue further the experiments of Mr. Holbert, but refer to his statement annexed. We consider Mr. Holbert justly entitled to the first premium, a silver cup of the value of 50 d.

On behalf of the committee,

B. P. Johnson, Chairman."

"John Holbert's Dairy, Chemung.—A statement of Mr. John Holbert's butter dairy and farm, located in the town and county of Chemung, New York, adjoining the Pennsylvania State line; elevation about 800 feet above tide water, and at 42 degrees north latitude. The farm contains 200 acres of land, which was farmed the past season as follows: I have kept and milked 40 cows, and my grain pastures and meadows are as follows: 24 acres of wheat, 8 of buckwheat, 10 of oats, 20 of corn and potatoes, 2 of summer fallow, 40 of meadow, 74 of pastures, 22 of wood and waste land. The soil is a gravelly loam, with a slight mixture of black sand; subsoil the same. I use no roots or slops for my cows; all that I feed them with is hay and grass, and corn stalks. My pastures are clover and timothy, and hay the same; and my meadows produce from one to two and a half tons per acre per annum. I sow plaster on all my pastures and meadows every year, and use the Cayuga plaster.

"Breed of Cows.—My cows are generally the common breed. I have a few that have a slight mixture of Durham blood in them. Their ages will range from three years old to twelve. I prefer a cow not less than five years old for the dairy, and as much older as she winters well. I change pastures often, and think it a good plan to change twice a week. Too much care cannot be taken to have your cows well watered and salted. I keep a large watering trough in my cow yard, where I very frequently observe cows drinking large quantities of water immediately after coming from the brook. I keep salt lying in the yard the year round.

"Making Butter.—I take care to have my cellar thoroughly cleansed and whitewashed early every spring. I keep milk in one cellar and butter in another. Too much care cannot be taken by dairymen to observe the time of churning. I usually churn from one hour to one hour and a half. I put from one to two pails of cold water in each churn before commencing to churn, and one pail more in each when nearly done, in order to thin the milk, and make it produce all the butter it contains. When done, take the butter out, wash it through one water, then set it in the cellar and salt it, then work it from three to five times before packing. Butter should not be made quite salt enough until the last working. Then add a little salt, which makes a brine that keeps the butter sweet. One ounce of salt to a pound of butter is about the quantity I use. I pack the first day, if the weather is cool; if warm, the second day. If the milk is too warm when churned, the quantity of butter will be less, and the quality and flavour not as good as when it is cool at a proper temperature. I have always worked my butter by hand. Last fall I bought a butter-worker, but I disapprove of its use entirely, and recommend the hand ladle in its stead. In packing, I fill my firkins to within two inches of the top, then lay a clean cloth on the top of the butter, and put salt on the cloth and keep it covered with salt and brine all the season. Great care should be taken not to let the milk stand too long before churning, as in that case in hot weather it becomes too sour, and the butter will be sour also, and in cold weather it becomes bitter; all of which can be prevented in cool weather by putting about one quart of buttermilk in each pan or tub before straining the milk, and in hot weather by churning as soon as the milk becomes thick and moist on the top of the cream. I use the Turk's Island salt of the Ashton sacks. I have never used any of the solar evaporated salt, or steam-refined salt from the Onondaga salt works.

"Experiments.—I tried several experiments in making butter the past season, among which are the following: Commenced making butter about the 1st of April, and up to the 4th of May made 512 pounds of butter. May 5th, 1848, commenced packing for fall market, and closed about the 15th of December. June 15, drew the milk from 37 cows; morning's mess, 525 pounds; evening's mess, 632 pounds of milk; in all, 1,157 pounds of milk, making 3 pounds $11\frac{1}{2}$ ounces of butter to 100 pounds of milk. June 20, had three more cows come in, which made my dairy full. My cows commence coming in, or calving, in March, and do not all come in until the middle of June, as was the case this year. My dairy was not full until the 20th of June. I do not rear all the calves, but generally save a few of the finest; this year I reared six. I keep swine to consume the buttermilk.

"I drew the milk from 5 cows for 30 days in succession, commencing with the 28th day of May, with the following result, viz., I made 248 pounds of butter from 5 cows in 30 days. On the 11th day of June I drew from 5 cows 187 pounds of milk, which made when churned $8\frac{1}{2}$ pounds of butter. I churn all the milk, and churn by horse power, and usually churn 4 one-and-a-half barrel churns at once.

"On the 8th day of August last I drew the milk from 40 cows; in the morning I got 508 pounds, and in the evening 519 pounds; in all, 1,027 pounds of milk, which when churned made 39 pounds of butter. The morning's mess made 3 pounds and 14 ounces of butter from 100 pounds of milk, and the evening's mess made 3 pounds and 10 ounces of butter from 100 pounds of milk. I find that the morning's mess or milk made 4 ounces more butter than the evening's did from 100 pounds of milk.

"I find by churning the milk separate that one of my best cows will make as much butter as *three of my poorest*, giving the same quantity of milk. June is a much better month for making butter than July and August, as I made one hundred and seven pounds more butter from thirty-seven cows in June than I did from forty in July. I find also that one hundred pounds of milk drawn from my best cows (that is, those that give the richest milk) will make *one pound more butter* than one hundred pounds drawn from the whole herd. There is more difference in *quality* than in quantity. For making butter it will pay all dairymen well to look to the quality of milk their cows give. One cow well kept is worth two cows poorly kept, for dairying. I am inclined to think that too many farmers overstock their farms, and consequently keep their pastures too short; as lands that are kept with a good coat of grass on them through the season stand a drought much better and produce pasture earlier the next season, and cows will do better on them than on shorter feed.

"Quantity of Butter made.—As I have said before, I commenced making butter about the 1st of April, and up to May 4th made five hundred and twelve pounds, then commenced packing for the fall market. Made in May, twenty-six days, seven hundred and forty seven pounds; in June, thirty days, made eleven hundred and eighty-six pounds; in July, thirty-one days, ten hundred and seventy-nine pounds; in August, thirty-one days, ten hundred and sixteen pounds; and from September 1st up to December 15th, three and a half months, nineteen hundred and forty-eight pounds, which is about the close of the season for making butter. I sold my dairy this year to R. Clearwater, at 183, Washington-street, New York, on the 30th day of November, for twenty-three cents per pound, which amount was five thousand and thirty-four pounds; the spring butter, and butter that was sent to the different fairs, and the butter that was made after the dairy was taken off, amounted to fourteen hundred and fifty-four pounds; the whole averaging twenty-three cents per pound, amounted in cash to fourteen hundred and ninety-two dollars and twenty-four cents (that is, over and above family use, and our family will average over eight in number), and which finally makes an average of thirty-seven dollars and thirty cents per cow, including heifers.

"I sold my dairy last year to C. Adams and Co., at 224, Fulton-street, New York, for twenty-four cents per pound. I am told by them that it went south, and stood the climate well.

"All of which respectfully submitted.

"John Holbert."

—Canadian Agricultural Journal.

SUBSOIL PLOUGHING.

A PRIZE ESSAY OF THE WENTWORTH FARMERS' CLUB.

BY THOMAS KEIR SHORT.

As for the advantages derived from subsoiling much diversity of opinion exists, and, on the whole, very little is yet known. Some practical farmers stoutly maintain that it is labour lost, and money thrown away; others equally competent to judge say that it is one of the most beneficial operations in farming, almost equal to a good manuring, and no system complete without it. Thus we see practical men differ: both may be right, and both may be wrong.

I can produce instances where the use of the subsoil plough has been attended with the greatest benefit, and others where it has been so much money thrown away. Many of its advocates are too much prejudiced in its favour, being under an impression that because it has been of great use to them, it must, as a matter of course, be the same to others; but this does not follow, for, like many other operations in agriculture, science must be called to our aid. Analysis is requisite; and chemistry solves the question.

A friend of mine subsoiled ten or fifteen acres of land which had been previously furrow-drained 30 inches deep—the land termed strong clay—the subsoiling being performed across the drains: two lands were left undone: the land sown with wheat and red clover. The crop looked well all winter, except one end, which had been much damaged by game; the subsoiled part always keeping in advance of the other. The crop is now reaped, but not yet thrashed. The produce of the subsoiled part is laid by competent judges at fifteen bushels per acre over that undone, and was ready for the scythe ten or fourteen days before the other, which is of much consequence if a wet latter harvest sets in. The red clover on the two lands unsubsoiled attained the height of ten inches, from the thinness of the corn, and was shaken out for the horses; whereas that on the subsoiled land was only four inches high, from the luxuriance of the wheat crop.

Another friend subsoiled a similar-looking piece of land a few miles distant. The greatest care was taken to perform the work well. The results were that no difference in the crop was perceptible, and that it was time and money thrown away.

These two experiments gave sufficient evidence to the contending parties for and against subsoiling to back their opinions; for in these two cases both were right and both were wrong, both being ignorant of the cause.

We will now examine the cause chemically, which will elucidate the question.

Strong land contains large portions of a mineral called alumina, which is a very compact adhesive substance, possessing strong attractions for water and ammonia. An analysis of the soil where the experiment was successful was found to contain 28 per cent. of alumina, the soil resting on the new red sandstone formation. The other soil where no good was derived contained 45 per cent. of alumina, and rested on one of the worst of clays—the lias.

I was induced to try these analyses from having seen a paper some time back in the *Journal of the Royal Agricultural Society*, by Mr. Thompson, who is of opinion that no permanent good can be derived from subsoiling land containing more than 43 per cent. of alumina. I am inclined to think that 40 per cent. is the greatest to which the per centage should go; and as an instance of this, that the less alumina the land contains the more permanent the advantage.

Land containing less than 35 per cent. of alumina, when ploughed after being subsoiled, and having produced a crop, turns up in a much better state, approaching more to a strong loam than clay, and is much easier to work; and I am of opinion that the cost of subsoiling is saved in the labour alone.

I have been much surprised to see strong land on the lias formation, which had been subsoiled, turn up the year following as compact and tenacious as ever, without a crack or any other mark in it to denote that it had ever been moved; and this can only be accounted for by the presence of alumina in such large quantities, which being divided into very minute particles, having a strong attraction for each other and for water, causes them to unite as firm as ever.

On the light or sand land I have seen great advantage derived from subsoiling also; but in this case we cannot allow alumina to have anything to do with it, consequently we must look to other causes. At the same time I have seen failures equally as great on light soils as on strong clays.

As an instance of the benefit derived from subsoiling sand or light gravelly land, a level field was ploughed 7 inches deep with the common plough, and followed by the subsoil plough 14 inches more; two lands were left undone in the middle of the field; the operation was performed in November, 1845. In 1846 the land was sown with Swedish turnips on ridges, the ridges crossing the subsoiling, the whole of the field was manured alike with bones and fold-yard manure; nothing particular was noticed in the turnips until the bulbs began to form in the autumn, when in was evident those on the subsoiled land were growing the fastest.

Late in the autumn, in crossing the field, the two lands undone had the appearance of a hollow or valley across the field, being much less in both bulbs and tops, and four tons per acre less in weight. The barley also shewed the two lands conspicuously, and the seeds this summer have stood the dry months much better than where the land was not subsoiled. I could give some other evidence, but I do not consider it requisite.

We will now examine the cause of success and failure on light soils.

It is well known that a soil may be rich in mineral constituents requisite for the growth of plants, but from the state of combination in which these minerals are found cannot be assimilated by plants as food; consequently, in their present state, are of little use. Science teaches us how to bring these constituents into use, and the more we know of it the simpler we find the process.

These minerals in their present state of combination are termed "*dormant*," and in many cases only require exposure to the air; for it is well known that the hardest rock in time becomes disintegrated by the action of the air, which is principally attributed to the presence of carbonic acid in the atmosphere. It is to the influence of the atmosphere to which I attribute a large portion of the benefit derived from subsoiling sandy soils, but not entirely; as it is well known that the laws of gravitation carry all bodies heavier than the atmosphere downwards, consequently much of the valuable properties of manure are carried down into the subsoil, particularly a porous one, by percolation, and are after placed beyond the reach of the roots of plants ordinarily cultivated.

By the process of subsoiling, the air is admitted to a greater depth, and in larger quantities than before; the carbonic acid of the atmosphere comes in contact with a larger portion of these dormant constituents of the soil, and by chemical action forms them into a state for the assimilation of plants.

I am also fully convinced that much depends on the time of year when the operation of subsoiling is performed, particularly on sandy soils. As an instance of this, during the process of subsoiling early in January the operations were stopped by frost; other circumstances occurred to prevent the completion of the field until the end of March; the field was sown with turnips, which told to the row where the stoppage took place, the others not being any better than the part left undone. I have often observed that the greatest number of failures on sand land have taken place from this circumstance.

The best period for subsoiling is from the end of October to the beginning of January, as the land has then the full benefit of frost and snow.

Some persons run the subsoil plough down every furrow; this I do not think is necessary, and it prevents many who can only command three or four horses from performing the operation at all. The system I recommend is to clear the land of weeds and rubbish as early in the autumn as possible, plough it once over, drag it deeply, then throw the land into winter ridges with the common or double mouldboard plough as deep as possible; after which run the subsoil plough down each furrow to the depth of fourteen or sixteen inches; nothing more is requisite until the spring, when it is prepared for turnips. If it is intended to subsoil for barley, the operation must be performed as soon as the turnips are eaten off; but for wheat the old system of the subsoil plough following the common plough down each furrow is all that can generally be done.

I am inclined to believe that many of the cases of wheat being thrown out of the ground by frost, may in a great measure be lessened by using the subsoil plough, as I have observed that it never occurs to such an extent on land that has been subsoiled.

It is caused principally by the expansion of the water contained in the soil during the process of freezing; and as most farmers are anxious to have what they term a firm bed for thin wheat, the light soil which covers the grain expands when it becomes frozen from the resistance of the firm soil below; but where subsoiling has been practised, the water has a much better chance of escaping by being able to percolate the soil more rapidly.

Also the deeper a soil is ploughed, a much better chance is given to the various crops to withstand dry weather, as it is well known to the gardener that the more he stirs the soil between his crops in dry weather the less water they require; so it is with agricultural crops on a larger scale. Some soils contain a pan or bed of hard concrete a few inches below the surface; and although the land may be free from springs, is often very wet from the surface water being unable to percolate. On such soils as this, the subsoil plough is invaluable.

I knew a part of a field of this description this spring which had been subsoiled; after the operation, between ten and fifteen tons of the hard concrete was carted off, the stones and pebbles being cemented together with oxide of iron. The operation has been successful, and the land is now as dry as possible, even after the heaviest rains.

One great obstacle to subsoil ploughing is the great draught that some of the cumbersome subsoil ploughs require; in fact, in this age of invention, it has often occurred to me that the various implement makers seem anxious to cram as much cast metal and iron into their productions as possible, as if the railroads and other branches of the arts could not consume it; also as much complication as possible is now introduced into the various branches of agricultural mechanics.

Light draught, firm workmanship, and simple construction, are the three grand points to be looked after in the construction of agricultural implements.

Many varieties of subsoil ploughs have been invented, most of which are now discarded. The best I have yet seen is made by Mr. George Cartwright, of Martin, near Bawtry, Yorkshire; it is composed of cast metal and iron, is of easy draught, three horses, on light gravelly land, being able to plough one acre per day, at a depth of 16 inches, the common plough taking eight inches deep before it, the total depth being 24 inches. The price of this valuable implement is £5 5s.

Those persons who are inclined to follow the practice of subsoiling will find it to their advantage to attend to the following rules, if they wish their efforts to be crowned with success:—

Strong clay containing more than 40 per cent. of alumina derives little benefit from subsoiling.

The period from the end of October to the beginning of January the best. Subsoil across the drains if possible.

Work the horses one before the other; avoid treading the subsoiled land as much as possible.

Look that your men do not alter the depth to save the horses.

Use only such implements as are of the best construction and light draught.

Always see your implements tried and proved before you purchase.

PRACTICE WITH SCIENCE.

One of the best implements for thoroughly working the ground, and cleansing it of all sorts of weeds, is Mr. Garrett's patent horse-hoe. This may be adapted to his drill machine, which makes the two act well together. It is suited to all methods of cultivation, whether broad, flat, or ridge ploughing, and is adapted to hoeing corn or pulse of all sorts, as well as roots. It may be increased or diminished in spread to suit all lands or methods of planting; the axletree being moveable at both ends, either wheels may be expanded or contracted, so as always to be kept betwixt the rows of plants. The shafts are readily altered and put to any part of the frame, so that the horses may either walk in the furrow or in any direction to avoid injury to the crop. Each hoe works on a lever, independent of the others. The hoes may be set to any width, from seven inches to any wider space; and by the easy method of steering they may be guided with the handle behind to the greatest nicety. Mr. Hewitt Davis says of this hoe, that it is calculated to work a most important reform as regards the cleaning of land, and he had practically tested its utility. By its use, all corn sown in rows from nine inches upwards may be hoed in a superior manner, and at an expense of only 1s. per acre. Mr. Pusey also says "several farmers I know regard this horse-hoe as one of the best implements lately invented. On an arable farm of 400 acres the price (£17 10s.), might be saved by its use, I should think, in the first season." Such being the uses of this valuable implement, from authorities which cannot be disputed, it becomes important to the improvers of the present day that they should take advantage of the facilities thus afforded for eradicating all the noxious intruders which rob the corn crop of its proper sustenance, and also for giving them freer scope to extend their fibres. It has hitherto been too much imagined that the green crop was the only one to be attended to, and that the succeeding corn crop might be left to itself. Much, no doubt, has been gained by the introduction and good cultivation of the former; but our labours should not end there; we should consider that the same principles, if true in one case, are equally so in the other. If the bulk of a green crop can be enlarged, and the weight of a crop of turnips perhaps doubled by working the ground well, keeping it clean, and bringing it to a thorough state of pulverization, by parity of reasoning the same results would arise from the corn crop being treated in a similar manner; and whilst we have such powerful aids at hand as the implement just described, and others of modern invention, there is no excuse, unless antiquated prejudices be considered in that light, for having our corn crops so much neglected, and, in fact, abandoned to chance. One of the best and most useful implements that have made their appearance of late years is Dr. Newington's hand-drill-hoe and cultivator. The great merit of it is, that it completes its work easily yet efficiently, that it effects it by hand labour cheaply, and that its whole cost is only 30s. This implement, by shifting the shares along a groove in the frame, can be used for any description of crop, provided it be in rows; thus for hoeing or stirring drilled wheat, two rows at once, four shares are necessary, two for each row; the same for carrots, mangold wurzel, turnips, &c.—five shares. From the shape of the shares, they penetrate the ground on the implement being dragged on. The labourer has nothing to attend to but the guidance of the implement in a straight line, and no force except that of drawing is required to make the shares penetrate the earth; every other share being set behind its fellow precluding the collecting of earth or weeds. After the operation the weeds will be found to be torn out or cut off, and the soil mellow and open, and not trodden on afterwards by the workmen; the roots of the plants are enabled to penetrate in all directions, and to receive the full benefit of the air and dews at night, which latter being absorbed, and the loose earth rendering it constantly moist, while unmoved soil in the immediate vicinity will be found to be dry and cracking, and the plants growing upon it stationary and drooping. With this implement a man is enabled to get over a large breadth of ground in a day. I have tried it on some rather loose marshy soil, and its working is most satisfactory. If the land be of a stiff nature, and become still more so by the winter rains, it may require more power than a man can give, to work the implement efficiently. In this case it may be desirable that the rows should be first gone through with Mr. Garrett's more powerful horse-hoe, and followed by this some time afterwards, when the ground is tolerably dry. One advantage of it is that its use may be continued in a more advanced state of the crop than the other; and if it be true, as Mr. Tull tells us, that by cutting the fibres of the roots, new mouths will be formed for taking in fresh sustenance, this process will be attended with the best effects. It would be needless here to go through the list of scarifiers and grubbers, of hoes and cultivators, many of which are useful and even necessary in the cultivation of green crops; but it may be of service to consider the best means of giving a deep stirring to the land. There are two methods advocated—double trenching and subsoiling; these appear intended for different purposes. If the land has been shallow ploughed, and there is a good substratum underneath, which the plough has not already reached, then it may be most serviceable to bring this virgin soil to the top. But if the soil below be of a cold sterile nature, a greater mischief cannot ensue than in making it an available soil for cropping. In double trenching, the common plough will take out the first furrow, but in the succeeding one the share of this is often too wide, and particularly in strong land so great an obstruction is caused as to prevent the plough reaching its proper depth. It would therefore be better to have a plough for the purpose, with a more contracted share. The great obstacle to the subsoiling plan has been the supposed difficulty in its execution. It was considered that nothing less than a large heavy plough, that would require four or six horses, would be equal to this. Mr. Smith, of Deanston, has constructed a plough of this kind, which answers the purpose well, but makes the working come to a great expense. It is now considered by some preferable not to penetrate too far into the ground in the first instance, but rather to effect the work by degrees. A common plough with two horses is equal to taking out the first furrow-slice; this should be followed with the subsoil plough with two horses lengthwise. A plough suited for the purpose may be had at Halewood, near Warrington, price £4. When it is required to be done a second time to a greater depth, Read's sub-pulveriser, 25, Regent-circus, London, price £5, is a very valuable implement. It may, however, be mentioned than an addition he has made to it is too light and flimsy, as a scarifier, and its price too exorbitant—£6. One hint may be given to young farmers: never buy an implement without first inquiring the price. New implements are constantly coming out which catch the eye, but which, when brought into practice, entirely fail in answering the purpose they were intended for.

LAW. RAWSTORNE.

—Gardeners' Chronicle.

A LECTURE ON THE ANATOMY AND PHYSIOLOGY OF THE MATERNAL ORGANS OF REPRODUCTION IN ANIMALS, WITH THE PRINCIPLES OF PRACTICE APPLICABLE TO CASES OF DIFFICULT AND PRETERNATURAL LABOUR, MORE ESPECIALLY IN THE COW AND EWE.

BY JAMES BEART SIMONDS, LECTURER ON CATTLE PATHOLOGY OF THE ROYAL VETERINARY COLLEGE, LONDON; HONORARY MEMBER OF THE ROYAL AGRICULTURAL SOCIETY, &c.

My Lord Duke and Gentlemen,—On an occasion like the present, knowing that so many and important matters require your attention, I shall not presume to intrude unnecessarily upon your time by the introduction of remarks which are purely of a prefatory nature. It is, therefore, my intention to proceed forthwith to the consideration of the subject which has been selected for this lecture, namely, the general structure and function of the organs of reproduction in the cow and ewe, and the rules or principles which should guide us in cases of preternatural parturition. As the latter is that which chiefly interests you as men of practice, so it will receive from me the fullest description; but it is of equal importance that I should explain the construction of those parts in the female which are specially employed in the act of parturition. It fortunately happens that no argument is needed to show to either the scientific or practical breeder, or to those more immediately connected with the feeding and rearing of our native breeds of cattle, the necessity of such investigation. It is a matter which may be said to come home to all, being intimately identified with our agricultural, and therefore with our national, prosperity. As Englishmen we may well be proud of our improved cattle and sheep, which are at once the boast of Britain and the envy of the world. But we might ask, how frequently are the hopes of the breeder disappointed, and his endeavours to improve a race of cattle rendered fruitless, by the casualties attending upon their birth? In such a dilemma science stands waiting, and offers a ready hand to guide him through difficulties and overcome danger. Essential therefore to success is a knowledge of the principles to which we have alluded, and which will form the basis of this discourse.

It is not our intention to enter on the *vexed* question of the best means to improve the breed of any particular class of animals, nevertheless we may be allowed to make a few passing remarks on what is commonly designated "the theory and practice of breeding."

Breeding with a view to improvement may be said to be founded on an established law of nature, that *like produces like.* We should, however, always bear in mind that in animals there is a perpetual tendency to change, by which the development of their frame and strength of constitution are materially influenced, arising from a variety of causes, such as domestication, system of management, removal to a different climate, a continued habitation of the same district, partaking in general of the same diet, feeding on many kinds of provender, a liberal or niggardly allowance of food, especially when young, with protection from or exposure to the inclemencies of the weather, &c. But although these may be regarded as the chief causes in operation to produce the tendency to change, still among them we have the required means to promote the permanent improvement of a breed. Thus it will be seen that, in the language of Sir J. Sebright, "it is not always by putting the best male to the best female that the best produce will be obtained; for should they both have a tendency to the same *defect*, although in ever so slight a degree, it will in general preponderate so much in the produce as to render it of little value."*

In order to improve a particular race of animals, two plans are advocated by the two classes of practical breeders. One of these is commonly called "the crossing," the other "the in-and-in" system. The latter of these was strongly advocated by the late Mr. Bakewell, and his example had at least the effect of destroying the great prejudice which existed against breeding from animals having a close relationship to each other. The too rigid adoption of this plan is found, however, to produce degeneration, and therefore its advantages are limited: for animals of the same family, living in the same locality, and subjected to the same system of management, are predisposed to the same defects and diseases, and these become hereditary. Besides which, every improvement of a breed requires the

* "The Art of Improving the Breeds of Domestic Animals," by Sir John Saunders Sebright, Bart. M.P. London 1809.

application of the same means to maintain it which produced it, and the chief of these is *care in the selection* of both the male and female, so as to avoid the consequences of that predisposition to which we have alluded. As with defects so it is with improvements; these are transmitted from parent to offspring. Hence when *care in selection* is fully and efficiently carried out, deterioration from ordinary causes does not so rapidly occur. To assist in overcoming these causes, the taking of animals from different families and localities, or "crossing," is adopted. But even here care in selection is of equal importance.

We have spoken of hereditary predisposition to disease: this is exemplified by the fact that horses bred from "roarers" are so susceptible of this abnormal state of the respiratory organs, that "roaring" follows from causes which would be insufficient to produce it in other horses. And experience has shown that very many of the young horses sent from this county (Yorkshire) to London, being in this condition, early become diseased through the altered circumstances under which they are placed. That which is true with regard to horses applies equally to cattle, sheep, and all domestic animals. As with disease so it is also with colour; this not only becomes immediately hereditary, but passes back, as it were, through several generations; hence the necessity of looking to the *purity* of a breed. In illustration of this position I quote from Mr. Wilkinson's letter to Sir J. Sebright, wherein we read that, "suppose a number of pure Devon cows to be crossed with a breed of perfectly white bulls, it is probable that some of the calves would be perfectly red, others white, and the greater part would partake of these colours jointly. If we were now to take the red heifers produced by this cross, and put them to a Devon bull, it would not be a matter of any great surprise if some of their progeny, though sprung from red parents, should be perfectly white, and still less that several should be mixed with this colour; though it would not, by any means, be so probable as in the former instance.

And were we thus to proceed through several generations, this white colour would be less and less apparent in the breed, but would most probably occasionally show itself in some individual or other. If, on the other hand, we were to breed from pure Devons only, that is, from those that have been carefully bred for a great length of time, we should reasonably expect their offspring to be of the same colour with the parents themselves."*

It has often been remarked, that wild animals undergo but very slight changes either in form, size, or colour; the reason of this, in many tribes, is obvious. We may take the class to which the deer belong as an example. At the season of rut, when the herds commingle, great contentions take place between the males, by which the larger number of females falls to the most vigorous and healthy males, and a strong progeny is the result. Besides which, many of the weaker animals not unfrequently are carried off by the cold and privations of winter, thus leaving parents of good constitutions, and able to support their young, during the earliest period of their life. In these uncongenial seasons, the robust, however, do not suffer to an extent sufficient to produce permanent injury, as the range they take is extensive, and thus space makes up for the local deficiency of herbage, and exercise overbalances the sedative effects of cold. Many other reasons might be advanced were it necessary: these, however, are sufficient to show that here we have nature's plan of *selection*, which man but imitates in the *care* he bestows in pairing animals to breed together.

There are several singular circumstances connected with this division of our subject, and which may be here mentioned, although their causes cannot now be discussed. To speak of the existence of affection, or of favourable impressions in a female towards a particular male of another variety, but of the same species to which she belongs, being so strong as to influence the form and colour of her offspring, the immediate produce of a different male, appears to be very speculative, if not otherwise objectionable. Love of animals to man is, however, an attribute the possession of which will scarcely be denied to them. We know but little of the affection they have for each other, nor of its bounds or duration, and consequently it is difficult to say whether the facts we shall mention do in reality depend upon it or on the *one* sexual connexion with a favourite male exciting a peculiar development in the still immature ova of the female. The physiologist and the psychologist could each bring forward many well-grounded arguments in favour of his particular view. With these we have not now to do, and therefore we proceed to narrate the cases themselves. The first is as follows:—"The Earl of Morton, being desirous of obtaining a breed between the horse and the quagga, selected a young mare seven-eighths Arabian blood, and a fine male of the latter species, and the produce was a female hybrid. The same mare had afterwards, first a filly and then a colt by a fine black Arabian horse. They both resembled the quagga in the dark line along the back, the stripes across the forehead, and the bars across the legs. In the filly the mane was short, stiff, and upright, like that of

* "Remarks on the Improvement of Cattle, in a Letter to Sir J. S. Sebright," by J. Wilkinson. Nottingham, 1820.

the quagga; in the colt it was long, but so stiff as to arch upwards, and hang clear of the sides of the neck. In other respects they were nearly pure Arabian, as might have been expected from fifteen-sixteenths of Arabian blood."* The second case is analogous, but it occurred in the pig:—"D. Giles, Esq., had a sow of the black and white kind, which was bred from by a boar of the wild breed of a deep chesnut colour: the pigs produced by this intercourse were duly mixed, the colour of the boar being in some very predominant. The sow was afterwards bred from by two of Mr. Western's boars, and in both instances chesnut marks were prevalent in the litter, which in other instances had never presented any appearance of the kind."† The third we shall quote is thus given:—A cow, the property of Mr. Mustard, of Angus, "chanced to come in season while pasturing in a field which was bounded by that of one of his neighbour's, out of which an *ox* jumped, and went with the cow until she was brought home to the bull. The ox was white, with black spots, and horned. Mr. Mustard had not a horned beast in his possession, nor one with any white on it. Nevertheless the produce of the following spring was a black and white calf with horns."‡

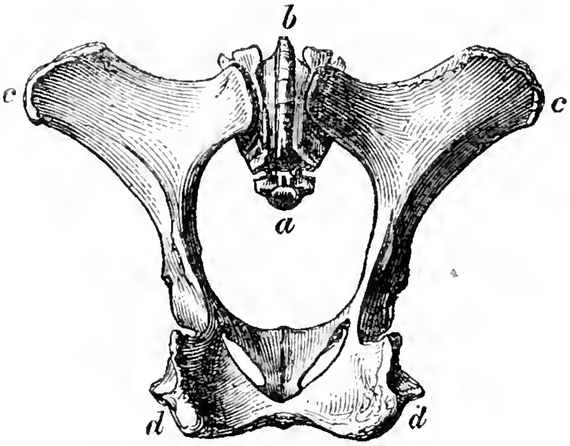
We select one other case, and in another animal, namely, the dog:—"On one occasion when the late Dr. Hugh Smith was travelling in the country, accompanied by a favourite female setter, she became suddenly so enamoured of a mongrel that followed her, that to separate them, he was forced, or rather his anger irritated him, to shoot the mongrel. The image of this sudden favourite, however, still haunted the bitch, and for some weeks after she pined excessively, and obstinately refused intercourse with any other dog. At length she admitted the caresses of a well-bred setter; but when she whelped, the Doctor was mortified with the sight of a litter which he perceived bore evident marks (particularly in colour) of the favoured cur, and they were accordingly destroyed. The same also occurred in all her future puppings: invariably the breed was tainted by the lasting impression made by the mongrel."§ The latter two cases, and many similar ones which might be related, particularly in the dog, would seem to show that mental impressions received at the time of œstrum are of themselves sufficient to stamp the progeny. Be this as it may, each has a practical bearing, which he who looks to the preservation of the purity of a breed will not fail to profit by.

* Bell's British Quadrupeds," page 392.
† "Philosophical Transactions," 1821.
‡ Quarterly Journal of Agriculture," vol. i., Essays, p. 28.
§ Blain's Canine Pathology, 1832.

Before concluding this section of our address, it will be right to allude to the circumstance that accidental varieties, or *lusus naturæ*, may, by care in their selection, form the types of a future progeny. The solidungulous breed of swine, the two digits or toes being united and covered with a hoof similar to that of the horse, is thus accounted for, as is also the ancon or otter breed of sheep.

We proceed to speak of the general structure and functions of the organs of reproduction in the cow and ewe—these are the vagina, uterus, Fallopian tubes, and ovaries, with their several appendages. In an unimpregnated state the uterus is chiefly lodged within the pelvic cavity, but encroaches more or less within the abdomen when in the opposite condition. The cavity of the pelvis is formed by the bones constituting the hips and buttocks (see fig. 1), and it is important to bear in mind

Fig. 1.



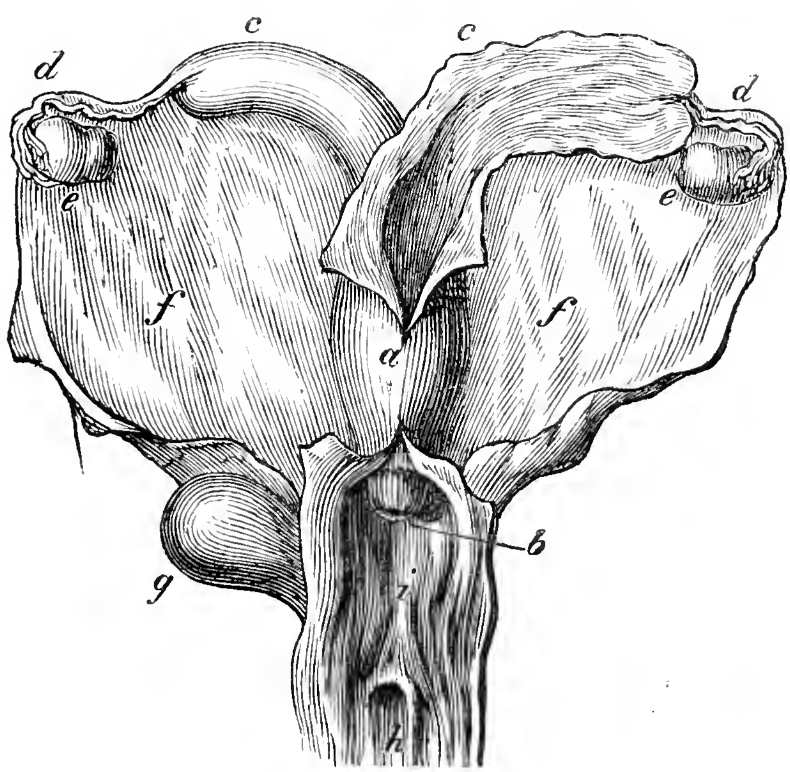
a.—The pelvic cavity.
b.—The sacrum, a continuation of the spine.
c,c.—The projections, called the hips.
d,d.—The bony prominences of the buttocks.

that its size will materially interfere both with the rapidity and safety of parturition. Many an animal is lost from too narrow a pelvis mechanically obstructing delivery. The practical breeder should therefore always remember, that external form is but a type of internal development, and consequently when the hips are narrow, the buttocks compressed together, and the spine drooping, the size of the pelvic cavity must be small, and parturition thereby rendered more dangerous. The annexed woodcut (fig. 1) shows the relative connexion that the bones of the pelvis have to each other, and the way in which they form the opening through which the fœtus passes in delivery.

The vagina, *i* (fig. 2), extends from the external shape, the *labia pudendi*, to the mouth of the womb, *b*; it is placed at the lower part of the pelvis, and has the rectum above it, and receives inferiorily the opening of the urinary bladder, *h*; previous to parturition its walls become flaccid, and its inner surface is bedewed with a mucous secretion to favour the passage of the fœtus. In the act of coition the intromittent organ of the male is placed within the vagina, and is thus brought in contact with the mouth of the womb, by which means the fecundating fluid is conveyed into that organ.

The uterus, or womb, *a*, is held in its situation chiefly by the broad ligaments, *f f*; at its anterior part its coats are continuous with the vagina, and posteriorily it is divided into the two horns, *c c*, which have attached to their extremities the Fallopian tubes, *d d*, and connected with these are the ovaries, *e e*. During the period of gestation the os uteri (mouth of the womb) remains closed; but at the time of parturition it is widely dilated, thus forming a free and open passage from the vagina to the interior of the uterus. The coats of the uterus are three, and are united to each other by areolar tissue: the external or serous coat is smooth and continuous with the lining membrane of the abdomen; it gives support to the viscus, and by its reflections forms the two broad ligaments. The middle or muscular coat varies considerably in strength and thickness, referable to impregnation or non-impregnation; it is thin and comparatively weak in the latter case, and its fibres, which interlace each other in every direction, become greatly increased during gestation. On the muscular coat the expulsion of the fœtus from the uterus in delivery partly depends. The internal or mucous coat has a velvety appearance, and it secretes the menstrual fluid; but its principal use in the lower animals is to form a bond of connexion between the mother and her young ones, by which their vitality is preserved and their development effected. To this we shall hereafter more especially refer.

Fig. 2.



a.—The body of the uterus.
b.—The os uteri.
c,c.—The horns, one of which is laid open.
d,d.—The Fallopian tubes, with their fimbriated extremities.
e,e.—The ovaries.
f,f.—The broad ligaments.
g.—The urinary bladder.
h.—The opening of the bladder.
i.—The vagina cut open to show the passage leading to the bladder and os uteri.

We will now add a few remarks on the causes of œstrum, impregnation, and the development of the fœtus. The term œstrum is employed to designate that condition of the female which shows her fitness and desire for the male. Its early or late appearance is governed by a variety of external circumstances. It is associated with puberty, and passes off on the approach of old age. In some of our improved breeds of cattle, especially when well kept and tended, œstrum comes on very early in life, and in such instances the animal often conceives when she is little more than a year old. These early conceptions, however, too frequently prove injurious, by interfering with the development of the frame of the female, and also by deteriorating the quality of her offspring. Domestication, with its ordinary accompaniments, exerts a considerable stimulating influence on the generative system; thus some animals which in a state of nature produce but one litter a year, will, when domesticated, bring forth several: such are the dog and pig. The immediate cause of œstrum is the existence of fully matured ova within the ovaries of the female; and when these escape, without coition and consequent impregnation, we observe a temporary cessation of the desire until other ova are equally perfected. It follows, therefore, that impregnation can only be effected when the ova are in this condition. The time occupied in the development of the ova differs in different animals, hence the variation we witness in their return to the male. The ordinary symptoms of œstrum in the cow and other animals are too well known to render it necessary to repeat them; and it is sufficient to state that they denote a highly excited state of the system. Impregnation is produced by the fecundating fluid of the male acting on the matured ovum of the female, which action probably takes place in the ovarium. Physiologists are acquainted with many phenomena which illustrate this. The way in which the male or seminal fluid finds it course through the Fallopian tube to the ovarium, is disputed. Its conveyance, however, is generally believed to be effected through the agency of moving filaments, called spermatozoa, with which it abounds. Hence it is all important that the Fallopian tubes should be pervious, or impregnation cannot take place. If their passage be obliterated, as we have often proved by the experiment of passing a ligature around them, the animal is as effectually rendered non-productive as if the whole parts had been taken away. The above facts explain how it is that, in the ordinary operation of spaying, the simple removal of the ovaries, leaving *in situ* the uterus with its horns and Fallopian tubes, destroys the desire as well as the power of conception, and when by accident or otherwise the operator leaves behind an ovarium, all the other parts being cut away, the animal returns to the male, notwithstanding she is sterile.

The impregnated ovum when it bursts and escapes from its ova-sac is seized or entangled by the fimbriated edge of the Fallopian tube, and subsequently conducted into the uterus, where it excites that extraordinary action which leads to the formation of a new creature in every essential particular like its parent. Should the ovum not be caught by the fimbria, it falls into the cavity of the abdomen, but is not necessarily destroyed, as even here, although out of its proper matrix, it sets up an analogous action to that which otherwise would have been produced within the uterus. Thus we have explained the formation of those extra-uterine fœtuses, which are occasionally met with both in human and veterinary practice.

Without describing the earliest stages of the formation of the fœtus from the impregnated ovum, it will be sufficient to remark that in the descent of the ovum into the uterus it receives a coating of effused fibrin, which forms the membrane termed the corium, by which the fœtus is attached to the inner surface of the womb, and obtains from the mother the materials necessary for its vitality and growth. The outer surface of the corium (see *Plate*) is thickly studded in the cow and ewe with shaggy projections, *c*, named cotyledons, and these are fitted into corresponding concavities, *b*, in the membrane lining the womb, the *tunica decidua uteri*, thus forming the bond of connexion we have spoken of. The tufts of the corium contain the ramification of the fœtal vessels, and the concavities of the *tunica decidua uteri* the enlarged and elongated branches of the uterine arteries of the mother: thus by the two sets of vessels lying in contact, the blood of the fœtus is purified and reinvigorated, as the maternal blood is more highly oxygenated than that of the fœtus. The change which is effected is a chemical one, and analogous to that taking place in the lungs of an animal after birth; the cotyledons may also be compared to the stomach, or rather to the digestive and assimilative organs of a perfect animal. Thus it will be seen that although there is no direct communication between the vessels of the mother and those of the fœtus, yet every requisite for its life and growth is provided for.

Besides the corium, there are two other membranes to be noticed as belonging to the fœtus, the amnion, *g*, and the allantoid, *e*. The amnion immediately surrounds the body of the fœtus, and secretes a fluid, the *liquor amnii*, in which it floats, and by which it is protected from those injuries which might otherwise destroy its life: it being a property of fluids to diffuse and modify the force of a blow. The liquor amnii, with its investing membrane, is also made to serve a no less important office, that of being protruded into the mouth of the womb at the commencement of parturition, thus acting as a hydrostatic dilator.

The allantoid membrane is situated between the amnion and corium, where it forms a sac to receive the urinary secretion of the fœtus: it is of large size in the lower animals, and its dimensions increase with the growth of the fœtus, a phenomon which is not observed in the human subject. The allantoid sac has a direct communication with the true urinary bladder by means of the lrachus (see Plate, *f*). The umbilical cord, *h*, is composed of this tube, the urachus, and the arteries, *i*, which convey the impure blood out of the body of the fœtus to the cotyledons, and the veins, *j*, which return it after having been re-oxygenated in the manner previously alluded to. It will be evident from the foregoing remarks, that a due provision is made for an equal distribution of this pure blood through the body of the fœtus, so that every part of the frame may be built up at the same time; consequently we meet with vessels in the fœtus that are not needed after birth. To enter more fully into this interesting and instructive subject, would be to encroach on the practical part of our lecture, and therefore I proceed to speak of the symptoms of pregnancy and the period of utero-gestation.

Explanation of the Plate.

a.—The interior of the uterus, studded with, *b*, the maternal portions of the cotyledons.

c.—The outer surface of the corium, with the tufts of the fœtal vessels, some of which are seen in union with the maternal portions of the cotyledons.

d.—The inner surface of the corium.

e.—The allantoid membrane, which forms a receptacle for the urinary secretion of the fœtus.

f—The urachus, or passage through which the urine is conveyed to the allantoid sac.

g—The amnion, the membrane which envelops the fœtus, and secretes the fluid in which it floats.

h.—The umbilical cord, showing, *i*, the arteries conveying the impure blood to the cotyledons, and *j*, the veins returning it after its purification.

The first and most striking indication of impregnation is the cessation of œstrum, the animal not returning to the male at the usual period, or refusing his overtures when introduced to him. With this is associated a general quietude of the system and a tendency to accumulate flesh, and in some animals, as the mare, a sluggishness while at work. Shortly afterwards the abdomen is found to increase in size, the loins to droop, and the muscles of the croup to be less prominent. The *labia pudendi* are swollen and flaccid, a blush of redness pervades these parts, extending into the vagina, from which an augmented quantity of mucus is discharged. The abdomen gradually gets larger and larger, and has a peculiar round appearance at its lower portion, with a falling in immediately beneath the bones of the loins. As the period of labour approaches, the mammary gland enlarges, the secretion of colostrum takes place within its follicles and the teats are hot and full. When delivery is about to be effected, the animal becomes restless, often lies down, strains rises again, changes her position, looks to her flanks, and carries the tail higher than natural, &c.

As I shall have again to allude to these indications, I pass on to remark on the means taken to satisfy ourselves that a fœtus does exist within the uterus. During the earliest periods of gestation the question of pregnancy is a most difficult one to decide, but subsequently that which was ambiguous becomes clear, and we are then enabled to make a correct diagnosis. As the fœtus is early located within the womb, so we shall find that, in such animals as will admit of the hand being passed up the rectum, we can detect its presence in the form of a small, roundish, and slightly moveable body situated below and without the intestine. The hand being quietly kept in this situation, and pressed upon the enlargement, will occasionally recognise voluntary movements in the living embryo. Some persons prefer to introduce the hand into the vagina, and carry it to the os uteri so as to ascertain its condition; for, as I have elsewhere observed, the mouth of the womb is closely shut during gestation, and we also find at this time that it contains a layer of thick albuminous matter. There are serious objections to this latter proceeding, for when the manipulations are most carefully performed abortion will not unfrequently result. Percussion over the uterine region is also of great assistance; and auscultation has its advocates, who inform us that the ear placed in contact with the abdomen of an impregnated animal, and moved gently from spot to spot, will often detect the sound of the fœtal heart. We confess, however, that we have not succeeded to our satisfaction, although we have made very many investigations of this kind. With reference to percussion, all are practically acquainted with the manner in which this is adopted, and the side of the cow, viz. the right, is selected. The inclination of the impregnated uterus to the right side depends upon the rumen being situated in the left division of the abdomen. In the still more advanced periods of gestation, fœtal movements can be seen while standing by the side of an animal; and as these are often found to be both stronger and quicker in the mare after drinking a full quantity of cold water, grooms and stablemen have frequent recourse to this plan; to which, however, we object, as spasms of the intestines and death have occasionally been produced by it.

The period of utero-gestation, or length of time that the fœtus is detained in the uterus, depends upon several causes, and differs in nearly every variety of animal unless belonging to the same tribe or family. The average period that the mare carries her young may be stated as being near to *forty-eight weeks*, the cow *forty*, the ewe *twenty-two*, the bitch *nine*, and the sow *sixteen weeks*. It certainly is a fact, and one which shows the mighty power of the all-wise Creator, that, in animals placed so high in the scale of organised beings as the canine race, full and perfect development of their young should be effected in the short space of sixty-three days.

If, however, we descend the scale, we shall find that this is comparatively a long period to be occupied in the perfecting of the offspring of the lower animals.

The late and much lamented Earl Spencer has recorded in the pages of your Journal* his observations on the duration of gestation in no less than 764 cows; and we are much gratified in being able to say that he has thereby rendered most efficient aid to science, as well as considerable service to the practical breeders of cattle. I refer to the table accompanying the paper for full details, but I shall nevertheless make an extract or two in consequence of the important bearing these statements have on this part of our subject:—"From the inspection of this table," his Lordship says, "it will be seen that the shortest period of gestation, when a live calf was produced, was 220 days. Any calf produced at an earlier period than 260 days must be considered decidedly premature, and any period of gestation exceeding 300 days must also be considered irregular, but in this latter case the health of the produce is not affected. It will also be seen that 314 cows calved before the 284th day, and 310 calved after the 285th; so that the probable period of gestation ought to be considered 284 or 285 days, and not 270, as stated in the book upon Cattle, published under the superintendence of the Society for the Diffusion of Useful Knowledge."

The facts here mentioned with reference to the great differences in the time of gestation cannot, even in the present advanced state of science, be satisfactorily accounted for. Dr. Carpenter, writing on the same subject, remarks that "the average length of time that elapses between conception and parturition in the human female appears to be 280 days or 40 weeks. There can be little doubt, however, that gestation may be occasionally prolonged for one, two, or even three weeks beyond that period; such prolongation not being at all unfrequent among the lower animals, and numerous well authenticated instances of it, in the human female, being on record. Upon what circumstances this departure from the usual rule is dependent has not yet been ascertained; but it is a remarkable circumstance, ascertained by the observations of cattle breeders, that the *male* has an influence upon the length of gestation—a large proportion of cows in calf to certain bulls exceeding the usual period, and a small proportion falling short of it. Hence we must attribute the prolongation of the period to some peculiarity in the embryo, derived from its male parent."† Alluding to the opinion which is also entertained with respect to the sex of the fœtus influencing the time of gestation, Earl Spencer observes, "there is a prevalent belief among farming men, and I believe farmers, that when the time of gestation of a cow is longer than usual, the produce is generally a male calf. I must confess that I did not believe this to be the case, but this table shows that there is some foundation for the opinion. In order fairly to try this, the cows who calved before the 260th day, and those who calved after the 300th, ought to be omitted as being anomalous cases, as well as the cases in which twins were produced; and it will then appear that, from the cows whose period of gestation did not exceed 286 days, the number of cow-calves produced was 233, and the number of bull-calves was 234: while from those whose period exceeded 286 days, the number of cow-calves was only 90, while the number of bull-calves was 152." This places the matter in so clear a light that it is unnecessary to add another word, and therefore I shall pass on to the last division of this lecture, namely, natural and preternatural parturition.

Labour, although perfectly natural, may occupy some time, or be rapidly effected; we observe a considerable difference in this respect among the different animals which man by domestication has rendered subservient to his use. Delivery under ordinary circumstances is quick in the mare, the birth of the foal rarely occupying more than a few minutes; in the cow half an hour may be regarded as about the average time after labour-pains show themselves; while in the ewe it not unfrequently happens that several hours will be spent in labour. I will here advert to a table in which I have attempted a classification of labours. showing the several varieties met with in practice.

CLASSIFICATION OF PARTURITION.

Division.	Variety.
Natural	Quick. Lingering. Twin.
Preternatural	Lusus Naturæ. Every kind of Malpresentation.
Premature ..	Ditto ditto.
Protracted ..	Mechanical Impediments. Imperfect Throes.
Impractical..	Maternal Defects.
Instrumental.	Destructive, or not, of the Fœtus.
Complicated .	Uterine Dropsy, Hæmorrhage, Rupture. Inverted Vagina, Bladder, Rectum. Ruptured do. do. do. Scirrhous Os Uteri, Lacerated Vulva. &c. &c. &c.

Before describing *preternatural labour* arising from false presentations, I must speak of *natural* delivery and the way in which it is accomplished. The symptoms denoting the approach of parturition

* Vol. i., p. 165, *et seq.*
† Carpenter's "Manual of Physiology," p. 478.

have been before described, namely restlessness, frequent change of position, lying down, quick rising, straining, &c.; these all indicate an excited state of the system accompanied with pain; this pain is not, however, of the ordinary character, but early becomes propulsive or bearing down, and also intermittent. It is important to distinguish between *straining* and the *true propulsive pains* of parturition; the former not unfrequently depends on the dilatation of the os uteri, and this, in many cases, precedes labour for some days. The dilatation of the mouth of the womb is often associated with great pain, and this is apparently proportionate to the freedom with which it expands. Proprietors of stock should not be in too great a hurry with their animals at the time of parturition, although they may express much uneasiness by continued *straining*. I have known many cases where valuable animals have been lost in consequence of impatience on the part of the owner in seeking too soon to give assistance. I have also frequently seen cases where the symptoms of approaching parturition have disappeared, and not returned for two or three days. A careful examination *per vaginam* may be made under these circumstances, and should the mouth of the womb be found only partially dilated, the case must be left to nature's efforts, when all will generally end well. I should state, however, that in *extreme* cases of this description an ounce dose of tinct. opii administered to a cow, and followed by an ordinary aperient, will be productive of much benefit.

The act of parturition, by which the fœtus is expelled from the uterus, is in part effected by the contractility of the muscular coat of the womb, and in part by the energetic action of the abdominal muscles. The cause of this contraction taking place at the expiration of a given time cannot be satisfactorily explained: it does not arise from the full development of the fœtus, nor its capability of living, comparatively, independent of its parent; if so, neither abortion nor premature labour would occur. Nor can the length of gestation be said to depend on the mere life of the fœtus, for then a dead fœtus would be cast off immediately, no matter what might be the stage of gestation; whereas daily instances are met with where a dead fœtus is retained the full time.

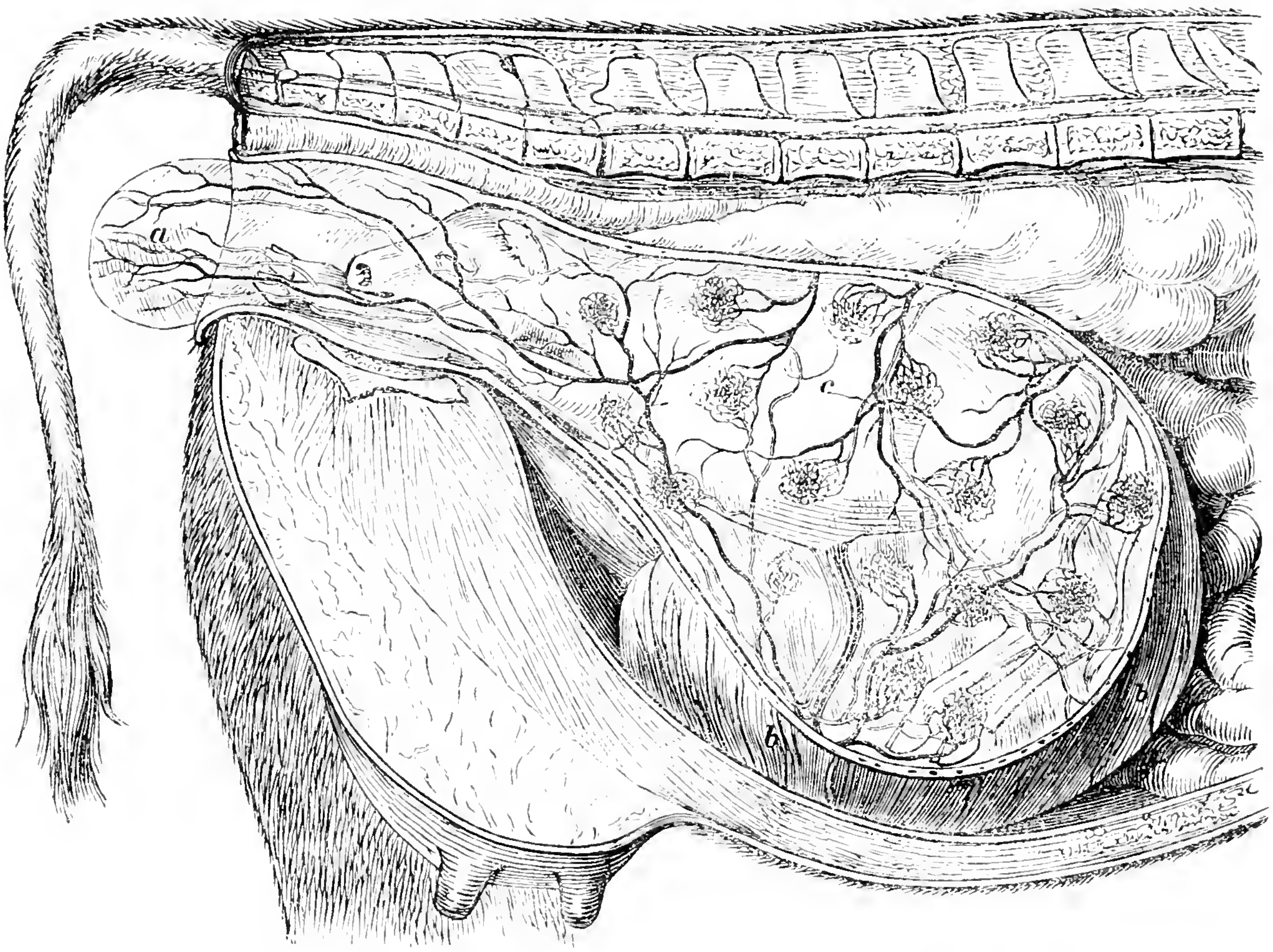
The mouth of the womb being freely dilated, and everything prepared for the birth of the young, the simultaneous and repeated contractions of the uterus and abdominal muscles propel the fœtus, covered by its membranes, first towards and next into the vagina. This advance is assisted by its position, and also by the pushing forwards of the liquor amnii. This fluid, contained within its proper membrane, first appears at the "shape;" and is commonly designated "the water bladder;" as soon as it bursts, the propulsive action of the uterus is brought to bear immediately on the body of the fœtus, by which it is ultimately expelled. In fig. 3 we have a view of the calf placed in the natural position and covered by the amnion, which, with its contained fluid, is protruding from the shape: the sketch will materially assist the description I have given.

With the birth of the young the mother experiences an immediate relief, but labour is not considered to be completed until the membranes have also been cast off. This is effected by a more gradual and far less painful action of the uterus, which first detaches the cotyledons from their numerous connexions, and then ejects the membranes by an augmentation of the propulsive power. After this the womb contracts with some force upon itself, and thus effectually compresses the mouths of the uterine vessels and stays the escape of blood.

It is not always that delivery is accomplished with the facility I have described, although the presentation is perfectly natural: delay may arise from a disproportion between the size of the fœtus and its dam, when force will be necessary to assist the expulsive throes. This assistance ought only to be rendered during the continuance of each *alternate* pain: by a steady adherence to this rule considerable resistence may be overcome, and the life of both the mother and her young preserved. We can call to mind one case in particular, where we succeeded to our perfect satisfaction in removing from a small Suffolk cow a calf, which weighed, when taken away, no less than 8 stone; (14 lbs. to the stone). Upwards of two hours were occupied in the act; nevertheless we had the gratification of being instrumental in saving both the parent and her offspring.

Protracted labour in a natural presentation may result from congenital disease of the fœtus; that which is most commonly met with is dropsy of the abdomen, and this is depicted in the annexed sketch. Under these circumstances no advance can be made by the application of a proper amount of force, and the life of the fœtus should at once be sacrificed. To effect the necessary reduction in the size of the body by giving an exit to the fluid, a trocar of sufficient length should be thrust through the chest into the abdomen (as represented in the sketch), and the stilet withdrawn, when the pressure which is brought to bear on the fœtus, by the traction employed, together with the labour-pains of the mother, will be sufficient to forcibly drive the fluid through the sheath of the instrument, thus reducing the enlarged abdomen and facilitating delivery. Several years ago I was called to a mare in labour, where the obstruction to its progress de-

Fig. 3.



a.—The water bladder. *c.*—The fœtus inclosed within the Amnion.
b, b.—The uterus.

pended on the accumulation of a large quantity of urine within the bladder of the fœtus, from a congenital closure of the urachus; the case cost me a great deal of labour and anxiety; the mare, however, did well; and I make mention of the circumstance for the purpose of stating that I was led to the subsequent employment of this instrument from the difficulty I then experienced. The particulars of the case are given at length in the 'Transactions of the Veterinary Medical Association for 1841-2.'

Among other causes of LINGERING LABOUR from congenital disease, and where the presentation is natural, is an accumulation of fluid within the cranial cavity, designated *water on the brain*. In such instances the body of the fœtus is unusually small, so that we have little to apprehend if we can succeed in reducing the size of the head. Having satisfied ourselves by an examination of the real condition of the parts, let the fore-legs be returned into the body of the uterus (*represented in fig.* 5), thus making more room in the vaginal passage for our further manipulations. Then place a hook attached to the end of a cord within the orbit, draw firmly at this with the left hand, so as to fix the head against the brim of the pelvis below, and the sacrum above. Introduce with the right hand an instrument called a perforator, thrust its point through the bones of the head, and split them asunder by compressing the handles of the instrument; an exit will thus be given to the fluid, and the bones will consequently now yield sufficiently to allow the fœtus to pass through the pelvic cavity. Prior to attempting delivery it is, however, necessary to re-adjust the legs by bringing one after the other into the vagina, when moderate traction alone will be needed to remove the fœtus; the force being applied in this, as in every other case, only during the maternal efforts to unburden the uterus.

Among the varieties of natural delivery we may name TWIN-LABOUR, although it rarely happens that both fœtuses are presented with the head and fore-legs advancing; one being thus placed, and the other in the reverse position. It is, however, in but few instances that the veterinary accoucher is required when parturition is delayed, simply in consequence of twins: the young are generally of small size, and the one which lies in the natural position is first expelled, thus bringing the parts

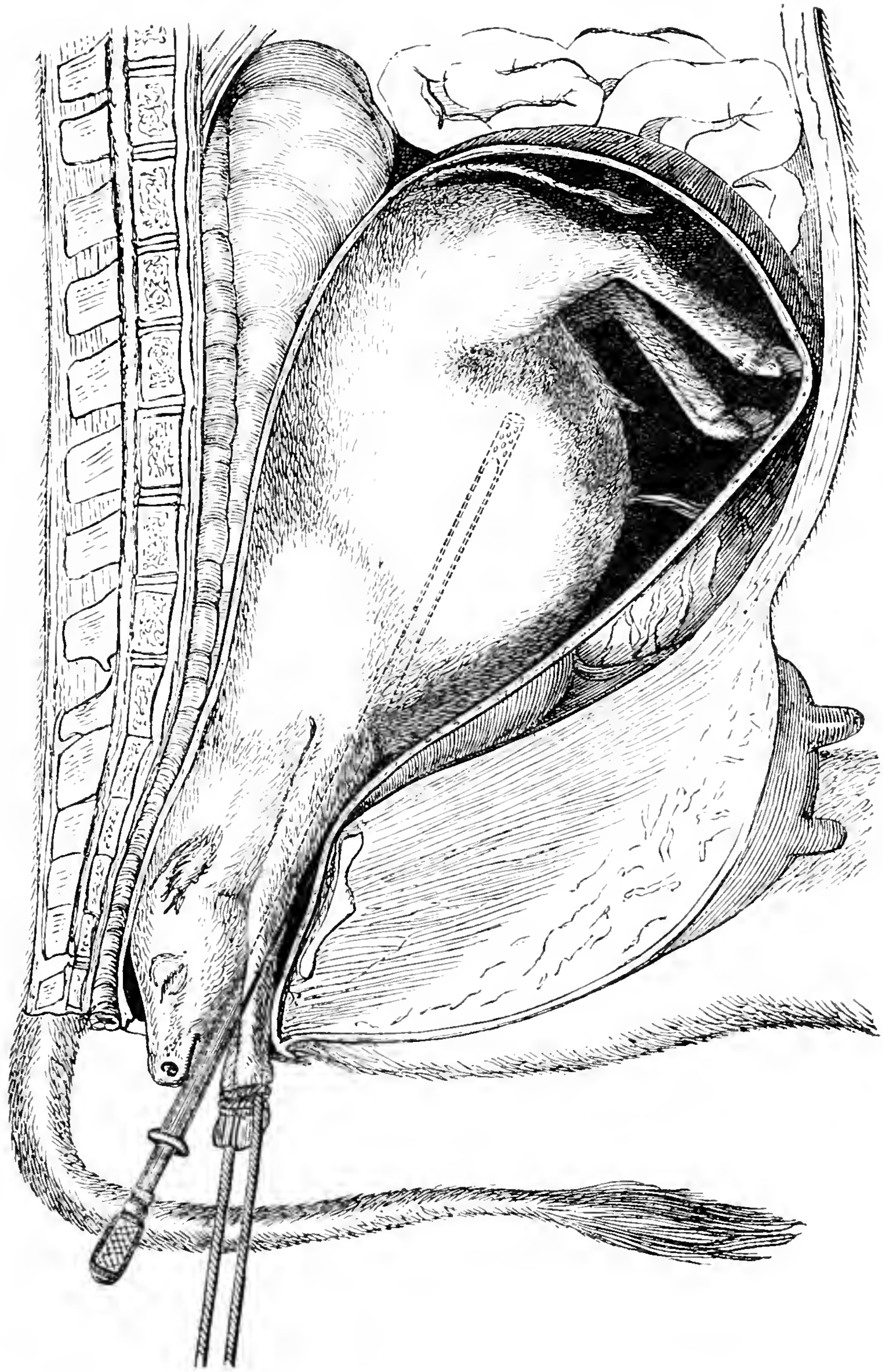


Fig. 4.

into a fit condition to favour the birth of the other. And here I would remark that neither the veterinary practitioner nor the farmer should ever leave a case of parturition in which his services had been required, without a manual exploration of the uterus to satisfy himself that another fœtus was not present.

I pass on to consider some of the principal forms of PRETERNATURAL PARTURITION; and the first to which I shall allude is the one depicted in fig. 6. It will here be observed that the two fore-legs have passed through the mouth of the uterus into the vaginal passage, while the head is turned back and lies in contact with the side of the young animal. This presentation is of common occurrence, and may be regarded as a mere alteration of the natural position, arising from the circumstance that, when the head reached the pelvis, instead of its passing onwards in a straight direction, it became turned a little aside, and the repeated throes of the mother acting on the hinder part of the body of the fœtus, forced it into the position here represented. The difficulty of adjusting the fœtus, and effecting delivery, will be proportionate to the distance the

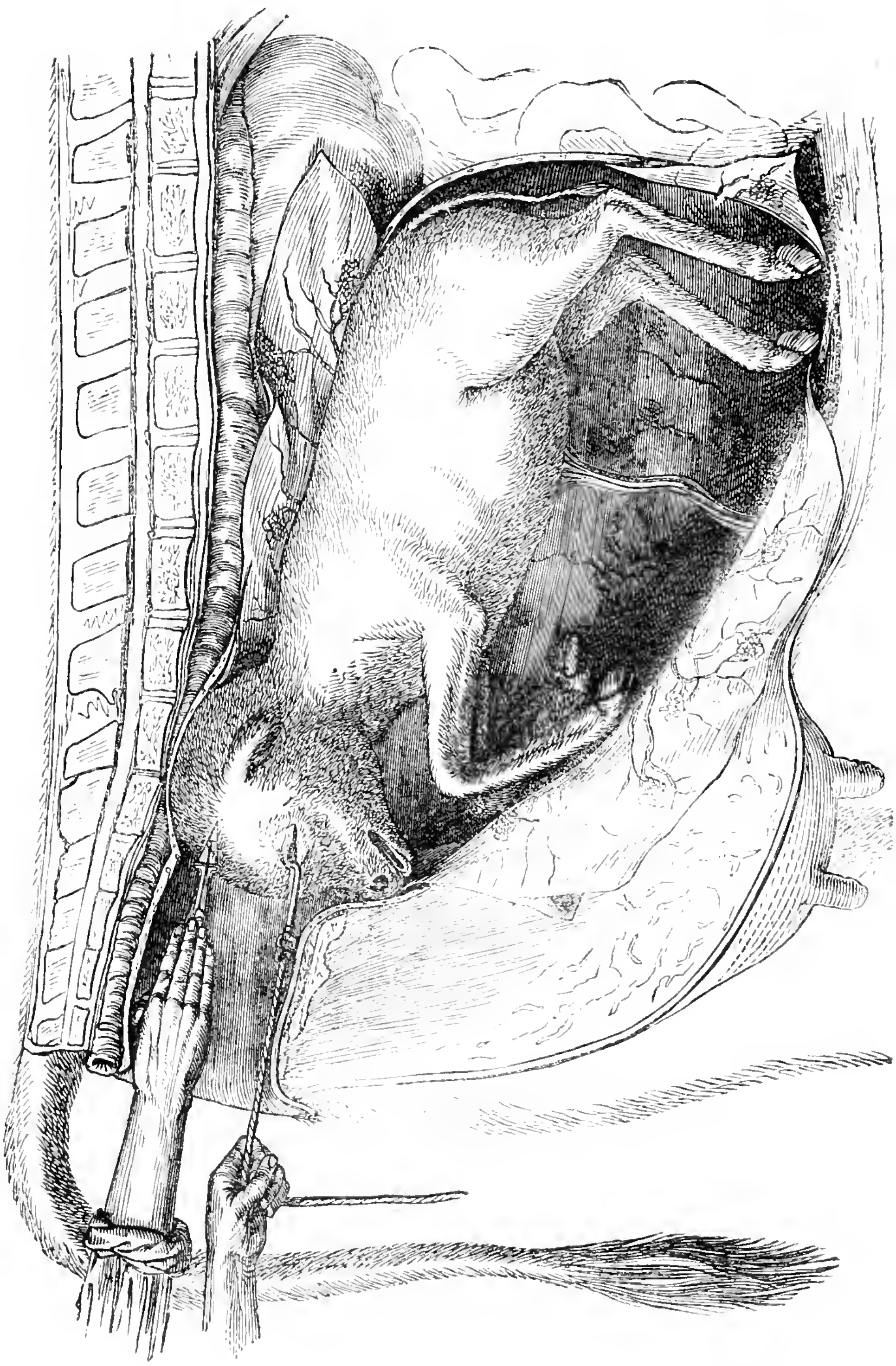
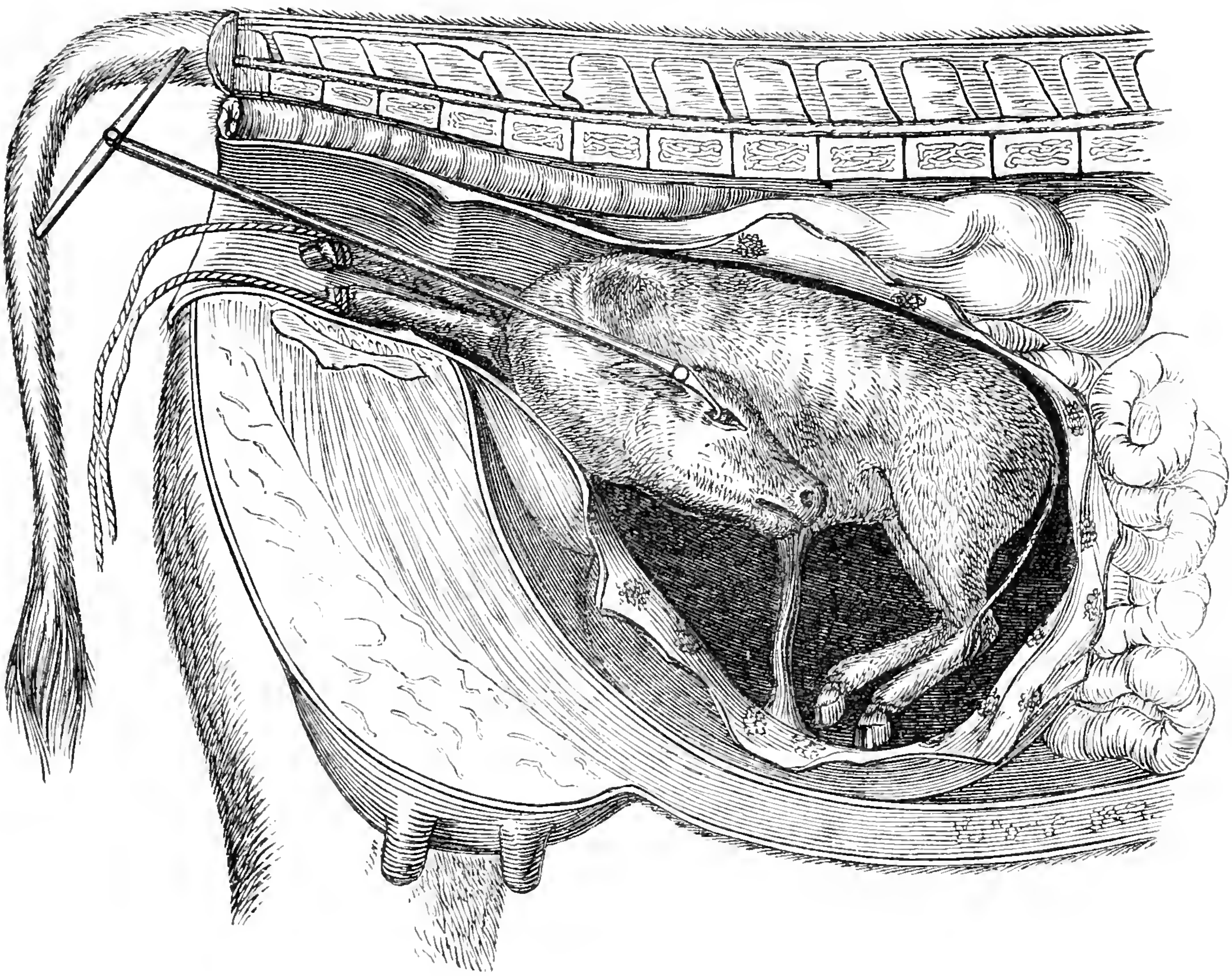


Fig. 5.

head is placed backwards. In some cases it will be found within our grasp, while in others we can only succeed, after repeated efforts have been made to reach the ear or the orbit. Under either circumstance we are first to secure the fore-legs, by passing around each, directly below the fetlocks, a cord having a running noose; they are then to be returned into the body of the uterus; after which pressure is to be made upon the curved side of the neck or chest, depending on the position of the head, which pressure must resist the propulsive efforts of the mother, when it will be found that the neck will be thus straightened and the head consequently brought nearer to the pelvic opening. We should remark, that in this presentation the fœtus is often found dead, and therefore we may venture to adopt those means which otherwise we should not have recourse to. In extreme cases, however, of this description, the preservation of the life of the mother is of the first consideration, and we must not hesitate to use instruments to facilitate our manipulations. A hook attached by a hinge-joint to a steel rod, and which has at the other end a cross-handle, removable at pleasure, is

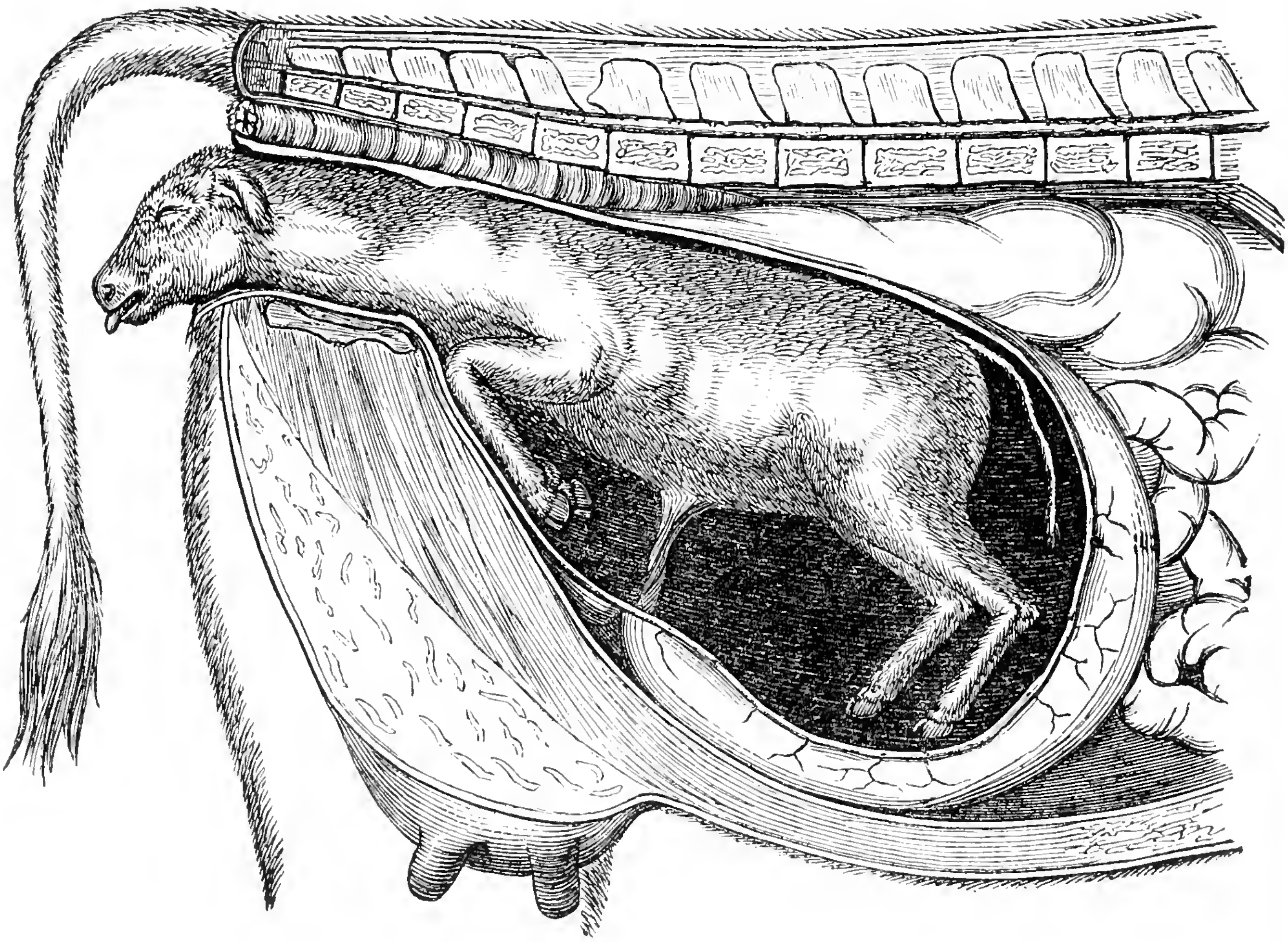
FIG. 6.



the most useful instrument which can be employed. The operator, taking the hook in his hand and carrying it towards the orbit, directs his assistant to advance or draw it backwards, as he may find it necessary, so as to aid his efforts to place it within the orbit. After having adjusted the head, the legs by means of the cords are to be brought up, and delivery accomplished in the usual manner.

The *second form* of false presentation that I shall descripe is shown in the annexed sketch, fig. 7. It will here be seen that the head of the calf is protruding from the labia; in other words, it is born while the fore-legs and the rest of the body of the animal still occupy the vagina and uterus. The first remark to make is, that at the commencement of labour this was a presentation of the head within the vaginal passage, unaccompanied with the simultaneous advance of the legs—a condition of things of not unfrequent occurrence. Occasionally it will happen in this presentation, when the pelvis is large and the parturient pains very strong, that the head will be forced out; but far more frequently, its being born depends on the misapplied efforts of those who are called to give assistance to the cow. Farmers and others are too apt to imagine, when an examination proves the head of the fœtus to be located in the vagina, that by applying force and bringing it through, delivery will be effected; but it should be always remembered that in mares and cows, and even in ewes unless the lamb is very small and the pelvis of the ewe of full dimensions, it is impossible for this to be done. In a head presentation the operator should first place a cord, with a running loop, on the lower jaw of the fœtus, next exercise force sufficient to return it into the uterus; afterwards adjust the legs, then bring up the head by drawing at the cord on the jaw, and proceed to deliver. Should he be called to a case like the one figured, no attempts to return the head, or to draw away the fœtus, as I have before stated, ought to be made, as these will be altogether futile. The fœtus must at once be sacrificed, that the life of the mother may be saved. Let an incision be made through the skin from the pole to the muzzle, and another from the gullet to the end of the lower lip; dissect the skin on either side from off the head, so as to unite the upper and lower cuts, and then detach the skull from the trunk at the occipi-

FIG. 7.

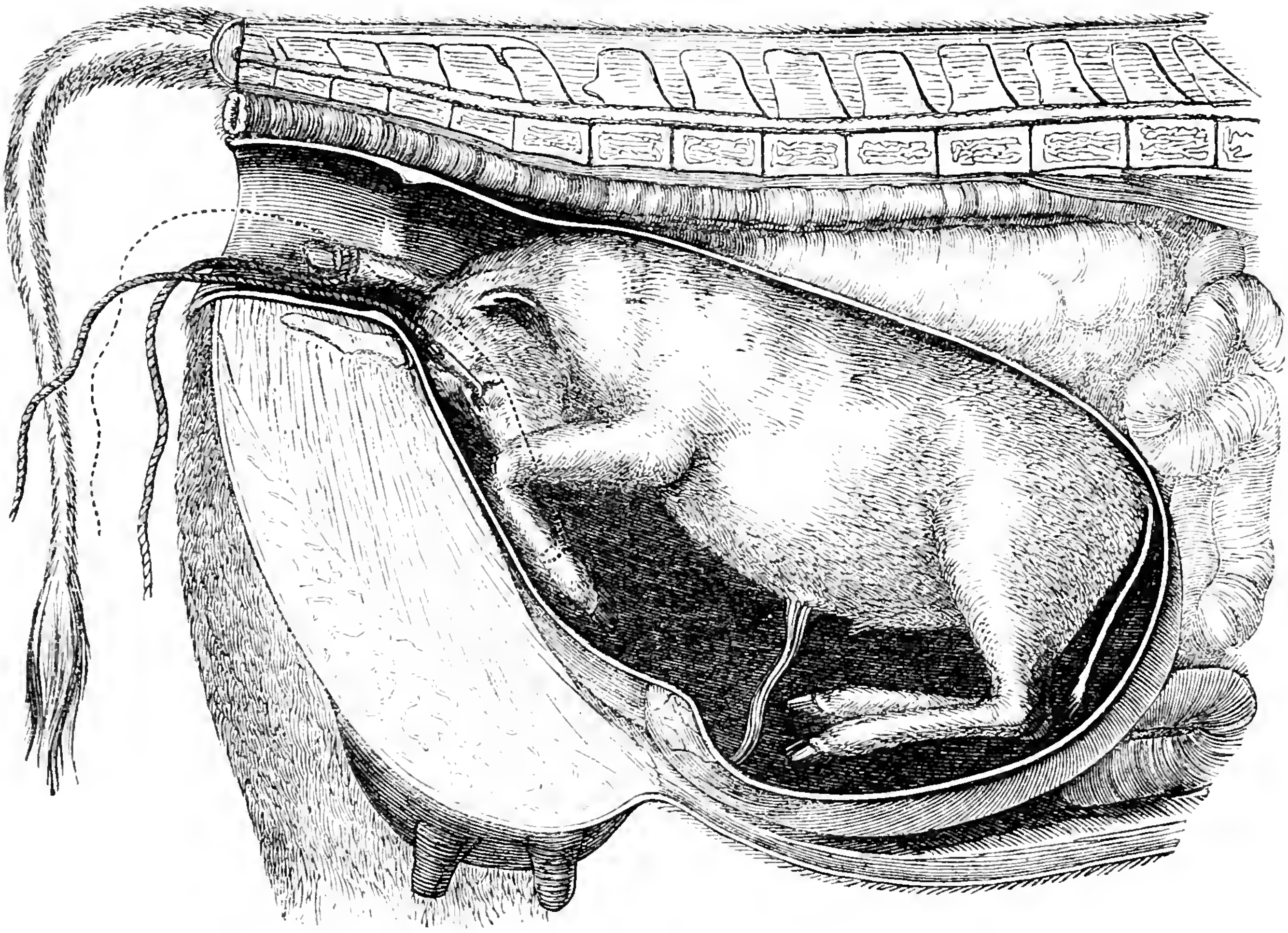


tal joint. Having done this, attach a cord to the incised skin, and put back the neck into the womb; feel for and place in their proper position the fore-legs, then bring up the neck and deliver.

The *third kind* I shall mention is represented in fig. 8. In this instance one of the fore-feet protrudes through the os uteri, while the other foot and the head are still in the body of the womb—the latter being curved downwards and pressing on the brim of the pelvis. We have here an occipital and foot presentation, but which is not very difficult to overcome unless the labour pains are very powerful. The first step to be taken is to secure the fore-foot in the manner described in the preceding cases, and the next to fasten a hook to one of the orbits. The hand is then to be re-introduced and carried towards the chest, following the direction of the protruding limb, and sufficient force employed to drive the fœtus backwards; this being accomplished, the hand is to be shifted to the upper part of the neck immediately behind the occiput, when moderate pressure being here made, it will be effective in straightening the head and neck. When the operator has thus far succeeded, his assistant is to draw the cord attached to the head *moderately* tight to prevent it again bending downwards. Another cord is now to be carried in and made fast to the other leg, as shown by the dotted line in the sketch. The legs are then to be alternately brought forwards, and by simultaneously drawing at them and the head the fœtus will be extracted.

The *fourth variety* I select for explanation is shown in fig. 9. In this instance the calf is lying on its back in the womb, with the legs turned towards the spinal column of the cow. Labour here is usually of long duration, and various expedients are adopted by practitioners to adjust the fœtus prior to the employment of traction to remove it; but in most cases I have proceeded as follows:—First a cord has been placed on the lower jaw to secure the head, so that at will it might be brought forward. Next, similar cords have been fastened on each fore-leg; the one attached to the leg represented in the fore-ground running on the outer side of the other limb, marked *a* in the sketch. An assistant has then been directed to draw *tightly* at this, so as to facilitate our endeavours to turn the

FIG. 8.



fœtus on its side, by placing the hand near the withers, as represented in the sketch. This being effected, the legs are brought into the vagina, and then the head; these additional manipulations will cause the fœtus to turn, as it were, upon itself, when it may be safely extracted.

One of the most difficult forms to deal with, and which invariably costs the practitioner considerable labour and anxiety, is that represented in fig. 10. Here we observe that the fœtus is lying with its head towards the chest of the cow, having the hinder parts pressed against the brim of the pelvis, and the hind legs placed under the body, so that on introducing the hand we can only feel the breech. We have here to reverse the position of the hind legs and bring them into the vaginal passage, as delineated in fig. 11, or delivery will be impossible. The great difficulty in doing this arises from the little command we have over the parts from our inability to grasp the hind legs; consequently many years since I was led to construct a simple instrument to enable the practitioner to surmount this difficulty. The instrument, which is sketched in fig. 10, consists of a curved piece of steel having an aperture at one end, to which a small cord is attached, at the other a female screw is placed, which admits of its junction to a whalebone staff, and between the two another opening exists, into which is inserted a stronger cord.

Taking the staff with the two cords in his hand the operator is to pass the instrument between the thighs of the calf, and push it in front of the stifle-joint, and then with a turn of the wrist to direct the small cord outwards. An assistant holding the instrument, the hand of the accoucheur is now to be introduced and directed to the front part of the stifle-joint, when the cord can be readily grasped and brought out; thus the limb will be embraced between the two cords. The whalebone staff is then to be detached, and the smaller cord to be run through a noose at the free end of the larger one, when, by drawing the smaller cord, the curved part of the instrument will travel round the limb, bringing with it the larger cord, and thus a looped ligature will be placed upon the leg above the hock. The like proceeding is to be adopted with the other leg. The operator is next to push the body of the fœtus forwards by either placing his hand against the breech, or employing for the purpose an instrument similar to an ordinary crutch; by these efforts

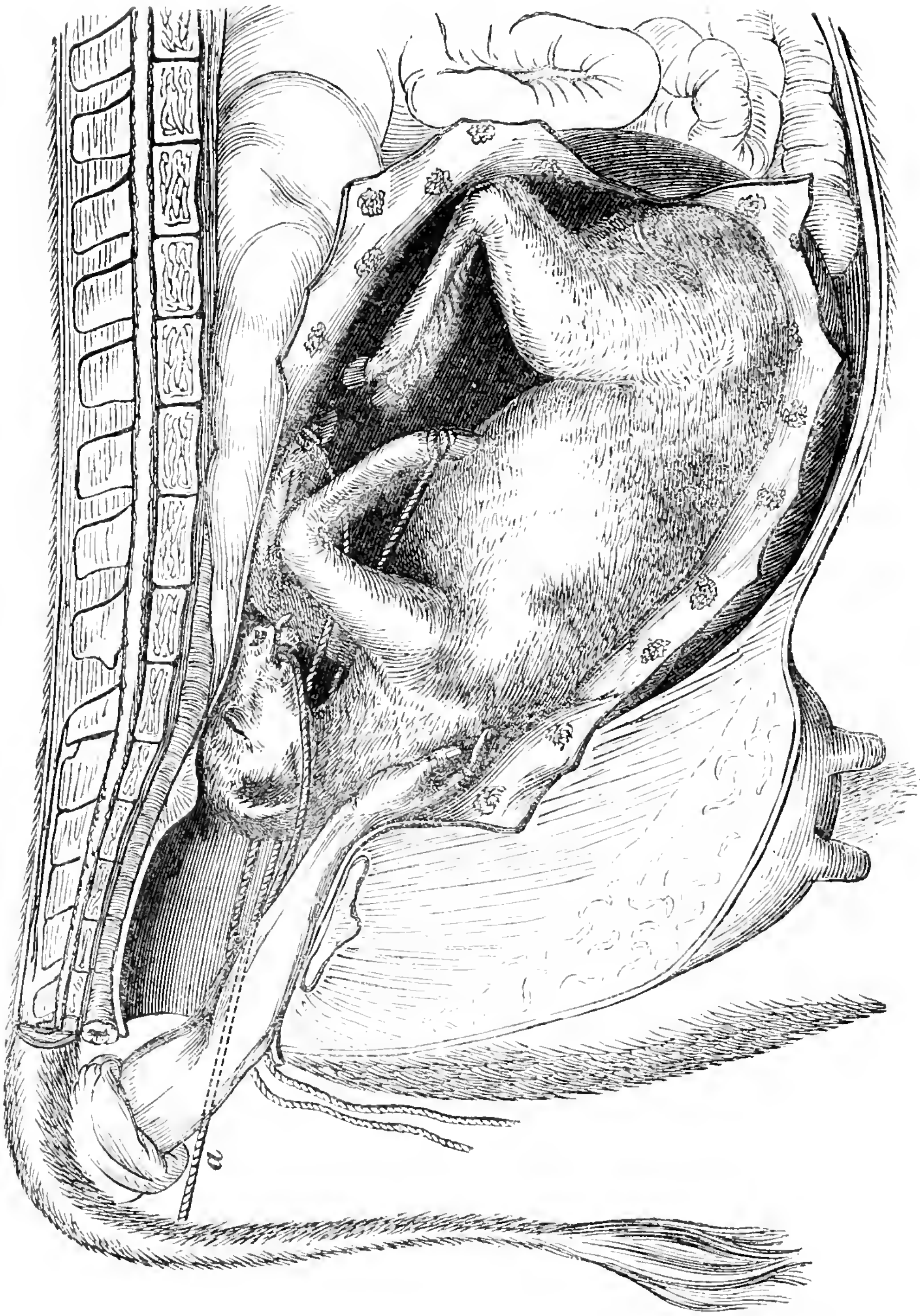


Fig. 9.

he will succeed in flexing the hock-joints and be enabled to pass the loops downwards to the fetlocks. Having accomplished this, a careful manipulation will allow of his bringing up the feet towards the os uteri, and ultimately so to turn the legs as to place them in position of fig. 11; after which, ordinary traction during each throe will enable him to effect delivery with safety both to the and mother and the young.

The above constitute the principal varieties of preternatural presentations; there are, however, some modifications of each, but these will not require from me a further explanation. The rules I have laid down are applicable as general principles, and can be adapted to each particular case.

Besides the methods of extraction which I have spoken of, it will sometimes be necessary, from the great size of the fœtus and other causes, to have recourse to *embryotomy*, or the dissection of the fœtus. In a lecture of this kind it is not to be expected that we can describe this process, which must necessarily differ in almost every instance, and ought never to be undertaken by any but those who have made this subject their especial study. One rule, and only one, I will mention, and that is never to remove a limb *before having dissected back the skin*, so that the various instruments employed may be attached to it, thus securing all the advantages of the limb to exercise traction upon without having the disadvantage of its size.

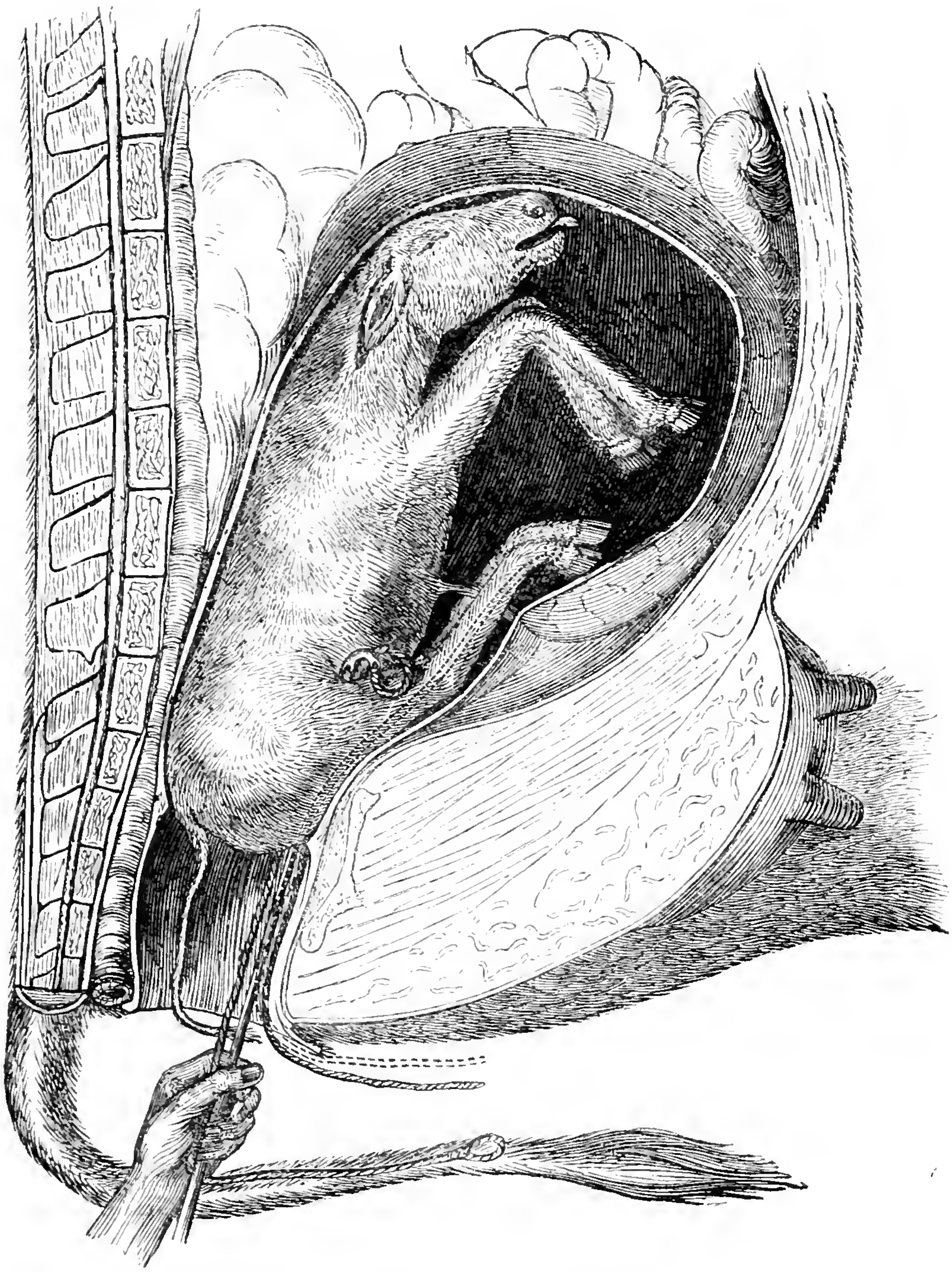


Fig. 10.

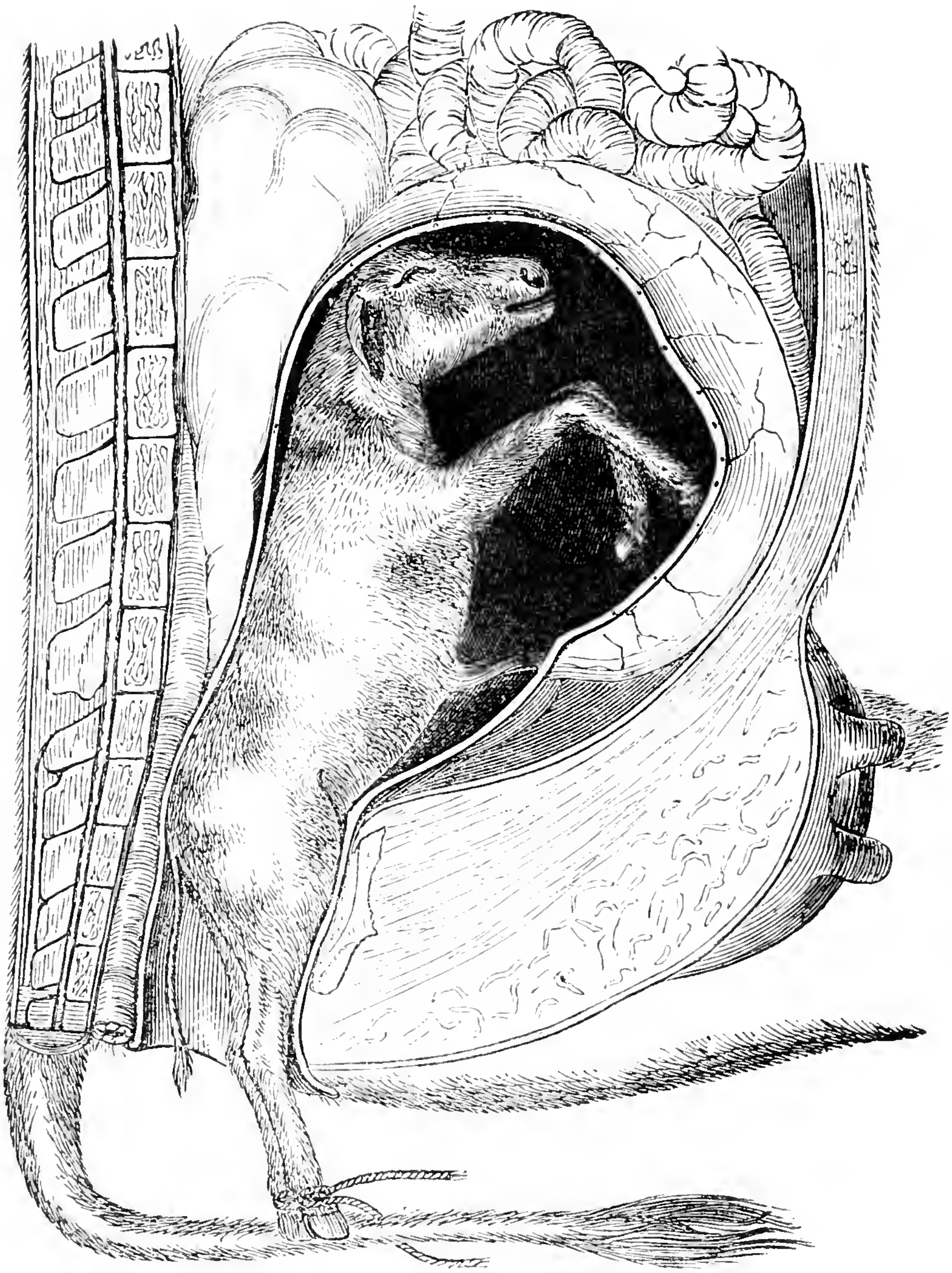
To the veterinary surgeon I need scarcely say that, varying the position of his patient will materially assist his efforts, and that he is enabled to manipulate with far greater facility when the animal is standing; but whether standing or otherwise, he must not cease his endeavours to adjust the fœtus and accomplish its early removal.

During protracted labour the patient's strength should be supported by diffusible stimulants and cordials, for the expenditure of the vital powers is very great. Many cases are lost even after delivery from inattention to this circumstance; good ale, with the addition of some alcoholic spirit, constitutes a most useful agent for the purpose.

When the fœtus has been extracted, no stimulants should be given, as these would bring on inflammatory action; but to quiet the system, a dose of *tinct. opii,* varying from 1 to 2 ounces, ought to be exhibited. The quantity here named will be proper for a mare or cow, a fourth part of which will be sufficient for a sheep. And I should also state that, although my remarks have been chiefly confined to parturition in the cow, still the rules laid down are equally applicable to other animals.

It was my original intention to have spoken of the consequences of parturition and the diseases and casualties immediately connected therewith; but having already exceeded the limits of an ordinary lecture, I must bring our observations to a close, thanking you sincerely for the kind atten-

Fig. 11.



tion I have received, and expressing a hope that the principles I have laboured to expound will hereafter prove of advantage in regulating your proceedings in these difficult and dangerous cases. —Journal of the Royal Agricultural Society.

ON THE PREVAILING EPIZOOTIC IN CATTLE, CALLED PLEURO-PNEUMONIA.

BY FINLEY DUN, JUNIOR, EDINBURGH.

[Premium, Gold Medal of the Highland Agricultural Society.]

(Concluded from page 127.)

Much difference of opinion exists concerning the propriety of using the FLESH OF MILK OF ANIMALS AFFECTED by pleuro-pneumonia. In the first stages of the disease, and before the inflammatory fever has run its course, we are of opinion that the meat is perfectly sound and well tasted, and will afford as much safe nutriment as it would have done previous to the attack of the disease. But when the malady assumes the typhous form, a change has taken place in the animal solids, the secretions are vitiated, the fat, the cellular tissue, and the meat itself, are discoloured, showing that they cannot now be safely used as articles of human food.

In the cases that have come under our observation, no change took place in the quality of the milk. As the disease progresses, the secretion diminishes, and is soon altogether dried up; but to the last its colour, taste, and odour remain unchanged, except in some instances in which it became thicker and of a more buttery character. If, however, in the latter stages of the disease, milk continues to be yielded, it certainly should not be used as an article of human food, for the same reasons as those above adduced with reference to the *flesh* of the animal.

No sort of inflammation is more under the control of the practitioner than ordinary inflammation of the lungs. But in the pleuro-pneumonia epizootic, it is the peculiar character it assumes which is so much to be dreaded—namely, the low typhoid or adynamic fever, which will not stand prompt, vigorous treatment, and which so rapidly produces structural derangement.

In undertaking the TREATMENT of the diseases of cattle, we must always take into consideration the peculiarity of their temperament; and perhaps in no disease is their phlegmatic dulness more evident than in the prevailing pleuro-pneumonia. If to this peculiarity we add that marked tendency of the fever of pleuro-pneumonia to lapse into the typhoid form, we shall at once see how difficult the treatment of the disease must be.

If the animal attacked be in good condition and fit for the butcher, we would, generally speaking, recommend the owner to dispose of it immediately, rather than encounter the chance of losing it altogether; for, although the animal do eventually recover, it will be so reduced in condition, and so long a time will in most instances elapse before it again begins to thrive, accumulate fat, or give milk, that it is frequently more profitable to get rid of it at once. This advice may be considered by some as militating against the interests of the veterinary surgeon; but straightforward, conscientious conduct, instead of hurting him, must eventually gain him the confidence and esteem of his employers.

The practitioner is often asked, not only by uneducated persons, but even by men who ought to know better, whether any specific has been discovered for the cure of pleuro-pneumonia. But can anything be more preposterous than such a question? How, or where can we discover a sovereign and never-failing remedy for a disease which exhibits such diversity of form, and which attacks such vital organs as the lungs? But although faith in all nostrums, specifics, and antidotes must give way before the test of experience, yet the non-existence of a never-failing remedy for pleuro-pneumonia should not be a cause of disappointment or regret, but ought rather to call forth energies and talents in the application of known and successful remedies.

If the practitioner is called in when the inflammation is at its height, as indicated by the full, oppressed pulse, let him immediately apply the fleams. Nauseating and other remedies used in human medicine are not so much to be depended upon in the case of cattle. In them the effect is longer in being produced, and is always more uncertain; and hence the great importance of BLEEDING, which has with much reason been considered as "the sheet-anchor of the veterinary surgeon." The abstraction of blood, by starving, as it were, the parts inflamed, reduces the inflammation, the sympathetic fever, and the quantity of blood to be purified by the congested lungs. In cattle, blood is most easily and conveniently drawn from the jugular vein. The vein is to be raised in the usual manner, by passing a cord round the neck. On account of the looseness and toughness of the integuments, the use of a broad-shouldered fleam is greatly preferable to the lancet. The quantity of blood to be drawn will be various, depending upon the strength and condition of the animal. The average quantity for a full-grown ox may be from four to six imperial quarts. It is, however, impossible to determine with mathematical accuracy the exact quantity of blood to be drawn; and the practitioner must be guided by the effect produced. He must allow the blood to flow until the pain be subdued, until the breathing become more natural, and the pulse smaller and softer. But whenever the approach of syncope is perceived, the orifice must be closed; for every drop then lost reduces uselessly the strength of the animal. By pushing venesection too far, we cause debility; and, by thus reducing the amount of fibrine in the blood, we increase the tendency to effusion, and diminish the chances of recovery. When the disease has been allowed to run on unchecked for two or three days, or when the pulse is quick and small, indicating that the height of the inflammation is past, or when it is irregular and intermittent, showing that the heart is affected, blood-letting will not be advisable.

Let the sick animal be removed from, and prevented having communication with, the sound, healthy stock. Let him be placed in a cool, well-ventilated situation. Never let the temperature of the place rise above sixty degrees Fahrenheit, and especially prevent draughts. Confinement in a heated atmosphere increases the number of respirations, and, by preventing the proper oxygenation of the blood, ministers to that low typhoid fever which so much aggravates the malignity of pleuro-pneumonia. But although it is necessary that the air which the animal respires be cool, yet the surface of the body may be kept warm with horse-cloths, or by other means.

Many practitioners make a general rule of exhibiting large saline purges. It must be allowed that in cattle practice generally these are highly useful; but we are of opinion that few cases of pleuro-pneumonia require their administration, and that they are very apt to produce the irritation so easily excited in all febrile affections. Cases, however, do occur in which the stomach and intestines seem full, and the dung is hard and caked; and in such circumstances the use of purgatives is indispensable. But even here it is necessary to proceed with caution, as the bowels are very easily moved, and diarrhœa, if once set up, is very difficult to subdue, and in many instances carries off the animal.

In the first stages of pleuro-pneumonia, in addition to venesection, it will also be necessary to exhibit some SEDATIVE MEDICINE. In different parts of the country many different medicines are in repute, upon many of which, however, little reliance is to be placed. Digitalis, extract of belladonna, antimonial powder, sub-chloride of mercury, hydriodate of potash, sulphur with nitrate of potash, and others too numerous to mention, have been made trial of. But, from repeated experiments made by ourselves, it appears to us that no officinal agent is attended with so much benefit as tartarized antimony—tartar emetic. Many practitioners have used this medicine in cases of pleuro-pneumonia, but, considering it inefficient, have laid it aside. Given to cattle, indeed, in homœopathic infinitesimal doses, it can have little or no effect. Those who give such doses reason, doubtless, from their effects upon man and other omnivorous and carnivorous animals, but probably forget that, in the herbivora, other and less sensitive stomachs are to be acted upon.

To an ordinary-sized animal, in the first stages of the disease, when the antiphlogistic treatment is to be pursued, let the tartarized antimony be given in four-drachm doses, three times a-day. If pure, it will dissolve in about sixteen times its own bulk of cold water, in which it is to be given. It is better that some time elapse between eating and the administration of the medicine. We have sometimes, and apparently with advantage, given doses of five and six drachms; and in more than one instance have seen one ounce given, morning and evening, without any apparent bad consequences. Tartarized antimony may be given either by itself or with an equal quantity of nitrate of potash, which acts as a diuretic, and the use of which is attended with much benefit where the urine is scanty or turbid. Tartarized antimony, in the doses which ought to be given in pleuro-pneumonia, acts as a sedative, and has a powerful effect upon the heart. Its exhibition, for two or three days, diminishes the fever, and, while it reduces the number of pulsations, increases their strength. It does not appear to injure the appetite, but, on the contrary, seems to improve it. Tartar emetic will in most animals cause purgation; but that will seldom take place with cattle before the third day, and in some cases it appears to have no cathartic action whatever.

Sometimes on the second, and even on the third day, the pulse may have risen considerably, and, although it be much less strong than before the first bleeding, a second blood-letting may be required. The quantity of blood to be drawn ought generally to be less than that taken on the previous occasion. It will not, however, be advisable to take too little, as a third bleeding can never be resorted to with advantage; and indeed, if the first and second application of the fleams have produced a sufficiently rapid and copious flow, a third blood-letting will not be necessary.

If, after two, or at most three days under treatment with the tartarised antimony, no change for the better appear—if the heart's action be not reduced and the fever abated—it will be useless to push that medicine further, and something else must be had recourse to. When tartar emetic thus fails to produce effect, we have generally found that calomel and opium succeed. These are to be given in gruel, in does of one scruple each, three times a-day. When, by the use of calomel and opium, the heart's action becomes reduced, it will not be expedient to continue their exhibition any longer, otherwise much uneasiness will be caused, and ptyalism produced, which may be difficult of removal.

In using sedative medicines in pleuro-pneumonia, it is necessary narrowly to watch their effects; and if the system appears to suffer from debility or nausea, the exhibition of TONICS, either vegetable or mineral, will be found attended with the greatest advantage. The tonics which we would recommend are, proto-sulphate of iron, four drachms; or carbonate of ammonia, from two to three drachms, with camphor one drachm; to be given twice a-day.

After six or eight of the tartar emetic powders have been given, it is frequently advisable to withhold them altogether for a day; and if the pulse is sufficiently reduced, and does not again rise, proceed with the tonics. In this stage the use of sulphate of iron (green vitriol) is preferable, as being less stimulating than the carbonate of ammonia. As stated above, it is to be given in four-drachm doses, twice a-day. It is to be administered in water, in which it readily dissolves. In proof of the virtue of sulphate of iron in cases of pleuro-pneumonia, we need only state, that where it has been given, the owners of the cattle, or those in charge, ever after place much faith in its curative powers, and are constantly asking for supplies of the "green powders." Its continued use in large doses, however, is apt to give the secretions a most intolerable odour, while the fæces become quite black. This, however, is easily remedied, by ceasing for a day or two the exhibition of the iron, or replacing it by some other tonic. In some cases, where the prostration of strength is great, it is advisable to exhibit tonics very early in the progress of the disease.

The inflammation attending pleuro-pneumonia being of a sub-acute character, and generally tardy in its progress, BLISTERS are much more efficacious than in similar diseases in the horse. Their use, although often attended with benefit, is, however, secondary to the measures previously mentioned, and they ought not to be applied until means be adopted for subduing the more acute inflammation. And indeed, in cases where there is much debility, they ought not to be resorted to, as they produce more irritation than the system can well bear.

Many cattle proprietors do not approve of blistering, as it may spoil the sale of the animal; but, if properly managed, no permanent blemish will remain. The ointment used for blistering the horse will scarcely raise the thick hide of the ox; and the best mode for securing the efficiency of the blister, is to scald the sides with hot water by means of horse-cloths or sacks dipped into it, and laid over the back of the animal. Having by this means rendered the skin more open and tender, rub in well about a pound of mustard, made up with turpentine or hartshorn. The action of this application may be kept up by the use of lard ointment; but it is seldom advisable again to use the mustard, otherwise sloughing of the integuments may be produced. The large surface over which the internal inflammation extends will show the necessity of blistering very extensively. The mustard should be well rubbed in from the spine to the sternum.

Instead of blistering, rowels and setons may be used by those who prefer them.

Little can be said about the feeding of animals during the progress of the disease. In general, they refuse to eat anything; but, if the appetite still continue, the diet should be spare and light, consisting of gruel and mashes, with a small quantity of light green food. In some cases, although the animal will not eat, she will drink, and often eagerly seeks for cold water, which may be given without the least fear of injury.

If the pulse be now reduced, and the breathing less hurried and laboured, proceed with the exhibition of tonics as previously directed. Advantage may now be derived by the substitution of the carbonate of ammonia and camphor for the sulphate of iron. In order to prevent excoriation of the mouth and throat, let them be given in tepid gruel, which, by forming a mucilaginous mixture, destroys its causticity. Good sound ale, with some ounces of ginger, forms an excellent and readily obtained stimulant. In conjunction with the tonics or stimulants, the following may be given occasionally:—treacle, one pound; sulphur, two drachms; nitrate of potash, two drachms. If this be mixed with gruel, most animals will take it readily, without the necessity of horning it down. When, however, it causes purgation, it must be immediately discontinued. The use of treacle in this, as in most other diseases of cattle, is attended with much benefit. It supports the system, invigorates the stomach, keeps the bowels open, and prevents that indigestion which is so apt to attack animals recovering from pleuro-pneumonia.

Some patients, while in a convalescent state, and when beginning to recover their appetite, suddenly look worse, are dull, and again refuse their food. One is apt to be perplexed about such a case—

there is no inflammation or fever to warrant the abstraction of blood, the evacuations appear natural, and yet there is something far wrong with the animal. In such cases, the treatment to be adopted is to give general stimulants, and also large doses of ginger, in order to stimulate the stomach, and cause it to resume its impaired function.

When serious effusions have taken place to much extent, all officinal agents will be of little service. In the earlier stages, however, iodine has been found of much advantage. Let it be given in iodide of potassium, with water or gruel, in from one to two drachm doses, thrice a day. The cost of iodine, however, prevents its extensive use; but a mixture of one ounce resin, one ounce nitrate of potash, and one ounce ginger, will make a good substitute.

It is necessary to be very careful in the feeding of animals *recovering* from pleuro-pneumonia, and to restrict the amount of food given. If allowed the same quantity as those in health, they may, with all the voracity of returning strength, devour more than their stomachs, weakened by disease, can properly digest. Should this occur, and the crude indigested mass accumulate, and if the stomach and intestines be not speedily cleared out, gas will be evolved, and *hoven* induced, which, as a sequel to pleuro-pneumonia, is almost always fatal. By the use of powerful stimulants, and the canular and trochar, temporary relief may be afforded; but we have seldom met with a case of pleuro-pneumonia, followed by excessive hoven, which has terminated favourably. Injudicious feeding produces attacks of indigestion, which, when severe and of frequent occurrence, cause so much irritation that the inflammation is again set up; and we have, in all probability, a relapse of pleuro-pneumonia, which is generally more dangerous than the first attack.

As relapses are frequent, precautionary measures must be adopted, not only with regard to feeding, but also as to exposure, sudden changes of temperature, &c.; and any reappearance of the active symptoms must be promptly and vigorously checked. The fact, however, of an animal's having previously had pleuro-pneumonia does not, after a perfect recovery, either exempt it from or render it more liable to a second attack.

Dr. Mercer, in a paper which appeared in the *Journal of Agriculture* for January, 1848, has striven hard to convince the proprietors of stock, that, by care on their own part, by attention on that of the person in immediate charge of the cattle, and by the decision and promptitude of the veterinary surgeon, the "epidemic zootic pleuro-pneumonia will soon be made to take its flight, and become no more the dread of the honest and industrious agriculturist." There is much truth in Dr. Mercer's remarks, although the tenor of his paper tends perhaps too much to raise the expectations of the farmer, and lead him to suppose that the number of fatal cases among his stock is due to the unskilful treatment of the medical attendant, rather than to the natural virulence of the malady itself. However correct the principles may be upon which the treatment is based, and however skilful and decisive the practice, it must be admitted that many cases will terminate unfavourably, and thus prove the fallability of all remedies. Nothing, indeed, is more vexing than daily to visit a case in which every effort proves unavailing—where, in spite of alteratives, tonics, and stimulants, the typhoid fever still goes on, sapping the fast-failing strength, and destroying every hope of recovery. But although such cases do present themselves, and damp our ardour in the treatment of the disease, yet in others we have the satisfaction of finding ourselves more successful, and, by judicious and timely aid, assisting nature to subdue the malady, and regain her wonted strength.

Hydropathy and homœopathy have both been tried in the treatment of the pleuro-pneumonia epizootic, but apparently without success.

The grand principles which ought to regulate our treatment of pleuro-pneumonia, and which, when properly pursued, will guide us to the best and most scientific mode of combating the disease, may be thus set forth in a few words: Pursue warily the anti-phlogistic course; subdue the inflammation, and reduce the fever, with the least possible expenditure of the strength of the patient; resort to venesection only when the symptoms indicate a state of active inflammation: avoid pushing too far the exhibition of sedatives, contra-stimulants, or any depleting measures whatsoever; rely mostly on the use of tonics, and subsequently of stimulants; separate the animal from his fellows—place him, if possible, in a loose box, and keep him cool, clean, and comfortable; keep the bowels in good condition with treacle given at intervals; check the slightest appearance of diarrhœa by giving flour-gruel, and, if necessary, astringents. Where the animal is reduced, and manifests much weakness, blisters, rowels, and setons are to be condemned as producing irritation and increasing the hectic fever. In short, let the treatment of the disease be guided by a mature consideration of the symptoms; and, while attending to the more important remedial measures, do not neglect what is aptly called by Dr. Armstrong, "the small artillery of physic;" endeavour, by the combination and co-operation of various means, to arrive at the main point—the grand object of your treatment—the eradication of disease and the restoration of health.

The most likely MEANS of PREVENTING the

OCCURRENCE of PLEURO-PNEUMONIA are only to be found by reverting to its causes. A full and satisfactory knowledge concerning these would teach us to prevent what predisposes to the disease, and to avoid what acts as its immediate exciting cause. The disease sometimes takes its date from a very remote period. The predisposition is sometimes present in the constitution of a stock. Such being the case, let breeders of stock avoid purchasing animals with narrow, contracted chests, such as have been too finely bred, or such as have any constitutional tendency to disease. Let rearers and holders of stock endeavour to keep their animals always growing; and never to let them fall back in condition. If confined to courts, or stall-tied, let the animals be fed regularly and often. Let their food be of a nutritious character; but avoid giving large quantities of such as is highly stimulant. All sudden changes in the feeding and management of cattle ought to be avoided. The transition from ordinary or indifferent fare to the eating of large quantities of highly nutritious food, ought to be slow and gradual. The change from the close confinement of a byre to living in the open fields in a much lower temperature, and exposed to every sort of weather, ought to be made less violent, by gradually preparing the animals for their new mode of life. Let particular attention be paid to the thorough drainage of all houses where cattle are confined, and remove daily all dung and wet litter. Let all dunghills, composts, filth, and decomposing animal and vegetable matter be removed to a considerable distance, for the olfactory nerves of cattle, and especially of cows, are particularly sensitive. Where cattle are confined in byres, or courts entirely closed in, the keeping of pigs should, if possible, be avoided. Let the animals have plenty of room, for it is evident that nothing can have a more baneful effect upon the constitution than the confinement of many living beings in a close and heated atmosphere. Yet how often do we see numbers of animals crowded and shut up in hovels where a man can scarcely stand upright, and where the poor creatures remain for weeks and months condemned to respire a vitiated atmosphere! Let courts, and suchlike open places, be comfortable and sheltered, especially from the north and east. Prevent exposure to humidity, to violent and sudden changes of temperature, and to everything which tends to reduce the vital energies.

It is well known that a certain amount of warmth is necessary for the promotion of the growth of an animal, and also for the secretion of milk; and it is a knowledge of this, practically pushed to excess, which in a great measure causes neglect of, and even opposition to, a proper system of ventilation. A sufficient amount of fresh air is, however, as indispensable to the wellbeing of living creatures as warmth, and it is fortunate that the two are not incompatible. The ventilation of cow-houses is, in too many instances, a mere apology for what it ought to be. In many cases, the safe introduction of fresh air, without exposing the animals to cross-currents, is rendered almost impossible by reason of the bad construction of the houses, and the extreme lowness of the roofs. In order, however, that the byres may be such as to insure, at the same time, sufficient warmth of a *healthy sort*, and also an ample supply of pure air, the walls must be high; and the roof, if possible, open to the top, and without lofts. Ventilating boards, which may be regulated at pleasure, should be inserted both above and below the eaves. Windows ought to be so constructed as to admit sufficient light; and thus prevent darkness favouring the accumulation of filth, and serving as an excuse for the want of cleanliness.

Let the slightest indisposition be carefully watched, and checked in its incipient stages; for, during the prevalence of epidemic or epizootic diseases, every malady is liable to lapse into the absorbing vortex.

Since pleuro-pneumonia is capable of diffusion by means of contagion, let every animal affected by it be separated from its fellows. In feeding them, be careful to avoid using the same vessels for the healthy and the diseased. It seems quite improbable, however, that the disease can be transmitted from one animal to another through the medium of the attendant.

When an animal dies from, or has had an attack of pleuro-pneumonia, let the house be cleaned out, and the walls, stalls, &c., washed with some disinfecting lotion, as, for example, a solution of chloride of lime. This solution may be made by pouring boiling water upon the powder. In addition to the washing of the walls, a vessel may be placed in the byre containing a stronger solution, or cloths hung up which have been saturated with it. Chlorine is thus gradually evolved, which effectually destroys the contagious effluvia. A copious evolution of the gas may be produced by allowing a weak solution of hydrochloric acid to filter slowly upon chloride of lime, or by pouring dilute sulphuric acid upon a mixture of the black oxide of manganese and common salt.

Nitric acid has been highly recommended as a disinfecting agent. The extreme facility with which it parts with oxygen causes a rapid and entire decomposition of all vegetable and animal effluvia. Its use, however, can be but limited, for it not only destroys organic compounds, but attacks and corrodes most substances with which it comes in contact. It is also expensive.

One of the most useful and efficient disinfecting agents with which we are acquainted is probably sulphurous acid. Although this substance has been generally disregarded, its high claims as a disinfectant have, in his prelections, been frequently urged by Dr. George Wilson, lecturer on chemistry, Edinburgh. Sulphurous acid is used in bleaching. It is employed, in the patent process of paper-making, for arresting the smell resulting from the putrefaction of the size (gelatine). It is also used in the Manchester dye-works, for destroying the intolerable odour arising from the decomposing cochineal, an odour which no other known substance can so effectually remove. Since it thus acts as a bleaching agent, is so efficient in destroying offensive effluvia, and in arresting putrefaction, it is likely to prove possessed of the power of neutralizing miasmata emanating from the bodies of animals affected by pleuro-pneumonia, or other contagious diseases. Sulphurous acid is obtained by the burning of sulphur, or by decomposing sulphuric acid (oil of vitriol) by heating it with charcoal. Without trusting entirely to the gas evolved, the walls of the building may be washed with a weak solution of the acid. The employment of sulphurous acid need not prevent chlorine being also used.

In some cases the adoption of these precautions against the spread of infection may not be necessary; as a general rule, however, they ought to be adhered to, and a due attention to them will, we are sure, be of much service in preventing the further dissemination of the disease.

Some practitioners, on the appearance of pleuro-pneumonia among a stock, immediately bleed the *whole indiscriminately*, or insert rowels or setons in the dewlap. Little faith, however, is to be placed in these precautionary measures—unless, indeed, the animals are in such high condition as to be particularly predisposed to inflammation. In such cases, the abstraction of blood, and the administration of mild laxatives, may be beneficial.

A direct and repeated violation of the established laws of nature must, sooner or later, meet its punishment; and accordingly, when pleuro-pneumonia makes its appearance in foul, ill-ventilated, and ill-regulated byres, we need not be astonished that, in all probability, it spreads with rapidity, and is virulent and fatal in its attacks; for the animals, living in a close and heated atmosphere, and subsisting, for the most part, on large quantities of highly stimulating food, are predisposed to inflammation, and readily fall victims to the disease.

On the other hand, however, in districts where pleuro-pneumonia has raged, many farms have altogether escaped. Such exceptions have generally occurred where owners seldom changed their cattle, where the animals were principally brought up on the farm, and where great care was used in the selection and purchase of stock. When these precautions are used, and when a proper course of management is pursued, if the disease does appear, it seldom tarries long, and is generally less severe in its attacks than when it invades the unhealthy precincts of the town byres.

When cattle are to be purchased, endeavour to procure them from people of acknowledged character, or from those whose stocks you know to be sound and healthy, rather than run the risk of bringing among your own stock animals that have been purchased in a market. The exhaustion of a journey, or the exposure in a market previous to being sold, is often sufficient to render cattle susceptible of infection, which, in ordinary circumstances, might have had no effect upon their organisms.

All the pains and care of the stock-proprietor to keep his animals intact, and to ward off the disease, have, in some instances, been rendered fruitless by his being unfortunately situated in the immediate neighbourhood of a public road, and by drovers, in search of night quarters, unscrupulously turning into his fields all sorts of cattle. We know of several cases at present, in which cattle have been thus infected, and hundreds of pounds' worth of stock lost. Such facts merit the attention of gentlemen whose land lies on any market road, and ought to warn them against leaving the gates of their pasture-fields without being properly lockfast.

The principal facts adduced in the foregoing pages may, by way of *résumé*, be briefly brought under review, as follows. When any disease assumes an epidemic or epizootic form, the number of cases of other diseases very much decreases. There seems to be something in the animal constitution which favours its development, and all other diseases converge, as it were, for the time, into the one absorbing focus.

Pleuro-pneumonia seems to result from a modification of the same causes as induce other epidemics or epizootic diseases. Whatever the other existing causes may be, contagion is certainly the principal one. Of the many other alleged causes, none possess all the essential characteristics of an exciting cause: some are not uniformly present, and do not constantly precede the disease; while the operation of others is inadequate to produce the effects imputed to them, and therefore, although they may possess *some* of the properties which characterize exciting causes, they do not exhibit *all* the characteristics, and consequently are not entitled to be considered as the *efficient* exciting causes, of any epidemic or epizootic disease.

The remote or predisposing causes of pleuro-pneumonia are numerous, and include whatever reduces the vigour of the system, disturbs the operation of important functions, or infringes those laws which nature has laid down for the preservation of the health of her creatures. But although these predisposing causes are so various in their nature, and produce such serious results, they happily can, in the majority of cases, be remedied or prevented by care and attention.

We have shown that most of the symptoms of pleuro-pneumonia are such as are exhibited in pneumonia, pleurisy, or bronchitis—modified, however, by the structure principally affected, or, in other words, by the local seat of the disease. The most remarkable peculiarity of pleuro-pneumonia, however, is the tendency of the inflammation to assume the subacute and chronic forms, and of the fever to lapse into the typhoid form—tendencies the effect of which renders the epizootic disease more fatal than ordinary pulmonary inflammation. In many cases the disease progresses for a considerable time before any symptoms become apparent. The consequent hold that it takes of the system before any remedial measures can be adopted, accounts, in a great measure, for the mortality attending it.

The terminations and post-mortem appearances have been found to be exceedingly various, depending on the intensity, the duration, and the particular seat of the disease.

We have indicated the means to be pursued in enabling the practitioner to discriminate between the same symptoms as exhibited in different diseases, and have shown the importance of arriving at a just and true prognosis of the case to be treated.

In the treatment of pleuro-pneumonia, we have shown the futility of depending on specifics. We have also shown that the best and most scientific mode of treatment results from a deliberate consideration of the symptoms, and the modifying influences amid which the animal may be placed. Observation and experience indicate the necessity of cautiously using depleting measures, and of supporting the strength and vigour of the constitution by the exhibition of tonics and stimulants. As much depends upon the care of those in charge of the animal being well directed, the practitioner's instructions should be given in plain and simple language, and accommodated to the capacity of those who have to follow them out.

In using means to prevent the occurrence of the disease, we should endeavour to maintain, in a sound and healthy tone, the physical powers of the stock, and to avoid whatever tends to depress the vital force. Exposure to the influence of contagion must be guarded against; and, on the appearance of the disease, every precaution must be used to prevent the healthy having communication with the sick. By a steady pursuance, on the part of the stock-proprietor, of these precautionary measures, and by the exercise of care, prudence, and attention, the virulence of the disease will, we are sure, be much abated, and its progress checked. And although we can scarcely hope at once to banish it from the land, we may, at all events, greatly mitigate its ravages, and alleviate the sufferings of a class of animals, whose existence and well-being are of so much national importance.—Journal of Agriculture.

INTRODUCTION TO METEOROLGY.

By David Purdie Thomson, M.D.

Edinburgh. 1849.

Meteorology is the science which acquaints us with the various phenomena of the atmosphere, and with its relations and properties; and the author in the work before us enters at some length into these several considerations. He commences with an account of the composition of the air, and of investigations into the nature of the gases which unite in its formation. The figure of the atmosphere, and its specific gravity and density, are then considered; together with the influence of winds, and the various uses of the barometer and thermometer; and also the subject of isobarometric and isothermal lines, and the effects of latitude, altitude, and temperature. Indeed all the various phenomena which the atmosphere has been observed to present are also brought under notice; and a vast number of facts are brought together, which must have cost the author much time and labour to collect and arrange, selected as they are from so many works, both ancient and modern; their value being much enhanced by numerous references to the original authorities. The most esteemed instruments used in meteorological observations are noticed and considered; and after explaining each in succession, the author thus speaks of the newly invented barometer called "the aneroid," which is now to be seen in the shops of our philosophical instrument-makers:—

"Since writing the above, I have inspected the new and beautiful instrument invented by M. Vidi. It was described by Professor Lloyd to the British Association, and reported to have stood the test of being placed under the receiver of an air-pump, when the indications corresponded with those of the mercurial gauge to less than 0.01 of an inch. The principle upon which the instrument depends is the pressure of the atmosphere on a metallic chamber, partially exhausted, and so constructed that by a system of levers a motion is given to an index-hand which moves upon a dial. Upon comparison of indications made with the aneroid barometer and a very perfect mercurial barometer, given by Mr. Dent, we find that from forty-nine observations made between the 6th of January and 23rd of February, the mean difference was 0.037 inch, the aneroid being in excess; and from sixty similar observations made with a standard barometer during the month of December last, and between the 3rd and 31st of January, 1849, the mean difference amounted to 0.026 inch, the mercurial being in this case in excess over the aneroid barometer. Combining these observations (109 in number) a mean difference amounting to 0.0025 inch is found to exist; the indications of the aneroid being in excess. For general use the instrument is thus shown to be well suited; for the measurement of heights it is peculiarly adapted, from its portability and comparative strength; and for nautical purposes we know of no better instrument."

Nearly forty pages of this work are appropriated to the interesting subject of meteorolites, in which all the principal meteoric stones which have fallen from the earliest historical epoch to the present day, of which we possess accounts, are noticed; together with their composition and analyses. The following extract will show our author's views as to their origin:—

"Various conjectures have been hazarded on this *questio vexata*, and explanations of the origin of meteoric stones proposed; they resolve themselves into one or other of the four theories—the *terrestrial*, *atmospheric*, *lunar*, and *cosmical*. Those who explain their origin by the *first* of these hypotheses call in the agency of volcanoes, or the influence of lightning in tearing up the ground and transporting to a distance. We grant the power of these forces in some of the instances; but we discard the theory on the ground that as the chemical composition of aërolites is altogether different from that of terrestrial bodies, they are not telluric, and the similarity referred to indicates for nearly all a common origin. Lemery, Muschenbröck, and Bory de St. Vincent support the terrestrial theory; but they are not agreed as to the mode by which the projection takes place. The *atmospheric* hypothesis has greater weight of authority than either the terrestrial or lunar, and certainly is much more tenable than either; but to us it does not seem satisfactory. From the fact that mineral and gaseous particles are constantly floating in the air, it has occurred to the supporters of this theory that these, meeting perhaps through the agency of electricity or chemical affinity, become consolidated and fall to the earth. It is believed by the partisans of the atmospheric theory that all ponderable bodies are constantly parting with particles from their surfaces by a process of evaporation, besides those which are separated by other causes —a theory denied by Faraday on the principles of gravitation, cohesion, and elastic tension. Some of the attending phenomena are certainly most easily explained by this hypothesis, and we can conceive of such an origin in the case of minute aërolites; but how upon these principles to account for the formation of those enormous masses which have been recorded, is to us a matter of exceeding great difficulty. Patrin, Izarn, Salverte, Ideler, Egen, Fischer, and Jameson support this theory. The *lunar* theory is the offspring of the fertile mind of Laplace. This great astronomer brought the science of numbers to bear upon the question, and demonstrated the possibility of a projectile reaching our globe, having received a certain initial velocity from a lunar volcano. It is evident there does exist between our globe and her satellite a point where the attraction of each is equal, beyond which a body will fall either to the earth or to the moon. Laplace has calculated that a force equal to that of about 10,000 feet per second, or an initial velocity not quite four times more rapid than a cannon-ball, will carry a body from the moon beyond that limit, and thus determine it to the earth's surface. Olbers, Biot, and the late Baron Poisson arrived at a similar conclusion. Before this hypothesis can be assumed, it must be demonstrated that an atmosphere surrounds that luminary; for unless Nature has other laws to direct her operations in our satellite than here, no projectile could be thrown from a volcano without an atmosphere to furnish oxygen to feed the flame. We had hoped that the existence of such an aërial body would have been shown by the magnificent telescope of Lord Rosse, but the appearance of her disc through that powerful instrument affords no indication of the presence of air similar to ours; besides, the volcanoes, several of which are miles in breadth, are all extinct. However, on the 29th of March, 1820, Laplace, in a paper read before the French Board of Longitude, abandoned this theory and adopted that which gives them a more distant origin. The last hypothesis is that which supposes these bodies to be *cosmical*. Chladni, Humboldt, Halley, Bergman, Brewster, and others, have adopted it. According to this theory aërolites are supposed to have an existence independent of other celestial bodies, revolving with the planets in infinite numbers and similarly produced; or to be fragments of a great planet, of which the minor planets are the representatives. That these bodies were once united is highly probable; not only from their almost equal distance from the sun and their diminutive size, but from the eccentricity of their orbits; for Olbers remarked that upon that supposition, the orbits having all diverged from one point, so must the fragments have their parhelia in the same part of the heavens, and their aphelia in the opposite celestial hemisphere; in other words they must have two common points of reunion in the course of their periodic revolution, and it is so. Besides the arguments of projection and velocity, which flow as a consequence of such a catastrophe, in favour of this origin of these bodies, their specific gravity supports this theory, as has been pointed out by Brewster. Upon this hypothesis, and it is the only one we consider ourselves warranted to adopt, these meteoric bodies assume no small importance. If the fossils of our globe bear record of changes in the abode of man primeval to the historic era, these aërolites testify to some catastrophe in the planetary regions. If the 'Medals of Creation' show that the grand principles of life have been unchanged, the meteorolites plainly tell us they are the product of familiar elements—they convey the striking declaration that the *materiel* of the universe is the same."

One of the chapters of this book is devoted to the consideration of prognostications of the weather, deduced from various sources; from the barometer, from the sun, the moon, stars, twilight, appearances of the rainbow, clouds, mists, wind, from the animal and vegetable kingdoms, and from inanimate bodies. Our author is not one of those speculative philosophers who, after forming an imaginative theory of the causes of changes of weather, endeavour by plausible explanations to force any natural phenomena which may occur, to coincide with their hypothesis. On the contrary, his aim appears to be to collect together during a lengthened period a vast number of facts, deduced from the observations of men in all parts of the globe; and then we may be in a better position to consider the connexion of these effects with various operating causes. It is certain that no theory which has yet been brought forward to explain and account for the causes of the various changes of the weather has any foundation whatever in truth. It would be easy to allude to one or two of these in particular, which are now being zealously advanced by their advocates; but we refrain. All such theories are noticed by scientific men with a smile. It was only last year that Arago, of Paris, wrote thus:—"In the present state of our knowledge no philosopher, who is conscientious and careful of his reputation, will speculate on a prediction of the weather." And it was only in the previous year that Sir David Brewster thus expressed himself:—"In the very atmosphere in which he lives and breathes, and the phenomena of which he daily sees and feels and describes and measures, the philosopher stands in acknowledged ignorance of the laws which govern it. He has ascertained, indeed, its extent, its weight, and its composition; but though he has mastered the laws of heat and moisture, and studied the electric agencies which influence their condition, he cannot predict whether on the morrow the sun shall shine, or the rain fall, or the wind blow, or the lightnings descend." The science is altogether new, and the facts before us are at present too limited to allow us to form a theory of the laws which govern these changes. But we have no doubt whatever that at no very distant day, when we have acquired a greater number of data, and when our knowledge of the laws of magnetism and electricity is increased, that this science will be as well understood as its kindred one of astronomy; and that its professors will be equally able to predict the state of the weather at any given spot on a given day, as the astronomer can at the present time point out the exact relative position which all the heavenly bodies will assume at any particular period. It is true there are some disturbing forces which influence the weather, and which tend to produce rain, wind, fog, or drought; but how far greater are the disturbing forces which modify the orbits of the comets in unlimited space, and yet their exact return to their perihelion can be foretold, and the laws which govern their various motions are consequently well understood.

The author concludes the work by thus expressing his belief that it is from an increased number of facts and an extended knowledge of the various modifications of electricity that we are to hope for the further advancement of this science:—"The unwearied labours of many who are now distributed over the globe, watching every cosmical phenomenon, and recording, at stated times, their observations, have been already amply rewarded; and we look forward with no small expectation to 'coming events,' which in the discoveries of Faraday, may be said to have 'cast their shadow before.'"

To a student who desires to possess a good knowledge of the science of meteorology we would, in conclusion, recommend the perusal of this book; and more particularly so as it contains a vast and carefully prepared selection of facts, which cannot fail to be useful to any person who wishes to investigate this interesting subject.

THE TITHE COMMISSION.

The following is a copy of the report of the Tithe Commissioners to her Majesty's Secretary of State for the Home Department, dated July 25, 1849:—

Tithe Commission Office, July 25.

Sir,—It is our duty to report to you the progress of the commutation of the tithes in England and Wales to the close of the year 1848.

We have received notices that voluntary proceedings have commenced in 9,632 tithe districts; of these notices, one was received during the year 1848.

We have received 7,062 agreements, and confirmed 6,767. Of these, nine have been received and 14 confirmed during the year 1848.

6,619 notices for making awards have been issued, of which 195 were issued during the year 1848.

We have received 5,153 draughts of compulsory awards, and confirmed 4,712; of these, 306 have been received and 380 have been confirmed during the year 1848.

We have received 10,655 apportionments, and confirmed 10,385; and of these, 482 have been received and 525 confirmed during the year 1848.

In 11,479 tithe districts, as will be seen from the above statement, the rent-charges to be hereafter paid have been finally established by confirmed agreements or confirmed awards.

We have in our possession agreements and draughts of award as yet unconfirmed, which will include 796 additional tithe districts, and make a total, when completed, of 12,275 districts in which the tithes will have been commuted.

397 altered apportionments were made by the Tithe

Commissioners up to the 31st of December, 1848, of which 294 were confirmed.

At that date exchanges of glebe lands were effected in 232 places, and 46 such exchanges were in progress.

At the close of 1848 we had confirmed 9,667 distinct mergers of tithes.

The tithes which remain to be settled will, for the most part, produce small rent-charges; some, however, of these will occasion considerable difficulty.

They consist, first, of cases which have been delayed from the uncertain state of the law under Lord Tenterden's act.

With this class of cases we have been up to this time making steady progress, since we have been acting on the resolution, pointed out in our last report, of considering the certificate of the Barons of the Exchequer a sufficient warrant for our decisions in the prolonged absence of any final judgment.

The remaining cases consist of disputed moduses of tithes only partially or imperfectly computed under inclosure acts, in a few instances of some importance, in numerous instances of slight importance; and further, of the tithes of extra-parochial places to which the Crown has a *primâ facie* right.

In all the cases where the amount involved is not large we are much impeded by the disinclination of parties to attend our meetings, or give us any assistance in our inquiries, and for their own sake we take this opportunity of giving such parties notice of what are likely to be the results of their indifference or negligence.

In many cases the tithes and lands belong to the same person. In some instances the tithes are mortgaged or settled distinctly from the land, and the landowner cannot therefore merge. In the majority of instances, however, they can merge, and that by a simple instrument which costs little.

In spite of our invitations and exhortations we find it often impossible to procure these mergers. We are then obliged to treat the tithes as existent, to commute them into rent-charges, and to apportion those rent-charges, mapping the lands.

We have always been unwilling to be driven to these extremities, but the time is come when we can delay no longer.

Extra-parochial places produce many similar results. To the tithes of such places the Crown has in all cases a *primâ facie*, and in some a valid and available title. By proof of nonpayment for 30 years, or by the production of, or reasonable proof of, Royal grants, the *primâ facie* title of the Crown is easily rebutted, and the privilege at once conferred on the landowners of merging, or, if they prefer it, of holding their rent-charges by a title which cannot afterwards be disputed.

The very slight exertion necessary to secure these benefits is more than we can prevail on a large body of landowners to make.

We shall be obliged, we fear, in many such instances to award the rent-charges to the Crown, whose *primâ facie* case is thus left unrebutted by any evidence before us. The rent-charges so established can only be got rid of, when got rid of at all, by further inquiries and very needless expenses.

We dwell on these facts as a warning to the landowners, and exclusively with a view to their benefit.

The powers intrusted to us by the Legislature are amply sufficient to enable us to get through this kind of work, whether we are or are not aided by the parties we have to deal with.

The present tithe act will expire at the end of the parliamentary session of 1851; by that time we hope to have commuted the whole of the tithes of England and Wales as to which no litigation is then existing.

There remains the task of completing the apportionments not yet confirmed. It is a heavy one. The apportionments to be received will be between 1,000 and 2,000, after allowing for rent-charges merged, and for the reduction of their apparent numbers from other causes.

The conducting this operation constitutes the greater part of our office-work at present, and will continue to press upon us till our labours close.

Deaths among the persons appointed to apportion, and other causes of delay, may prolong a few of these cases; still we see ground for expecting that we shall get through this work by August, 1851.

There will be some cases—we hope and believe there will be few—of obstinate and protracted litigation. Over these we have, in fact, no control at all.

We trust that for these cases of litigation only the Legislature may have to provide separately at the close of the present tithe act.

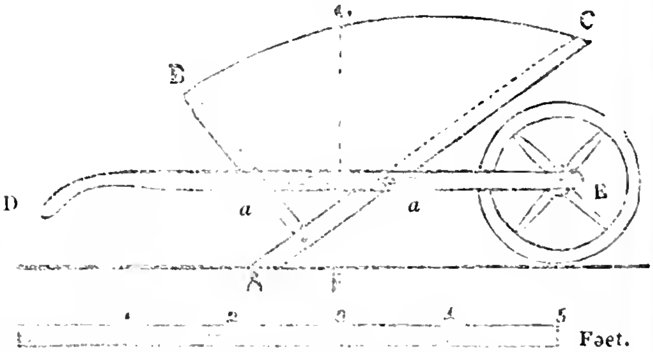
We have the honour to be, sir, your very obedient servants,

WILLIAM BLAMIRE.
T. WENTWORTH BULLER.
RICHARD JONES.

To the Right Hon. Sir George Grey, M.P., &c.

GARDEN WHEEL-BARROWS.—In accordance with your request, I beg to forward a sketch of a barrow, containing great strength and utility. Its construction is such that the load, from being thrown forward, is of course much easier to wheel than such as are differently made.—*John Cox Redleaf.*

Fig. 23.



REFERENCE.—A to B, 2 feet; A to C., 3 feet; D to E, 5 feet; F to G, 2 feet 3 inches; width across, 1 foot $11\frac{1}{2}$ inches; diameter of wheel, 1 foot 8 inches; *a a*, iron pins with screws, passing through from side to side. —Gardeners' and Farmers' Journal.

YORKSHIRE AGRICULTURAL SOCIETY.

The council dinner was held at six o'clock on Tuesday, evening, July 31, in the Music Hall. The dinner was of very excellent quality, and a pretty numerous party sat down, presided over by the Earl of Carlisle, with the Earl of Harewood in the vice chair. The company also included Sir J. V. B. Johnstone, Bart., Sir Charles Tempest, Bart., the Mayor of Leeds (John Hope Shaw, Esq.), William Beckett, Esq., M.P., W. R. C. Stansfield, Esq., M.P., Edmund Denison, Esq., M.P., J. G. Smyth, Esq., M.P., and many of the leading agriculturists of the county.

The viands having been discussed, and royalty duly honoured,

Mr. G. D. Legard introduced the subject of the evening's discussion, namely, "The best mode of housing fattening cattle." In the course of his remarks he said there were three methods of housing fattening cattle. The first was the stall-feeding system, the prevalent method in England; second, box-feeding, of late introduction in Norfolk and Cambridgeshire; third, feeding in sheltered yards, the plan pursued in the south of England and Scotland, and that which he had himself pursued. The dimensions of a yard for ten beasts are 55 feet square, giving a superficial area of 3,025 square feet, or nearly three times the space required in boxes. The sheds should not be less than 18 feet within, thereby enabling them to be sheltered from the storms of winter as far as may be. The yards ought to be dished out, so that the surplus matter may be carried off, and, in order to avoid too much water running into the tank, the building should be spouted. Then came the question of the exposure of manure to rain being prejudicial, and this gave rise to a question of no slight importance to this branch of agriculture. Not long ago he was present at a meeting of a farmers' club when the subject of preserving farm-yard manure was under discussion. A practical farmer there rose, and said he believed that the exposure of manure to rain, instead of being disadvantageous, would be beneficial, and he quoted a statement made by Professor Sprengel in the first volume of the Royal Agricultural Society's Journal. The Professor laid it down that the urine of cattle is very much advantaged by water, and he has given three analyses of cows' urine. The first is, when fresh, 205 parts of ammonia to 1,000 of water; second, after four weeks' putrefaction, 487 parts; and, thirdly, with rain water added in equal parts, 1,622 parts. This is explained by the fact that water absorbs ammoniacal gases; also, that it retains and abstracts from the atmosphere carbonic acid gas, which combines with the ammonia, and neutralizes it; also, it absorbs a much greater quantity of sulphuretted hydrogen gas than when unmixed, more than thirty times the quantity. The question is of importance—are these dicta from the philosopher's laboratory trustworthy? Mr. Legard then concluded by making some observations on the inconvenience often felt in giving cattle oil cake, because the master beast fights the weaker ones, and gets the best portion of the food. The plan that he had seen adopted was this—the cattle are fed in yards with sheds, and the oilcake is given to them in a manger, which is protected by a sort of rack, which, by admitting the head of the animals only, prevented them from getting more than their share. The construction was very simple, and the plan having been successful, he felt justified in recommending it. (The gentleman then resumed his seat amidst applause.)

An animated and interesting discussion followed, in which Mr. H. S. Thompson, Mr. W. R. C. Stansfield, Mr. Maw, and others took part. Though some diversity of opinion prevailed, yet the plan recommended by Mr. Legard met with the most general approval.

The council meeting took place at the Court-house, to receive deputations from places which might invite the society to meet there in 1850. The only deputation present consisted of Messrs. Rhodes, Wilson, and Arrowsmith, who represented the town of Thirsk. Driffield and Pocklington were also spoken of, but the council eventually selected Thirsk as the place for meeting next year. The Duke of Leeds is to be the president for 1850.

The subjoined are the prizes awarded—

IMPLEMENTS.

Heavy Ploughs—1st, Busby, £5; 2nd, Barrett, Ashton, and Co., £2.

General Purposes—1st, Busby, the same plough as on the light land in every respect, £5; Meynell, £2.

Light Ploughs—1st, Busby, Y.L.L., £5; 2nd, Barrett, Ashton, and Co., £2.

Heavy Harrows—1st, Barrett, Ashton, and Co., for their zig-zag ditto, £4.

Light Harrows—1st, Kirkwood, £4.

Subsoil Pulverizer—1st, Kirkwood, £4.

Scarifier—1st, Smith and Co., Stamford, £5; 2nd, Kirkwood, for his Grubber, £4.

Skim Plough—1st, E. Hill and Co., £2.

A new Implement for Ribbing and Drilling—Busby, £3, and silver medal.

To Barrett, Ashton, and Co., for their mill for bruising beans, barley, and linseed, £2.

To Barrett, Exall, and Andrews, for their two-horse thrashing machine, £5.

To ditto for their two-horse gearing, £3 and silver medal.

To E. Hill and Co., for their improved hurdle for feeding sheep off turnips on the ridge, and their general assortment of fencing, £4.

To Messrs. Richmond and Chandler, for their steaming apparatus, £2; ditto, for their sack hold, 10s.

To Mr. Young for his general assortment of iron fencing, £1.

Chaff Cutters—1st, Busby, for Corne's chaff machine, £4. 2nd, Messrs. Smith and Co., Stamford, for their invention for throwing their chaff engine out of work to prevent accident, £2.

Horse Hoes—First to Mr. Busby, for Messrs. Garrett's hoe, £3.

Clod Roller—To Mr. Crosskill, silver medal.

To Mr. Crosskill for his potato washer, £1.

To ditto for his broad cart manure drill, £2.

To ditto for his wheels and axles, £5.

To Barrett, Ashton, and Co.. for dressing machine, £1.

To Barrett, Ashton, and Co., for their barley hummeller, £1.

To Mr. Meynell, for his turnip cutter for both cattle and sheep, £1.

To Mr. Gascoigne, for his whippletree, 10s.

To Mr. Green, for his different specimens of wire fencing, £1.

To Mr. Nelson, for general assortments of forceps, 10s.

To Smith and Co., Stamford, for their hay maker, £3.

To Mr. Harland, for his one-horse cart, £3.

To Sir George Cayley, for his one-row drop drill, silver medal.

To Mr. Clayton, for his tile-making machine, £10 and silver medal.

To Mr. Stratton, for his liquid manure cart, £2.

To Mr. Crabtree, for his rat-trap, £1.

To E. B. Wilson and Co., for the best steam engine, £20.

To Barrett, Ashton, and Co., for threshing machine, £10.

To Mr. Marsden, for washing machine, £1.

To Messrs. Barrett and Ashton, of Hull, gold medal.

SHORT HORNED CATTLE.

For the best Bull of any age, £25; second ditto, £10.—1. A. L. Maynard, Marton, Ripon; bred by him. 2. F. H. Fawkes, Farnley Hall, Otley; bred by Mr. Wodehouse.

For the best Yearling Bull, £20; second ditto, £10.—1. Richard Booth, Warlaby, Northallerton; bred by him. 2. Sam. Wiley, Bransby, York; bred by him.

For the best Bull Calf, £10; second ditto, £5,—1. Charles Towneley, Towneley Park, Barnley; bred by Richard Eastwood. 2. John Booth, Kellerby, Chatterick; bred by him.

For the best Cow of any age, in calf or milk, £15; second ditto, £5.—Both prizes to Richard Booth, Warlaby, Northallerton; bred by him.

For the best three-year-old Cow, in calf or in milk, and having had a calf, £15; second ditto, £5.—1. Richard Booth Warlaby, Northallerton; bred by him. 2. Marquess of Londonderry, Wynyard Park, Stockton-on-Tees; bred by John Robinson.

For the best two-year-old Heifer, in calf, £10; second ditto, £5.—1. Lord Feversham, Duncombe Park, Helmsley; bred by his lordship. 2. F. H. Fawkes, Farnley Hall, Otley, bred by him.

For the best yearling Heifer, £10; second ditto £5.—1. Benjamin Wilson, Brawith, Thirsk. 2. Charles Towneley, Towneley Park, Burnley; bred by Sir Charles Tempest, Bart.

For the best Heifer Calf, upwards of six months old, £10; second ditto, £5.—1 Charles Towneley, Towneley Park, Burnley; bred by Richard Eastwood. 2. F. H. Fawkes, Farnley Hall, Otley; bred by him.

CATTLE OF ANY BREED.

For the best Cow for dairy purposes, £10. Edwin Eddison, Headingley, Leeds; bred by William Cattle.

For the best fat Ox ot any age, £5.—Lord Fitzwilliam, Wentworth-house, Rotherham; bred by his lordship.

For the best fat Cow or Heifer of any age, £5.—Samuel Wiley, Brandsby, York; bred by him.

LONG WOOLLED SHEEP.

For the best Yearling Ram £20; second ditto, £10.—1. John Borton, Barton-le-street, Malton.—2. George Robinson, Carnaby, Bridlington; bred by him.

For the best Ram of any age, £10: second ditto, £5.—Both prizes to John Borton, Barton-le-street, Malton; bred by him.

For the best Pen of five Ewes, £10; second ditto, £5—1. Robert Dawson jun., Sewerby-field, Bridlington; bred by him. 2. George Warmsley, Bempton, Bridlington; bred by him.

For the best Pen of five Shearling Wethers, £10.—George Walmsley, Rudston, Bridlington; bred by him.

For the best Pen of five Shearling Gimmers, £10; second ditto, £5.—1. George Warmsley, Rudston, Bridlington; bred by him. 2. W. Dudding, Saxby, Spittle; bred by J. W. Dudding.

PIGS.

For the best Boar, large breed, £6; second ditto, £3.—1. Edwin Eddison, Headingley, Leeds; bred by David Cooper. 2. J. R. W. Atkinson, Elmwood-house, Leeds; bred by Mr. Hopper.

For the best Sow, large breed, in pig or milk, £6; second ditto, £3.—1. Timothy Smith, Hoyland-hall, Barnsley; bred by him. 2. J. R. W. Atkinson, Elmwood-house, Leeds.

For the best Boar, small breed, £6; second ditto, £3.—1. H. L. Maw, Tetley Crowle; bred by him. 2. Robert Smith, jun., Sharow, Ripon; bred by W. F. Hobbs.

For the best Sow, small breed, in pig or milk, £6; second ditto, £3.—1. George Leather, Knowsthorpe, Leeds; bred by Edwin Eddison. 2. G. E. Taylor, Oatlands, Leeds, bred by Edward Wilson.

For the best Three Store Pigs, of the same litter, from four to nine months old, £6; second ditto, £3. 1. Joseph Naylor, Chapeltown, Leeds; bred by him. 2. S. Napoleon, Bobert Milestone, Leeds; bred by William Morritt.

HORSES.

For the best Stallion for Hunters, £10; second ditto, £5.—1. R. Reed, York; bred by Lord Wenlock. 2. George Holmes, Thirsk; bred by Mr. Backhouse,

For the best Stallion for Coach Horses, £10; second ditto, £5.—1. Thomas Moss, Scargill, Richmond; bred by Mr. J. Smith. 2. Thomas Denby, Rawcliffe, Selby; bred by Mr. Clarkson.

For the best Stallion for Roadsters, £10; second ditto, £5.—1. John Baxter jun., St. Peters, Norfolk. 2. Parkinson Fort, Silsden, Skipton; bred by John Horner.

For the best stallion for agricultural purposes, £10; second ditto, £5.—1. John Ramsbottom, Bilham Grange, Doncaster; bred by J. Newton. 2. W. Foster, Otley; bred by Thomas Renton.

For the best mare and foal for hunting, £5; second ditto, £2.—1. Edward Ackroyd, Denton Park, Otley 2. J. T. Leather, Leventhorpe, Leeds.

For the best mare and foal for coaching, £5; second ditto, £2.—1. Botterill Johnson, Frodingham Bridge, Driffield; bred by Edmund Johnson. 2. Robert Goodlass, Hutton Cranswick, Driffield; bred by him.

For the best roadster mare and foal, £5; second ditto, £2.—1. Joseph Woodhead, Gomersall, Leeds. 2. George Holmes, Thirsk.

For the best mare and foal for draught, £5; second ditto, £2.—1. W. Walker, Winmoor Farm, Leeds. 2. John Simpson, Hunmanby, Scarborough; bred by him.

For the best three-year-old hunting filly, £5.—John Simpson, Hunmanby, Scarborough; bred by him.

For the best three-year-old hunting filly, £5.—Botterill

Johnson, Frodingham Bridge, Driffield; bred by Edmund Johnson.

For the best three-year-old coaching gelding, £5.—William Johnson, Brigham, Driffield; bred by John Foster.

For the best three-year-old coaching filly, £5.—Christopher Jordison, Lockington, Beverley; bred by him.

For the best two-year-old coaching gelding, £5.—John Robinson, Leckby, Thirsk.

For the best two-year-old coaching filly, £5.—John Smith, Marten Lodge, Bridlington; bred by R. Smith.

For the best three-year-old hackney gelding, £5.—N. T. L. Hodgson, Highthorne, Thirsk.

For the best three-year-old hackney filly, £5.—Edward Donkin, Westow, York; bred by John Beasley.

Foa the best pair of horses of either sex, for agricultural purposes, worked during the season, £5; second ditto, £2.—1. T. C. Johnson, Chevet, Wakefield; bred by him. 2. George Leather, Knowsthorpe, Leeds.

LEEDS, THURSDAY.—The annual meeting of the Yorkshire Agricultural Society was brought to a close last night, by a public dinner in the New Stock Exchange, where a large company sat down to an excellent and exceedingly abundant entertainment. The Right Hon. the Earl of Carlisle presided; the Right Hon. Lord Harewood occupied the vice-chair; and the guests' tables were surrounded by Lord Galway, the Hon. and Rev. the Dean of Ripon, Sir J. V. B. Johnstone, W. Beckett, Esq., M.P., the Hon. Mr. Webster, W. R. C. Stansfield, M.P., Edmund Denison, M.P., J. G. Smyth, M.P., the Mayor of Leeds, and the principal gentry of the district.

After the usual loyal toasts had been drunk, the Earl of HAREWOOD gave "Success to the Royal Agricultural Society," which was received with three times three.

Sir JOHN JOHNSTONE, Bart., M.P., responded in appropriate terms.

Mr. E. DENISON, M.P., then proposed the health of the noble President, in a speech highly laudatory of his lordship's virtues and public services.

The toast was drunk with applause, again and again reiterated, and

The Earl of CARLISLE, on rising to respond, was most warmly greeted. His Lordship adverted to the fact that no district and no place was more happily suited than that in which they were met to enforce the reconciling and stimulating lesson how much they all depended on each other; how close and instantaneous a chord of sympathy, quicker even than the electric chain, connected together the farmer's barn and the tradesman's till. The noble Earl then alluded to a measure which had just passed through Parliament—a bill for allowing the borrowing of money by private individuals for drainage on their own properties. It was a bill brought in and suggested by the Duke of Richmond, to whom the promoters of British agriculture always felt a large debt of gratitude. For the protection of the borrower and of his successor, and of the remainder men, whoever they may be, there would be the security of an organized superintendence, that of the Drainage Commission, and of the execution of the work by skilful and practical inspectors. And for the protection of the person who lent the money, there would be a first charge made on the property so improved, equivalent to the increased amount of value which had been imparted to the property. And, as the amount of interest would not exceed five per cent., it was calculated that by allowing three per cent. additional, to repay the principal, a sum total of eight per cent. would pay off both principal and interest in the course of twenty-two years. The person who was to succeed to the estate would have the security of competent and practical men that the money would be well laid out, and that no more would be laid out than the actual money's worth; and the lender would then have the security, that in the space of twenty-two years the whole sum, consisting of both principal and interest, would be repaid to him. The noble lord next glanced at the difficulties to which both the agricultural and manufacturing interests had been exposed, and concluded by expressing his conviction that better prospects were brightening before them, and that if there be a determination entered into, with a humble dependence upon the source of all endeavour and of all success—if there be a determination never to be put down (Hear, hear)—never to give way, then he felt confident that their manufactures would be successful, that their trade would be universal, their agriculture victorious—the teacher of new arts, the source of new riches, the dispenser of new blessings, to every generation of our race.

The meeting was also addressed by Lord Galway, Mr. W. Beckett, M.P., Mr. J. E. Smyth, M.P., the Mayor of Leeds (Mr. John Hope Shaw), Mr. James Brown, Mr. Smith, of Burley, Rutlandshire, Colonel Tempest, the Hon. and Very Rev. the Dean of Ripon, Mr. John Gott, Mr. H. S. Thompson, Mr. R. Creyke, and other gentlemen, in the capacity of successful competitors, or the proposers of complimentary toasts, which included the customary series.

THE EFFECT OF CHARCOAL ON FLOWERS.—About a year ago, I made a bargain for a rose-bush, of magnificent growth, and full of buds. I waited for them to blow, and expected roses worthy of such a noble plant, and of the praises bestowed upon it by the vender. At length, when it bloomed, all my hopes were blasted. The flowers were of a faded colour, and I discovered that I had only a middling multiflora, stale-coloured enough. I therefore resolved to sacrifice it to some experiments which I had in view. My attention had been captivated with the effects of charcoal, as stated in some English publications. I then covered the earth in the pot in which my rose-bush was, about half an inch deep, with pulverised charcoal. Some days after, I was astonished to see the roses, which bloomed of as fine a lively rose-colour as I could wish. I determined to repeat the experiment; and therefore when the rose-bush had done flowering, I took off the charcoal, and put fresh earth about the roots. You may conceive that I waited for the next spring impatiently, to see the result of this experiment. When it bloomed, the roses were, as at first, pale and discoloured; but by applying the charcoal, as before, the roses soon resumed their rosy-red colour. I tried the powdered charcoal likewise in large quantities upon my petunias, and found that both the white and the violet flowers were equally sensible to its action. It always gave great vigour to the red or violet colours of the flowers, and the white petunias *became veined with red or violet* tints; the violets became covered with irregular spots, of a *bluish*, or almost *black* tint. Many persons who admired them thought that they were new varieties from the seed. Yellow flowers are, as I have proved, insensible to the influence of the charcoal.—Revue Horticole.

MR. MECHI'S AGRICULTURAL GATHERING AT TIPTREE HALL.

However high Essex may stand in the ranks of improved or modern agriculture, it claims a success that has unquestionably been attained on the most legitimate grounds, and by the soundest and surest of ways. Other counties, perhaps, may have surpassed it in the rapidity with which their celebrity has been reached and acknowledged; still, this fame has generally been associated more or less with a certain kind of individual patronage, without which, it might fairly enough be argued, such superiority would never have even been aimed at, much less allowed. The county of Norfolk, for instance, will always have its pristine, and so, in some measure, its continued excellence coupled with the name of the late Lord Leicester; while Lincolnshire, again, will as deservedly trace back to the judicious liberality of the Yarborough family. These districts have, in fact, warmed into life and prominence under the sunshine of a patronage that, should gratitude ever forget, history will take care never to disregard.

Without for one moment attempting to disparage the worth of many of the Essex landlords, we may still venture to assert that the county owes little of its present position to any such source. The rise and progress of agriculture in Essex is mainly attributable to the exertions of its *working men*: it is with the industry, energy, and ability of this class that we couple the good doings of Essex—with the names of such men as William Hutley, Fisher Hobbs, Robert Baker, and others, who learned their trade, fought their way, and obtained their influence and character *as working men*.

In no locality, then, could a kindred spirit—a man with the strength and courage of a working man, backed with the innate talent of a master mind—have better established himself than in this county—in one where his efforts would be certain to meet with their proper reward. If he succeeded, who so well able to appreciate him as those who best understood what he had accomplished? If he failed, who so fit to stop or teach him as those whose own works had already shown them well qualified to do so?

On terms something very like these has Mr. Mechi settled at Tiptree. If he succeeds—and succeeded he often has—his merit is never denied him; while, should there be the least point of a failure, we want not the eager eye of a stranger to point out his mistake so long as there is a William Hutley or a Fisher Hobbs within a few miles of his own door—good and keen judges, willing to tell him all openly and plainly in that true spirit in which an Englishman alone can give and take.

The course adopted by Mr. Mechi for testing himself and his works is as open as his aim is commendable. He has no nicely squared statement, published just now and then, to proclaim that he has done what no man ever did before—no "hiding a blunder or concealing a trip," but a direct challenge and hearty welcome for all to examine all he attempts—to approve and adopt should they so think fit—to condemn and ignore any plan that might seem to defy the patent of practice. If the latter course be necessary, we hope ever to see it expressed with the due feeling and courtesy of gentlemen; remembering always, that whatever their result, Mr. Mechi's labours have a directly national aim and use, and that, like the buoys at sea, they may serve to avoid if not always to attract.

We were glad to find on our visit to Tiptree, on Thursday, July 12, that agriculturists were becoming more and more inclined to look at the picture in this light. They begin to properly appreciate now the earnest endeavours as well as the jovial liberal spirit of the man—they begin to discern that any success of his may be equally their own, while it is attempted at a cost in which they are liable to no risk. Should, though, the anxiety to attack still remain in some quarters, there was but little opportunity for its display at the last annual gathering. From the hundred to a hundred and fifty assembled, we heard but one opinion—that Tiptree Farm was never in better working condition, and that the Tiptree wheat crop was one of the very finest of the year, take the width and the breadth of the land through. There were, as will be observed in our summary of the speeches, a few objections to lesser points from old friends but impartial judges; while, taking the whole round of the farm and the visitors, we never collected a more satisfactory verdict of approval than was passed on Thursday last: the opinion, in fact, of the meeting seemed very much expressed in the quiet observation of a Norfolk man, who, after marking lynx-eyed every sign and token about the place, and deliberating a little inwardly on the great outlay with which everything was achieved, remarked, "Well, mind you, I have heard a good deal, but I never saw this before; and now, mind you, I aint going to say but what it may pay him."

At half-past three, the survey being concluded, the company sat down to a cold collation in the long room—

a repast designated by Mr. Mechi, in his invitation card, as a lunch, though a more perfect entertainment of the kind we never saw. We only hope some members of the Council of the Royal Agricultural Society who were present will take care to report, before the next great meetings, how such things can be accomplished. A refinement of taste in arrangement and display vied with the boundless hospitality with which all was provided, and the excellent attention and tact with which it was served. Had we not the fear of Mr. Baker's greater experience before our eyes, we should have hazarded a compliment to Mrs. Mechi, that we need hardly say was most worthily responded to by her guests when it was introduced.

Mr. Mechi was faced by Mr. Fisher Hobbs as vice-chairman, and supported, amongst others, by the following gentlemen:—The Reverend Sir John P. Wood; Captain Skinner, R.A.; Mr. Hawkins, Mayor of Colchester; Mr. R. Baker, of Writtle; Mr. R. Garrett, of Leiston; Mr. Round, of Hadleigh; Mr. Allman, Professor of Natural Philosophy, Dublin University; Mr. J. Paul, of Thorpe Abbotts, Norfolk; Mr. Bale, of Diss, Norfolk; Mr. R. Dixon, of Witham; Mr. W. Bullock Webster, of Hornsdown; Mr. Holmes, of Huddersfield; Professor Hazelwood, of Hoddesdon; Mr. Caldecott, of Fawley; Rev. G. Wilkins, of Wix; Mr. Garrard, of Colchester; Mr. Bawtree, of Abberton; Mr. Corbet, Secretary of the London Farmers' Club; Mr. Dix, Secretary of the Harleston Farmers' Club; Mr. Kersey, Secretary of the Hadleigh Farmers' Club; Mr. White, late Secretary of the York Farmers' Club, &c., &c.; ninety-six in all sitting down.

After the usual loyal toasts, the company joining in the national anthem on the health of Her Majesty being given, the Chairman proposed the "Army and Navy," which was briefly responded to by Captain Skinner. In introducing the next toast, "The Bishop and Clergy of the Diocese," with which he coupled the name of Sir J. P. Wood, Mr. Mechi remarked on the necessity for some further church accommodation in his neighbourhood, in aid of which he should be ready at any time to contribute £100, should the erection of a new church be decided on (cheers).

The Reverend Sir J. P. Wood, in acknowledging the toast, dwelt on the advantage of a good feeling between the clergy and agriculturist, and the high character the Bishop of that diocese had so long and deservedly maintained. He, further, took the opportunity of proposing the health of a gentleman, which he was sure would at once be responded to in the manner he could wish—of a gentleman who had been one of the first to unite science with practice, and to whom they already owed much for the improvements he had effected in agriculture. The reverend gentleman, after remarking on the advantage all classes of society must reap from a system of high farming, and the national benefit those gentlemen conferred who led the way in such an improved course, gave the health of their esteemed friend and host, Mr. Mechi, with many thanks to him for the kindness and liberality with which he had entertained them on this as on all former occasions.

The toast was received with three times three, the company answering to it in the most enthusiastic manner.

Mr. Mechi in returning thanks observed, that he took the compliment rather to the cause than to the man; to that cause which afforded what an increase of population is continually requiring, an increase of employment and an increase of labour. He felt there were many difficulties in the way of improvement, many prejudices to be removed; prejudices, however, being not confined solely to farmers or landlords, but extending to all classes, and causing them, for example, at one time to regard rail-roads as curses, as he might instance a case in his neighbourhood. To remove prejudice from the mind of the agriculturist he felt assured that meetings of this kind, one with another, would be attended with better effect than any Act of Parliament that could ever be devised. He was ever anxious to appeal to practical men as to whether they considered his system profitable or not; of one thing he was certain, that in many instances both landlords and tenants were over-landed. The great want at present in agriculture was more capital; and with less land to lay their money out on, he felt convinced, as a rule, that men would do far better. Of course, to ensure their outlay, farmers must be guarded by a lease, or an equitable kind of compensation in the event of their quitting. In reference to what they had seen that day, he confessed that in one item, that of stock, he himself was not satisfied, but he hoped by next year to show them a better herd. In conclusion, Mr. Mechi strongly advocated high farming and the general good with which it was accompanied; while he adverted to the too often neglected education of the farmer and the condition of the labourer. The former, with such institutions as those at Cirencester and Hoddesdon, ought no longer to be allowed; and in improving the lot of the labourer he was assured every master was benefiting himself quite as much as the man by so doing. He intended educating all the youths in his employ, and he would strongly urge this subject on the attention of those around him.

The Chairman next gave success to the Royal Agricultural Society, and with it the health of Mr. Hobbs, a member of the council, and a most successful exhibiter at the late meeting. He trusted there were none present but who read the Journal of that Society, and profited by the valuable information contained in it. For his own part he had found that many notions which he had prided himself on as being very clever had been anticipated by others in the Journal of the Society.

Mr. Fisher Hobbs, who was very cordially received, could not take that reception to himself, but to the Society. He trusted that the exertions of the Council at the Norwich Meeting had met with the approbation of the public: in one particular he had heard, and knew there was cause of complaint, viz., as to the style of dinner provided. The blame, however, in that case, rested not with the Council, but with the Local Committee: he hoped, however, that at their next Meeting at Exeter they would find a recurrence of this would be guarded against. As regarded what he had been over that day, he could honestly say that he had never seen a finer wheat crop at Tiptree: but while he said this without flattery, he should, though he had not the happy knack of his friend their host, venture to mention one or two things he could not so highly approve. His great complaint with his friend Mechi was, not that he went too fast, but that he did *not go fast enough*—not that he drained too deep, but that he did not drain deep enough nor close enough. He also thought the root crops he had seen were not what they should be; and he believed they might be much better, did Mr. Mechi depend more on autumnal cultivation and less on his spring ploughing. Mr. Hobbs further expressed the necessity of steam or water-power for carrying out all the great operations of farming, and stated that the prize steam-engine, exhibited by Mr. Garrett at the Norwich Meeting, had been purchased by Mr. William Hutley, of Power's Hall.

The Chairman next gave, "Success to the London Farmers' Club," and with it the health of Mr. Robert Baker, who had been one of those mainly instrumental in forming it, and who had frequently obliged them by acting as chairman at the meetings. He (Mr. Mechi) had a great liking for clubs in general—excepting only clubs in France—and this one, the head of all the farmers' clubs in the kingdom, he felt had, and was, doing a great deal of good. Mr. Baker they nearly all knew too well individually to need his expatiating on his many good qualities then. However much they two might at times differ in public, they were always good friends, and he sincerely hoped, as he knew all who heard him did, that Mr. Baker would be long spared amongst them. He was one who, whatever he advocated, did so with the most thorough sincerity and anxiety for the welfare of the agricultural interest.

Mr. Baker, who was received with prolonged cheering, said that, in conjunction with Mr. Fisher Hobbs and others, he had, in the outset, taken great interest in the establishment of the London Farmers' Club. It had struck him that, if the local clubs were found to work so advantageously, one might be made still more beneficial by assembling at its meetings members from different parts of the country. Mr. Baker proceeded to congratulate the company on the spirit and highly intellectual faculties of their host, and the treat they had enjoyed from the exercise of them that day. They had many great names in agriculture that marked the ages in which they flourished, and they could so trace down from Tull, Tusser, Marshall, Young, and others, to Mr. Mechi himself. After some able observations on the value of a turnip-crop, and the policy of breaking up grass-lands, especially those of a better description, Mr. Baker concluded by proposing the health of Mrs. Mechi, with three times three, and many thanks to her for the sumptuous banquets he had provided for them.

The toast was duly honoured and responded to by Mr. Mechi, who then gave, "The Local Farmers' Clubs," and with it Mr. Kersey, of the Hadleigh Club, to which that gentleman briefly responded. This was followed by "William Shaw, and our other absent friends," in proposing which Mr. Mechi made very favourable mention of Mr. Shaw's desire to serve the cause of agriculture, and instanced his aid in establishing the Royal Agricultural Society, as also the London Farmers' Club, and the determined stand he had made for "Tenant Right." A great number of the guests left after this for the up and down trains at Kelvedon, though a good party still remained of those not dependent on the time-table for their ride home.

ONE POUND SHARES.—A new and excellent way of dividing the capital of companies has been most successfully adopted by the Islington Cattle Market and Abattoir Company, empowered by special act of Parliament. The one pound is to be paid in full on allotment of the shares, thereby avoiding all calls. This company is receiving a great deal of support, and the public are taking up the shares well; one gentleman has taken 6,000. The rental of the houses, &c., on the Islington Market estate ensures interest on the capital, and the responsibility is limited to the amount of the shares. There is now no doubt whatever of Smithfield Market being abolished. "Hereditary rights" must give way to public convenience, public morals, and public health. One good proof of profitable results from the Islington Market may be inferred from the Liverpool Cattle Market, which was formerly in the centre of the town. It has been removed to the suburbs, and the £25 shares pay a dividend of £2 18s. per share per annum, exclusive of the abattoirs, which are paying, in addition, 20 per cent. more profit to the shareholders. Our readers are aware that the parliamentary committee have condemned Smithfield, and state that it ought to be removed.—*Morning Post.*

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IMPROVED IRON PIPES FOR WATER, GAS, AND DRAINAGE.—Sheet-iron pipes of a peculiar description were patented in 1838, by M. Chameroy, a French engineer, and which have in France been extensively employed for gas, water, and drainage, being, as numerous testimonials show, more economical than cast-iron, possessing freedom from all leakage, are uninjured by salts or acids, bear great deflexion without injury, and for water are far more conducive to health. Messrs. Fox, Henderson, and Co., of the London Iron Works, Birmingham, have purchased the exclusive license for their manufacture in England, and erected machinery for executing large contracts. They are made of sheet-iron, bent to the requisite form, strongly rivetted together, and coated with an alloy of tin; the longitudinal joints are also soldered, rendering them air-tight and waterproof. For additional stiffness and protection they are then coated on the outside with asphalte cement, and when intended for water, the inside is also coated with bitumen, which resists, like glass, the action of acids and alkalies. They become so elastic by these processes, that an 8-inch pipe will bear a deflection of 1 foot in 50, without leakage at the joints, or injury to the pipe itself. The vertical joints screw together similar to a cast-iron gas-pipe.

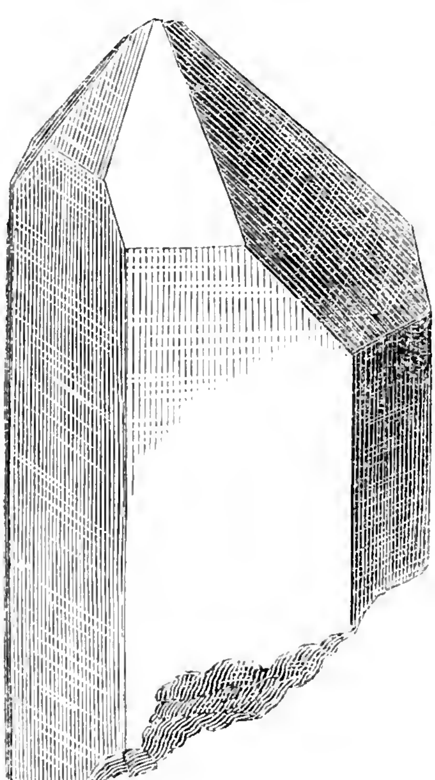
ON THE CONSTITUENTS OF THE SOIL.

BY J. C. NESBIT, ESQ., F.G.S., M.C.S.L., &C.

ON SILICA.

Silica, or pure sand, is a constituent of an immense variety of rocks, and is found in greater or less quantity in soils of every description. It is contained in granite, and most of the other primary rocks. In the massive state, it occurs in extensive veins, and the sandstone rocks of many districts are sometimes almost wholly composed of silica nearly pure, although common sands are generally contaminated with oxide of iron.

The sands of the sea-shore contain variable proportions of silica. Some sands approach pure silica, as the beautiful white sand of Alum Bay, in the Isle of Wight. The fine white powder found within certain round flints is nearly pure silica, as are also some of the sands of the greensand formation, as in the quarries of Reigate, in Surrey. Some of the sands of Alum Bay exhibit the most curious and fantastic combinations of colour, of which they are said to form no less than 63 distinct shades. Common flint contains about 98 per cent. of silex, combined with small portions of alumina, lime, oxide of iron, and water.



The beauty of silica in its crystalized form is exceedingly striking, as may be observed in the crystals of quartz (crystalized silica.) The quartz crystal is a six-sided prism, surmounted by a six-sided pyramid, and is represented by the annexed woodcut. The finest quartz crystals are found amongst the Alps, in France, and the Savoy. Many very large ones, some nearly the size of a man, have, however, been brought from South America and Madagascar. Smaller quartz crystals are found at Buxton, in Derbyshire, and Bristol, where they are called *diamonds*. The silex crystal will scratch glass, as any one may easily prove for himself. Although it has this property in common with the diamond, it has not the same composition, for the diamond is composed of carbon.

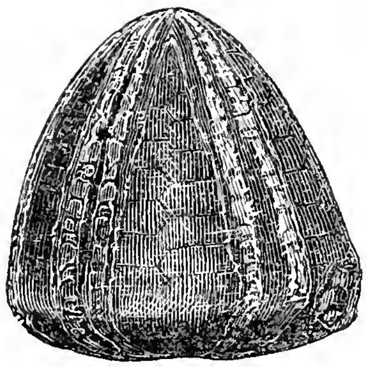
Silica occurs very largely, in veins, in the massive state, in many districts. It also is largely contained in granite. Granite consists of mica, quartz, and felspar. Quartz is nearly pure silica, and felspar contains 64 per cent. of silica. Silica forms the basis of many precious stones, as may be seen by a reference to the following table

	Silica.	Alumina.	Lime.	Iron.	Water.
Amethyst*	97.5	0.25	—	0.75	—
Rock crystal	96.38	a trace.	—	a trace.	—
Opal	90	—	—	—	10
Flint	98	a trace.	a trace.	a trace.	1 to 2
Chalcedony	84	16.00	—	—	—
Cornelian, Agate, Jaspar	Differ little from chalcedony				
Garnet	33.75	27.25	—	36	—
Stilbite	58.9	16.1	9.2	—	16.4

One of the most common forms in which silica is met with, is the common flint. It is found in the chalk in the most grotesque forms. The smallest piece of flint cannot be examined by a microscope, without detecting in it traces of organic life, either in the form of spongites, the remains of the coral insect, or a zoophite of some description, which have been enveloped by the silica whilst it was gradually deposited. Sometimes the silica has been deposited in the interior of different shells, of which it has taken faithful casts. One of the most common in the chalk is the cast of the *echinus*, or sea urchin, of which figure 2 gives a representation.

They are sometimes known by the names of the Pharisee's loaf, the fairy's loaf, and the shepherd's crown.

* The amethyst owes its colour to a trace of manganese.



Cast of echinus.

In the Weald of Kent and Sussex is sometimes found a very peculiar sandstone, which bears ripple marks, and is, consequently, known to geologists as the ripple sandstone of the Weald. The markings of this stone have evidently been made by the waves on a beach when the stone was in a soft state, and the existence of the stone proves that the whole of that part of the country was once covered by the sea or by an immense river. In some geological formations are to be found the remains of whole forests of trees, which no longer consist of wood, the carbonaceous matter having been all replaced by sand or silex.

A paper was read a short time since, at a meeting of the Geological Society, describing an immense forest of these petrified trees, which has been discovered in Australia. Some of these were seven or eight feet in circumference.

One of the most singular forms in which silex is found is in what are called potato-stones. They are found, amongst other places, near Bristol. They are sometimes picked up on the beach, and have nothing in particular to distinguish them, except being large and round. When broken, however, they are found to be hollow spheres, the internal surface of which is covered with sparkling quartz crystals of the most beautiful description.

It is a great problem, which we shall not pretend to solve, how these stones have been formed. They evidently must have been hollow, like the skin of an orange with the fruit extracted, before they became solidified, because the crystals have been formed inwardly, with their bases towards the exterior.

Silica is not so insoluble a substance as is generally supposed, for there are abundant modes by which it can be rendered soluble. The idea of its insolubility probably arises from our constantly seeing so many glass and siliceous vessels used for holding fluids; but the fact of the existence of crystals of silica (quartz) would at once show that there must be some mode of rendering silex soluble. The Geysers, which are boiling springs in Iceland, throw up silex in solution in a considerable quantity, thus showing that the silex in the bowels of the earth is, by some chemical process, rendered soluble. Potash and soda are found to be mixed with silex in the water of these springs; and when the water comes into the air, the silex is deposited. Judging by the accounts we have received from travellers who have visited them, there are few objects more beautiful than the Geysers. These springs are indeed intermittent fountains of boiling water, which throw up their contents by a series of jets from twelve to ninety feet high, which are ejected with a noise resembling discharges of cannon. The principal spring rises from a shaft twelve feet in diameter, and seventy feet deep, in the midst of a natural basin of about fifty feet in diameter. Sir John Stanley, in his description of the principal one of these springs, says—"We observed the water in the basin to be much agitated; it boiled violently, and heaved as if some expansive power were labouring beneath its weight, and some of it was thrown up a few feet above the basin. Again there were two or three shocks of the ground, and a repetition of the same noise. In an instant the surrounding atmosphere was filled with volumes of steam, rolling over each other as they ascended, in a manner inexpressibly beautiful, and through which columns of water, shivering into foam, darted in rapid succession to heights, which, at the time, we were little qualified to estimate; but afterwards ascertained, by means of a quadrant, to be about 96 feet. At last, the water having filled the basin, it rolled in great waves over its edge, and forming numerous rills, made its way down the sides of the mound. Much was lost in vapour also, and still more fell to the ground in heavy showers of spray. The intervals at which the several jets succeeded each other were too short for the eye to distinguish. As they rose out of the basin, they reflected, by their density, the purest and most brilliant blue. In certain shades the colour was green, like that of the sea; but in their further ascent all distinction of colour was lost, and the jets, broken into a thousand parts, appeared as white as snow. Several of them were forced upwards perpendicularly; but many, receiving a slight inclination as they burst from the basin, were projected in beautiful curves, and the spray which fell from them, caught by a succeeding jet, was hurried away still higher than it had been, perhaps, before. The jets were made with inconceivable velocity, and those which escaped uninterrupted, terminated in sharp points, and lost themselves in the air." These springs have been playing, according to historical records, for 600 years. The incrustations, which are formed of the silex on the border of the basin, and the edges of the streams running out of it, are said to be remarkably beautiful, resembling in shape the heads of cauliflowers, of extremely delicate formation. The siliceous deposits from these hot springs cover an area of upwards of thirty square miles, and contain large quantities of impressions of mosses, leaves, &c., the minutest fibres even of which are preserved. The siliceous matter likewise exists, from a loose spongy texture, to the most transparent and hard masses, resembling agate or opal.

Dr. Forchammer has shown that the analysis of the water of these springs would indicate that the siliceous and other mineral matter was derived from the disintegration of albite or soda felspar, and of silicates of magnesia, minerals of frequent occurrence in volcanic districts. If this be the case, a portion of the silica and the soluble ingredients are brought up by the water, whilst the other ingredients, alumina, silica, &c., are forming beds of clay in the interior of the earth.

The following is Dr. Forchammer's analysis of the water:—On evaporating 28 ounces of this water, a residuum was obtained weighing 5.817 grains. This was composed of—

Silica	0.506
Soda (free)	1.767
Chloride of sodium (common salt)	2.264
Sulphate of lime (gypsum)	0.453
Sulphate of magnesia (Epsom salts), and sulphate of soda (Glauber salts)	0.827

Another exceedingly curious form in which silex is found near Paris, is the float-stone, or, as the Germans call it, the *schwimmstein*, from its extreme lightness and porosity. It is sometimes, for the same reason, called spongiform quartz. It is composed of very minute crystals, scratches glass, and possesses the singular property of swimming in water. This is possibly the sort of stone which we read of in history, as having been used by the Romans in the upper part of some of their ships. It is very little heavier than wood.

The best amethysts are brought from Cambray, in India, from Siberia, Ceylon, and Persia, where they are found lining the geodes, or nodules, and in rolled masses. Of inferior transparency and hue they occur in Sweden, the Hartz, Bohemia, Transylvania; in agate balls at Oberstein; in Germany; in large crystalline groups, near Cork, and in several parts of the United States.

The garnet is principally found at Ceylon, and Pegu, where it occurs in alluvial deposits; and Greenland, whence many fine stones have been obtained for the purposes of the lapidary. In smaller but most beautiful crystals it is found in the Alps, in Piedmont, sometimes near Ely, in Fifeshire, and in several parts of Bohemia. The garnet is believed to be the carbuncle of the ancients.

Tripoli, which is so much used for polishing, contains 90 per cent. of silica. A peculiar kind of tripoli, called polishing slate, occurs near Bilin, in Bohemia; in very extensive strata, in many places 14 feet in thickness. The following is its composition according to Bucholz;—

Silica	83·5
Alumina	4·0
Lime	8·5
Oxide of iron	1·6
Water	9·0

When the substance is examined by the microscope, the most astonishing facts are brought to light. Ehrenberg, the great German philosopher, tells us that these immense deposits consist almost entirely of the minute siliceous shields or coverings of a very small animalcule. So wonderfully small are the fossil remains of these animals, that it takes 187 millions of them to weigh one grain. One cubic inch of this slate contains the remains of forty-one thousand millions of these animalcules! Ehrenberg has likewise discovered that many of these animalcules, with siliceous covering, live at the present day.

The living species are found in the springs of Carlsbad, in Bohemia; and on analysis, the water of the springs is found to contain silica in solution, from which the animalcules derive their siliceous coverings. How admirably has the Almighty adapted external circumstances to the wants even of the most minute creatures.

A most important purpose served by silex is that of forming the enamelled glossy surface of the straw crops of our agriculturists. It also serves a similar purpose with several other classes of plants. The bamboo cane possesses the property of secreting this silex to so great an extent, that nodules of siliceous matter, weighing several ounces, have sometimes been found secreted in its joints.

Wood, which has been for a length of years subject to the action of water, frequently become silicified. Some time since a piece of timber, in Trajan's bridge over the Danube, was found to have been, to the depth of half an inch, converted into agate. It will be seen that the natural history of this substance—silica—is as interesting as its uses are important.

Pure silex can be obtained in various ways from sand, flints, &c. One of the best ways is to take some flints, make them red hot in a common fire, and then quench them suddenly in cold water. This will make them easily pulverisable. They must then be reduced to a fine powder. One ounce of the powdered flints must now be mixed with 3 oz. of carbonate of potash and

1 oz. of carbonate of soda. The whole must be melted in a crucible placed in a common fire until in tranquil fusion, when it forms a kind of glass. The crucible should be capable of holding at least four times the quantity of the mixture put into it, and must be subject to a steady fire heat for about a quarter of an hour. As it gets hot, considerable effervescence will arise, and the viscid mass will foam up very much, but must be pushed down by a piece of iron wire. The effervescence is caused by the escape of the carbonic acid which was combined with the potash and the soda. The carbonic acid having been robbed of these two substances, by the superior affinity, at a red heat, of the silex for these alkalies, the compound remaining will be a mixture of silicate of potash and silicate of soda, together with some undecomposed carbonates of potash and soda.

Although a large part of the carbonic acid will be driven off, it will not all be expelled, as the mixture will be found to effervesce on the application of an acid.

The mixture having been perfectly fused, it is dissolved in water, which is easily done, and thus a transparent solution containing silica is obtained.

On adding muriatic acid to this solution, a gelatinous sediment will be deposited. If this sediment be well washed in distilled water, all the potash and soda will be taken away, and the silex will be left in a pure state. It must then be dried and ignited, and will then be pure silica.

Silex can be procured in another way, without the aid of so much heat. Fluoric acid or fluorine has a great attraction for silex, and if we take fluor spar, and powdered glass or sand, and mix them intimately with some sulphuric acid, and then heat this mixture in a retort, the fluo-silicicacid is evolved as a gas; and if it be made to pass through water, a considerable quantity of silex will be deposited. The action which takes place is this: The fluorine of the fluor spar unites with the silicon, or the base of the silicic acid, and these two are given out in the form of a gas. In passing through the water, which is composed of oxygen and hydrogen, the silicon takes oxygen from the water and forms silica, a portion of which is instantly deposited in the form of a beautiful white powder. The fluorine takes the hydrogen, and, in combination with a portion of silica, remains in solution in the water, and is called fluo-silicic acid.

The glass in common use is a silicate of potash of lead, but it contains three or four parts of sand to one part of potash, and is therefore insoluble in water and most acids. Common bottle glass owes its green colour to oxide of iron, and is composed chiefly of silicate of soda and lime. Other glasses owe their colour to oxides of antimony, cobalt, manganese, copper, chrome, and gold.

Some siliceous minerals are soluble in acids, and the amount of silica in them may be determined in the following manner:—

The mineral, finally powdered, must be digested for some time in muriatic acid, until the whole forms a gelatinous mass. This must be evaporated carefully to dryness, and the soluble matters washed out with water; the insoluble matter is silica, the weight of which must be ascertained by the balance. The quantity of silica or sand in guano can be determined in the same manner, by acting on it with muriatic acid. Genuine guano ought not to contain more than from 1 to $2\frac{1}{2}$ per cent. of silica, but it sometimes contains as much as 20 or even 30 per cent., either from a portion of the soil being brought home with it, or from its having been adulterated.

When siliceous minerals are insoluble in muriatic acid, they can be analyzed as follows:—

Let a quantity of the mineral in *very fine* powder be fused for half an hour, in a *platinum* crucible, with three times its weight of carbonate of potash, and its own weight of carbonate of soda. Dissolve the melted mass in muriatic acid and water, evaporate to dryness, and wash with dilute muriatic acid and then with distilled water; the insoluble matter is silica, which can be weighed as usual.

Silica is composed of one atom of silicon and three atoms of oxygen; reckoning the equivalent weight of an atom of hydrogen as 1, the atom of oxygen weighs 8, and silicon 28. Silica is therefore composed of—

1 atom of silicon, weighing	28
3 atoms of oxygen, weighing	24
	—
1 atom of silicic acid, or sand, weighing..	52

That is to say, every 52 parts of silica, or sand, contain 28 of silicon, and 24 of oxygen.

The specific gravity of silica is 2690, water being 1000. That is to say, if a certain bulk of pure water weighs 1000 lbs., the same bulk of silica would weigh 2690 lbs.

The chemical symbol for silicon is Si. Consequently, the symbol for silica is Si Oz. It is called by the French "Silice, or l'acide silicique," and by the Germans "Kieselerde, or Kieselsäure."

ON THE ADVANTAGEOUS GRAZING OF SHEEP AND CATTLE, WITH A VIEW TO INCREASING THE STOCK PRODUCING CAPABILITY OF THE SOIL.

BY M. M. M.

There are few persons so patriotic as to follow a pursuit from mere patriotism or philanthropy. Unless there is some prospect of profit—some object of honour or praise—or some special amusement attends the pursuit, we can hardly expect any one to embark in any speculation.

To make experiments in feeding is the duty of the grazier; of the physiologist and of the chemist to make experiments on the fat and flesh producing effects of the different kinds of food, and of the best modes of administering and adapting it to the wants of the stock. One recommends barley dry and whole, because the grinding of the teeth excites the secretion of saliva, and promotes the healthy action of the digestive and assimilative organs; another advises the barley to be crushed, to facilitate the dissolving of the starchy particles in the stomach and intestines; while a third insists on the whole being ground into flour, in order to give the animals the entire benefit of its nutritive qualities; and even beyond this will some writers go, and say, that there is the greatest amount of good to be derived to the animals by steeping and malting the grain; and so far is this supported and backed-out by practical men, that we have been assured by Mr. Fisher Hobbs, and other excellent agriculturists, that they know of no kind of food whatever which, given in small quantities, will produce anything like the rapid formation of fat and flesh—the glossy coat—the external signs of health and vigour, which a small quantity of malt will produce.

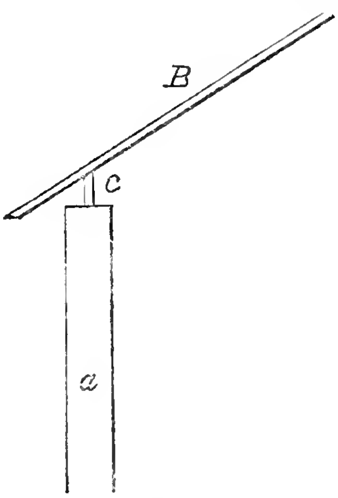
But even here there is but little known, so little that a government enquiry was made some time ago as to the value of malting barley, and so little was known, and so far were the experiments made, that the professors Thomson commenced a series of experiments with animals in Glasgow, which they gave out as satisfactory in their results, but than which it is difficult to conceive anything more thoroughly erroneous and vicious; and we have no hesitation in saying that, if there are no better data for scientific opinions generally than there are for this, they are not worth a single rush.

It is quite evident, therefore, that there is but little settled as to the best mode or pabulum of feeding stock, nor have they even better settled the precise conditions under which they should be kept. A question was raised at the recent meeting of the Yorkshire Agricultural Society, at Leeds, at the discussion after the council dinner, as to the temperature at which we should aim to keep feeding animals, and even this, in that large and intelligent meeting, did not meet with that speedy or ready answer which might have been expected. Mr. Rutson commenced by stating that some animals commenced perspiration, while others, in the same situation and circumstances, did not; and, it was observed by the attendants, that the perspiring animals were those which were thriving the fastest. We believe it to hold good as a general rule that, if forty oxen and forty heifers are placed in the same cow-house in the autumn, the oxen will be found perspiring most violently, while the heifers will be free from it; and yet it will be found that the heifers are thriving the fastest. *What* it is, or whether it should be checked or encouraged, or whether it is possible to do the one or the other, it is difficult perhaps to determine; still it does seem to be a truth by far too reasonable to doubt, that there can be no perspiration without a loss of substance, and therefore, other things being equal, it is better avoided than courted.

The best answer which could be given to the enquiry was that of H. S. Thompson Esq., who stated that last year he had some feeding bullocks, and he put eight of them into a warmer shed than the others; and, although they were fed with the same quantity and the same quality of food, the result was very different, for those in the warmer shed had, in the course of five or six weeks, made considerably more beef, and therefore it was clear that the warmth had done them good. He was unable to state exactly what temperature was the best, but he should say that from 55 to 60 degrees would be found the most favourable. When the temperature got above that, the animal was likely to be off its food, and that was the best test.

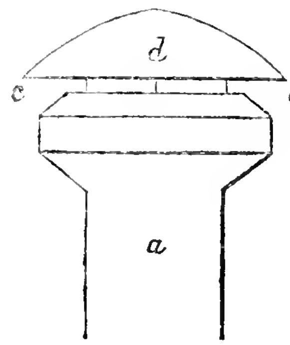
Connected with this is the subject of ventilation. And it must be remembered that there is all the difference in the world between hot air and bad air, and between coolness and ventilation; for though hot air will as such be continually tending upwards, and cold air will as such be continually descending, yet there are heavy gases which are very impure, nay poisonous; and hence the object of ventilation should be to admit the pure air to dilute the foul—to allow the foul air escape, and admit the oxygen. The principal gases which escape are, the carbonic acid gas, evolved from the lungs of the animals, and which is a heavy gas, and will have the tendency to remain at the bottom of the building; the sulphuretted hydrogen from the manure, which is a light gas, and tends upwards; and the ammoniacal gas is also a light gas, and has the same tendency.

There is an article in the last number of the Journal of Agriculture on the subject of ventilation, which contains some useful hints; laying down the axiom, that " no foul air can by any possibility be removed from the interior of a building, however well arranged the means for its exit may be, unless an ample supply of fresh air is admitted into it. For upper ventilators there are contrivances by far too numerous to describe. For cow-houses, however, a plan, by no means a bad one, is that which any builder may arrange *for* at the time he fixes the roof: It is this—



(Fig. 1.)

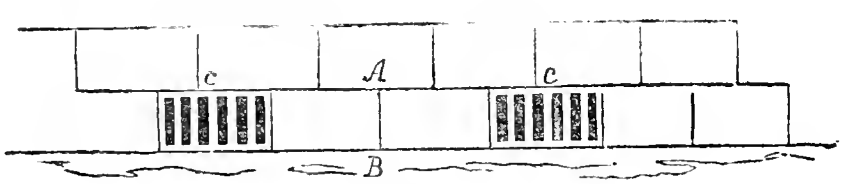
Here *a* is the wall, and *b* the roof, arrangements being made for ventilation at the point *c*, by trellis-work, by which a down draught is prevented. In older buildings this is not so easily accomplished, but Tredgold's Top (Fig. 2.) here will be of great service,



(Fig. 2.)

and admits of being planted in any positon :—*a* is fixed into the ventiduct; *d*, the cover made conical, prevents a down draught; and the angular edges *c c* create an upward current in the tube by the course which they cause the wind to take.

To provide for the escape of the carbonic acid gas from below, the perforated brick may be inserted with great advantage. The wall will then, at the foundation of the buildings, have somewhat the appearance below (Fig. 3).



(Fig. 3.)

Here *a* is the wall, *b* is the ground, *c c* are perforated brick ventilators.

Having thus alluded to the heat and ventilation connected with cattle fattening, in so far as they may be supposed to affect the meat-producing capabilities of the soil, it is unnecessary to go over the various kinds of food by which they may be fattened; this belongs to a somewhat different branch of the subject, and may form the basis of a subsequent paper; but there are some soils where it appears difficult to grow any kind of plants which are calculated to produce fat at all. On these, however, the gorse will often be found to succeed, and to be a useful and nutritious aliment, but it often requires a kind of appliances not always within reach; yet, if it be desirable to make the inferior descriptions of land available for the production of fat stock, it is also worth while to provide such gorse crushers or other machinery as may be necessary to make that kind of forage useful to the animals for which it is intended.

Sometimes a class of plants like this will be found more profitable than allowing the land to grow another race of plants of a higher order, and which are in themselves both less calculated to feed, and of smaller bulk, and in every way less adaptedfor the purpose.

This brings us to the question of the comparative influence of *breaking up or retaining old grass pastures,* as regards the supply of the largest quantity of animal food. For the purposes of this inquiry the grass land must be divided into three distinct classes.

First, The alluvial deposits of the river sides, and the deep grazing valleys of a similar description, where the soil will fatten large bullocks in summer; second, The richer class of clays and clay loams which will feed smaller animals—as Irish and Highland heifers; and third, The poor and inferior grass lands on cold clays, on burning sands, and on lowland peats, and their hill-sides and uplands.

As to the policy of ploughing up the land of the first class the writer apprehends there can be no doubt or hesitation whatever. There is not only the greatest profitable return for land occupied by grass, but the greatest absolute return per acre of food; and though there is a difference between the two cases, and a larger produce may possibly be raised without a commensurate profit, or profit at all, yet it is so certain that few parties will continue to produce any additional quantity without profit, that the profitable production is, after all, the real question at issue.

As regards the second-rate grass land there is much difference of opinion, and a prevailing one is, that it ought to be broken up and made arable, in order to develop its resources more fully. Without entering into the general question, which is foreign to this subject, it is quite clear that, as regards *animal* food, the third class of soils even is more generally productive as grass than if broken up and brought into cultivation.

In reference to the third; to commence, the question ought to admit of being thus stated: that after these thin, hungry, grass lands have been improved, and all done to them which can be profitably effected, the broken up and cultivated land is placed in the same position. But too generally the case is put differently, and then no wonder the argument tells heavily. The starved and neglected grass lands are generally calculated as such, and set against the well cultivated tillage; but this is evidently unfair, and is taking for granted a fact which we have no right to assume; that because the grass land has been neglected and robbed, and its improvement never attempted, it is impossible to become to. For the purposes of this inquiry the writer will take severally drained, or naturally dry, grass land, or drained, or naturally dry, arable. To make the cases equal there should always be as much artificial or extraneous manure put upon the grass, as is necessary to apply to the same number of acres in tillage to keep it productively occupied, leaving this out for a moment, we have in arable cultivation, assuming it to be carried on in a fair course rotation, the following average results on 50 acres:—

Fifty acres in corn, two years:
Fifty acres in seed leys, one year:
Fifty acres in turnips, one year.

	Sheep.
At five sheep per acre the seed leys will carry	250
At ten sheep the turnip will carry	500
Total sheep depastured on the arable land in four years	750

The grass land during the same period may safely be taken to carry an equal quantity of sheep as the seed leys. For although the latter will yield more food in the months of May and June, yet the former will afford a much larger supply than the seed leys for the months of August, September, and October, because the leys are never on such soils very luxuriant after the month of July sets in, and will not improve animals much after that period.

As the grass land produces every year 50 acres, it will, at five sheep per acre, carry—

First year	250
Second	250
Third	250
Fourth	250
	1,000

It is quite true that the turnips, though carrying only 10 sheep per acre during the winter, will lay on them much more flesh and fat than either the seed leys will in the summer or the permanent pasture, in the proportion possibly of 25 per cent. increase. This will place the figures somewhat different from the scale above, but will still leave a result favourable to the permanent grass land.

Assuming the sheep to increase ¾ of a lb. per week on the grass and seed leys, they will increase 1 lb. per week on the turnips. Thus, taking the case as above, or the arable land:—

	lbs.
250 sheep, at ¾ lb. each per week, for 25 weeks	4,687
500 sheep, at 1 lb. per week, for 25 weeks	12,500
Total	17,187
Old grass land as before given:—	
250 sheep, at ¾ lb. each, for 20 weeks	4,687
Do. second year	4,687
Do. third year	4,687
Do. fourth year	4,687
Total	18,748

Nor would a five course rotation, which is very unfrequent in this country, effect any great difference in the proportion, and at any rate, inasmuch as the leys will carry less stock the second year han the first, it will be somewhat in favour of the old grass land. The case of sheep is taken in the above instance for the reason it was before—the facilities it admitted of calculation; but the results would be the same or even greater with young and growing cattle.

1. Effects on the Graziers of Breaking up the Old Grass Land.

It has already been shown that the effects of cultivation are to create a demand in winter for the stock to consume the turnips which the summer seed leys cannot supply, and it is this demand which renders necessary a class of persons to direct their attention to breeding alone, or at any rate to breeding as the main feature of their productions. Now it is those who are occupying the third class of grass pasture grounds who are able to meet this demand, and without them the grazier must either send for his grazing cattle from abroad, or he must inconveniently and unprofitably employ his land in breeding stock to the displacement of his feeding stock, and so far abstract his usual supplies.

The change it would effect would be that, as regards cattle, it would compel the winter feeder to give part of the food to calves, and part to feeding animals, and to occupy his best grazing pastures with young stock instead of feeding matured animals. Now neither of these processes can be profitably carried on by such individuals on such soils, and the combination is extremely undesirable; whereas at present the breeding is confined to one locality adapted to it, and the feeding to another specially suitable.

As regards the sheep a still greater degree of inconvenience must be felt and difficulties arise to overcome. Thus, inasmuch as the turnips create a demand for more sheep than the farm can carry in summer, it is difficult to conceive from whence they could be obtained if all the grass were broken up, and consequently all were in the market purchasing sheep for turnips.

Nor would the disarrangement stop here. Many of the summer supplies of sheep are from a class of grass lands unsuited to the grazing of bullocks, even of a small size; and, as seed leys lay on fat but very slowly, there would be an excess of mutton produced in winter and a deficiency in summer. Whereas, by the present employment of old sward, even of the third rate quality above described, a regular supply of animal food is provided. If a fat market is selected with wold land on one side destitute of grass, and with a mixed grazing district on the other, it will be observed that while the winter supplies will come almost invariably from the former, the summer supplies will come as regularly from the latter.

The questions of corn feeding, cake feeding, &c., are left at this point of the inquiry, because it is quite clear that they may be made to apply to both cases equally, and may, with as much and even more advantage, be used on the old grass pastures as on arable land—they will form a future paper.

It appears, therefore, that the most advantageous and profitable course is to have a class of breeding farmers, and a class of graziers, combined probably with a class who combine both; and any disturbance of them will drive the grazier either to rear stock to a disadvantage, or seek a foreign supply which is difficult to obtain, irregular in quantity, and difficult to feed; it is thus undesirable materially to disturb their relations.

2. Means of Increasing the Supplies of Animal Food.

The writer has already entered sufficiently into the question of seeking an early maturity in the animals attempted to be fattened. This he has shown to be the most profitable to the grazier, and the most productive to the community; and therefore it will rank by far amongst the first means of increasing the supply; and inasmuch as this is or ought to be followed by qualities of increased tendency to feed, it is a point which cannot be brought too frequently or too prominently before the farming community. Many as are the objections to the large sums spent on the exhibitions of *stock* alone, there is a much greater degree of utility in that branch than is generally understood in a flesh-consuming population. But for these, hundreds of thousands of farmers would never see how much might be done, and how much is doing, in promoting the tendency to grow rapidly and feed early. No effort of the tongue or the pen, however eloquent or powerful, will produce one thousandth part of the impression of a single specimen; and there are no means placed within the reach of the bulk of our farming population of witnessing these specimens except at a public exhibition. Without these the knowledge of, and consequently the desire for, and the spread of good animals must have been far behind; and though the produce of many is alloyed by hard native breeds, still their effect on the whole has been of a highly improving character.

(*a.*) *Liberal Feeding of Animals in Early Life.*

Various have been the objections raised to the pampering of young animals; and a smile has often been raised against it and the persons who advocated it, as there has been against most of the best and most valuable suggestions when few took the pains to make themselves acquainted with facts. To have early development of the organs, especially of secretion, there must be at once a large and liberal supply of those materials of which the structure of the animals is composed, and in such a condition as is suitable for assimilation; but, inasmuch as in their normal state, the young are fed through the medium of their mother's secretions, a supply of all the conditions favourable to their increase should be carefully provided. The liberal supply of cattle and sheep with corn, combined with peas, cake, cabbages, turnips, and such kind and variety of food as affords the requisite quantities, not only of the organic gases, but supplies of the phosphates &c. for the bones and muscles. Sufficient care is seldom exercised to train the young animals early to look after supplies for themselves, in addition, such as placing before them rye, Italian rye-grass, &c., by which they are not only taught to feed themselves early in addition to the milk and so make greater progress, but also relieve their mothers to a certain extent and obtain their food easier, because it is assimilated from the food eaten by the dam and not from her organization; and therefore may be expected to be easier of reassimilation by the young animals themselves. The force of this remark may be very strikingly observed from the difference between the dam and her produce, of say an ewe having but one lamb, and another having three, or even two. The mother with one lamb will be fresh and vigorous, and the lamb will soon be plump and fat with ordinary keeping. The mother of the two will be herself leaner, and also her offspring, while the mother of three cannot be kept from getting absolutely poor in spite of all the food which can be given her, and her offspring will be small and poor also, and may often at two years old be pointed out as the smallest, and often the thinnest of the flock.

To have the capability of rapid growth and the early development of feeding qualities, there must be the means for completing the requisite organization placed at the command of the systems of young animals; and if they are not it will be in vain in after life to overcome the difficulty. The breeder who thus pampers his young stock in their early stages saves over his more careless neighbour some two or three, and in extreme cases as much as twelve months' keep in the animal, and therefore can well afford to be smiled at, for observing a rule so conducive to his profit.

(*b*.) *Economisation of Food* is a point perhaps more necessary to be attended to than all other points of mere feeding put together. More food is wasted in cattle and sheep feeding than is lost by the deaths of animals; and it is seldom that one head more of stock might not be kept in twenty or even in ten. This may be readily conceived when it is reflected that every exertion the animal makes is a waste of its food; and though a certain amount of exercise is necessary to health and digestion, yet the evil is by far too generally on the other side. In many cases the animal has its food thrown before it to eat, let alone, or reject at pleasure; sometimes an insufficient quantity is given to a greedy feeder, or an excess given to one more easily satisfied, by which it is cloyed and nauseated just because a basket happens to contain a certain quantity, and no attention is paid to the wants of the animals. The feeds are often also given at irregular, uncertain, or too long intervals, and this operates also to the waste of the food. Then the labour of the animal in obtaining its food is too often neglected, nor is it given in a condition so cleanly and orderly as to tempt the animal to eat it with avidity.

For all these human labour or machinery may be a powerful auxiliary to the increase of food. If all the food consumed by growing, as well as feeding animals which admits of it, were cut into pieces, just capable of being taken into the mouth and masticated, there would be the double saving of the food necessary to sustain the exertion of the animal while feeding, and of the food, because it will be eaten up much cleaner than if the animal were first to scoop out particular parts, and leave the rest, which is invariably the case, in animals which are left themselves to feed.

Thus turnips require to be sliced for cattle and sheep, barley to be ground, cake to be broken, beans and peas crushed, hay and straw to be chopped. In illustration of the importance of this, allusion need only be made to the practice of feeding sheep at one year old, which is so successfully practised in some districts of the kingdom, and to which allusion has already been made, and which, though accomplished easily by the instrumentality of cutting the turnip, with possibly a little additional food, and which could not be if the turnips were left to be gnawed by the animals themselves.

(*c*.) *Adoption of Artificial Feeding* is another mode of increasing the amount of food produced very materially. There are some soils which grow plants deficient in some particular principle because wanting in it themselves. Hence their produce is defective in building up animal structures, and, unless some mode of supplying it is adopted, large quantities of the whole have to be consumed before the requisite quantity of any particular principle can be obtained.

Thus from some of the alluvial river-side land on the Derwent the hay contains in 1000 parts as much as 12·209 of potash and 4·726 parts of phosphoric acid, while a poor clay soil from the same county yielded but 8·876 parts of potash and 4·066 of phosphoric acid. Therefore, as regards potash, it is clear that an animal depasturing in the one will have to eat one third more grass than in the other to obtain the same supply. Chemical research, yet in its infancy as regards its investigations on organic nature, has not yet laid down either the precise wants of animal structures or the precise supplies any given food is calculated to supply, and therefore it cannot teach us the exact kind of food most suitable to be supplied to the animals; but there can be no question that the *seeds* of most plants given to animals on turnips, or on slowly feeding grass lands of the second class referred to, will not only enable them to feed faster but much more so than the proportion of food given or its cost will acccount for—so will it leave the soil in a better condition for feeding the following year. If cake, corn, pulse, or such kinds of food as supplied the flesh and fat producing principles at the least cost were selected each year by way of eking out the ordinary supplies of ground, one-third more animals might be produced and fed on the same area of land. In Lincolnshire, in Nottinghamshire, and some of the best cultivated districts, the cake trough is as common an occurrence in the seed leys as the gate which keeps the animals in them. The result is that the stock is kept in such a state as to require but little stall-feeding. The process it is quite true requires a large capital being employed, and in some seasons may be of doubtful expediency; still, as the soil is being continually enriched, it is found to answer on the average of years.

The same rule applies to the winter and house feeding; a change and variety of food is as necessary to the tone of the animal's stomach as to the supply of the materials of feeding; and it is always bad economy to feed animals on the produce of the farm alone. For instance, if the farm is defectively supplied with a given constituent of plants and animals, this will run through the whole system.

The hay and straw will be deficient; the turnips and roots; the grain will be deficient; and as all farms sell off quantities of the latter and make manure of the former, the sources of the supply of the whole will be so; and hence the chance as it is at present, and the certainty as it may become when chemistry has made greater progress, of obtaining supplies where extraneous food is supplied.

(*d.*) *Preparation of Food.*

This must be made to a certain extent available in food production, and beyond that extent it is impossible for it to go. The digestive powers of the animal may be assisted to a certain point, but they require a particular degree of exercise which is necessary to their healthy assimilation. Hence the boiling or steaming of food generally has not been attended practically with that degree of success which justifies its adoption. Still there are some feeding materials which require cooking before their complete resources can be brought out. Thus linseed, even when its vegetable oil is extracted, is the most valuable, or one of the most valuable feeding substances, and yet one very important feeding principle is expelled by the very act of crushing. Alone and raw, however, it is incapable of being used to any extent in fattening; but by being subjected to the boiling process the mucilage is coagulated, and other changes take place which render it one of the most valuable vehicles of stock feeding. Alone, however, it would be too rich for the digestive organs of the animals, and therefore it is combined with chopped straw and meal, which it also partly mixes with; and holding heat readily partly cook them before it is eaten.

With the relative merits of the systems of Mr. Marshall's, Mr. Warnes's, or other plans of cooking, the writer will not enter, as they have been ably discussed in this journal, nor will he enter upon the cold steeping of linseed, though there are statements made which will tend to show that there are advantages as regards the preparation of the food for fattening stock which are equal if not superior to the boiling of the linseed. These are details which the present paper cannot comprehend.

The swine, however, seem to possess a degree of difference in their structure which makes another rule apply; and the feeder of bacon finds that in order to make most of his food he must cook at any rate his roots; but the corn, of whatever kind, with which they are given has not been hitherto proved to be cooked with advantage.

e. Shelter to the Animals, from heat and cold, is as essential to the economical production of fat and flesh as to the profit of the grazier. In summer the heat and flies are as annoying as the cold winds of winter are preventives to fattening, and house feeding in the latter case is adopted to get over the one, while boxes have been recommended in the former as affording air, freedom from the rays of the sun, and from the annoyances of flies.

On the richest grass lands, or even on those of second rate quality, to remove the grass from the land and convey it to the houses is doubtful. Still the care which is exercised by animals at large in selecting the shade of any trees which are available is sufficiently indicative of the shelter the animals require, and their grazing during night, of the temperature most agreeable; and should warn those who delight in removing trees that there may possibly be a danger of carrying their theories too far. Hence, however, this may be fairly deduced, that shelter is requisite from the heat and torment of summer to out-fed animals.

The indoor fed animals require ventilation, but still freedom from all exposure; and to attempt to feed in open yards is a waste of flesh and food too perfectly reckless to admit of one moment's consideration. The stalls or the boxes are unquestionably necessary to the full development of animal food.

The shed-feeding or stall-feeding of sheep again are means in the hands of the stock-feeder of increasing very materially the amount of matter produced on a given area per acre. The saving of food and increase of weight are very great; but it is always questionable whether both repay the cost of cartage of the food and manure, and the loss of consolidation and soiling of the animals. Inasmuch as a straw flooring is unfavourable to the animals, and has a tendency to produce foot-rot, a boarded floor with crannies sufficient to admit of the free escape of the excrements is indispensable; but with all the fleeces are dirty, and the animals in a state evidently not the most comfortable.

Stall-feeding obviates this disadvantage; and by having a narrow grating immediately behind the animals, the whole of the ejectamenta is readily absorbed, and these cleanly animals are freed from its annoyance.

From the above it will be clear that the means of increasing the supply of animal food is very much in the hands of the breeders and graziers; not by disarranging the relations of farm cultivation, but by exercising these plans and modifications in their details of a much less radical character. These it is easy to alter, re-arrange, or modify; but one false step taken on a large scale is not easily retraced.

The effects of this increase in our population will be of a very decided character. It will, whatever vegetarians may say, improve their strength, their capability of enduring labour, and elevate their social and moral condition. It evidently requires something beyond the mere Anglo-Saxon breed to enable and sustain an endurance of patient fatigue, such as the English and Americans undergo; and in nothing is this better provided for than by our population being liberally supplied by the stimulating pabulum of animal food for at least two meals a day.

The transition state produced by the introduction of the railway system will make a material difference in our food producing, not only as to the transmission of it from the producing to the consuming markets, and not only in the cheap and rapid transit of manures and tiles, but also in the vast quantity of horses which it has rendered useless and thrown off the road, both from the coach and from the waggon, and especially from the coal cart. For although the making of railways necessarily occupies a considerable quantity of land, still it is much more than compensated by the improvements they effect on that adjoining, and the horses they throw off the roads will consume at least twenty fold. Mr. Mc Culloch estimated the horses used for pleasure and for profit at 1,500,000; and, inasmuch as it is not any stretch of estimate to say that one-fourth are taken off the roads by railways, there will be a reduction in their number by 375,000. Now taking each of these horses as consuming the produce of three acres of land—a very low estimate—there is left for food producing more by 1,125,000 acres of land. Assuming that one-third of this is occupied in growing wheat, and that the produce of this is 20 bushels only per acre, it would give 7,500,000 bushels of wheat; and assuming one of these horses was supplied with one head of cattle, there is at once a supply of 375,000 more cattle, which, at some 30 stones each, will give 11,250,000 stones, or as much as 157,500,000 pounds of animal food in the kingdom.

It may be urged that if one-third of the land be supposed to be growing wheat, the remainder would be unequal to the producing of so many head of cattle. It must be remembered, however, that if one-third more is supposed to be giving grain crops, and one-third green crops, they will be found quite adequate to the fattening of small cattle of 30 stones weight; because a beast of that size and weight will require the produce of much less land to fatten him than a horse will to keep him in condition for a twelvemonth.

The keeping of horses is a loss to the community. It is consuming our broad acres by animals when steam, which requires no food, will answer the purpose, and therefore so many cattle are displaced. One steam engine, however, which requires neither corn nor hay, and two men will convey 80 or 100 tons of coals for, say 50 miles, and in a very few hours; whereas to employ animal power, it would require 100 horses, and at least 50 men, and would take, at the very least, two days, or equivalent to 200 horses and 100 men for one day. If to this were added the goods conveyed by waggon, the passengers conveyed by coach, and the private conveyances of one kind and another, the saving of food is altogether enormous.

It is unnecessary moreover to have any alarm as to the effect of this on prices. True, there is a vast amount of animal food thrown upon the market, and this would, as such, cause a diminution in price. But this is a case clearly exceptional; the food of these horses and men, though so consumed, have to be paid for by the community. The masses are relieved from this by the new channel with which the traffic is diverted; and, therefore, they have so much more to expend in the luxuries of life, as, taking the bulk of mankind, the different kinds of animal food must be considered.

When interest and patriotism go together we may expect the results to be of a most favourable character to the community; and hence we may hope than when the production of beef, and pork, and mutton shall be demonstratively proved to be profitable, there will be a large increase in the amount of animal food raised in the country.

Sowerby, Thirsk, Aug. 10, 1849.

EUROPEAN AGRICULTURE.

No. IV.

SAXONY AND PRUSSIA.

"On leaving Bavaria, and entering Saxony, the contrast is so striking, that the traveller seems to have been suddenly transported from a desert to the promised land. Nature has, undoubtedly, done much to bring this about; but it is principally owing to the superior education of the people, and the encouragement given to agriculture, both by government and the upper classes." * The instruction provided in the public schools is inferior to that of Wurtemburg, and even Bavaria; but the general education, and the encouragement of the proprietors themselves (of whom the great majority are men of education), have set a stamp of order, industry, and prosperity on this country, which is not much below the perfection of agriculture, and is quite superior to the general appearance of France.

The law of entail in Saxony is peculiar. The estate descends to the youngest son, instead of the eldest, as with us, or to the whole family, as in France since the revolution of 1790.

But that which has most conduced to the agricultural prosperity of Saxony is the interest which the rich and well educated proprietors take in their own estates, by devoting much of their time to an occupation well worthy of their exalted rank.

The manufacturing industry of this country has not yet attained any great development, and we would almost be sorry to see manufactories supplant the family workshop, where the farmer, during the winter months, ekes out the subsistence which he derives from the farm.

The roads are numerous and good; and there is a railway through the country, communicating with the principal towns in Prussia. The soil is generally good. The character of the country people is "either a little more independent or not quite so polite as we met in Wurtemburg." Any one making use of gross or improper language is at once expelled, by the company present, from any public room in which it occurs.

In some parts of Saxony there still exists the triennial rotation of two white crops and a fallow, already mentioned as existing in Bavaria. This is, however, the exception; and the system pursued differs little from our own, except in the absence of turnips. No fault can be found with the following rotation:—

1st year. Fallow (as far as the manure will go), occupied with potatoes, vetches, and flax.
2nd. Rye, sown with white and red clover.
3rd and 4th. Clover, mown or pastured.
5th. Oats.

In the following the clover seems to be in the wrong place:—

1st year. Fallow, occupied as above.
2nd. Barley or oats.
3rd. Rye, sown with clover.
4th and 5th. Clover, mown or pastured.

We can hardly account for the preference given to rye over wheat, of which little seems to be grown, except by supposing the land to be poor or in want of manure, notwithstanding the high encomiums bestowed upon the Saxon farming by our author.

The work horses as suited to the soil of the country are light and active, and the breed of cattle and sheep as good as could be expected.

Prussia.

Notwithstanding the attention bestowed upon agriculture by the government of Prussia, by the endowment of agricultural colleges, the honorary titles and pecuniary prizes bestowed upon the students and upon farmers who may have shown more than ordinary care and intelligence in the cultivation of their farms, there can be no doubt that this country is much inferior to France in agricultural condition. The inferior nature of the soil (except in the neighbourhood of Magdeburgh on the Elbe, and the Rhenish Provinces), the state of the roads, the small importance of the principal towns, the oppressive nature of certain taxes, together with the monetary system, certainly must have a paralyzing effect on individual and collective efforts, and tend to prolong indefinitely the present state of Prussian agriculture.

The landed property is in three hands—the crown, the nobles, and the peasant proprietors. The last date their existence as a class from the year 1810, previous to which time the property of nobles could only be sold to, or possessed by nobles; their estates were free from taxes; they

* Royer's "German Agriculture."

rendered their possessors elegible to the Diet, conferred upon them the rights of jurisdiction, patronage, statute labour from the peasants, and many other equally oppressive privileges. And, strange to say, the nobles were confirmed in these injurious rights by Frederick II. so late as 1769. The exemption from taxation has been abolished by the laws of 1810 and 1820. The right of exclusive possession was abolished in 1807, thus giving rise to, or at least greatly increasing, the number of peasant proprietors. The other privileges have also been declared to be redeemable or altogether abolished on easy terms, at various times. The privilege of erecting a brewery, so lucrative in Germany, was formerly confined to the lands of the nobles; an estate to claim this privilege must not be worth less than 56,000 francs (£2,300), but now this is also conceded to the peasant proprietor if he has property worth 60,000 francs.

The land pays a direct tax of about 6 per cent. of the net annual value; but, besides this, the produce pays another most oppressive tax. Wheat pays a certain rate per cwt., which amounts to about £1 5s. per acre on an average crop; whilst rye, barley, vetches, and other grains pay only about 15s. per acre. We have remarked already that it was difficult to account for the absence of wheat in the different rotations described; but this taxation, absurd and ruinous in its mode of levying, and doubly absurd in the distinctions made, fully accounts for the absence of wheat, for the large tracts of inferior land which M. Royer says he observed lying uncultivated in all parts of the country, and for the generally inferior character of agriculture in Prussia. Another consequence of this taxation is the small consumption of cereals, "less wheat-bread being consumed in Prussia, than biscuits in France." The potato being untaxed is universally grown, and promises to become as much used in Prussia as in Ireland. Butcher meat pays a tax of about 5s. per cwt., which is rather more moderate than that upon wheat. But we never before met with such a senseless, ruinous, ignorant system of taxation, and which, as already remarked, fully accounts for the state of agriculture in Prussia. It must also completely prevent the existence of such a class of men as our English farmers; such taxes amount to a very fair rent for the land, and render it impossible for any one but the proprietor to live upon the land. Besides, as the taxes are levied according to the produce, they are a premium to the indolent farmer, and must be a most effectual bar to all improvement. Their removal or modification would be of infinitely greater value than all the schools and colleges. These taxes upon grain and butcher meat yield only about £400,000 per annum. Barley, for brewing (except for private use), pays a direct tax of 4s. 2d. per cwt., yielding about £250,000 per annum. Salt is a government monopoly; and, though Prussia is as well situated as England for supplying this article, in some places it costs 3d. per lb. The tax upon salt actually produces about £1,000,000 per annum. Strange to say, tobacco, except when grown in large quantities, is free from taxation.

Though greatly relieved, the peasant proprietors still pay taxes from which the nobles are exempt. For instance, they have to remove the snow from the roads, to transport criminals, to contribute in money and kind towards the support of the pastor and the schoolmaster, to repair the church, school house, and the roads, and to lend their aid in case of fire. Notwithstanding all these disadvantages the number of peasant proprietors continues to increase, and threatens at no distant day to absorb the others altogether.

The roads throughout the country are generally bad; and if put into proper order would materially contribute to the improvement of agriculture. They should certainly have been attended to before the railroads, which now intersect the country in all directions, were thought of.

Our brief survey, in the last few numbers of the Farmer's Magazine, of the agriculture of France, by means of Colman's work, and of Germany and Prussia by the assistance of Royer's "German Agriculture," has, we trust, been not altogether devoid of interest. These are the countries with which the British farmer is now brought into unmitigated competition—he is now protected only by the sea which separates him from Europe, by the want of skill, and perhaps the want of energy of the population, from seeing his markets inundated with corn. Fortunately for the English farmer, the inhabitants of the part of Europe which has past under review are, at present, too busily engaged in political squabbles to perceive the value of their almost virgin soil. To the coming struggle we look forward with dread; we wish from our hearts that we could look on as unmoved as our statesmen appear to do, upon the system which was first so industriously and assiduously reared by means of the corn laws, and then as assiduously and industriously knocked down by the free trade movement. We shall take an early opportunity of noticing the agriculture of North America. C.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

A Special Council was held at the Guildhall, Norwich, on Tuesday, the 17th of July; present, His Grace the Duke of Richmond, K.G., Trustee, in the chair; Hon. Robert Henry Clive, M.P.; Sir Thomas Dyke Acland, Bart.; Col. Austen, Mr. Raymond Barker, Mr. Barnett, Mr. John Booth, Mr. Hamond, Mr. Fisher Hobbs, Mr. Milward, Mr. Stansfield, M.P., Mr. C. Hampden Turner, Mr. Henry Wilson, and Mr. Wingate. The business transacted at this Council had reference to topics of a local and temporary character connected with the details of the Norwich Meeting then about to be held.

A General Meeting of the Society was held at the Guidhall, Norwich, on Friday, the 20th of July; present, The Earl of Chichester, President, in the chair. Votes of thanks were passed unanimously, to the following parties for the manner in which they had respectively promoted in so essential a manner the success of the Norwich Meeting held in that week:

1. To the Mayor and Corporation of the City of Norwich; on the motion of Colonel Challoner, seconded by Sir Robert Price, Bart., M.P.
2. To the Local Committee, on the motion of Mr. Fisher Hobbs, seconded by Mr. Shaw, of London.
3. To the Owners and Occupiers of Sites of Ground; on the motion of Sir Robert Price, Bart., M.P., seconded by the Hon. Capt. Dudley Pelham, R.N.
4. To the Committees of the Norfolk and Norwich Museum, and the Norwich Chamber of Commerce; on the motion of Colonel Challoncr, seconded by Mr. Barnett.
5. To the Railway Companies; on the motion of Mr. Fisher Hobbs, seconded by Mr. Kinder.
6. To Professor Simonds and the Rev. Edwin Sidney, M.A.; on the motion of Sir Robert Price, Bart., M.P., seconded by Colonel Challoner.
7. To the Earl of Chichester; on the motion of the Duke of Richmond. seconded by Colonel Challoner.

A Special Council was then held—present, the Marquis of Downshire, President, in the chair; Duke of Richmond; Earl of Chichester; Hon. Captain Pelham; Colonel Austen; Sir Robert Price, Bart., M.P.; Mr. Barnett; Colonel Challoner; Mr. Hamond; Mr. Fisher Hobbs; Mr. Kinder; Mr. Shaw (London); and Professor Simonds.

The Council ordered their best thanks to be conveyed to Mr. Staff, the Town-clerk of Norwich, for the exact manner in which he had carried out, under the authority of the Mayor and Corporation, the wishes of the Council, from time to time communicated to him; and to the Commissioners of Metropolitan Police for their grant of a supply of their force during the meeting, accompanied with an expression of the entire approbation of the conduct of Inspector Otway and the men under his charge.

On the motion of Col. Challoner, Mr. H. Manning was requested to act as the Society's Contractor of Works at the country meeting to be held next year in the city of Exeter, at the same rate of charge as on former occasions.

Colonel Challoner then gave notice that at the next monthly Council he should move the presentation of the Gold Medal of the Society to their Consulting Engineer, for the manner in which he had perfected the dynamometrical apparatus proposed by Colonel Challoner for testing the powers of agricultural machinery; and the Hon. Captain Pelham that he should move, at the same time, certain arrangements connected with the Stewards and Judges of Implements, for the purpose of facilitating the discharge of the duties and details of their office in future.

A Weekly Council was held at the Society's House in Hanover-square, London, on Tuesday, the 31st of July: present—Mr. Raymond Barker, Vice-President, in the Chair; Mr. Brandreth; Mr. Burke; Col. Challoner; Mr. F. C. Cherry; Mr. Dyer; Mr. Kinder; Mr. C. E. Overman; Prof. Sewell; Prof. Simonds; Mr T. Turner; Prof. Way; and Mr. W. White.

NEW MEMBERS.

The following new Members were elected:

Alexander, The Rev. John, Norwich
Baxter, William Edwin, High-street, Lewes, Sussex
Bethell, John, Brighton, and 8, Parliament-street, London
Bird, The Rev. James Waller, Briston, East Dereham, Norfolk
Bouverie, The Rev. W. Arundell, Denton Rectory, Harleston, Norfolk
Finch, Henry, 69, King William-street, City, London
Fitz-Patrick, the Right Hon. J. Wilson, M.P., Lisduff, Rathdowny, Ireland
Franklyn, Thomas, Maidstone, Kent
Hall, George, Barton-Seagrave, Kettering, Northamptonshire
Macdonald, Sir Archibald, Bart., Woolmer Lodge, Liphook, Hants
Moody, Captain, R.E., late Governor of the Falkland Islands (J. U. S. Club, London)
Moore, The Rev. Edward, Frittenden, Staplehurst, Kent
Pritchett, William D., Little Hallingbury, Hertfordshire
Scudamore, J., Abinghall, Mitchel Dean, Gloucestershire
Sedgwick, The Rev. Professor, Trinity College, Cambridge
Shaw, Thomas, Kilree, Stoneyford, Ireland
Stanley, Hon. Edward Henry, M.P.. St. James's-square, London
Tomson, James, Barnt Green, Bromsgrove, Worcestershire
Vincent, James, Clifton Manbank, Sherborne, Dorset
Whaley, J., Holly Lodge, Enfield, Middlesex
Whitmore, Thomas Charlton, M.P., Apley Park, Shiffnal, Salop
Wickham, Edward, St. Margaret's, Rochester, Kent.

Communications were received from Mr. Wright on the amount of grain consumed by rats; and from Messrs. Storar of Cheapside, on Hosen tubing adapted for the purpose of distributing liquid manure.

A MONTHLY COUNCIL was held at the Society's House in Hanover-square, on Tuesday, the 7th of August; present, Mr. Raymond Barker, Vice-President, in the Chair, Hon. Captain Dudley Pelham, R.N., M.P., Sir Robert Price, Bart., M.P., Col. Austen, Mr. Barnett, Mr. S. Bennett, Mr. Brandreth, Mr. Burke, Col. Challoner, Mr. Cherry, Mr. Garrett, Mr. Brandreth Gibbs, Mr. Grantham, Mr. Fisher Hobbs, Mr. Kinder, Mr. Milward, Prof. Sewell, Mr. Shaw (London), Mr. Shaw (Northampton), Prof. Simonds, Mr. W. Simpson, Mr. John S. Tanqueray, Mr. T. Turner, Prof. Way, and Mr. Jonas Webb.

Mr. D. K. Bramwell, of Funtington, near Chichester, was elected a member of the Society, and the names of eight candidates proposed for election at the next meeting.

Finances.—Colonel Challoner, Chairman of the Finance Committee, presented the monthly report of the accounts of the Society; from which it appeared that the following special balances were in the hands of the Bankers, namely, composition balance to be invested, £939; balance derived from arrears of subscription paid £1,134; and available balance for current purpose, £1,129. The Chairman further reported, on the part of the committee, that the amount of the receipts for admission into the show-yards at Norwich, on the Tuesday evening and Wednesday, was £419, and on the Thursday £1,914. Colonel Challoner had then the gratification of informing the Council that, in consequence of the kind and prompt manner in which so large a number of the members in arrear had responded to the request contained in the letter addressed to them by himself, as Chairman of the Finance Committee, the funds of the Society were in a condition, at the conclusion of the present session, fully able to meet and discharge every claim against them.

Diseases in Stock.—Mr. Raymond Barker, Chairman of the Veterinary Committee, presented the Report of the Committee, which was unanimously adopted by the Council.

REPORT OF THE VETERINARY COMMITTEE.

With a view to the collecting and perpetuating a body of authentic information in regard to the diseases of cattle, sheep, and pigs, and arresting their progress, the Society appoints a professional inspector for these purposes. Any member of the Society who may desire a competent professional opinion and advice in cases of extensive or destructive disease among his stock, and will address himself by letter to the Secretary, will, by return of post, receive a printed list of queries, which he is requested to fill up and return immediately. On the receipt of such returned list, the Secretary will convene the Veterinary Committee forthwith (two members of which, with the assistance of the Secretary, shall be competent to act), and such Committee will decide on the necessity of dispatching the Society's inspector to the spot where the disease prevails. The remuneration of such inspector shall be a professional fee of £2 2s. per diem, and £1 1s. per diem for personal expenses, and he shall also charge the cost of travelling to and from the localities where his services may have been required. The fees will be paid by the Society, but the travelling expenses will be a charge against the applicant for professional aid. This charge may, however, be commuted or remitted altogether, at the discretion of the Council, on such step being recommended by the Veterinary Committee.

The inspector, on his return from visiting the diseased stock, shall report to the Committee in writing the result of his observations and proceedings, which report will be laid before the Council.

When contingencies arise that may prevent a personal disfharge of the duties confided to the inspector, he may, subject to the approval of the Committee, name some competent processional person to act in his stead, who shall receive the same rates of remuneration.

(Signed) THOMAS RAYMOND BARKER, Chairman.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

QUERIES.

This list is returned by
Mr.....................................(Christian and surname.)
of ....(Parish.)
near...(Post town.)
Most convenient railway station from London..............
Date...

1. What length of time have you occupied your farm?
2. What are the relative numbers of cattle, sheep, and pigs kept by you for breeding, milking, grazing, or other purposes?
3. What is the general character of your arable and pasture grounds?
4. What has been the usual state of the health of the animals kept on the farm?
5. When did the disease first appear?
6. What number of your cattle, sheep, or pigs are now affected?
7. How many have died or been destroyed?
8. What time has usually elapsed between the first indications of illness and the death of the animal?
9. What was the state of the weather previous to and at the time the disease was first observed?
10. Did the malady first show itself among the breeding or fatting cattle, sheep or pigs?
11. What is their age and condition as to fatness?
12. Can the outbreak be assigned to contagion or infection? If not, what do you believe to be its probable cause?
13. Is a similar disease prevalent in the neighbourhood?
14. What are the symptoms shown by the animals, and what is your opinion, so far as you are able to form one, of the nature of the malady?
15. Has amelioration been attempted by change of situation or management? alteration in the quantity or quality of the food? by medical treatment or any other means?
16. What effects have followed any efforts that may have been made to stay the progress of the malady?
17. Are you willing to pay the travelling expenses of the inspector, should the Committee decide on sending him down?

Have the kindness to add any other information that you think desirable, and return this list without delay to the Secretary, JAMES HUDSON, Esq., 12, Hanover-square, London.

Member of Council.—On the motion of Colonel Challoner, seconded by Mr. Jonas Webb, Lord Camoys, of Stonor Park, Oxfordshire, was unanimously elected a member of Council, in the place of Mr. Thomas Umbers, of Wappenbury, deceased.

Norwich Dinners.—Mr. Shaw (of London) regretted to state that he feared the quantity and quality of the dinner supplied by the contractors, at the Norwich Meeting, had not given that general satisfaction it was desirable they should have done. At the proper stage of the proceedings in preparation for next year's meeting, he should be prepared, from the experience he had derived from attending large dinners of a similar character in London and elsewhere, to offer to the Council suggestions which he hoped would prevent a recurrence of the evil complained of; in the meantime he thought a statement he had seen in one of the Norwich papers, that the alleged failure on the part of the contractor arose from the manner in which the society had tied him down in his price, ought to be met with the counter-statement that, instead of such limitation, the contractor's own price was accepted; and, in order that he might be enabled to fulfil his engagement more easily, one of the most costly dishes he engaged to provide at the Council Dinner, namely, turtle-soup, was considerately, and of their own accord, directed by the Council to be omitted. He thought it ought also to be known, that the contractor was the only party who sent in a tender in reply to the society's advertisement. An animated conversation then took place on this subject; in the course of which the anxiety and attention evinced by the Hon. Mr. Clive, during the dinner, towards all the guests who applied to him or required his care, as the Steward of that department, were duly and gratefully estimated.

Consulting Engineer.—A letter was read from Mr. Thompson, Senior-Steward of the Implement yard at the Norwich meeting, conveying a strong recommendation on the part of himself and his colleagues, that some public notice should be taken of the very able and zealous way in which Mr. Amos had performed the duty of Consulting Engineer on that occasion. Mr. Thompson did not think it too much to say, that the greatly increased accuracy of the trials of implements at that meeting was in a great measure due to Mr. Amos's unremitting exertions, and to the complete success of the very simple and beautiful instrument, made by Messrs Easton and Amos, for testing hand and other low powers. That machine had been applied to several classes of implements in Mr. Thompson's department, and in some instances had brought out results which were as unexpected as they were valuable in guiding the decision of the Judges.

Colonel Challoner then brought forward the motion of which he had given notice at the Special Council at Norwich; and having favoured the Society with a detail of the steps by which this great result had been attained, and his own proposition of the machine, and his wishes connected with it, carried out by Mr. Amos during the last two years, the motion was seconded by Mr. Shaw, of Northampton, and carried unanimously, that the Gold Medal of the Society should be awarded to Mr. Amos (of the firm of Easton and Amos) as a mark of the satisfaction of the Council for the manner in which he had applied himself to the perfecting of those means of testing different implements exhibited at the country meetings of the Society, by which trials, hitherto of most difficult and uncertain adjudication between competing machines, had now become, by means of this exactness of test, nothing more than a simple registration of facts, distinct and decisive in their character, and in their evidence convincing alike to the judges and the makers of the implements themselves.

Exeter Meeting.—On the motion of Colonel Challoner, seconded by Mr. Milward, Sir Mathew White Ridley, Bart., was requested to accept the office of Steward of Implements at the country meetings of the Society, in the place of Mr. Thompson, who retires by rotation. The name of Mr. Shelley was added to the list of the General Exeter Committee.

The Council agreed to the following schedule of Prizes for Implements at the Exeter Meeting:

IMPLEMENT PRIZES; 1850.

For the Plough best adapted for general purposes, 7*l*.

For the Plough best adapted for deep ploughing, 7*l*.

For the best One-way or Turn-rest Plough, 5*l*.

For the best Paring Plough, 5*l*.

For the best Subsoil Pulverizer, 5*l*.

For the best Drill for general purposes, which shall possess the most approved method of distributing compost or other manures in a moist or dry state, quantity being especially considered, 10*l*.

N.B. Other qualities being equal, the preference will be given to the drill which may be best adapted to cover the manure with soil before the seed is deposited.

For the best pair-horse steerage Corn and Turnip-drill, 10*l*.

For the best Drill for small occupations, 5*l*.

For the best Turnip-drill on the flat, which shall possess the most approved method of distributing compost or other manures in a moist or dry state, quantity being especially considered, 10*l*.

N.B. Other qualities being equal, the preference will be given to the drill which may be best adapted to cover the manure with soil before the seed is deposited.

For the best Turnip-drill on the ridge, which shall possess the most approved method of distributing compost or other manures in a moist or dry state, quantity being especially considered, 10*l*.

N.B. Other qualities being equal, the preference will be given to the drill which may be best adapted to cover the manure with soil before the seed is deposited.

For the best drop Drill, for depositing seed and manure, 10*l*.

For the Manure-distributer which is best adapted for distributing broadcast any kind of compost or hand-tillage when in a moist state, and which is capable of adjustment for the delivery of any quantity, from 2 to 20 bushels per acre, 5*l*.

For the best portable Steam-engine, applicable to thrashing or other agricultural purposes, 50*l*.

For the second best ditto, 25*l*.

For the best portable Thrashing-machine applicable to horse or steam power, 20*l*.

For the best Corn-dressing Machine, 10*l*.

For the best Grinding-mill for breaking agricultural produce into fine meal, 10*l*.

For the best Linseed and Corn-crusher, 5*l*.

For the best Chaff-cutter, 10*l*.

For the best Turnip-cutter, 5*l*.

For the best Oilcake-breaker, for every variety of cake, 5*l*.

For the best One-horse Cart for general purposes, 10*l*.

For the best Light Waggon for general purposes, 10*l*.

For the best Machine for making Draining Tiles or Pipes for agricultural purposes. Specimens of the Tiles or Pipes to be shown in the yard; the price at which they have been sold to be taken into consideration, and proof of the working of the machine to be given to the satisfaction of the judges, 20*l*.

For the best Set of Tools for general Draining, 3*l*.

For the best Heavy Harrow, 5*l*.

For the best Light Harrow, 5*l*.

For the best Cultivator, Grubber, and Scarifier, 10*l*.

For the best Pair-horse Scarifier, 5*l*.

For the best Horse Hoe on the flat, 10*l*.

For the best Horse Hoe on the ridge, 5*l*.

For the best Horse Rake, 5*l*.

For the best Horse Seed-dibbler, or Seed-depositor, not being a drill, 10*l*.

For the best Cider Mill, 10*l*.

For the best Barrow Hand Drill, to work with cups, 3*l*.

For the best Liquid Manure Distributer, 10*l*.

For the best Haymaking Machine, 5*l*.

For the best Gorse-bruiser, 5*l*.

For the best Cottage Stove or Range for burning coals, 5*l*.

For the best and most economical Steaming Apparatus for general purposes, 5*l*.

Miscellaneous Awards and Essential Improvements, Silver Medals estimated at 20*l*.

For the Invention of any New Implement, such sum as he Council may think proper to award.

ON THE RELATIONS OF SCIENCE TO PRACTICE IN AGRICULTURE.

By Dr. Anderson.

The application of science to agriculture is a subject on which so much has been said and written during the last few years, and which has occupied so much of the attention of the agricultural public, that it may seem almost superfluous to add to what has already been penned. It has always appeared to me, however, that there are still many points of great importance for the practical man to consider, which have either never been sufficiently prominently presented to his view, or which, from their being less striking, or perhaps less enticing, have been allowed to fall into the background, and have hence led to a certain amount of misapprehension in regard to the exact position of science and its relations to practice. Such misapprehensions it would be desirable under any circumstances to dispel; but now that the Highland and Agricultural Society has actively taken up the prosecution of agricultural chemistry, it is of primary importance that the farmer and the chemist should come to a distinct understanding with regard to the mutual bearings of scientific and practical agriculture—the manner in which they can be made to assist one another—and, what is of all others the most important point, how they can be made to co-operate, so as to establish on a firm basis the general principles of agricultural science, which must necessarily be the first step towards the development of a scientific practice. Under these circumstances, I have thought that I might advantageously refer very shortly to some of these matters, and point out what we are in future to expect from the application of chemistry to agriculture, the more especially as it is not very difficult to perceive that the interest which attached to it has somewhat abated with the general public, though I believe it to be undiminished with our most active and intelligent practical men.

This very diminution in the interest attaching to chemical agriculture, I believe to be mainly founded on one of the most serious misapprehensions—serious alike to agriculture and to chemistry—with which we have now to contend; and that is, the erroneous and altogether extravagant expectations which some persons entertained, regarding the extent and rapidity of the influence which chemistry is likely to exert upon agriculture. To hear them talk of it, one might almost imagine that chemistry, as by the wand of a magician, is at once to spread fertility over our barren moors, and raise abundant crops where nothing ever grew before; and that the chemist can, by a few simple experiments, determine with absolute precision the circumstances under which the farmer must go to work, so as to produce an abundant crop. It needs not to be mentioned that such views are the exception, not the rule; but, between this extreme case and those likely to be fulfilled, there are many expectations which, with less apparent extravagance, are equally beyond the powers of chemistry in its present imperfect state, and involve questions which, if they ever can be answered, must await the advance of pure science to a point much beyond that to which it has yet attained. Nor is it, perhaps, matter of much surprise that such expectations should have been entertained, as it must be admitted that the general public is not in a position to estimate correctly the extent of the benefits which it is likely to derive from the application of science to any art; and, unfortunately, in the present instance, it has been misled by the far too laudatory terms in which the application of chemistry to agriculture were talked of some years ago. Hopes were then excited which, to those intimately acquainted with chemistry, it was very evident could not be sustained, but which the enthusiastic embraced at once; only, however, when they were disappointed, to abandon as worthless the whole science itself, along with the unobtrusive modicum of real progress, which was altogether lost sight of amidst the ruins of their lofty expectations. Even those who take a more cautious and sober view of the progress of agricultural chemistry are apt to be led into expectations greater than facts justify, by the extraordinary progress which the application of chemistry has effected in some other arts, such, for instance, as the art of bleaching and the manufacture of soda, which chemistry, by one great stride, raised from the state of primitive rudeness in which they had existed almost from time immemorial to one at least of comparative perfection. Such facts may lead us at first sight to expect that the application of chemistry to agriculture should be followed by equally rapid results; but a little further consideration seems to point out a very material difference between such arts and the cultivation of the soil. In such a case as the manufacture of soda, for instance, and indeed in all those in which the application of science has produced the most marked results, the chemist has presented to him for solution a definite and circumscribed problem, involving the mutual relations of some three or four different substances; and he is able to trace the changes which the coal, common salt, and lime employed, undergo, from the commencement of the process through each successive step, until the soda is obtained in the perfect state; but in the art of agriculture each question frequently involves, not one, but many problems, connected with the highest and most abstruse doctrines of the science, in which not merely chemical forces, but the far more recondite phenomena of life come into play, and in which the investigations of the chemist are carried on, and his conclusions tested under the influence of weather, climate, and many other perturbing causes.

The extreme complexity of the problems with which agricultural chemistry has to deal may be conceived from the fact, that most plants contain from twelve to fifteen different substances, all essential to their existence, the relations of which must be investigated before definite views can be obtained regarding the changes which go on in the organism of the plant. These relations, moreover, are far more complicated than even the number of the elements alone would lead us to suppose: the single element of sulphur, for instance, which does not constitute more than two or three parts in the thousand of most plants, exists there in not less than three different forms of combination, in each of which it is as essential to the plant as those which form the great proportion of its bulk. Now, it must be sufficiently manifest, that questions involving elements of such complexity are not to be solved as rapidly or easily as the far simpler problems of mineral chemistry; and that not merely on account of their superior complexity alone, but because, in the one case, theoretical chemistry sets us far on our way towards the solution, while in the other there is still a great gap to be filled up, a whole mine of scientific facts to be worked out, before we are in the condition to approach sufficiently near the comprehension of these more complicated phenomena. In fact, the latter are not questions of *pure* chemistry, but are intimately interwoven with vegetable physiology—so much so, indeed, that in many instances it is scarcely possible to decide to which of these two sciences they ought strictly to belong. And it is just herein that their great difficulty consists, for there is nothing more certain than that those questions which lie, so to speak, on the confines of two sciences, require for their successful investigation a high degree of development of both the sciences on which they depend. Now, chemistry is still far from having attained all that development of which it is capable, as the time during which it has been cultivated has not been sufficiently long to admit of much progress, except in special departments. Few of those who are not themselves chemists, are aware that the facts and doctrines of modern chemistry have been determined during little more than the last sixty years; and that, with few exceptions, all the laborious investigations of the older chemists, and, without exception, all their general doctrines, were then swept away, to be replaced by the science as it now exists; while organic chemistry, with which agriculture is more intimately connected, has been successfully prosecuted for not more than half that period.

To expect any *rapid* advances, in the practical applications of agriculture, of chemistry in its present state, is manifestly unreasonable. The progress must necessarily be slow, in some instances almost imperceptible; and much must be done which at first sight the practical agriculturist may be inclined to consider altogether foreign to his object. Extended researches will frequently be requisite which do not directly lead to practical results—that is to say, which are not immediately convertible into an equivalent of current coin, but which are the foundation of such results, and form the starting point of perhaps a very different series of experiments, having an immediate bearing upon practice. It is of great importance that this should be distinctly understood and borne in mind, for it is by no means uncommon to suppose that nothing more is necessary than at once to convert scientific facts to practical purposes; while, so far from this being the case, the agricultural chemist has a two-fold duty to perform—he must both determine the scientific facts of agriculture, and eliminate from them the practical conclusions to which they lead. It may, perhaps, be said that the establishment of these facts falls within the province of the pure chemist, and that their practical application only ought to be the province of the agricultural chemist. But if this principle were to be acted upon, the progress of chemical agriculture would be slow indeed; for the investigations of the pure chemist lead him now, and are likely for a very long period to lead him, in directions very remote from those most likely to afford the materials which the agricultural chemist requires to work upon. The latter would, therefore, require to sit idly waiting till the former supplied him with facts, which his own exertions would have enabled him to ascertain. Nay, the agricultural chemist may even do a better service to agriculture, by pursuing the investigation of those apparently theoretical subjects, than by directing himself to those which seem to have the most immediate practical bearings.

There is another point on which there has been a good deal of misunderstanding between the chemist and the agriculturist, which is intimately connected with the erroneous estimate of the extent and perfection of chemistry. It is not uncommonly supposed that the chemist is in the condition at once to solve, by the investigations of the laboratory, all such questions in practical agriculture as may happen to be submitted to him—that he can determine, when nothing else can, why certain methods of cultivation are successful, others unsuccessful. It is just possible that he may in some instances be able to do this, but far more frequently his researches enable him not to state positively what is or what is not the case, but rather to draw a probable conclusion—to form, in fact, a hypothesis, which is not in itself a truth, but which must be further tested by experiment in the field, whereby it may be either confirmed or entirely refuted. Now, very unfortunately, this hypothesis is often taken for a positive statement; and when it turns out to be erroneous, it is immediately held up as an instance of the fallacy of science by those who, not being themselves acquainted with the method of investigation by experiment, are unaware that all scientific facts are developed in such a manner. No one ever thinks of going fortuitously to work, when he proposes to determine a scientific fact. He first weighs all facts of a similar character, or having a bearing on the subject which he desires to elucidate, and then founds upon these a hypothesis, the truth or fallacy of which is to be tested by experiment. Now, without any explanation, it has frequently happened that such hypotheses have been handed over to the practical man, whose field experiments having refuted them, he has forthwith abandoned the science which seemed to him to give erroneous results, not knowing that these results were only in progress of being arrived at by those very experiments which he was engaged in performing. The very same process has been employed in the applications of science to every other art; but the difference between them and agriculture is, that, with the former, the hypothesis is formed, and the experiments executed by the same person; in agriculture the hypothesis must, in many instances, be handed over for experimental elucidation to the practical man. The many failures which are made in other arts remain unknown to all but those by whom they have been made, while in agriculture they become known to all and sundry; and by them it is not understood that, though these results are negative, they still serve to bring us all the nearer to the truth.

And this leads me to observe, that, the true manner in which chemical agriculture is to be advanced, is not merely by the exertions of the chemist, or the labours of the laboratory alone. It must be by the simultaneous efforts of science and of practice, each endeavouring to develop, with care, steadiness, and accuracy, the facts which fall within its province. Nor must each pursue its own course irrespective of the other. They must go hand in hand, and, taking advantage of each other's experience, and avoiding all sort of antagonism, they must endeavour to co-operate for the elucidation of truth. The chemist and the practical man are, in fact, in the position to give each other most important assistance. The one may point out the conclusions to which his science, so far as it has gone, enables him to come; while the other may test these conclusions by experiment, or may be able, from his experience, at once to refute or confirm them. But it will not do to imagine that there is here either a triumph or a defeat. Such a spirit cannot be anything but injurious. It is rather to be looked upon as a fortunate state of matters, which, admitting of the examination of our conclusions from two different points of view, directs us with the greater certainty in the path of truth.

For the development of agricultural chemistry in this manner, the Highland and Agricultural Society appears to me to possess peculiar advantages. It has within its own body a large number of members, who are both able and willing to assist in furthering its views in this direction by experiments in the field; and I am glad to say that some are actually already commenced, the results of which I hope, at no very distant period, to communicate to the society.

As it may be interesting to the members of the society to learn the nature of these investigations, I shall state very shortly the method in which we propose to pursue the work of the laboratory. Our plan is, as far as possible, independently of the ordinary analyses of manures and the like, to carry on two different classes of researches. 1st, extended investigations on subjects of interest and importance, and the completion of which must necessarily occupy a considerable period; 2nd, shorter investigations of subjects of a more circumscribed character, which do not occupy so long a period; and 3rd, subjects which, from their consisting of isolated portions, may be taken up in the intervals which occur in the investigation of other matters.

In the former of those classes of investigations, we are now engaged with a series of experiments for the purpose of determining, as far as chemistry can, the relative feeding values of different grains, and other ordinary sorts of cattle food—our object being so to determine their values that the farmer may know what quantity of any given sort of food he ought to substitute for that he has ordinarily employed, when the price of the former falls so low as to make it advantageous to use it. In this way the farmer will be enabled to employ the produce of his own farm, in place of disposing of it at low rates, and purchasing foreign cake or other foods. The subject is one of considerable difficulty, but when completed it will, I hope, serve to throw some light upon the principles of successful feeding; and it is our intention to extend it to our root crops, and to the different sorts of grass employed for hay, as opportunity may offer. Another question, now under investigation, is the alleged inferiority of the butter of cows fed with turnips grown with guano, to that of those fed with turnips grown with ordinary manure. I do not expect, however, that we shall be able to complete this till the close of the present season, as it was begun at too late a period to admit of our obtaining the turnips of the last crop in their best condition. Turnips, however, are now being grown both with and without guano, by means of which we shall be able to investigate this matter more fully than we have been yet able to do. In connexion with the turnip crop, we have also made arrangements for determining the cause of the different feeding value of turnips grown in high and low districts, and the chemical department of which will be entered upon so soon as the turnips now being grown expressly for this purpose are ready.

The subjects belonging to the second and third classes are of too special a character to render it necessary for me here to go into any details regarding them. I shall only mention that one is a careful series of analyses of standard soils from different parts of Scotland—a thing which is much wanted; for, notwithstanding all that has been done in agricultural chemistry, we are still very far from having a corect knowledge of the constitution of the soils best adapted to different crops.

It will be seen, from what I have now mentioned, that we are occupied with a large amount of work, the satisfactory completion of which will require a considerable time, but from which, I trust, we shall obtain results alike creditable to the society, and advantageous to agriculture. Of this I entertain little doubt; but I may be permitted to observe, that my chief fear for agricultural chemistry is, that the constant craving after immediate results on the part of the agricultural public, may lead to the publication of hurriedly and imperfectly performed investigations. The chemist knows well how desirable it is to weigh and repeatedly to examine all his results, and to proceed cautiously and slowly; while the agriculturist, though in his own operations he is content to cast his seed upon the ground and wait patiently for the harvest, is too apt to imagine that the tree of science bears fruit at all seasons, though, in point of fact, the patient waiting for results is a most necessary element of scientific progress. If this error is avoided, I am convinced that good results will be obtained, and that all men will in time be convinced, that the slow and careful determination of scientific facts, is likely to become one of the most important assistants in the improvement of practical agriculture.—Journal of Agriculture.

DRAINS—THEIR DEPTH AND DISTANCE.

At the last monthly general meeting of the East of Berwickshire Farmers' Club, D. Milne, Esq., of Milnegraden, the President of that very efficient club, read the following report of experiments he had recently made on the above subject :—

Mr. Milne stated that, having to drain a twenty-four acre field, he took the opportunity of trying the effect of drains varying in depth and distance. He divided the field into four parallel breaks—each about six acres in extent. In the westermost the drains were $3\frac{1}{2}$ feet deep and 30 feet apart; in the one next to it, the drains were 3 feet deep and 15 feet apart; in the third, the drains were $3\frac{1}{2}$ feet deep and 15 feet apart; in the fourth, they were 3 feet deep and 30 feet apart. The furrow drains in each break led into a large drain at the ends; and at the mouth of each large drain, a water meter was placed. The field was drained in the winter of 1847-48. It had been 14 years in grass. Its last corn crop (viz., in 1834) was wheat, of which the land produced on an average 33 bushels per acre. In the spring of 1848, the field was partly sown with sandy oats, and partly with black oats got from Essex. The water meters were set in June, 1848, and were removed in April, 1849. At harvest of 1848 the stooks were counted, and the following was the result :—

SANDY OATS.

On 3 feet and	15	feet drains,	$558\frac{1}{2}$	stooks per acre.
„ $3\frac{1}{2}$ „	30	„	$503\frac{1}{4}$	„

BLACK OATS.

On 3 feet and	15	feet drains,	$562\frac{1}{2}$	„
„ $3\frac{1}{2}$ „	30	„	$542\frac{3}{4}$	„

These crops, on being thrashed, yielded as follows :—

SANDY OATS.

On 3 feet and	15	feet drains,	44	bushels per acre.
„ $3\frac{1}{2}$ „	30	„	$63\frac{3}{8}$	„

Weight—41 lbs. per bushel.

BLACK OATS.

On 3 feet and	15	feet drains,	$52\frac{1}{8}$	„
„ $3\frac{1}{2}$ „	30	„	$74\frac{3}{8}$	„

Weight—40lbs. per bushel.

Some modification of these results was, however, necessary, in regard to the black oats, in consequence of one of the breaks on which it grew having been on nearly one-half of it shaded by trees. That the trees had the effect of considerably lessening the produce, particularly of grain, is evident from the following statement :

BLACK OATS.

Break shaded,	produced	611	stooks per acre.
„ unshaded	„	$514\frac{1}{2}$	„
„ shaded	„	$70\frac{5}{8}$	„
„ unshaded	„	$34\frac{5}{8}$	„

If the shaded break is thrown out of view, the result, as regards black oats, would be as follows :

On 3	ft. and 15ft.	drains,	611	stooks per acre.
$3\frac{1}{2}$	and 30	„	$542\frac{3}{4}$	„
3	and 15	„	$70\frac{5}{8}$	bushels „
$3\frac{1}{8}$	and 30	„	$75\frac{3}{8}$	„

The quantity of seed sown for both kinds of oats was at the rate of five bushels per acre. The water discharged from the two sets of drains was as follows :

From the	3 ft. and 15 ft.	drains,	35,711	gals. per acre.
„	$3\frac{1}{2}$ and 30	„	46,510	„

In this calculation the quantity of water which fell on the few acres shaded with trees was thrown out of view. From these results it would appear that rather more water had been discharged by the $3\frac{1}{2}$ drains than by the 3 feet drains, though the latter were twice as numerous as the former. In those parts of the field therefore drained by the 3 feet drains there was more water left in the land, or went off by evaporation; and there was also less depth of soil for the roots. This fact seemed to explain the produce obtained. If the number of stooks afforded a correct criterion of the quantity of straw, there was most straw on the 3 feet drains, and most grain on the $3\frac{1}{2}$ feet drains; from which he would infer that a damp soil, though favourable to large produce in straw, was unfavourable to large produce in corn. The $3\frac{1}{2}$ feet drains probably produced with greater dryness greater warmth, as the larger quantity of rain which they carried off would impart to the soil a greater amount of heat. Why the $3\frac{1}{2}$ drains, though one-half as numerous as the 3 feet drains, should carry off as large or a larger quantity of water, was a separate question. Of course the deeper drains would draw from a greater extent of surface; but he had not anticipated that a $3\frac{1}{2}$ feet drain would have drawn off double, or rather more than double, the quantity of water that a 3 feet drain draws. The water meters, however, showed that this had been the case; unless, indeed, there were springs in those breaks where the deeper drains were. He was not aware that any such springs existed. The subsoil was pretty uniformly retentive throughout the field; and the upper soil was not perceptibly more open in one part than in another. So far, therefore, as his experiments had proceeded, they showed that if drains were made $3\frac{1}{2}$ feet deep, only one-half the number will produce the same or a little better effect than 3 feet drains. The expence per are of the former, in the field referred to, had been £4 6s. 4d.; of the latter, £8 12s. $4\frac{1}{2}$d. Mr. Milne stated that he had heard of a similar experiment having been tried in East

Lothian by Mr. Hope, of Fenton, with an opposite result. He had seen no account of Mr. Hope's experiment; but if correctly reported to him, it would lessen his confidence in the results obtained by himself, and would be an additional inducement to persevere with his observations, in order to obtain further data, for coming to a right conclusion. Probably, in another year, more correct data could be obtained, as in a few months only after the drains were made, the soil could not have been opened very thoroughly. He had last winter put the subsoil plough through the field; and he would endeavour to ascertain what was the produce of this year's crop on the several divisions, and report the result to the Club. One thing was quite evident, that with almost any system of drainage, the increased produce amply compensated the cost. From the crop which had been yielded on the field above referred to, even after only six months had elapsed from the execution of the drains, he calculated that an increase of about 20 bushels of oats (equal to about £2) per acre had been obtained. This result was in conformity with what had been obtained from other fields previously drained by him. But on the general benefits of draining, it was unnecessary to dwell. The great question now was, What is the system of drainage which could be done most efficiently, and at the least expense? To this point enquiries ought to be specially directed.

We have much pleasure in subjoining a full account of Mr. Hope's experiments, alluded to by Mr. Milne—

(TO THE EDITOR OF THE NORTH BRITISH AGRICULTURIST.)

SIR,—In reply to your inquiry as to the result of the experiments made by me, in draining with tiles at different depths and distances, I may premise that the field operated on may be described as rather a free loam, but upon a very stiff retentive clayey subsoil, mixed with small stones, quite free from under-water. The ridges were 18 feet in width, and were gathered up from the stubble, leaving every furrow open, to save spade labour. Into eight contiguous furrows, each upwards of 330 yards in length, there was put a drain of 3 feet in depth below the plough furrow. Then one furrow was missed, but in the following another drain of the same dimension was put. After that followed two furrows without any drain, thus leaving a ridge which may be said to be undrained. The rest of the field was done with drains 1 foot 8 inches in depth below the plough furrow. The land since then having been ploughed flat, the drains may be considered as 10 or 12 inches deeper than the depths cut with the spade. The cost of the 3 feet drains was 6d. per rood, or £4 per S. acre; the ebb drains, 2¼d. per rood, or £1 10s. per st. acre.

The draining of the whole field, which contains 15 S. acres, was finished early in February, 1841, and in summer was sown with turnips, the drills running across the drains or ridges. One half was made white globe, the other half Swedish turnip, the manure applied being half a ton of rape dust and 12 carts of farm-yard dung to each variety per acre. The crop was removed and weighed on the 14th December, and the produce found as follows, per Scotch acre :—

	White Turnips.		Swedish Turnips.	
	tons.	cwt.	tons.	cwt.
On 3 feet drains, 18 feet apart ...	21	8	13	15
On 1 ft. 8 in. do., 18 feet apart...	24	6	13	17
On 3 feet drains, 36 feet apart ...	20	14	15	—
On portion undrained	21	8	10	15

It was only after the white turnip had finished growing that the land could be said to be wet, and to receive any benefit from the draining. The subsoil, from the deep drains, appeared to be against the white turnips; but the Swedish were much larger where they came in contact with it. At the same time they were obviously thinner on the ground.

About the middle of February, 1842, the field was sown with wheat, drilled across, that a like quantity of seed might be given to each part of it. Three bushels per acre was the quantity sown. The different portions were cut, stacked, and threshed separately; and the following is the result, per Scotch acre, the weight of all being the same, 62lb. per bushel:

	Wheat.		Straw.		
	qrs.	bush.	tons.	cwt.	lbs.
On 3 feet drains, 18 feet apart ...	5	6¼	1	11	108
On 1 ft. 8 in. drains, 18 feet apart	6	4	1	14	56
On 3 feet drains, 36 feet apart ...	6	0	1	9	84
On portion undrained	6	0	1	11	42

From the period when the land was sown, until the crop was reaped, there never was more moisture in the soil than what was requisite for the growth of plants.

The field was grazed in 1843 and 1844. Little or no difference was observed in the pasture during the first year, though, in the second, appearances were against the portion with deep drains. In the spring of 1845, the whole was ploughed up and sown with grey Angus oats. Before harvest the effects of the drains were very obvious, the crop on the ground ebb-drained being much heavier and bulkiest; at one period it was laid when the crop on the deep drains was all standing. On the latter, and on the ridge undrained, the crop was sooner ripe, though the field was all cut in one day. This accounts, in part, for the weight per bushel being greater on these portions; indeed, the quality improves as the quantity diminishes. The following table exhibits the result, per Scotch acre:—

	Oats.			Weight. Per bsh.	Straw.		
	qrs.	bsh.	pks.	lbs.	tn.	cwt.	lb
On 3 feet drains, 18 feet apart,	10	0	0	40	2	6	108
On 1 ft. 8 in. drains, 18 ft. apart,	12	1	2	39	2	17	96
On 3 feet drains, 36 feet apart,	9	4	2	40	2	4	26
On portion undrained	9	0	0	40½	2	4	40

On the removal of the crop, there was a marked difference in the condition of the land, the deep drained portion being full of couch grass, while the part with the ebb drains was comparatively clean.

In 1846, the field was sown with Skirving's purple top yellow turnip, the manure applied being 5 cwt. of guano, 1 qr. of bone dust, and 16 tons of farm-yard manure, per Scotch acre. No difference was observable by the eye, the whole crop being fine. One-half of the crop was consumed on the ground with sheep, they being allowed at same time 1lb. of linseed cake each daily. While the sheep were on the ground, it was found necessary to complete the drainage of the whole, every 18 feet, the water having stood from end to end of the field on the undrained furrows, for even the deep drains had little or no effect on the undrained furrow betwixt them. In 1847, the field was again in spring wheat (Fenton), and was a most magnificent crop throughout; it yielded, over the whole, 7 qrs. 6 bushels per Scotch acre, and weighed 63lbs. per bushel. The field was pastured last year, and it kept but a small stock. It is now in oats, which, unfortunately, are a light, shabby crop, similar to most of the oats this season in the neighbourhood, and one part of the field cannot be said to be better than another. I have, therefore, no hesitation in giving it as my decided opinion, that on land with a stiff clay subsoil free from under water, 30-inch drains are all that is required to carry off the surface water. All practical men are well aware that no general rule ever can be laid down for either the depth or the distance betwixt drains; this can only be determined by the nature of the soil and subsoil in each particular case. I have seen material benefit obtained from making drains four and five feet deep, when $2\frac{1}{2}$ feet drains would have been money thrown away; but, from the above, and other experiments under like circumstances, I am also satisfied that to insist upon it as a rule to go deeper than thirty inches in all cases, the difference of the expense may be worse than money lost, that the crops may be materially hurt into the bargain.—I am, Sir, &c., GEORGE HOPE.

Fenton Barns, Aug. 10, 1849.

—North British Agriculturist.

THE DEPLORABLE YEAR 1848.

A deeply-interesting public document has just been furnished to the Lord Lieutenant by Captain Larcom, one of the commissioners of public works. It purports to be a return of the agricultural produce in Ireland in the year 1848—but, in truth, it is a sad history of this country for the past year, as a few extracts which we propose to make will show.

In the gallant captain's prefatory remarks, addressed to the Lord Lieutenant, he states that the accompanying returns were collected by the constabulary in the same manner as the returns in the preceding year. "But," he goes on to say—

"But the disturbed state of the country required the whole time and energy of the constabulary in their more arduous and obvious duties in the preservation of peace and order. This in some places led to occasional delay, and in the counties of Waterford and Tipperary, and the metropolitan district of Dublin, it was necessary to abandon the inquiry altogether. To persons, indeed, who have not witnessed the admirable discipline and untiring exertions of that exemplary body of officers and men, it will rather appear matter of surprise that at such a time the returns could be collected at all, than that in a few counties they should be wanting."

In consequence of these omissions, the compiler found it necessary to deduct the produce of 1847 from the places from which no returns could be obtained in 1848, when making comparisons of the aggregate produce of both years.

It appears by a comparison of these returns with last year's, that there has been a reduction in the number of farms in Ireland in every class except those above 30 acres. In those of from 1 to 5 acres the decrease has been 24,147; from 5 to 15 acres, of 28,379; from 15 to 30 acres, of 4,274; while of farms above 30 acres, there is an increase of 3,670. Thus in one year we find no fewer than 53,130 proprietors reduced—we know not to what level. How many have died of destitution, how many emigrated, how many are in the poor houses, and how many of this tremendous number of *heads* of families may now be engaged as farm-labourers for the larger proprietors, are questions which may excite the sympathies of the country, but there are no grounds for hazarding replies. It is almost needless to suggest that a fearful amount of human suffering must have been endured by the dwellers upon the suppressed farms. Let the fact be borne in mind that the returns for 1847 likewise showed a great falling off in the number of small farms, occasioned by the failure in the potato crops of that and the preceding year.

From the table relating to the province of Leinster, we learn that the decrease in the number of holdings, not exceeding an acre, as compared with 1847, was 3,794; the decrease in the number of holdings above 1 and not exceeding 5 acres, was 4,026; in holdings of 5 and not exceeding 15 acres, 2,546; in those of 15 to 30 acres, 791; making a total reduction in the number of holdings in this province of 10,617. To meet this there is an increase in the holdings above 30 acres, of 540.

In Munster the decrease in the holdings under 30 acres was 18,819; the increase in those over 30 acres 1399.

In Ulster the reductions in the small farms were in about equal proportions with the above-mentioned provinces—they amounted to 15,102; the increased number of large farms, 1,134. There is a point in the Ulster return which is worth mentioning, as it is not to be found in any of the three other provinces—an increase in the number of farms of from 15 to 30 acres, of 762.

Connaught—unhappy Connaught!—is shown to have passed through a fearful ordeal, as we shall presently see, not only by the extensive suppression of farms, but by the frightful scarcity of food to which this state paper refers. We shall in the first instance proceed with this synoptical sketch of the changes in the number of small farmers. There were, in 1847, 35,634 holders of from 1 to 5 acres; in the following year the number was reduced by 9,703. In 1847 there were 76,707 holders of from 5 to 15 acres, whose numbers fell off by 12,891 in 1 8 8; and in those of from 15 to 30 acres there was a reduction of 2,121; making a total decrease in the small tenantry of Connaught of 26,599. To meet this apparent universal abandonment of the soil of this province, there was an increase in the large farms of 597. The report thus proceed:—

"In the columns showing the extent of land under crops, a material decrease will be observed in the extent of leguminous crop in every county, amounting, on the whole, to no less than 337,886 acres, while the increase of green crop appears to have been 382,190. The culture of the potato has again occupied the attention of the people, the increase of area under that crop having been 481,750 acres. The extent of flax has decreased 4,108 acres. But on the whole kingdom the increase of land under crops amounts to 302,464 acres. These facts tend to show that there was no falling off in the industry of the country in 1848; on the contrary, the success which attended the contracted culture of 1847 had evidently led to increased exertions, but unfortunately the results were not such as could have been desired, as will be seen by an examination of the columns of the table devoted to produce."

This is but a just tribute to the Irish farmers, who made such praiseworthy exertions to raise their country from the slough of despond into which it had for a time fallen, owing to the debility occasioned by the weight of her accumulated misfortunes.

It was not the will of Providence that their industry should be crowned with success, as we shall see by the document before us, which states, that on comparing the returns of '48 with those of '47, "*the averaged result is a lamentable confirmation of the diminished produce of* 1848." The following are given as the mean rates in the entire kingdom:—

In 1847, the acre of wheat produced 6 6-10 barrels; in '48, but 4 5-10.

In '47, the acre of oats produced 8 4-10 barrels; in '48, 7 4-10. Still, if you recollect, the Irish farmers congratulated themselves on having a good oat crop last year.

There is little difference in the comparisons of barley, rye, beans, and turnips; but in POTATOES the falling off was nearly one-half. The acre in 1847 produced 57 tons; in 1848, but 30:—

The report goes on to say:—

"In the potato crop this indicates a reduction of nearly one-half, and there can be no doubt that *a much smaller quantity in fact was realised*, because many of the reports were sent in before the full extent of the decay became known, which, therefore, if made at a later period, would have given a much lower general average.

"Calculating the produce, however, even at this rate, the increase in the quantity of potatoes in 1848 over 1847, was only 725,521 tons, while the decrease in grain crops was 673,488 tons. This reduction in the grain crop was, no doubt, greatly brought about by the mere diminution of area so cultivated, and by the unfavourable nature of the season for such crop, from the low temperature and frequent rain. But another fact which the tables exhibit, and to which attention was directed in the returns for 1847, ought not now to be overlooked, viz., that the extent of preparation crop in that year was only 661,011 acres, while the white crop of 1848 extended over 2,356,796 acres, a disproportion which must inevitably bring about a rapid reduction in the rate of produce. At present there is a somewhat better prospect, the grain crop of 1848 bearing to the preparation crop to ratio of 2·7 acres to 1, whereas in 1847 it was 4·5 to 1. Notwithstanding, however, this change for the better, it is evident a still further reduction in these relative proportions must be looked for before a wholesome system of agriculture can be predicted."

"In the summary tables will be found the means of ascertaining the extent of the depression in each county and union; but in making the comparison it is necessary to bear in mind that the produce, even of 1847, was in many districts very far below the wants of the population, and consequently that the extraneous supply of food required by the population of these districts, over and above the produce of the districts, is not to be measured by the difference between the produce of the respective seasons.

"The following table shows the comparative amount of grain to each person in each province in Ireland:—

	Grain. lbs. per head.		Grain. lbs. per head.
Leinster	885	Connaught	347
Ulster	696	Munster	380

"The following is a similar table for eight of the best and worst circumstanced unions in Ireland:—

Best.	Grain, lbs. per head.	Worst.	Grain, lbs. per head.
Dunshauglin	1442	Galway	172
Enniscorthy	1322	Skibbereen	166
Ardee	1279	Westport	166
Gorey	1253	Dingle	149
Downpatrick	1226	Kanturk	133
Gortin	1173	Bantry	103
Newtownlimavady	1152	Clifden	102
Edenderry	1140	Kenmare	71

"By a comparison with the recent reports of the poor law commissioners, it will be observed that the unions in the latter column are amongst those which have received the largest amount of assistance from the government, except Kanturk, which, though by nature in the same category, has struggled through without it, having collected the highest rates of any union in Ireland.

"The number of acres of flax has been stated to be 4,108 less in 1848 than in 1847, having been in the former year 58,312, in the latter 53,868, but the quantity of produce exhibits more than a proportionate reduction. The average produce of flax, however, was, in the returns for 1847, calculated at the ratio assumed by the Flax Society in their reports—viz., six hundred-weight to the statute acre. In the present returns it is the result of independent inquiry, being included in the local queries on the crops generally. This has given for 1848 only 38 stones, or $4\frac{3}{4}$ cwt. per acre."

Thus it appears that in all the staple articles of food, as well as in that of flax, our only manufactures, there was a serious deficiency in the year 1848 as compared with the preceding year, which again, we must repeat, was rather a scarce one, independently of the potato disease.

We shall next proceed to review the return of live stock, and after the details already given, the public will not expecct anything cheering as far as the small farmers are concerned. There is nothing of the sort in this paper. The decrease in the stocks of horses, mules, asses, cows, sheep, pigs, and poultry, of all holders of less than 15 acres of land, is considerable; but then the larger farmers would appear to have got possession of all the smaller farmers had parted with and much more. The estimated loss in money's worth to the farmers of less than 15 acres is £358,240, while those above this quantity of land increased their live stock by £976,551, giv- a balance in favour of the market value of the live stock of the country of no less than £618,581.

The report thus winds up :—

The foregoing table shows a steady diminution in the capital of the smaller farmers; but, as will be seen by the following table, not in so great a proportion as their numbers have been reduced, while the larger farms exhibit an increase in stock beyond their increased numbers :—

Classes of Holdings.	Alteration per cent. in the Number of Holdings.	Alteration per cent. in the Value of Stock.
Under 1 acre	30 per cent. less ..	26 per cent. less
Above 1 and not exceeding 5 acres ..	20 ditto ..	13 ditto
Above 5 and not exceeding 15 acres..	11 ditto ..	4 ditto
Above 15 and not exceeding 30 acres..	3 ditto ..	5 per cent. more
Above 30 acres	·03 per cent. more	5 ditto

"The increase in the value of stock in the whole kingdom being 2.3 per cent. in the year 1848 over that of 1847."

It appears by a "general county table" that in the province of

Ulster, there were, in the year 1848, 232,397 farms, whereon were grown 97,244 acres of wheat, 914,000 acres of oats, 37,000 acres of barley, 235,211 acres of potatoes, 49,549 acres of flax, besides various other crops.

Leinster, 154,099 farms, wheat, 273,834 acres; oats, 528,606 acres; barley, 84,142 acres; potatoes, 198,812 acres; and flax 1239 acres.

Munster, 113,555 farms, 133,994 acres of wheat 244,551 acres of oats, 91,865 acres of barley, 199,864 acres of potatoes, and 1249 acres of flax.

Connaught, 151,043 farms; wheat, 60,674 acres; oats, 235,167 acres; barley, 29,635 acres; potatoes, 109,012 acres; flax, 1826 acres.

For the benefit of those who may not be familiar with the brief statistics of Ireland, it may be well to premise that Ulster has the largest population of all the Irish provinces, being rather more than 50 per cent. over Connaught, and 40 per cent. over Munster. It must necessarily raise a greater quantity of food than any of the other three.

THE AUSPICIOUS YEAR 1849.

Having given so much in reference to a year that must ever be remembered as one of extreme suffering to the humbler classes of society in Ireland—in short, a "hard year" for the poor—we may turn with gratification to the multiplied proofs of better times by which we are surrounded. The kind friend who has supplied us with the materials for the foregoing communication, and who has daily access to official returns from poor law commissioners and inspectors, and other competent and unprejudiced authorities, on the state of the crops, says that nothing can be more cheerful than the reports received by the government. According to these gentlemen there is a far greater quantity of land under tillage this year than ever was seen in this country before, and all descriptions of crop are healthy and abundant.

Now this information corresponds with that which is received from the provincial journals and private sources. Let us take an illustration of the *advantage* that has accrued to a large party of people ranked above amongst the unfortunate dispossessed tenants of small holdings. Between land voluntarily resigned and that from which defaulters had been removed, the Earl of Lucan found himself last winter the holder of some 10,000 acres. His lordship at once set to work to till this abandoned territory himself. He induced a number of Scotch agriculturists to accept employment as stewards, with the twofold object of rendering the estate fruitful, and instructing his tenantry by precept and example in the most approved modes of farming. The result so far has been most successful. These 10,000 acres are now adorned with splendid crops of wheat, oats, potatoes, turnips, and other green crops. A considerable number of the poor fellows who were starving on their wretched little farms are now well-fed, well-clad, and well-housed labourers on the estate of Lord Lucan, in the county of Mayo.

After all, may not the late visitation of Providence—the potato disease—be for the ultimate advantage of the Irish peasantry who have survived the horrors which it entailed upon the entire country? We may be excused for saying we think it will, as we have evidence already in support of this opinion.
—The Herald.

SPROTBOROUGH FARMERS' CLUB.

Subject of discussion—"The Cutting and Securing of Wheat and other Grain Crops."

Mr. Wood, of Sprotborough, in the chair.

Mr. Wood, on taking the chair, referred to the importance of the subject for discussion. He was sorry to perceive the absence of two or three friends whom he was sure would have given some valuable assistance, by the detail of their experience on the subject before them. But no doubt there were those present who had more to do with the cutting and securing the corn crops. And he should be glad if Mr. Dent would give them the benefit of his experience on the subject.

Mr. Dent said he hoped that much would not be expected from him, because he must acknowledge that he generally found himself behind his neighbours in getting his corn in. He often felt dissatisfied with himself in not getting it sooner and securing it better than he did. Therefore, he was rather seeking for instruction from the discussion this evening than anything which he could give to benefit the club. That was what he felt on the subject. He was sorry that Mr. George Mann was not there that evening, because he could have given them some valuable information on the subject.

In reply to questions from the chairman and secretary, Mr. Dent observed that he did not cut his corn so green as he ought to do. With respect to reaping with sickle or mowing, he mowed all he could, both strong and light. He had some oldish men who could not mow, and these he allowed to shear. But he certainly preferred mowing to shearing.

The Chairman: Do you leave it long after it is cut?

Mr Dent: That depended upon how it was cut. If cut green it required more time. He would give his reasons why he preferred mowing. In the first place, he thought that which was left was more valuable in the fold to be made into manure than that in the field as stubble. And then he made a practice of scuffling all he could at Michaelmas. And it made a deal of difference in respect of scuffling, between corn being mown or shorn. He had not a Ducie drag: his was a broad-shared one. He had been used to the common paring plough; but he got a five-share scuffler last year, which was better. It was made by Hall, of Campsall, and was the best article he had met with. He had also a horse hoe, made like his friend Mr. Jenkinson's, which he also liked very well. He found great advantage from scuffling; and it was this that made his turnips look so well. He had heard some one here say that turnip crops were not so good from scuffling.

Mr. Jenkinson, of Cadeby, said he was no advocate for it, but he spoke from his experience.

Mr. Dent would not dispute it, but he had found great advantage from scuffling. He would let his barley lie in swathe. He thought it was better that it should run the risk of lying a little.

Mr. Newham, being called upon, said that as regarded harvesting wheat, he preferred cutting it six or eight days before it was ripe. And his reason was this, that he had a finer sample of wheat and better quality of straw; and he had not the disadvantage of losing a considerable portion in the stubble by being too ripe in case of boisterous weather. If he were to leave wheat till it was ripe to begin with, he should feel very uncomfortable when a windy night came upon it: and not only that, but it was better to handle, and it would stand more weather than if it were allowed to stand until it was dead ripe. When corn was fully ripe it would not stand in the sheaf so well, and it was not in a proper state for cutting. He did not agree with Mr. Hewitt Davies, who had lately written on the subject, and who would have corn cut fully ripe. What would he do if he had 160 or 200 acres of wheat? Where would he command the labour to get in that amount without a considerable loss, provided it were fully ripe before he began to cut at all? He could not understand it; and he should be glad if Mr. Davies would throw a little more light upon the subject. He quite agreed with him in respect to having the land clean and free from weeds; but he could not understand how he had it ripe and could lead it the next day. How could he ensure that the next day would be fine? How could he secure fine weather for a week, when his corn should be ripe? His reason for cutting when green was to avoid these disadvantages. He would cut it six or eight days before it was ripe, and would have it all cut before ripe if possible. He should not then see it lying on the ground, as it would when fully ripe. And he would prefer mowing wheat early for this reason, that of securing the whole portion of the straw in a more valuable condition; because when it ripened at the bottom he saw no advantage in letting it remain any longer. What nutriment it had to receive, it received then from the straw above where it was ripe; therefore, where was the advantage of letting it remain uncut? He would cut it low enough where it was not ripened, because it then ripened in the sheaf.

Mr. Dent inquired if by cutting it the circulation would be stopped?

Mr. Newham thought not. When the root had fully performed its duty, he could not see how any more nutriment could come from it after it was ripe. No doubt it came from the straw higher up. He meant when the straw was in red shank. With respect to leading, that must of course be regulated by the weather. But he was not an advocate for letting it remain longer in the field than was necessary. As soon as it was dry he would lead it. He would cut it green, and lead it as soon as it was dry. With respect to barley, he though it received an advantage from lying in swathe. The dew would make it evenly ripe. He thought it would malt more freely by growing more evenly. There would be no advantage lost by this means. He found with fine weather they got their barley so much sooner than if they took it up and put clover inside the sheaf. With respect to cutting wheat before ripe, there was an advantage with respect to the stubble. Cattle that had very little else but straw to live on, would do better on straw cut before fully ripe, than on straw allowed to remain uncut until it was fully ripe, while it would also make much better manure. He preferred mowing wheat because he held that it was better made into manure in the yard than left in the field as stubble. In many counties they mow the stubble after they have mown the corn; but here they did not make such great crops as to require that. In all cases he preferred mowing to shearing wheat. But he was regulated by the number of men he could get. For instance, with respect to Irishmen, they could not mow, and therefore he must have some shorn from necessity. When he employed Irishmen, he had one or two of his own men to follow them for the purpose of "stooking." He found this advantageous, on account of the slovenly manner in which the Irish did their work. When the corn was once well set up, it would stand a deal of weather; and when once thrown down, it would not stand afterwards. He would have his corn mown when green. There was much difference in the manner in which wheat was taken up and tied. He should like to offer a premium for the man who could mow and take up wheat the best.

Mr. Dent was sure it might be done much better than it was generally.

The Chairman said they did that much better in the Wolds than about here.

Mr. Jenkinson did not consider them very tidy reapers generally in the East Riding. They were rather slovenly than otherwise.

Mr. Newham thought it rediculous to talk about the price of reaping wheat; because there was no comparison between the quality of wheat which was well and that which was ill got. He had seen men sometimes who would do it as well and as neatly as if it had been shorn.

Mr. Dent said he wished he could get his men to do so. Did Mr. Newham's men mow it inward?

Mr. Newham said he would not let them do it any way else.

Mr. Dent: I am glad to hear that.

Mr. Newham said he would always give men the same price for mowing as for shearing, providing they did it well and neatly.

The Chairman inquired whether in tying the sheafs they put the noose inside?

Mr. Newham: They always put the noose inside, That was a safeguard against their making too big sheaves. Sometimes they made it more like a bottle of straw than a sheaf of corn. They had only themselves to blame if they had it not done well; for if masters would not allow the men to do it their own way, they would be compelled to do it right. All masters should be alike, and compel the men to do their work in a proper manner. He gave them 6s. 6d. to 7s. an acre for mowing and taking up wheat. He had given more than that, and he would at any time give as much for mowing as for shearing, if neatly done. When there was a great force of Irishmen it was impossible perhaps to find food for them all. He gave them bread and beer twice a day, and he always found that they improved in appearance. They required a deal of managing, but he found he could do more with encouragement and the promise of a little extra if the work were done well, than by any other means.

Mr. Jenkinson agreed with Mr. Newham on the subject of cutting wheat before it was ripe. When he first went to Cadeby, the wheat was valued about harvest time, and when reaping had just commenced. One part of the field was reaped before it was ripe; but in consequence of a dispute between the valuers, the other part remained until it was ripe before it was reaped. He was only a young farmer then; but he had never been convinced more about anything than he was with respect to the better quality of the wheat cut unripe than that which remained uncut until it became ripe. That which was cut first was put at the bottom of the mow, and when thrashed out it was worth a shilling a load more than the other, and was a beautiful bright sample. Any person taking a sample in each hand could hardly be persuaded that they had been grown in the same field, and no difference but in the time of cutting—one eight days before it was ripe, and the other not until it was ripe. He was very particular in seeing things done in a workmanlike manner. For a good crop of wheat he should rather prefer shearing to mowing. For instance, such wheat as was this year growing upon limestone land, when stooked up in a neat manner, he should recommend shearing in preference to mowing. In some cases, where there was a little grass in the land, and they wanted to clean the land for Michaelmas, then it was better to scuffle it. If he had a field that he wanted to scuffle he should endeavour to mow it. But he should not recommend mowing in preference to shearing except for that. He had notwithstanding always got his mown wheat better than his shorn wheat. It was in better condition when it came out of the stacks, and it laid lighter and dried far better in the stack. Shorn wheat badly laid always came out bad. He remembered in 1826, it was so hot, and wheat became all at once so ripe, that he had to call his men up at one or two o'clock in the morning to go to shear. And then was done that which Mr. Newham had disputed with respect to Mr. Hewitt Davis; for a field was shorn in the morning, and the produce led away in the afternoon. It was put into the barn and was quite soft in comparison with some which was got at different times. As to Mr. Newham's plan of mowing inwards, he (Mr. Jenkinson) had never tried it.

Mr. Newham said that if they were to shear all, and mow none, they would have a difficulty in getting sufficient men. By mowing they could lead four days earlier, and the wheat would come out a drier sample.

Mr. JENKINSON agreed that it was ready to lead sooner and came out drier; but he thought it required a good deal of judgment as to the proper time for getting it. He should let barley lie in swathe, as Mr. Newham said, because it would make a better sample. Wherever there were seeds in the barley, it was better to lie in the swathe. He would let the barley stand until ripe before it was cut. If they cut barley green, they would spoil the sample. It was better to stand until fully ripe.

The CHAIRMAN: Then the question was whether they lost any quantity of straw by letting barley remain while ripe?

Mr. JENKINSON: No doubt; but the stubble was better fodder. If they mowed barley full of seeds, and tied it up in large sheaves, they could never get it dry.

The CHAIRMAN said his question was as to the difference in the quality of the straw, between barley being cut ripe and unripe.

Mr. JENKINSON: The straw itself was better cut green. He cut barley ripe because of the better quality of the corn. It was contrary to wheat. If they let wheat remain until ripe, they lost the quality.

Mr. NEWHAM believed that wheat was worth a shilling a load more by cutting it before it was dead ripe. There could only be one opinion about it. There was less bran and more flour.

Mr. PIGOTT, of Newton, said he agreed that wheat should be cut before it was ripe, but not with respect to what had been said as to its lying in swathe. He should also prefer mowing to shearing, if the land were clean.

Mr. JENKINSON: Suppose he had a close nearly full of grass; that he sheared half and mowed half, which would be ready soonest? Why he would cut the mown wheat some days before the shorn wheat; and it would be drier when led, and drier when thrashed out.

Mr. NEWHAM said he could not speak from experience, because it was a system he did not profess to practise, that of growing grass among wheat.

Mr. DENT said the question was an interesting one. It was whether corn in a field, having grass in it, if mown, was ready to lead sooner than if it were shorn.

Mr. WEBSTER, of Sprotbro', in reply to Mr. Newham, said in some situations it was impossible to grow wheat without grass. Some land was clearer of timber than others; and it must be remembered that that would make a good deal of difference.

Mr. PIGOTT, in continuation, and in reply to a question or two from the chairman, said he led his corn as soon as it was dry. He did not prefer leading it very soon unless it was dry. Of course if there was grass among it, it required a longer time to get dry. He preferred the barley standing till it was ripe. If there was no clover in it, there was no harm in taking it up soon after it was dry, if perfectly ripe. He was not much acquainted with oat growing.

Mr. DENT inquired whether it were better to bind barley tight or slack?

Mr. JENKINSON recommended not over tight.

Mr. NEWHAM said they would take care not to do that.

Mr. DENT did not care how loosely they bound it so that they got it well in.

Mr. WM. DUNWELL, of Wilsic, being called on, said he was for cutting wheat rather green. He liked shearing better than mowing, particularly where there was a heavy crop. In regard to mowing, he agreed with Mr. Newham in some things. It was an advantage to mow when they wanted to get the after-grass off, and also to get the crop taken away. He recommended tying inside, because it better repelled moisture than if tied outside. He made it a practice to let a man follow the Irish to stack after them. He did not think many made a practice of shearing barley. A year or two since they had a field shorn, and it happened to be very fine weather, and they made a nice job of it. They made great pains not to have it tied up wet; but wherever a sheaf was tied up with the least moisture, even from dew, it was as soft as though it had been in a dyke. As to barley, they mowed it as near ripe as they could. He had seen them in Lincolnshire, where they mowed very high in the stubble, and they recommended that plan very much. It looked untidy; but, if a very wet harvest, the barley was better. Oats they seldom grew; but there was perhaps more care required in harvesting oats than any grain. He had sometimes seen very great loss. With respect to stooking, it was a point of consideration to have the stacks north and south, instead of east and west. He meant in the close. He should prefer going by the sun than by the shape of the close.

Mr. WEBSTER said he differed from Mr. Dunwell; because he should not shear his wheat if he could get it mown in a decent way. He preferred mowing to shearing in any season. He thought there was not that danger, and they got the corn much earlier. He had always got his corn very green until last year, when he let it stand too long, and some got too ripe. He found in the samples that there was more than a shilling difference between the part of the close where the corn was got green and that part where it was got ripe, and a great loss as well. They must not expect altogether to get rid of grass in their fields at Sprotbro'; but as they had it, they must make the best of it.

Mr. DENT hoped they would not be discouraged. He should certainly like to grow wheat without grass, if it could be done.

Mr. DUNWELL said there was not half so much grass among the wheat now as there used to be a few years since.

Mr. WEBSTER advocated the mowing of wheat, on the ground that they would have to employ less Irish. He did not like to encourage the Irishmen to come over here, to take the bread from the mouth of the industrious and honest English labourer, just at the time when he ought to be making something extra for himself and family. He believed that there were plenty of Englishmen to be found to get in the harvest. He had not employed one Irishman last year, having been robbed by them the year before.

Mr. NEWHAM was afraid they could not depend upon the labourers of this country to get in the whole of the harvest. He had seen enough of that last year, in the treatment the Irish received; their enemies being in a great measure assisted and encouraged by the English labourers.

Mr. VICKERS was afraid they would do very poorly without the Irish during harvest, particularly as they were very clever shearers. Where corn was strong, and the land clean, he preferred shearing to mowing; but if the land had a little grass in, he thought it was better to mow it, and if possible get the grass clear off the land.

Mr. DUNWELL said he had heard that farmers used to let their corn stop till it was ripe, and then let the men have a good harvest of it.

Mr. JENKINSON said it used to be said that they had always a month of harvest; but farmers were better managers now than then.

Mr. JOHN SNOWDEN, of Marr, being requested to give his opinion on the subject, gave it as follows:—He said that in Scotland, where he had been, they cut corn green, and they both mowed and sheared; but in Dumfriesshire they mowed generally. They grow very little wheat, and chiefly oats. They did not let it lie after it was mown, but they took it up and stooked and raked it altogether. There was a taker up at each side, and each made their own bands. There were two binding for every three takers up, and one stacker for three takers up, and also one raker. They rake by hand, and they mow it into the corn. They take it up by hand. They can take it up better without the rake, and much straighter. They put ten sheaves together when they set them up. They did not put caps on. They sometimes hood the wheat. They make their corn-stacks round and small. He did not prefer the round stacks himself. They might be more convenient in Scotland, where they had seldom large barns. He thought it was more from custom than anything else. The round stacks would take rather more thatching. They cut their barley quite ripe, and very frequently cut everything down before they began to lead at all. They had to get extra workmen, but not to the same extent as in this country.

Mr. BROOKE, of Hampole, said he had often seen fifty men in a field at once in Scotland; not in patches, but altogether; and a man to look after them and keep them in order.

After a few desultory observations the discussion was closed, and the following resolution was drawn up by the secretary and agreed to:—"That wheat should be cut before it is quite ripe, say, from six to eight days; but as to whether the whole should be cut with the scythe or the sickle, this meeting recommends no general plan, believing that both may be profitably adopted. Barley to be mown perfectly ripe; and, where it contains clover or other seeds, allowed to remain in the swathe: the time being governed by the quantity it may contain."

The next subject for discussion will be "The breeding and rearing of cattle."

STAINDROP FARMERS' CLUB.

The president, T. F. Scarth, Esq., in the chair. Subject for discussion—"The Management of Summer Fallows," introduced by Mr. Harrison, of Forcett, as follows:—

Mr. Chairman and gentlemen, your committee in selecting me to introduce to the club this very important subject for discussion, have, I fear, not made a very judicious choice, as I have not had an acre of land in summer fallow on my farm for the last five years; and I am certain that many members of this club, from their experience and high standing as farmers, would have introduced the subject with greater ability than I have any pretensions to. However, I bow to their decision, and claim the indulgence of the club, while I state to you what ought to be done in making a good summer fallow. I may, perhaps, be allowed to remark, that as a great breadth of land has now been drained on many arms, a greater breadth of turnips might now be cultivated with advantage; while upon other farms the cultivation of a few acres of turnips not only takes all the best manure, but employs the whole available force of the farmer at a time when that force would be more profitably employed in the management and preparation of the land for the best rent-paying crop of the heavy or clay land farmer—the wheat crop, which forms the subject for discussion at this meeting. In the first place I shall presume that the land upon which I am going to recommend a system of cultivation, is either naturally dry, or that it has been made so by draining; if it is wet and undrained, I should recommend that so soon as harvest operations are concluded, it should be thoroughly drained—that all ditches and water-courses should be laid with good and sufficient culverts, and properly levelled up; and then I would have it ploughed to such a depth as the quality and depth of the soil would admit, and by no means to turn up any large portion of a poor clay or sandy subsoil which exists through a great portion of the poorer land in this district. Now, in this, first, ploughing or *fellying*, as it is provincially called, I would recommend that it should be ploughed with a broad winged sock, particularly if the land be subject to grow thistles or colt's-foot. If you do not attend to this particular point, the portion of the furrow left uncut does not always, in turning over, break off the roots of those weeds—it merely bends them over, and they rise up in judgment against you next spring. And you must also pay special attention that your plough is held in such a position that it cuts the furrow bottom perfectly level, so that were you to remove the furrows from a portion of the land, you would find it perfectly level. This ploughing will be best performed with a plough with two wheels—the ploughman should take care to mark all the earth-fast stones as he comes at them, and a person should follow to take them up; or they can be taken up at some convenient season during winter. When the ploughing is completed, as close to the hedges as it is practicable, the corners of the fields should be dug up with a spade, and should there be any land by the hedge-rows inaccessible to the plough, that also must be dug up, and all roots taken up to the depth of eighteen or twenty-four inches, and no hedge to be allowed to take up more than eighteen inches of ground on each side of the quick, and this space to be kept free from weeds; for no cultivation can be called perfect where the hedge-rows are allowed to grow weeds—the seeds and roots of which soon infect a whole field. The fences should not exceed from four to six feet in height, and be kept clipped or slashed, and no cattle to be allowed to trample about on the land during the winter months. These operations, with the placing of manure in some convenient part of the field, will be all that is necessary till the first dry season in the next spring sets in, when I would harrow it till it is particularly fine, which would cause the seeds of all annual weeds to vegetate, particularly kale, or runch, as it is provincially called, with the poppy, and a variety of other annual weeds, which are a serious injury to the growth of a good crop of wheat, as well as injuring its sale in the market. In some short time after this harrowing, should there be what is called knott grass or the bulbous-rooted quicken in the land, it will soon begin to make its appearance. I would, in that case, have it all taken carefully up with a gripe, and carted off the field; and then, when all the seeds of annual weeds seem to have vegetated, and the land is dry enough to plough, I would give it what we call the first stirring or second ploughing, which I would have done lengthways, if the land is to be kept in ridges. If the field is dry enough to sow perfectly level, in that case it might be ploughed across; but which ever way it is done, be sure to have it ploughed quite as deep as it was ploughed before, and with no wider furrow slice than the ploughshare or sock cuts quite clean. The land will now be in a state to be dragged and harrowed until it is quite broken up. I would then roll it either with a heavy roller or clod-crusher, and have it perfectly pulverized. If the weather was not dry enough to kill the roots of twitch or any other kinds of weeds whose roots are very tenacious of life, I would have them all hand-picked. It is impossible to state here what process ought to be adopted, but I would not let the land rest until it was perfectly clean, and made so small, or in such a perfectly pulverized state, that it would at all times, during the season for fallowing, allow the seeds of kale to vegetate—a weed which tends more to impoverish the land than any other; and without any intention of making any invidious remark, it is really a disgrace to every farmer who has it growing in his crops of corn without making any attempt to eradicate it. Those operations, the weather permitting, should be in a forward state in the month of May, if not quite concluded, when, should the land require lime, I would have it put on, and put on in the state called quick-lime. In this state it will incorporate better with the soil, and a less quantity will do, but I would be certain that the land required lime before I put it on. After this lining I would plough the land again and harrow it well. I would then apply the farm-yard manure, and in putting it on I would lay no more on each day than I had spread and ploughed in before night. From six to ten good loads of rotted dung will be a fair dressing for one acre. I would be particular to have it well spread; nothing looks so bad as to see a field of wheat showing you where every heap of dung had been pulled out of the cart by its luxuriant appearance, in comparison with the other parts of the ridge, where none had been spread. This operation being completed, it may not be desirable to harrow it, particularly if the weather be dry. It harrows the dung to the top, where it loses a great deal of its goodness by evaporation. It will now be in a state to receive the last ploughing or seed furrow, which, now that land is comparatively dry by draining, need not be done so early as it has been previously to its being drained. I would, at all events, allow it to remain till a further vegetation of the seeds of annual weeds has taken place, and on no account to sow wheat early and dry. If you do you will be rewarded by a listless, lazy growing crop. Should the land be sufficiently wet, I would sow it in October—if still dry, I would wait longer. I would certainly drill the seed in rows, about nine inches apart—a width between the rows sufficient for the use of the horse-hoe. Thanking you for the attention with which you have listened to these observations, I now submit them to the consideration of the meeting.

The PRESIDENT observed—That though not a practical farmer, yet from the experience he had had respecting lands, he quite concurred with Mr. Harrison's remarks—in which he thought there was a judicious combination of correct principles, with sound and practical knowledge, such as could only be expected from a man of his extended experience.

Mr. BELL agreed in the leading points of Mr. Harrison's remarks, which he thought quite to the purpose—more especially in regard to bare or dead fallows and deep ploughing. He was not an advocate for bare fallows, more than Mr. Harrison; but somehow or other we still have them, and therefore must not denounce, but make the best of them, when we could not do better. Certainly, by having a summer fallow on good land, you are thereby enabled to get it into a good state of cultivation. He would plough deep, and as early as possible—and again in June, but when there is a quantity of other work to perform, such as in the turnip and hay seasons, fallows are apt to be neglected. He would plough three times, and then lay on from eight to ten loads of manure, after that two ploughings more would be sufficient. He was not, as he had said, an advocate for fallowing lands, but would rather try to get as heavy a crop of turnips or other green crops as possible, for he had always observed that land which produced a luxuriant crop one year will generally produce a greater crop next year, than land of equal quality, and in an equal state of cultivation, the crop on which, by some casual circumstances in the season—the failure of seed or otherwise—has been injured. It would therefore appear that land is more fertilized by a large crop than by a poor one. This fertility probably arising from the state of the crop, causing the air beneath to become stagnant, thus aiding the fermentation and putrefaction in the soil—augmented, perhaps, by the additional quantity of roots and stubble remaining in the land after the preceding large crop. Be this, however, as it may, certain it is that land always turns up more mellow after a large crop than a poor one; it therefore follows, that if the land can be sown with a smothering fallow or such other crop as will admit it to be frequently stirred with plough or hoe, so as to destroy the annual weeds, and at the same time perfectly to shade and cover the ground, it must be more profitable to the farmer, not only on account of the present profit of the crop, but also on account of the additional manure produced, and the more favourable state of the land for the succeeding crop. In conclusion, as to bare fallow, from his experience, he would not have it at last so very smooth, and did not, therefore, care for a clot of fallow if clean.

Mr. HAWDON differed materially from Mr. Harrison and Mr. Bell, more especially as regards cropping land which ought to be fallowed. The worst description of soils certainly might be made to grow green crops, but he considered on such land as some he occupied it was bad policy to take turnips. On such land, it was so much exhausted, that it was very rare to get a good crop of wheat or barley succeeding; whereas, if the land had been fallowed and properly cleaned, in all probability there would be a luxuriant crop. He never broke fallows very small, as it had a tendency to run together in a wet winter, and if the spring proved dry the land was subject to crack so as to injure the roots of the crop. He contended that cleaning the land was of the first importance, and found that *dragging* land after the second ploughing was an economical mode of farming. It kept the land more together. On the poor land he had described, he would not plough till February, nor work it very fine.

Mr. NELSON agreed with Mr. Hawdon's views as to the management of poor land, and dwelt on the necessity of such lands being thoroughly drained, both as to properly working and cleaning them. Fallows could not be worked as they ought to be where a great breadth of turnips were sown. He never worked his fallows small, but liked to have a rough clod, as it kept the wheat warm in winter; though he would work the land well in summer, and pulverize them, stirring and harrowing about May, but would not overplough at the latter end of the season.

Mr. HEAVISIDE said the chief advantages of a bare fallow consisted in the farmer having the whole of the summer to clean and prepare his land for the succeeding course of crops, to meliorate it, by exposure to sun and atmospheric air, in a manner which he could not do if it were placed under a green crop, because he would be obliged to break it down and pulverize it early in ths spring by mechanical force, instead of giving it the greatest possible exposure to the sun and air. After the first stirring, which ought to be a true and good one, to the full depth of the fellying furrows, he would recommend the land to be ploughed endlong in stetches or open furrows, and the stetches to be split as often as need be. If it is clear of bulbous quickens let the harrows be kept off it until August, for he had no objection to a good clod, when, if a shower of rain fell, the clods would begin to moulder and burst, then harrow it, and gather off such weeds as are left. He was of opinion that land opened out in this manner, to the full influences of the sun and atmospheric air, until it begins to moulder and fall spontaneously, will make a cleaner fallow, and be in a better state of preparation for the growth of crops, both corn and clover, than if it were broken down early in the spring by the application of all the implements ever invented by the ingenuity of man. When land has been frequently sown with turnips, a bare fallow succeeded by wheat will be found highly beneficial. Change, next to good cultivation and the proper application of manure, is the life of crops. It is a popular error in this neighbourhood for a man, when he gets a field into a good state of cultivation, at perhaps a cost of from five to seven pounds per acre, to crop it year after year in succession—thus adopting the most direct method of reducing it again to the same state as it was in before his great outlay.

Mr. E. Scarth differed materially from Mr. Heaviside as to turnips on well drained land; he would always have either turnips or rape instead of bare fallow. If these crops were partially consumed on the land, the succeeding crop of wheat would be more benefited than by bare fallow. He thought the poaching of the land might be avoided by attention to the seasons in leading the turnips. He considered rape a good and profitable crop eaten on in strong land. He agreed so far with Mr. Heaviside that the crop after turnips would be short if no additional manure was applied, but if an extra quantity was applied to the turnips, or half the crop consumed on the land, or a top dressing applied to the wheat in spring, not only would Mr. Heaviside's apprehensions be found groundless, but the crop materially benefited. Another objection to bare fallow was, that applying large quantities of farm-yard manure to the wheat crop increased the quantity of straw, but diminished the size of the ear, whereas the manure applied to the preceding crop of turnips was so incorporated with the soil as to be in the best state for the growth of wheat; for fresh manure applied to light land rendered it too open, which was apt to occasion failures, as you cannot for wheat have too firm a seed bed. He agreed with Mr. Harrison as to his mode of working bare fallows: he would plough in autumn rather than in spring, and would pay particular attention to the extermination of all annual weeds. The best land produced most weeds—the remedy is to green crop and drill and horse-hoe the wheat. By this plan the annuals will soon disappear. He also thought that summer fallows should be well pulverized in the spring. He would not apply the manure later than the first week in August, if practicable. He would not burn the gathered weeds, but make them into a compost with lime and salt. He considered on all well cultivated farms that wheat should be drilled or dibbled, and kept perfectly clean by horse-hoeing.

Mr. Watkin differed also from Mr. Harrison as to working fallows so fine. He never used a roller. He would not lime fallow, but apply it to the clover. He agreed with Mr. Harrison that there is a loss in the wheat crop after turnips on poor land. On such land as had been alluded to turnips could not be eaten on, or led off without poaching the clay surface.

The discussion here turned upon the advantage of growing turnips upon such land as might not be considered good turnip soil, on which Mr. Moore, from Newton House, was appealed to by the President as to his experience on the very stiff clays of that neighbourhood.

Mr. Moore said he grew large and profitable crops of turnips by management and attention to the seasons, by which also the poaching of the land in leading off might in great part be avoided; but when this did occur, his remedy was to give the land, immediately after the removal of the turnip crop, a good furrow to the depth of the poached portion of the surface, and his land being thoroughly drained, all was right below. On such land eating the crop on with sheep was altogether impracticable.

Mr. Harrison being called upon by the Chairman to reply, he rose and said—Mr. Chairman, the subject for discussion this evening is, the best method of managing summer fallow; but the discussion seems to have taken quite a different turn, and has been principally whether the cultivation of green crops was not preferable to summer fallowing. Upon this discussion I feel I am not called upon to make any remark, but shall confine myself to those speakers who have either assented to or dissented from my introductory remarks. I feel gratified, sir, that the system I proposed has met with the concurrence of yourself, and that Mr. Bell has coincided with me in almost every particular. In answer to Mr. Hawdon, who says he does not approve of fellying poor land in the autumn, but would rather do it earlier in the spring, as the land does not then get run so much together, I beg to remark that, as all land either is, or should be, drained before it is fellied, there will be no danger of its running together. It can invariably be ploughed in a drier and better state in the autumn; and as there is generally such a press of team labour required in the spring, the fellying is only proceeded with at times when the land is too wet for any other operations, and I would beg to impress upon the meeting that the great sin of commission in fallowing land is ploughing wet. The sins of omission are numerous : they consist in fellying late—some say to save a stirring in working them during summer only when there seems nothing else to do, or when it is too wet to work turnip land—in fact, the poor land, on many farms, is only treated like a younger brother, if I may be allowed to use such an expression. In answer to Mr. Heaviside, who says, where land is clean he does not approve of its being made so very small and well pulverized as I recommend ; I did not think that, now in the nineteenth century, the plan of keeping fallows in great clods could have found a single advocate, and I regret I am not able to give him so good a castigation as he deserves. Taking it for granted that the land is clean, what benefit can it derive from atmospheric influence when lying in great clods, compared with what it does when well broken to pieces and properly pulverized ? If you put lime upon fallow, it has a tendency to sink downward, however fine the soil may be. If the land is in large clods, the lime falls to the bottom at once, and the soil receives no benefit by its incorporation. If you lay manure on and plough it in among large clods, it is in such an open and uncovered state that it is sure to lose, by evaporation, all its best qualities. As a proof of the value and advantage of a well-worked fallow, I have noticed that where a piece of land in a field has been worked in the spring with an intention of sowing turnips, and from some cause has not been so sown, I have observed that that land has always grown a very superior crop of wheat to land in the same field managed in a less careful manner ; and as a proof of a well pulverized fallow materially assisting the vegetation of the seeds of annual weeds, I would call your attention to many fields of Swedish turnips which, from their being worked at an early season, has tended greatly to encourage the vegetation of kale and a variety of other annuals —some fields of which I saw near as I rode here this afternoon, the second hoeing being not quite finished, bears me out in this assertion. I think, Mr. Chairman, there has been no other remark which requires from me any comment, and as the subject of summer fallowing seems to finish with the sowing of the seed, I did not, in introducing this subject, venture further ; but I would remind the farmer that his labours must be followed up in the spring. His wheat being sown with the drill, should be hoed and weeded, for which purpose Garrett's horse-hoe seems admirably adapted, not only for eradicating the weeds, but for making a nice bed for cloverseed where it is intended to be sown. It is an expensive implement, and rather out of the reach of the small farmer. Proprietors of land would do well to copy the example of W. I. S. Morritt, Esq., of Rokeby, who has bought one for the use of his tenantry.

This interesting meeting here concluded.—Darlington Times.

ON THE ACCUMULATION OF FAT IN ANIMALS.

It is yet a disputed fact whether the fatty substances which recent chemical investigation has discovered in the substances used to feed our domestic animals have any direct effect upon the proportion of fat which these animals form; or whether the formation of the fat does not rather depend upon the quantity of starch, sugar, and such like, which their food may contain. Boussingault has recently tried a series of experiments on this subject, of which a brief review may not be uninteresting.

He fed a number of pigeons on lard, another lot on the white of egg, and another on starch, and a fourth he deprived of food altogether. The results were briefly as follows :—

	Fed with	Proportion of Fat in their Blood.
Pigeons 3 weeks old	1. Starch......	.0021
	2. White of egg	.0056
	3. Nothing .. .	.0043
Pigeons 4 weeks old	1. Starch......	.0046
	2. White of egg	.0055
	3. Lard	.0065
	4. Nothing	.0070
Ducks	1. Starch......	.0042
	2. White of egg	.0044
	3. Nuts	.0049
	4. Nothing	.0034

From this experiment Boussingault draws the following conclusions :—

1st. In opposition to previous opinion, that the fat in the blood cannot be increased by fat in the food.

2nd. The proportion only varies between about $\frac{4}{1000}$ to $\frac{5}{1000}$; and

3rd. That the fat in the blood is in no case derived immediately from fat in the food, because those animals which received no food at all had as much fat in their blood as those which were fed on hog's-lard.

So far these experiments seem satisfactory; and when coupled with the fact that the food of our fattening animals—as potatoes, turnips, and such like—contain fatty substances in almost infinitesimal proportions, we may consider the non-importance of these substances (about which so much has been said and written) as almost established.

AN ACCOUNT OF TWO EXPERIMENTS WITH GUANO AND OTHER MANURES, IN STOVER PARK, DEVON.

No. 1.

Report of an experiment to test the comparative efficiency of five different kinds of artificial manure in improving pond mud, the experiment being made on an acre of inferior pasture land in Stover Park, in the years 1847-8-9.

The land on which the experiment was conducted is of uniform quality, the soil being a light sandy loam a few inches in depth, incumbent on a stratum of white clay.

The land underwent thorough draining in 1844, prior to which it would not produce a rent of more than 5s. an acre.

No manures were applied to the land in 1848 or 1849.

The object sought to be attained by extending the experiment over a period of three years was to test the *durability* of the different manures.

Manures applied in 1847.	Weight of hay cut in 1847.	Weight of hay cut in 1848.	Weight of hay cut in 1849.	Weight cut per acre in 1847.	Weight cut peracre in 1848.	Weight cut per acre in 1849.
	lbs.	lbs.	lbs.	Seams of 3 cwt.	Seams of 3 cwt.	Seams of 3 cwt.
1. Six cubic yards of mud mixed with six cwt. of salt (cost of manure 14s.)	312	327	613	$4\frac{2}{3}$	$4\frac{3}{4}$	9
2. Six cubic yards of mud mixed with $1\frac{1}{2}$ hogshead of lime (cost 13s 6d.)	353	337	538	$5\frac{1}{4}$	5	8
3. Six cubic yards of mud mixed with 3 bushels of bone-dust (cost 14s. 3d.)	511	419	670	$7\frac{1}{2}$	$6\frac{1}{4}$	10
4. Three cubic yards of mud mixed with 3 cubic yards of tan-yard refuse (cost 14s.)	524	354	558	$7\frac{3}{4}$	$5\frac{1}{4}$	$8\frac{1}{3}$
5. Six cubic yards of mud mixed with 90 lbs. of Peruvian guano (cost 14s.)	930	550	725	$13\frac{3}{4}$	8	$10\frac{3}{4}$

N.B.—The after-grass in 1847 was stocked with sheep, but in 1848 it was left unconsumed.

No. 2.

Report of an experiment made with the undermentioned manures on an acre of pasture land in Stover Park, in the year 1849.

The manures, when mixed with a small quantity of fine earth, were applied broadcast on March 29, and during the rainy weather which prevailed at the time.

The land is of a fair average quality, and was formerly used as tillage land, but has been in pasture for many years.

The crops were mowed on 22nd June, and the herbage produced by the different manures was of a superior quality.

Manures applied.	Quantity of manures applied.	Quantity applied per acre.	Weight of hay cut.	Weight cut per acre.	Cost of the manures.		Cost of the manures per acre.	
	cwt.	cwt.	lbs.	Seams of 3 cwt.	£	s.	£	s.
1. None	—	—	401	$4\frac{3}{4}$				
2. Superphosphate of lime	$2\frac{1}{4}$	9	616	$7\frac{1}{3}$	0	18	3	12
3. Nitrate of soda...	1	4	706	$8\frac{1}{3}$	0	18	3	12
4. Peruvian guano....	$1\frac{1}{2}$	6	1210	$14\frac{1}{3}$	0	18	3	12

E. S. BEARNE.

It is with extreme regret that we announce the death of Mr. Henry Colman, of Salem, Massachusets, U.S. He died on the 17th ult., at Park-street, Islington. Mr. Colman had been resident several years in this country and upon the continent of Europe, whither he had gone for the purpose of acquiring a knowledge of European agriculture, and which he diffused through the United States by means of a work published in parts, and which he completed a short time since. Mr. Colman was personally known to, and had been entertained at the houses of many of our leading landed proprietors and tenant farmers. His moderate opinions and unassuming manners rendered him a general favourite with ourselves and many who will deplore his loss.

PUBLIC SLAUGHTER-HOUSES. — In all cases where they have been built in France, the revenues have been such as to make such constructions good speculations. At Paris, in 1847, the revenues (gross) were 1,200,000 f. nearly; the expenses, including *employés*, repairs, water, lighting, &c., were not 140,000 f., leaving net 1,060,000 f. to pay the interest on a capital of 18,000,000 f. In the town of Havre the abattoirs are built upon an $18\frac{1}{2}$ years lease, and yet the proprietor makes money by his speculation. At Caen the abattoirs produce a net revenue of 24,000 f. to pay the interest of a capital of 300,000 f. Everywhere the results are about the same; nor can there be any reason to doubt but that in England the results would be equally favourable. The butchers of Paris, at first, violently opposed the establishment of the abattoirs; but now they are so convinced of their utility and commodity, that they would almost as vigorously oppose any return to the former system. Indeed, it must evidently be to the interest of the butcher that his meat be killed in the most perfect condition, to ensure its preservation, and to satisfy the public that every precaution is taken to ensure a supply of wholesome meat.—*Builder*.

CALENDAR OF HORTICULTURE.—SEPTEMBER.

Retrospect.

Since the date of the last calendar, the weather remained of a motley character till the end of July: there were six showery and four fine days, the rain being very heavy and copious, with some hail, and much thunder, between the 22nd and 27th days. The temperature was low, the average maximum scarcely being 66°. August came in fine, and the heat, with sun, advanced much. There was some wind in the second week, which seemed to produce its usual effects on fresh-budded, standard roses, breaking off or even tearing out some of the heads. Vegetables remained very fine and abundant. Of *fruits*, the reports were contradictory, and therefore it may be presumed that there will be an ample supply for domestic uses, but crops rather below an average. The weather of the third week must come under notice in the concluding paragraph.

OPERATIONS IN THE KITCHEN GARDEN.

Mushrooms.—This is the season for preparing beds ; it is also that wherein nature, if the weather be moderately showery, produces the most abundant supply in the pastures. As the simple method of growing the mushroom in melon frames is much to be preferred above the old and doubtful practice of the common exposed bed, I will state the operations rather fully, that the amateur gardener may avail himself of what was represented in an early volume of the Horticultural Transactions (iii., p. 6) as a cheap and effectual method of obtaining mushrooms throughout winter. *As to soil*, the firm, yellow loam of the *melon bed* is more congenial than the rich and light earth used for cucumbers.

We must, however, suppose that the bed was "spawned" when it was earthed for the last time, the spawn being laid on each side of the hills or ridges, and also on the surface of the beds, making the earth quite firm by treading. It will not interfere with the fruiting of the melons, and the existing warmth will speedily cause the spawn to extend itself through the surface of the ground. In the autumn, when the melon plants decay, the bed should be cleaned, the glasses put on and kept close. Sufficient water should be frequently given to keep the soil a little moist, but by no means wet; or gentle showers may be now and then admitted for the same purpose.

With care and good management, the mushrooms soon appear in great abundance. "Two bushels at a time have frequently been gathered from a bed two feet by six, and have produced individual mushrooms of nearly 2lbs. weight." So we read in that excellent book, "G. Lindley's Guide;" where also it is stated that not only will the mushrooms continue to spring till frosts check them, but that in the early spring, after frosts are supposed to be passed, a fresh crop can be produced in every part, by admitting gentle showers, and covering the earth deeply with straw. If the regular mushroom-house, which we meet with in first-rate gardens, be not present, the melon-frames form the best substitutes; and darkness is not required, as nature instructs us, by producing by far the finest mushrooms in the open fields.

Lettuces.—Sow the last crops of black-seeded "*Gotte*," the Bath Cos, and brown Dutch Cabbage, immediately. These sorts are hardy. The Gotte, according to Lindley, grows close to the ground—is hard and firm, about four inches across in the ball: pale green comes early into use, and differs from the tennis-ball in being more curled, of a lighter green, and not running to seed so soon by three weeks or a month. Lettuces, however, do best in cool frames for winter.

Normandy Cress is mentioned by Mr. Maund to be sown early for winter and spring use. The leaves are picked singly, and if the plants are abundant no other cress need be sown. Lindley, I think, calls it curled cress; and observes that "the radical leaves are those used"—as also for garnish.

Onions.—Sow early, to be transplanted in the spring.

Cauliflower, and early purple cape broccoli, are sown for frames.

Prickly spinach for the last time; and if any seeds have failed in former sowings, soak some, to forward the sprouting, and make up the blanks.

Plant out cabbage, winter greens, and broccoli. Earth celery. Plant more endive during the month. Continue to blanch endive as wanted, either by tying up the leaves or covering with tiles, garden, or sea-kale pots, taking care that the plants be quite dry. Hoe or pluck out winter spinach to four inches apart: pull onions when the stalks are quite yellow, and dry the bulbs speedily. Some persons sere the roots with a hot iron, to prevent their growth: at all events keep them cool and dry. Hoe weed with sedulous attention; dig and trench as required. Always, where possible, let the ground be dug to three full spits; and yearly bring up to the surface either the lowest or the middle spit, so that in turn the three may be aërated and broken fine.

Potatoes.—One remark I have just met with in a periodical, by Mr. Maund: it referred to 1843, that wet year. The "failures," then so called, became numerous; and were supposed to have been occasioned by the moisture—occasioning decay. Every conjecture has been fallacious; but as the present year, from all evidence, (save that of the Gardener's Chronicle, of the 11th August,) appear to offer, and so far confirm, the most promising hopes, I beg to recommend the discontinuance of digging till the yellowness of the haulm announce maturity. Early and waxy potatoes are of no value; they are unwholesome as food, comparatively void of starch, and therefore are neither mealy nor nutritious. Hence we now meet with very few tubers that possess the flavour and texture of those we were accustomed to enjoy 20 years ago. If potatoes be so diseased or debilitated as not to come to maturity in safety, let us abandon them altogether. Better be without a spurious and unsatisfactory aliment, than, for the sake of mere name, adhere to the culture of that which is equally valueless and insalubrious.

Hardy Fruit Department.

Wall-trees.—The protection of stone-fruit is of consequence; for, though at present there are few wasps and blue-flies, ants and earwigs are sufficiently numerous. Snails also harbour about the trees, and injure the fruit. It is said that powdered brimstone, or the flour of it, is the greatest repeller of ants. Nets should be suspended to receive the peaches and nectarines, which fall as they become very ripe. Continue to nail in close the young wood to aid its ripening; and the knife may be yet employed to retrench superfluous shoots. Cut back, to the main wood, all the small laterals of the vine which had been pruned to a leaf; for now the chief eyes will not break. Protect the fruit; and either guard it with nets, or, if it fail to ripen, make wine of it. Net the morello trees, to preserve the cherries from birds.

Strawberries.—It is probable that the dry weather has prevented the formation of new beds by rooted runners. In the early days of September, if any showers shall have moistened the earth, the work may be successfully done; and new beds of Mr. Cuthill's Aberdeen *Black Prince* made. This is a pleasant mildly acid fruit; early and abundant. In August, 1848, not a plant failed with me; but then the weather was very showery. Keen's seedling follows; then the old pine, Queen, and Elton; all good, and amply sufficient. Little dung is required if the soil be a free rich loam, with vegetable matter; but depth of tillage and pulverization are important.

The *melons* and *grapes* in the autumn vinery no longer rank under forced fruits. They require air and protection from insects; hence the sashes of the roof (unless netted or screened) ought not to be opened. Air should enter by front and back openings guarded by wire screens.

Fruit under Glass.

Pine-apples.—This is a chief season of growth; and also for potting the stock, and preparing suckers. So many new methods of treatment, soil, culture, &c., have been brought forward, that it is an affair of caution to venture any strong opinion. We lean to open-bed practice, which would economise labour and potting; and if this were combined with the late Mr. Knight's practice of keeping the suckers upon the old stocks, great advantages might be obtained. We opine that the quality, and extraordinary low price of the imported pines, will induce many to think ere they adopt the very serious and delicate processes of pine growing.

Floral Department.

Roses.—Look over the budded stocks, and, whenever the eye or eyes appear firm and lively, ease the ties to prevent that strangulation which may cause unsightly knots, and the breaking off of the shoot next year: a spongy bur forms, and, as I have myself proved, to the loss of the shoot.

Evergreens.—Transplant and introduce. The secret of success consists in the utmost tenderness to the roots, and their most speedy deposition in the places they are designed to occupy. The land should be well comminuted, rather sandy if possible, incorporated with plenty of three-fourth decayed leaves. Each hole ought to be adapted to the roots; and after the shrubs have been carefully set therein, the roots spread nicely over a hillock, or the like, fine soil should be insinuated, and be instantly moistened with soft pond water from the rose, not the nozzle, of the vessel. If the weather become showery the water will then interfiltrate among the soil and roots; but if parching, the rose should be used every evening, the surface previously covered with a three-inch layer of leafy mulch. Evergreens are lost by delay and careless planting. *Rhododendrons* will grow in loam; but leaf-soil, white sand, and half Mitcham Common loam are preferable. *Kalmias* prefer the same; and, in fact, little peat—that is, heath or moor soil—need be used, if leaves (not of laurel) be employed and freely used with white sand.

Every department must now be made and kept neat, box edgings cut, lawns swept and rolled. Herbaceous planting may proceed; but, excepting

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rooted pinks and carnations, we would rather defer planting till the spring.

WEATHER.

The weather continues fine and dry, notwithstanding the alarm sounded of the dire results which might be expected from the new moon of Saturday the 18th!—yes, of Saturday! ("*risum teneatis amisi*"). When will people blush at their superstitions?

I retain my remarks on the potato to prove how suddenly changes may occur in all human prospects! Disease has appeared which could be traced to the decay and drying up of the root, at and above its base, long before the leaves were touched. Surely we propagate the evil by planting tubers that had inherited the taint. J. TOWERS.

August 21.

AGRICULTURAL REPORTS.

GENERAL AGRICULTURAL REPORT FOR AUGUST.

The remarkably fine weather experienced during nearly the whole of this month has enabled the farmers to progress steadily, in some instances rapidly, with harvest work. Prior to the 27th at least two-thirds of the wheat and barley had been secured in the forward districts in, for the most part, excellent condition. The only exception to this remark is the fact that the wheats cut prematurely will have to remain in stack some considerable time to make a good sample. We quite agree with the principle laid down, and now acted upon by most of our agriculturists—that of cutting their wheat at least ten days before it is ripe, as a large quantity of the grain has been invariably lost in carting under the old and now pretty-generally exploded system of not harvesting until the crops are ready for thrashing; in other words, until they are "dead ripe:" yet it is obvious that much care is necessary under the new system, especially should the atmosphere prove humid, or the majority of the samples may turn out damp and shrivelled. We may observe, however, that the present season has continued extremely favourable for the full development of the views of those who have long contended for, and are now successfully carrying out, the present unquestionably good plan of cutting the crops before they arrive at a later stage of maturity. The exhausted state of the stocks of old grain has compelled many of the farmers in the early counties to thrash out their new wheats somewhat freely; hence, Mark Lane and some of the provincial markets have been well supplied with that description of produce, the prices of which have ruled rather high in comparison to those of old qualities; but the large importations from abroad have had considerable influence upon the demand for most descriptions: prices have, consequently, had a downward tendency, and some persons are of opinion, as large supplies will doubtless arrive from the Baltic during September, that we have not seen the lowest point. The general weight of the new wheats is undoubtedly good, many parcels weighing as much as 64lbs. per bushel; and it is pretty generally admitted, though of course in some localities the produce does not equal the expectations of the farmers, that the total crop of the entire country is likely to prove a most excellent one—certainly far superior, both as to weight and quality, than that produced in 1846, 1847, or 1848. A large amount of labour, it must be remarked, has yet to be got through; and the mode in which it may be accomplished must in a great measure depend upon the state of the weather during the first fortnight of the ensuing month. Even should it be fine, the harvest will be at least ten days later than was that of last year. The remarks we have made above respecting the wheat will bear equally upon the spring crops. The yield of barley is good, and of excellent colour, while that of oats, beans, and peas is in excess of several past seasons.

The consumption of flour has received a considerable check by the immense quantities of potatoes brought forward. As might be expected, numerous conflicting rumours have been afloat respecting the potato disease. In some quarters we have heard it asserted that one-half of the crop has been lost; but we candidly admit that we have placed but little reliance in such statements. It is scarcely to be expected that the disease has, as yet, been wholly eradicated; and, so far as our observations have extended, we feel somewhat convinced that the losses sustained this year will be trifling compared with those of the three preceding seasons. We have heard of one grower having shipped upwards of 40,000 bushels from Wisbeach in the best possible condition, and we may state that we never saw the London markets so well supplied as during the whole of the past month. Really prime samples have with difficulty sold at £4 15s., inferior ones £3 10s. per ton.

The crop of grasses, as well as seeds, is proving extremely good. Samples of most kinds have changed hands in the metropolis, at fair quotations; but the low prices of linseed-cakes, from the plentiful supplies of natural food for the stock, are much complained of by the crushers.

The markets for the sale of foreign and colonial produce have been far from active; not that the transactions have been beneath average ones, but the overwhelming supplies have rendered it almost impossible to establish anything like a permanent improvement. The principal exception that we may adduce is the article of wool. The imports of this year have been large in the extreme from the whole of our principal wool-producing colonies— upwards of 100,000 bales having arrived from the later settlements in New South Wales; yet the demand has fully kept pace with the arrivals, and prices have had un upward tendency.

The tallow market has ruled flat in the extreme, and speculators who purchased at St. Petersburg early in the year are considerable losers. We have already explained to them that the quantity of stock in this country, as well as in Holland—which latter portion of the continent must now be taken into the account—is unusually large; hence the forthcoming supplies of home fat will, we conceive, keep down the value of Russian tallow for some time.

A few pockets of new hops from Sussex have been disposed of in the Borough at from £8 to £11 5s. per cwt.; but we regret to state that our accounts respecting the aggregate growth are very unfavourable. The duty has been called from £70,000 to £75,000. We regret to observe that the efforts of the growers to obtain a repeal of the duty have as yet been unsuccessful; and, further, that the Government has refused to allow any further extension of time in which to pay the first instalment of the postponed duty, which becomes due on the 15th of October; the second on the 15th of November.

The hay and straw markets have been liberally supplied. Prices have fallen to some extent.

The large imports of foreign provisions have greatly interfered with the demand for, and value of, English and Irish butter, &c. The latter is selling with difficulty at from 14s. to 18s. per cwt. below the prices paid during the greater portion of last year. Bacon has sold slowly, at drooping currencies.

REVIEW OF THE CATTLE TRADE DURING THE PAST MONTH.

The abundance of live stock in our large grazing districts, added to the pressure of the times, has been productive of increased supplies of both beasts and sheep in our various markets. In Smithfield they have exceeded the wants of the butchers, and prices have consequently had a downward tendency, with very little prospect of any material improvement in them for some time hence. The prevalence of cholera has greatly interfered with the veal trade, which has ruled excessively heavy, at very low currencies. The abundance and low prices of hay and other food have been the means of keeping back, to as long a period as possible, a large number of both beasts and sheep; hence, the general weight of those supplies has exceeded that of many previous years.

The importations of foreign stock, though not equal to those in 1847, have been seasonably good. The beasts have mostly come to hand in fair average condition; while in the quality of the sheep we have observed a very decided improvement.

The imports have been as under:—

IMPORTS OF FOREIGN STOCK INTO LONDON.

Beasts	2,913 Head.
Sheep	15,981
Lambs	1,179
Calves	1000
Pigs	302

CORRESPONDING PERIODS.

	Aug., 1847.	Aug., 1848.
Beasts	4,185	2,526
Sheep	18,489	14,266
Lambs	874	871
Calves	1,942	2,135

About 4,200 head of beasts, sheep, calves, and pigs, have been landed at the northern outports, and 100 oxen from Spain, at Southampton.

The total supplies of stock on offer in Smithfield, since our last, have been as follows:—

Beasts	18,133 Head.
Cows	454
Sheep and lambs	173,620
Calves	2,488
Pigs	2,200

CORRESPONDING PERIODS.

	Aug., 1847.	Aug., 1848.
Beasts	19,073	17,975
Cows	878	497
Sheep and lambs	225,390	153,280
Calves	3,860	3,840
Pigs	2,227	2,443

The bullock supplies have been derived as under:

	Head.
Northern districts	2,800
Eastern, western, and midland, ditto	3,800
Other parts of England	4000
Scotland	710
Ireland	172

COMPARISON OF PRICES.

Per 8 lbs., to sink the offal.

	Aug., 1847.	Aug., 1848.	Aug., 1849.
	s. d. s. d.	s. d. s. d.	s. d. s. d.
Beef from	3 4 to 5 6	2 10 to 4 4	2 8 to 3 10
Mutton..	3 8 to 5 4	3 10 to 5 0	2 10 to 4 0
Lamb ..	4 10 to 6 2	4 0 to 5 2	4 0 to 5 0
Veal....	4 0 to 5 0	3 6 to 4 2	3 0 to 3 6
Pork....	4 0 to 4 10	3 8 to 4 6	3 2 to 4 0

Newgate and Leadenhall markets have been very scantily supplied with all kinds of meat, yet the general demand has ruled heavy, at drooping prices. Beef from 2s. 4d. to 3s. 6d.; mutton, 2s. 8d. to 3s. 10d.; lamb, 3s. 10d. to 4s. 10d.; veal, 3s. to 3s. 6d.; and pork, 2s. 10d. to 4s. per 8lbs., by the carcass.

NORTH NORTHUMBERLAND.

The productions of the soil over the locality from whence we report, being now so far matured, that something like an estimate may be formed as to the probable average yield of all cereal grain crops (after very extended and close inspection), we decidedly consider the wheat better filled in the ear than for the last three years past; and on all dry early land the produce will equal a full average. Yet as many fields will reap thin, we may expect a drawback, more particularly so, as on all such soils the havesting will be from two to three weeks later. Wheat harvest commenced near the sea coast partially on the 18th, and by the end of the present week, taking the coast line from Bamburgh north to Berwick, some hundreds of acres of very fine grain will have fallen under the sickle. Westward, towards Corn Hill and Wooler, barley reaping is pretty general. Oats have also been cut partially in these early districts. The weather latterly has been very fine, yet we do not expect a general harvest over the northern part of this county before the first week in September. Barley reaps short of straw; grain of fair good quality; the yield will be various, and as the breadth sown last spring was less than usual, we conclude that the marketable quality will fall far short of an average from this county. Oats are both thin in plant and short of straw, and will cut up the lightest produce per acre we have had for many years past. Beans and peas have improved much within the last month, but not having minutely examined the podding, we estimate them as *likely* to be a fair produce. Potatoes have also made great improvement, and so far (in this locality at least) we have neither seen nor heard of any disease, the garden sorts being the only variety yet in use, we speak from experience, "they are fine in quality and very productive in quantity." Turnips are very partial on all stiff loamy soils: they never brairded regular, hence the crop will lift very light; but there are many exceptions, and over the fine light soils north of the Tweed, the turnip crop has a most luxuriant appearance. The hay crop generally over the entire county has been light, and some not well got, owing to the heavy thunder showers which caught all late cuttings. Our fat markets continue dull, and best sheep have seldom realized above 5d. per lb. exclusive of offal. —Aug. 23.

VALE OF EVESHAM.

The important season of harvest has again arrived. The wheat crop on the sandy loams is excellent; on well-cultivated clays, good; but on the poor, cold, undrained clays there is a deficiency of fully one-third of an average crop. A considerable portion of wheat on the sandy loams was laid by the storms in the latter end of July, but as the ears were mostly filled previously to its going down, it sustained but little damage. The cutting of wheat commenced about the 7th instant, and in the memory of the oldest man it never was cut greener. How such early cutting may answer is yet to be proved. Present appearances do not show any very great loss, but rather the reverse, as the ear being so fine, had it been allowed to develop itself and harden, as in previous years, a vast quantity of grain would have been lost in cutting and carrying. The stock of old wheat in the farmers' hands is less than it has been for many years past at the month of harvest. The millers are holders of some considerable quantity, but the gross amount falls far short of the average of years. The barley crop is exceedingly variable. On some fields there is a fair average crop, and even bulky; but in the majority of instances the ears are short. The clover has almost overgrown the barley, and the yield will be very poor. Beans and peas are unusually good, and the samples will be of an extraordinary fine description. Vetches are equally fine and abundant. Oats, of which there are not many grown in this district, are about an average crop. The young clovers amongst the barley and wheat are a a full plant and healthy. The Swedish turnips are irregular; but in all cases where the seed was deposited in a moist bed, or just previously to a storm, the plant is good, but many acres not so favoured are deficient in plant. The common turnips are wild with luxuriance, and will be spoiled if the hoe is not quickly and freely used amongst them. The potatoes in the open fields and gardens looked remarkably healthy until within the last few days; but whether from the atmosphere being overcharged with electricity, or from the cold rains and cold nights, it is impossible to say; now, however, almost every field and garden patch of late potatoes is affected with the fatal spot that blighted and destroyed the crops in the last three or four seasons. The quality of the early white sorts already raised has not been so good as might have been expected from the sound and healthy appearance of the tubers and stems. The hay crop on the Avon meadows was larger than usual, and the upland grass lands yielded a fair crop; but from injudicious management, and in too many instances from the want of more hands to turn it about, many ricks were damaged, and have required cutting and turning to prevent too great fermentation. The clovers were secured in excellent condition. Fat stock is a complete drug, arising not so much from the over-abundance of fatted meat as the inability of families, especially poor families, to purchase it. Many sheep and cattle have been driven back unsold from the late fairs in this county. Wool is a little more in demand, and many are of opinion that it will reach 1s. per pound before Christmas. The crop of apples and pears is very variable, some orchards presenting quite a show of fruit, whilst others are altogether barren and fruitless.—Aug. 2.

AGRICULTURAL INTELLIGENCE, FAIRS, &c.

APPLEBY FAIR, August 21.—The market was not so well supplied as we had occasion to notice of late years, there frequently being from 80 to 100 carts and upwards. This year witnessed a heavy falling off, there being but 51 carts of cheese, considered an unusual small number, and in some measure accounted for by the great scarcity of grass in the "dales," from whence the market is principally supplied. Prices were very low. New milk sold from 5½d. to 6½d.; old milk 2½d., and some towards the end of the market as low as 2d. There was a fair show of milch cows, but few changed hands. Fat cattle, a very superior show of Scotch and shorthorns, the principal part of which were sold among the home butchers. Prices from 18s. to 22s. per stone. The former commanded a better market; gelt cows no demand. The sheep market this year was stocked with lambs in abundance; but owing to a thin attendance of dealers, and want of winter foddering, prices were down considerably, as compared with the same market last year; lambs which then sold for 17s and 17s. 6d., were now sold at 14s. and 14s. 6d., the reduction in other kinds being proportionate. One large lot of Leicester ewes, shown by Mr. W. Dixon, of Dudmire, were much admired, and bought by Mr. T. Atkinson, of Appleby, for 28s. each. Black-faced wethers: a great many shown, but few sold. Stock of all descriptions was a drug, and the cry amongst jobbers was "How were they to provide for them during the winter? the failure in the turnip crops being so heavy."

BERWICK FORTNIGHTLY MARKET.—The show was small as regards fat, but a fair show of sheep and lean cattle. The number shown were—fat cattle 26, lean 250. Most of the lean cattle were Irish, and met a dull sale; cows 24, and sheep 700. Mr. Calder, Fairneyside, had 6 fine fat polls, and Mr. Smith, Loanend, 2; these two lots were good. The prices were for fat from 5s. 6d. to 6s. per st.; mutton, 4½d. to 5d. per lb.; cows, £6 6s. to £11 each. The lean cattle sold would average £4 10s. to £4 15s. The market was rather brisker as regards fat and sheep, although some of each were left unsold.

CARRICK FAIR, (Wednesday last.)—The supply of stock was pretty good, but little business was transacted. Milch cows fetched from £5 10s. to £8, springers £4 to £5, heifers £3 to £4. Sheep: wethers 34s. to 37s., ewes 30s. to 34s. The horses were not numerous, and were of inferior quality.

GLOUCESTER MONTHLY MARKET was well supplied with both beef and mutton, prices remaining about the same; prime articles in either fetching about 5½d. per lb., inferior 5d.; fat beasts were rather scarce, and realized full 6d. per lb. Trade on the whole appeared to be very dull.

RUGBY CATTLE FAIR was attended by more butchers than usual, but trade was dull, particularly in stores. Beef, 5d. to 6d.; sheep, 4½d. to 5d. Milch cows were very low in price.

HORNCASTLE FAIR.—The show on the last two days consisted principally of yearlings and two-year-olds, and inferior animals, which were a drug in the fair. On Monday 3,460 sheep were penned, being nearly double the number of last year: lamb hogs fetched 15s. to 20s., two or three prime lots 21s., ewes 22s. to 30s.; nearly all were sold; fat ewes 32s. to 35s., being about 5d. per lb. On Tuesday an average supply of beasts was exhibited, but were slow sale at low prices.

IPSWICH LAMB FAIR was very numerously attended by the principal agriculturists and dealers of Suffolk; and the counties of Norfolk, Essex, Kent, and Sussex, and the Eastern Union Railway contributing materially in augmenting its attendance and supply. The quantity of lambs and sheep exhibited on the first day exceeded 40,000, of fair average quality; particularly the flocks of Lady Harland and the Messrs. Ropers' half-bred Leicesters, and the Downs of Sir Thomas G. Cullum, Messrs. Lugar, Garnham, Smith, Everett, and Waltons; especial preference being maintained for the latter breed of lambs for grazing purposes throughout both days. Messrs. Nunn, Ruffel, Munnings, Page, Betts, Battle, and other dealers exhibited some good stands of half-breds and other store sheep and lambs. Business commenced slowly; and to effect sales reductions from 2s. to 3s. per head compared with last year's prices were reluctantly submitted to, when many lots changed hands. A pen of full-mouthed ewes, 17 Hampshire Down tups, 3 shearlings, and a very superior three-year-old sheep, belonging to Mr. Parsons, of Stoke, justly commanded attention, and were purchased by Mr. Betts, dealer, the former at 50s. each, and the lambs at £6 per head. Mr. Sexton's accustomed stand of Sussex Down tups were alike admired, and 17 let for the season to average £18 10s. each. An unusual number of store beasts, of the Down and improved Irish breeds, were exhibited; with but a limited demand, at from 2s. 6d. to 3s. 3d. per stone, estimated weight when fat. Some good Suffolk colts, belonging to Mr. Porter, of Badwell Ash, 3 foreign cart horses, with a variety of Welsh and Irish ponies, comprised the horse fair; and many changed hands, at reduced rates. Messrs. Hurwood and Turner exhibited their prize roller mill and steam threshing machine; which, when at work, commanded great attention. On the second day, with a vastly reduced attendance and supply, a good many things changed hands, principally between the dealers, at similar reduced rates. Prices obtained by flock-masters only:—

Down Lambs.	WETHERS.	EWES.
		s. d.
Sir T. G. Cullum, Bart., Hardwick ..	21s. 6d.	
Mr. Everett, Brightwell Hall	20 6	21 0
Mr. Garnham, Rougham	22 0	
Mr. Lugar, Hengrave	25 0	
Mr. Newton, Elden	18 6	
Mr. Smith, Barton................	22 6	
Mr. Walton, Timworth............	18 0	
Mr. Walton, Newbourn............	22 0	
Averaging 22s. 6d. each.		
Half-bred Down and Norfolk.		
Mr. Rodwell, Alderton	18 0	22 0
Mr. Major, Foxhall	16 0	16 0
Mr. Waller, Sutton	19 6	22 0
Averaging 18s. 11d. each.		
Half-bred Down and Leicester Ewes and Wethers.		
Mr. Nunn, Eldo House............	17 0	
Mr. Roper, Lackford..............	19 9	
Averaging 18s. 4½d. each.		

NEW ROMNEY STOCK AND WOOL FAIR.—16,933 sheep and lambs were penned, and up to the hour of dinner (two o'clock) the average stood as under:—Lambs, 17s. 4d.; old sheep, 25s.; ewe tegs, 28s.; wether tegs, 26s. 2d.; two-year-old wethers, 35s. 5d. Several gentlemen offered their wool at 12d., but no more than 11d. would be given. No business done. 454 lambs of Mr. Isaac Barling's were sold by auction in a field adjoining the market field, which fetched on the average 18s. 11d. each. Eight ram lambs realized 30s. each.

LELANT FAIR.—There was a large supply of fat and lean cattle, and a brisk demand for them. Fat bullocks varied in prices from 44s. to 48s. per cwt. There appeared to be no advance in prices for milch cows and working oxen. There was a large number of horses, some of them of a superior kind, and a great many changed hands.

LUDLOW FAIR, Tuesday.—The show of sheep was large, and nearly all were sold—stores at from 6s. to 8s. per head less than at the corresponding fair of 1848. The price of good mutton was from 5d. to 5½d. Very few good cows were brought; prices from 5d. to 5½d.; stores met with a slow sale at lower terms. A great number of horses were shown, but very little doing, and prices lower. There was also a great reduction in the price of pork, and but few pigs were penned.

NEWARK FORTNIGHT MARKET.—We have had a very large show of sheep; and not only was the number large, but generally the quality very good. A considerable quantity of business was done, and at prices which seemed to meet the expectation of the seller. The market may be quoted something brisker, and prices better than last fortnight's market. There were 731 sheep, and 70 beasts penned.

METEOROLOGICAL DIARY—1849.

Barometer.			Thermometer.			Wind and State.		Atmosphere.			Weather
Day.	8 a. m.	10 p.m.	Min.	Max.	10 p.m.	Direction.	Force.	8 a. m.	2 p.m.	10 p.m.	
	in. cts.	in. cts.									
July 22	30.05	30.00	50	64	58	W. S.W.	lively	fine	cloudy	cloudy	dry
23	29.80	29.66	56	66	55	W. S.W.	lively	fine	cloudy	fine	showers
24	29.59	29.44	52	66	53	W. S.W.	lively	cloudy	cloudy	cloudy	showers
25	29.43	29.50	49	65	57	Westerly	brisk	fine	cloudy	fine	showers
26	29.56	29.65	52	64	55	S. Westerly	gentle	fine	cloudy	fine	showers
27	29.83	30.00	50	70	60	Westerly	gentle	cloudy	sun	fine	dry
28	30.02	29.98	53	69	58	S. Westerly	gentle	fine	sun	fine	dry
29	29.85	29.80	56	65	56	S. Weste	brisk	cloudy	cloudy	fine	rain
30	29.69	29.66	54	68	58	W. by S.	brisk	cloudy	sun	fine	rain
31	29.76	29.92	54	65	57	W. by N.	lively	fine	sun	fine	dry
Aug 1	30.05	30.12	52	72	62	S. West	gentle	fine	sun	fine	dry
2	30.14	30.04	53	69	62	W. by N.	gentle	fine	fine	cloudy	drizzle
3	29.97	29.97	57	64	56	Easterly, N.	gentle	cloudy	cloudy	cloudy	rain
4	29.98	29.92	46	65	58	E. by N.	gentle	fine	sun	fine	dry
5	29.92	29.92	49	71	57	Easterly	calm	fine	cloudy	fine	dry
6	30.04	30.06	49	76	62	Variable	gentle	cloudy	sun	cloudy	dry
7	30.07	30.00	54	76	68	S. S.E.	gentle	cloudy	sun	cloudy	dry
8	29.95	29.88	63	80	68	S. S.W.	fresh	fine	sun	fine	rain
9	29.79	29.70	56	71	58	S., S.W.	gentle	haze	sun	cloudy	dry
10	29.75	29.90	58	74	63	W. by N. by S.	fresh	fine	sun	fine	dry
11	29.93	29.83	62	78	68	S. West	gentle	fine	sun	cloudy	dry
12	29.80	29.73	61	71	60	S. West	lively	fine	cloudy	fine	rain
13	29.64	29.60	60	69	58	S. West	strong	fine	fine	fine	showers
14	29.70	29.77	54	67	57	Westerly	brisk	fine	sun	cloudy	showers
15	29.85	29.90	54	70	60	W. by S.	lively	fine	sun	fine	dry
16	29.91	29.89	56	63	55	S. West	brisk	cloudy	cloudy	fine	showers
17	29.89	29.91	48	66	55	W. by S. by N.	forcibl.	fine	cloudy	fine	dry
18	29.98	30.05	49	67	57	W. by N.	gentle	fine	cloudy	fine	dry
19	30.15	30.17	47	72	58	Northerly	gentle	cloudy	sun	cloudy	dry
20	30.33	30.32	56	66	61	Westerly	calm	cloudy	cloudy	cloudy	dry
21	30.32	30.24	56	73	62	W. by S.	calm	fine	sun	cloudy	dry

ESTIMATED AVERAGES OF AUGUST.

Barometer.		Thermometer.		
High.	Low.	High.	Low.	Mean.
30.260	29.350	82	41	616

REAL AVERAGE TEMPERATURE OF THE PERIOD.

Highest.	Lowest.	Mean.
69.1	53.7	61.4

WEATHER AND PHENOMENA.

July 22.—Overcast. 23.—Two heavy showers. 24.—Heavy rain early. 25.—Thunder storms; heavy showers and hail. 26.—Thunder about; heavy showers. 27.—Very fine. 28.—Fine, with clouds. 29.—Clouds and showers. 30 and 31.—Improving.

LUNATIONS.—First quarter, 27th day, 35 m. in the morning.

August 1.—Very fine. 2.—Fine day and a little drizzle. 4, 5, and 6.—Fine harvest weather. 7.—Sultry. 8.—Thunderous; fine close day. 9.—Cloudy combinations. 10.—Beautiful. 11.—Oppressive; cloudy evening; thunder and much lightning. 12.—A shower. 13 and 14.—Depressed heat; flying slight showers. 15 and 16.—Fine, but changeable. 17.—Dry; thunder at 5; beautiful clearing. 18.—One short shower; beautiful sunset. 19.—Cloudy masses by day. 20.—Fine warm harvest day. 21.—Fine; changeable.

LUNATIONS.—Full, 4th day, 3h. 52 m. morning; last quarter, 1 h. 33 m. afternoon; new moon, 18th, 5 h. 36 m. morning.

REMARKS REFERRING TO AGRICULTURE.—The weather, since the rain, has been propitious. Wheat cut here about the 5th, carried abundantly since in the finest order. Everything is propitious so far, but a sudden change of wind, with threatening clouds, took place at 5 P.M. of this, last day.

J. TOWERS.

Croydon, August 21.

REVIEW OF THE CORN TRADE

DURING THE MONTH OF AUGUST.

A partial commencement was made with harvest operations previous to the close of July, but reaping was not general, even in the southern counties, until eight or ten days later. The weather has, with the exception of occasional thunder showers, been favourable throughout the month for cutting and carrying corn; and within the last fortnight a considerable quantity of grain has been carted in very good order; there is, nevertheless, a larger proportion still abroad than is usual at the end of August, the backwardness of the spring and the want of sunshine in the beginning of the summer having retarded vegetation. In some districts more or less injury has, unquestionably, been done by the rain which has at times fallen; but it has been of a partial character, and there is ample reason to expect that the aggregate produce of the kingdom will be fully equal, if not superior, both as regards quantity and quality, to that of average seasons. Much must, of course, still depend on the weather. North of the river Humber little corn was cut until the 20th inst.; and in Lincolnshire, Cambridgeshire, and the fen counties generally, reaping began equally late. A good deal of corn is even now uncut, and several weeks must elapse before the whole can be secured. As far, however, as harvest has proceeded, the work has been accomplished in a satisfactory manner; in some cases the grain has been too hurriedly carted, but this has been rather the exception than the rule.

The yield of wheat to the acre is generally well spoken of, and we hear of fewer complaints of red rust, blight, mildew, &c., than is usually the case. The straw is generally clean and of a bright colour; a good indication of the absence of the defects to which this species of corn is most liable. The samples of the new produce hitherto exhibited at the different markets have varied a good deal in quality, but the principal defect has been that which has been caused by the grain having been cut before it had arrived at full maturity. Where reaping has been delayed until the crop was ripe the weight of the sample is good, the berry plump and full, and the mealing properties all that could be desired.

Barley was undoubtedly much benefited by the copious fall of rain which occurred the last fortnight in July, and will, we think, turn out a fair average crop. A larger proportion will be suitable for malting than in ordinary seasons. This grain ripened somewhat earlier than wheat in several of the principal barley growing counties, and a large portion has been well harvested.

Oats have arrived at maturity relatively sooner, as compared with wheat, than is usually the case; and in some of the home counties mowing of the former was commenced before the sickle was applied to the latter. We are disposed to think that the quality of the oat crop will be fine, and the quantity large in proportion to the breadth sown.

Beans are unquestionably an excellent crop; and peas have turned out much better than was at one time expected. Many of the samples which have come under our own notice have been almost faultless, free from worm, large, and in capital condition.

Should harvest be finished as auspiciouusly as it has been commenced, farmers will have ample reason to be satisfied with their crops of corn and pulse.

Up to a very recent period little was heard of the potato disease; but within the last fortnight the blight has again made its appearance in various parts of the kingdom. The accounts on this subject are of so conflicting a nature, and so little is as yet known of the real character of the disorder which has proved so destructive to this root of recent years, that it is impossible to foresee how far it may yet extend; but, considering the advanced state of the tuber, and the late period at which the haulm first showed symptoms of the attack, we feel inclined to think that the failure will be less serious than in any previous season since the first appearance of the disease. On the whole we are of opinion that a larger amount of home-grown food will be secured than has been the case for some years past, and that our agricultural friends will have to make up their minds to a low range of prices.

The full extent of the mischief attendant on the removal of all protective duties on foreign grain will now develop itself. In 1847 the potato rot, and last year short crops, prevented prices being reduced to a very low point; but, with a sufficiency of food of home growth, and free ingress for the surplus produce of the whole world, the value of grain must, we apprehend, suffer such a depreciation in our markets as to inflict even more serious injury on the British farmer than that he has already had to sustain.

The anxiety displayed by millers to secure some portion of new wheat for mixing with the old has caused prices of the former to open rather high; and those farmers who have been enabled to send their wheat at once to market have realized better rates than are likely to prevail hereafter, when thrashing shall have become more general.

Just now there is comparatively little foreign competition; the stocks in granary consisting for the most part of such inferior qualities as scarcely to be fit for the manufacture of flour; at the same time farmers are directing their whole attention, and occupying their entire strength in the harvest field; hence, for the time being, supplies of both home and foreign wheat are small, and buyers are under the necessity of paying the terms asked. This, however, cannot last long; so soon as the crops shall have been safely housed all will be anxious to convert a portion of the same into cash. Many will be compelled to do this to raise the needed funds to liquidate the expenses incurred in harvesting; but even where this is not the case, the desire to obtain the best price possible will lead to competition to send supplies into the markets soon; and whenever this occurs, there will be a temporary glut of new wheat, and a fall in its value. It must also be admitted that, though there is for the moment a scarcity of good qualities of foreign, sufficient is now on passage from the northern ports of Europe alone to produce an effect on prices whenever it arrives. Immediately after the blockade of the Baltic ports, the rivers Elbe, Weser, and Jahde was raised (which occurred on the 11th inst.), preparations were forthwith commenced to send off the wheat and other grain bought from time to time on British account since the 30th of April. A large number of vessels were chartered at Danzig, Konigsberg, Rostock, &c.; some of which have already been despatched, and others are receiving their cargoes on board. Ere long we may expect some of these ships to arrive off our coast; and as they will be followed by supplies from France, America, and other countries, it would be vain to calculate on present prices of grain being maintained. It is far from our desire to be the bearers of unwelcome tidings, but we cannot shut our eyes to facts, and deem it better to prepare our friends for what they have to expect than to hold out delusive hopes.

Our own opinion is, that should that portion of the crops still abroad be moderately well saved, and the potatoes turn out tolerably well in this country and in Ireland, the value of all agricultural produce would be lower than we have known it for many years past; not from any superabundance of home-grown grain—for, in that case, we should regard low prices as a benefit and not an evil—but from the effect of undue foreign competition, encouraged by the absence of restrictive duties.

The fall in the value of wheat since our last has been rather considerable, and cannot be estimated at less, on the average, taking one market with the other, than 5s. per qr.

At Mark-lane business has throughout the month been devoid of animation, the millers having bought merely from hand to mouth, feeling no confidence in the future.

In some parts of the country good supplies of old English wheat were brought forward in the early part of the month; but this has not been the case at the London market, from which we infer that stocks were reduced into a smaller compass in Essex, Kent, and the other near counties, than in other parts of the kingdom.

Notwithstanding the smallness of the arrivals of home-grown wheat, business at Mark-lane has, as already intimated, been very dull.

On Monday, the 6th inst., buyers refused to purchase until factors consented to accept prices 3s. to 4s. per qr. below those current on that day week. Even this important reduction failed to animate our millers, and of the moderate quantity on sale, a portion remained undisposed of till the following Monday, when a further decline of 1s. per qr. was in partial instances acceded to.

No new Wheat worth naming appeared at Mark-lane before the 13th, and the total quantity then exhibited did not exceed 150 to 200 qrs., principally from Essex. Most of the samples showed evident signs of having been cut too green, and the weight of the best did not exceed 61 lbs. per bushel. The prices realized on that occasion were, for red, 42s. to 46s., and for white 46s. to 52s. per qr. Since then supplies of new have increased, and the quality of that lately brought forward has been much better than that of the first samples. On Monday, the 20th, about 1,000 qrs. were offered on the Essex and Kent stands, mostly of fair, and some of fine quality; and though old scarcely sold so well as before, the new, owing to its being intrinsically more valuable, brought higher rates than the preceding week. Hardly any of the samples of the latter weighed less than 61lbs., and many parcels reached 63lbs. per bushel: the red brought 44s. to 48s., and the white 48s. to 54s., extra 55s. per qr. The weather, which had previously been showery, cleared up about the 18th instant with the new moon, and has since continued very favourable for harvest work: this has tended to cause additional depression; and though the quantity of English wheat exhibited at Mark Lane on the 27th was not particularly large, it proved more than sufficient for the demand, and most of the sales made on that day were at rates 2s. to 3s. per qr. below those current on the 20th inst.

The arrivals of wheat from abroad have been comparatively small during the month, only 45,000 qrs. having entered the port of London up to the

25th inst. (the latest date to which the return is at present made up). By far the greater part of the supply has been from ports lying east of Gibraltar, and is composed for the most part of Odessa and similar qualities. The scarcity of good old English has obliged our millers to purchase the finer descriptions of foreign ; but they have conducted their operations with extreme caution, refusing to take more than they have deemed necessary to provide for immediate and pressing wants. Holders have nevertheless remained tolerably firm, and prices have not fallen so materially as have those of English wheat. Comparing present quotations with those current at the close of July, the difference will be found scarcely to amount to 3s. per qr., fine high mixed Danzig being still worth 51s. to 53s., the best sorts of red Baltic, Rhine, and Louvain wheat 44s. to 46s., and good Polish Odessa 36s. to 37s. per qr. The stocks in the London granaries are not by any means heavy, and we have little afloat at this port but Polish Odessa of second-rate quality; still if the country demand does not increase, the quantity here is likely to prove fully sufficient to provide for our wants until the expected supplies from the north of Europe shall have come forward, and there is, consequently, little inducement to buy more than needed for present purposes.

The nominal top quotation of town-made flour is and has for sometime been 42s. per sack, other sorts are obtainable at corresponding rates ; the sale has throughout the month been very slow, the superior quantity and the comparative cheapness of potatoes having had the effect of causing a material falling off in the consumption of bread, as well at many of the large provincial towns as in the metropolis. The quantity of good fresh foreign flour remaining on hand is small, and the best marks of French, and prime brands of American, have not receded much in value, the former being at present held at 34s. to 35s. per sack, and the latter at 23s. to 24s. per barrel.

As yet we have only received trifling supplies of new English barley, and the stocks of old appear to be quite exhausted, scarcely any having come forward for many weeks past. The first parcel of new exhibited was from Kent, the quality good, though harvested rather too early : this lot was taken by a maltster at 31s. On Monday, the 20th, there was a somewhat increased supply, which was mostly placed at from 28s. to 30s. per qr.; since then buyers have manifested an unwillingness to continue their purchases at the rates named, and factors have been obliged to concede more or less, From abroad we have received rather liberal supplies of this grain ; but the demand for feeding purposes having been tolerably active, prices have not given way above 1s, per qr., the lighter kinds having brought 18s. to 19s., and good heavy parcels from 20s. up to 23s. per qr. Moderate as prices of other articles suitable for feeding are, barley at the rates named is probably as cheap as any, and we may therefore calculate on a continued inquiry.

The value of malt has undergone no change requiring notice. The operations have been altogether on a retail scale, but the quantity brought forward having been small, needy buyers have had to pay former terms.

The arrivals of oats from our own coast and Scotland have been quite moderate, and we have received no supply as yet from Ireland; but so soon as the harvest in that country shall have been somewhat further advanced we may calculate on receipts from thence, the crop being highly spoken of in the sister isle. From abroad good, but not by any means abundant, receipts have taken place ; and the stocks in warehouse having previously been reduced into an unusually narrow compass the downward movement in prices of wheat and other grain has not had much effect upon the oat market. Only one or two parcels of new English have yet appeared : these have proved of fine quality, and for a small lot from Lincolnshire 22s. per qr. was paid. Old Scotch oats have rather advanced than receded in value, fine feed having realized 23s. to 24s., and potato 25s. to 26s., extra even more. The bulk of the business done during the month has, however, been in Russian oats : the lowest sales were in the early part, when a large cargo of Riga's was parted with at 15s. 3d. per qr. ; subsequently a small rally took place, and good heavy Riga qualities have lately brought 16s. to 16s. 6d., whilst Archangels may be quoted about 1s. per higher. Some of the finer discriptions of foreign feed oats, weighing 41 to 42lbs. per bushel, cannot now be bought under 19s. to 20s. per qr., the market being bare of such sorts. Whether present rates will be maintained when the new Irish begin to come forward may be questioned, particularly as some quantity is known to be on passage from ports in the north of Europe, from which shipments were, till of late, prevented by the Danish blockade.

English beans have come to market rather sparingly, and the receipts from abroad have been only moderate; the inquiry for this article having, however, at no period of the month been active, the supplies have kept pace with the demand, and quotations have undergone little or no change. Taking Egyptian beans as the criterion of value, the article may be said to have remained perfectly stationary at 21s. to 23s. per qr., according to quality; the latter price has, however, been only obtained for the best clean samples, most of the sales having been at 21s. to 22s. per qr.

New peas have come forward freely ; the quality of both the white and grey is excellent, and the condition good. The first lots which appeared were sold at 32s. to 33s. for white, and 30s. to 32s. for grey; since, prices have given way, and are now respectively 30s. to 28s. per qr.

In the early part of the month Indian corn was completely neglected, and prices receded rapidly both in the English and Irish markets, until good qualities touched as low a point as 25s. per 480lbs. So material a decline, and less favourable reports respecting potatoes, caused a rally, but after prices had recovered about 3s. per qr. the demand again ceased suddenly, and during the last eight or ten days so little has been done in the article that it has become difficult to determine the exact value.

Before concluding our remarks we shall refer shortly to the position of the grain trade, and the prospect for the harvest in those countries from whence supplies are likely to reach us.

The weather has not been particularly favourable on the continent during the summer, and during the last fortnight in July so much rain fell in some quarters as to lead to serious apprehensions as to the probable fate of the crops. Subsequently an improvement took place; but until about the 18th of August the weather seems to have continued rather unsettled. Under these circumstances there can be no doubt that some extent of injury has been done to the corn crops, but we do not hear of many complaints; and if the latter part of August should have proved as auspicious abroad as with us, so as to allow of the grain being carried in dry condition, the result will probably prove better than anticipated. Of this we feel quite satisfied, that Russia, Poland, and Germany will be in a position to furnish us with larger supplies than we are likely to require; and though Holland may not have much to export, shipments to some extent will certainly be made from France and Belgium so soon as the harvest in those countries shall have been finally concluded. As yet prices are relatively higher abroad than in the British markets, but that quotations will ultimately be regulated by the value here is almost certain.

At the Upper Baltic ports, stocks of old wheat appear to have held out much better than was expected, and at Danzig there is some quantity of fine wheat remaining in warehouse. Holders there seem to have manifested much firmness, and notwithstanding the very discouraging accounts from hence, fine high-mixed wheat, of 62 to 63lbs. weight, had not been offered lower than 42s. 6d. to 43s. per qr. free on board; whilst for secondary sorts, comprising common to fine mixed, 39s. to 41s. 6d. per qr. had been asked. A vessel capable of loading 1,500 qrs. had been chartered for London at 3s. 6d. per qr.

At Konigsberg on the 17th inst. there was some inquiry for wheat on Dutch account, and though but few purchases had been made for England, previous prices had been well maintained, high-mixed being then held at 42s., mixed at 39s. to 40s. 6d., and red at 37s. 6d. per qr., free on board. Small barley was quoted 15s., and large 17s. 6d. per qr.

The advices from the lower ports are not altogether of so firm a tone. The dates from Rostock, Stettin, &c., are several days later than the letters from Danzig and Konigsburg, and the weather having undergone a decided improvement subsequent to the 18th inst., holders of old wheat had manifested greater anxiety to realize. The crops are not particularly well spoken of, still a fair yield of wheat was confidently expected in Pomerania, Mecklenberg, Silesia, Uckermark, &c. At the principal shipping ports very good qualities of red wheat, 61 to 62 lbs. weight, had been freely offered at 37s. to 38s. per qr. free on board; and it was the prevailing opinion that if the accounts from hence continued dull, prices would soon give way still further.

At Hamburgh a temporary rise took place in the value of wheat in the early part of the week, but afterwards all inclination to speculate subsided, and the export demand having been trifling, business again became dull about the 21st inst. Good Upland, 61½lbs., might then have been bought at about 40s. per qr., with 1s. 3d. to 1s. 9d. freight for London or the east coast.

Both in Germany and Holland the potato disease appears to prevail to some extent, which may perhaps lead to a large consumption of grain in those countries, and leave less for exportation.

The harvest throughout France may be said to have been brought to a close, and though the reports of the yield and quality of the new crop are not so favourable as was anticipated (previous to reaping being commenced) would have been the case, still offers were being pretty generally made of both wheat and flour at prices which would almost leave a small margin for profit, allowing for shipping expenses to this country.

By the steam ship Cambria we have advices of recent dates from America; the weather appears to have been rather unfavourable on the other side of the Atlantic, and the crops would not, it was apprehended, prove particularly productive in the States.

In Canada the probable result of the harvest was well spoken of, and we have no doubt that the quantity of bread-stuffs which America will be able to spare, for shipment, will be more than Great Britain is likely to stand in need of from that quarter.

CURRENCY PER IMPERIAL MEASURE.

	Shillings per Quarter. OLD.		NEW.	
WHEAT, Essex and Kent, white	40	to 50	45	to 50
Ditto, fine selected runs	—	—	50	52
Ditto, red	40	43	42	45
Ditto, extra	43	46	45	47
Ditto, Talavera	—	—	—	—
Norfolk, Lincolnshire and Yorkshire..	39	43	—	—
Ditto, white	41	47	—	—
BARLEY, English, malting and distilling..	—	—	26	28
Ditto, Chevalier	—	—	29	31
Ditto, grinding	—	—	23	25
MALT .. Essex, Norfolk and Suffolk	—	—	58	59
Kingston, Ware, and town made	—	—	58	62
OATS, Essex and Suffolk	—	—	16	18
Lincolnshire and Yorkshire (Polands)	—	—	18	20
Ditto, feed	—	—	15	18
Devon & West Country, feed	—	—	15	17
Northumberland and Scotch, feed ..	—	—	20	23
Dundalk, Newry, and Belfast, potato	—	—	18	21
Limerick, Sligo, and Westport, potato	—	—	17	20
Ditto, feed	—	—	16	18
Cork, Waterford, Dublin, Youghal, and Clonmel, black	—	—	14	17
Ditto, white	—	—	16	18
Galway	—	—	13	15
BEANS, Mazagan	—	—	28	30
Tick	—	—	28	32
Harrow	—	—	31	36
Pigeon, Heligland	—	—	36	38
Windsor	—	—	30	40
Long pod	—	—	28	30
PEAS, non-boilers	—	—	26	27
White, Essex, and Kent, boilers	—	—	28	30
Ditto, fine Suffolk	—	—	28	32
Maple	—	—	28	30
Hog and grey	—	—	27	28
FLOUR, best marks (per sack of 280 lbs.)..	—	—	37	42
Norfolk and Suffolk, ex-ship	—	—	32	34
RYE	—	—	23	24

FOREIGN GRAIN.

	Shillings per Quarter.	
WHEAT, American	42	to 45
Canada	38	44
Dantzic and Konigsberg	44	48
Dantzic, fine white, extra quality	48	53
Stettin and Hamburgh	41	45
Danish	37	41
Rostock, Pomeranian and Rhine	41	45
French and Belgium	41	44
Mediterranean, Odessa, and St. Petersburgh ..	36	38
Black Sea (nominal) hard to soft	35	39
Spanish	—	—
Buck or Brank	24	26
BARLEY, malting	23	25
Grinding and distilling	19	23
Hamburgh, Dantzic, Konigsburgh, and Riga ..	19	23
Danish, Mecklenberg, and Pomeranian	19	23
OATS, Dutch, brew, Poland, Friesland, and Groningen	18	20
Danish and Swedish	15	18
Russian	16	17
BEANS	—	—
Small	30	34
Egyptian	21	23
PEAS, white boilers	28	30
Yellow ditto	29	31
Non-boilers	26	28
MAIZE, white	25	27
Ditto, yellow	26	28

FLOUR, American, sweet	23	24
Ditto, sour	21	23
Canadian, sweet	22	24
Ditto, sour	21	22
Dantzic and Silesia, extra superfine	—	—
French, per sack	32	36

RYE MEAL (per ton) .... £6 0s. to £6 10s.
INDIAN CORN MEAL (per brl. of 196 lbs.)...... 15s. to 16s.

IMPERIAL AVERAGES.

FOR THE LAST SIX WEEKS.

	Wheat.		Barley.		Oats.		Rye.		Beans.		Peas.	
WEEK ENDING:	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
July 14, 1849..	48	2	25	3	18	9	26	11	32	1	30	9
July 21, 1849..	48	10	26	7	19	4	28	6	32	1	32	4
July 28, 1849..	49	1	26	1	19	6	26	1	32	5	32	0
Aug. 4, 1849..	48	0	26	3	19	4	25	6	31	10	32	1
Aug. 11, 1849..	47	4	25	8	19	2	26	7	32	0	31	1
Aug. 18, 1849..	46	3	26	1	19	0	27	5	31	9	29	2
Aggregate average of last six weeks	46	11	26	0	19	2	26	10	32	0	31	3
DUTIES	1	0	1	0	1	0	1	0	1	0	1	0

An Account of the Total Quantities of Foreign Corn imported into the principal ports of Great Britain (viz., London, Liverpool, Hull, Newcastle, Bristol, Gloucester, Plymouth, Leith, Glasgow, Dundee, and Perth) in Twenty-seven Weeks ending Aug. 15th, 1849, since the 8th of February preceding (including the quantity of Wheat and Wheaten Flour loosed from bond on that day), and the amount that would be available for revenue, if the Tariff proposed by Lord John Russell in 1841 was levied on this supply.

	Quarters.	Tariff per qr.		Amount for Revenue.		
Total Importations from Feb. 8 to Aug. 8, 1849:		s.	d.	£	s.	d.
Wheat and Wheaten Flour...	3,117,670	8	0	1,247,068	0	0
Rye and Rye Meal	68,841	5	0	17,210	5	0
Barley and Barley Meal	517,767	4	6	116,497	11	6
Oats, Peas, and Beans	979,621	3	4	163,265	6	8
Imported during the week ending Aug. 15, 1849:						
Wheat and Wheaten Flour...	72,698	8	0	29,079	4	0
Rye and Rye Meal	4,814	5	0	1,203	10	0
Barley and Barley Meal	24,184	4	6	5,441	8	0
Oats, Peas, and Beans	24,726	3	4	4,121	0	0
Total	4,810,321	..		1,583,886	5	2

PRICES OF SEEDS.

BRITISH SEEDS.

Cloverseed, red 35s. to 40s.; fine, 45s. to 50s.; white, 34s. to 42s.
Cow Grass (nominal) .... —s. to —s.
Linseed (per qr.).. sowing 54s. to 56s.; crushing 40s. to 42s.
Linseed Cakes (per 1,000 of 3 lbs. each).. £9 0s. to £10 0s.
Trefoil (per cwt.) .... 14s. to 18s.
Rapeseed, new (per last) .... £26 to £28
Ditto Cake (per ton) .... £4 5s. to £4 10s.
Mustard (per bushel) white .. 7s. to 9s.; brown, 8s. to 10s.
Coriander (per cwt.) .... 16s. to 25s.
Canary (per qr.) .... 90s. to 100s.
Turnip, white (per bush.) —s. to —s.; do. Swedish, —s. to —s.
Tares, Winter, per bush .... 6s. 0d. to 6s. 6d.
Carraway (per cwt.) .... 28s. to 29s.; new, 30s. to 34s.
Rye Grass (per qr.) .... —s. to —s.

FOREIGN SEEDS, &c.

Clover, red (duty 5s. per cwt.) per cwt .... 30s. to 40s.
Ditto, white (duty 5s. per cwt.) per cwt .... 24s. to 42s.
Linseed (per qr.) .. Baltic 38s. to 42s.; Odessa, 40s. to 42s.
Linseed Cake (per ton) .... £6 0s. to £8 0s.
Rape Cake (per ton) .... £4 5s. to £4 10s.
Coriander (per cwt) .... —s. to —s.
Hempseed, small, (per qr.) 32s. to 35s., Do. Dutch, 35s. to 36s.
Tares, (per qr.) .... small 24s. to 26s., large 28s. to 33s.

HOP MARKET.

BOROUGH, Monday, August 27.

Our market remains without any alteration since our last report, either as to demand or price, though, where sales are forced, rather less money must be taken. The accounts from the plantations indicate upon the whole some little improvement, and there are backers of £80,000 duty. Horton and Hart.

HIDE AND SKIN MARKETS.

			s.	d.		s.	d.	
Market Hides,	56 to	64lbs.......	0	1½	to	0	0	per lb.
Do.	64	72lbs.......	0	1½		0	1¾	,,
Do.	72	80lbs.......	0	2		0	2½	,,
Do.	80	88lbs.......	0	2¼		0	3	,,
Do.	88	96lbs.......	0	3¼		0	3¾	,,
Do.	96	104lbs.......	0	3¼		0	4	,,
Do.	104	112lbs.......	0	0		0	0	,,
Calf Skins		....	1	6		5	0	each.
Lamb Skins		....	1	8		2	8	,,
Horse Hides		....	7	6		0	0	,,
Shearlings		....	1	4		2	0	,,

TIMBER.

	£	s.	d.		£	s.	d.
Baltic Timber, per load of 50 cubic feet..	3	0	0	to	4	0	0
Yw. Deals, per standard hundred	11	10	0	..	16	0	0
Deck Deals, per 40 feet 3 in.	0	18	0	..	1	4	0
Pipe Staves, per mille	110	0	0	..	125	0	0
Lathwood, per fm. of 4 feet........	5	10	0	..	6	10	0
Petersburgh, Riga, and Archangel .... Yw. Deals, per stand. hundred ..	12	0	0	..	14	0	0
White..............................	11	0	0	..	12	0	0
Yw. Battens........................	13	0	0	..	15	0	0
Riga Logs, for 18 feet cube..............	3	0	0	..	4	0	0
Stettin Staves, per mille of pipe..........	75	0	0	..	130	0	0
Swedish Timber, per load	2	10	0	..	3	0	0
Gottenb. Yw. Deals, per 100 12f. 3in. 9in...	18	0	0	..	23	0	0
White ditto	16	0	0	..	19	0	0
Yw. Battens, per hd. 12 ft. 2½ in. 7 in.	11	0	0	..	14	0	0
Christiania Yw. Deals, per hd. 12ft. 3in. 9in.	24	0	0	..	25	0	0
White ditto......	21	0	0	..	22	0	0
Quebec and St. John's Spruce Deals.. per 100, 12 ft. 3 in. 9in.	14	0	0	..	17	0	0
1st qual. yw. Pine Deals, per st. hd.	13	0	0	..	16	0	0
Second do. do..................	9	0	0	..	10	10	0
Third do. do..................	7	10	0	..	8	10	0
Red Pine Deals, per hd. 12ft. 3in. 9in.	17	0	0	..	21	0	0
Red Pine Timber, per load	3	0	0	..	4	0	0
Yw. ditto	2	15	0	..	3	15	0
Birch ditto	3	0	0	..	3	10	0
Elm ditto	3	5	0	..	3	15	0
Oak ditto	4	15	0	..	5	5	0
Standard Staves per mille standard	60	0	0	..	70	0	0
Puncheon Staves, per mille	15	0	0	..	18	0	0

MAHOGANY, &c.

Mahogany,	St. Domingo	5½d.	to	1s.	9d.	per foot.
	Cuba	5¾		1		
	Honduras	4¾		1		
	African	5		0	7	
Cedar	Havana	5¼		0	6½	
Rosewood.	Rio	12l. 10s.	to	18l.	per ton.	
	Bahia....................	9		0	14	

BARK.

Per load of 45 cwt.

English, Tree..............	£14	0	0	to	£15	10	0
Coppice..................	15	0	0		17	0	0

WOOL MARKETS.

LIVERPOOL, Aug. 25.

Scotch.—There is little demand for laid Wool, but the new clip is arriving at market, and it will find its level. White is not inquired for. There is more inquiry for the best class of Cheviot. In other sorts little doing.

		s.	d.		s.	d.
Laid Highland Wool, per 24lbs....		8	0	to	8	6
White Highland do................		10	0		10	6
Laid Crossed	do...unwashed	9	6		10	0
Do.	do....washed	10	0		12	0
Laid Cheviot	do...unwashed	10	0		12	6
Do.	do.. washed......	14	0		17	6
White Cheviot	do... do.	18	0		23	6

Foreign.—There are several public sales announced for next week of East India, Egyptian, Buenos Ayres, Turkey, and other low Wool, which has prevented much being done by private sales this week.

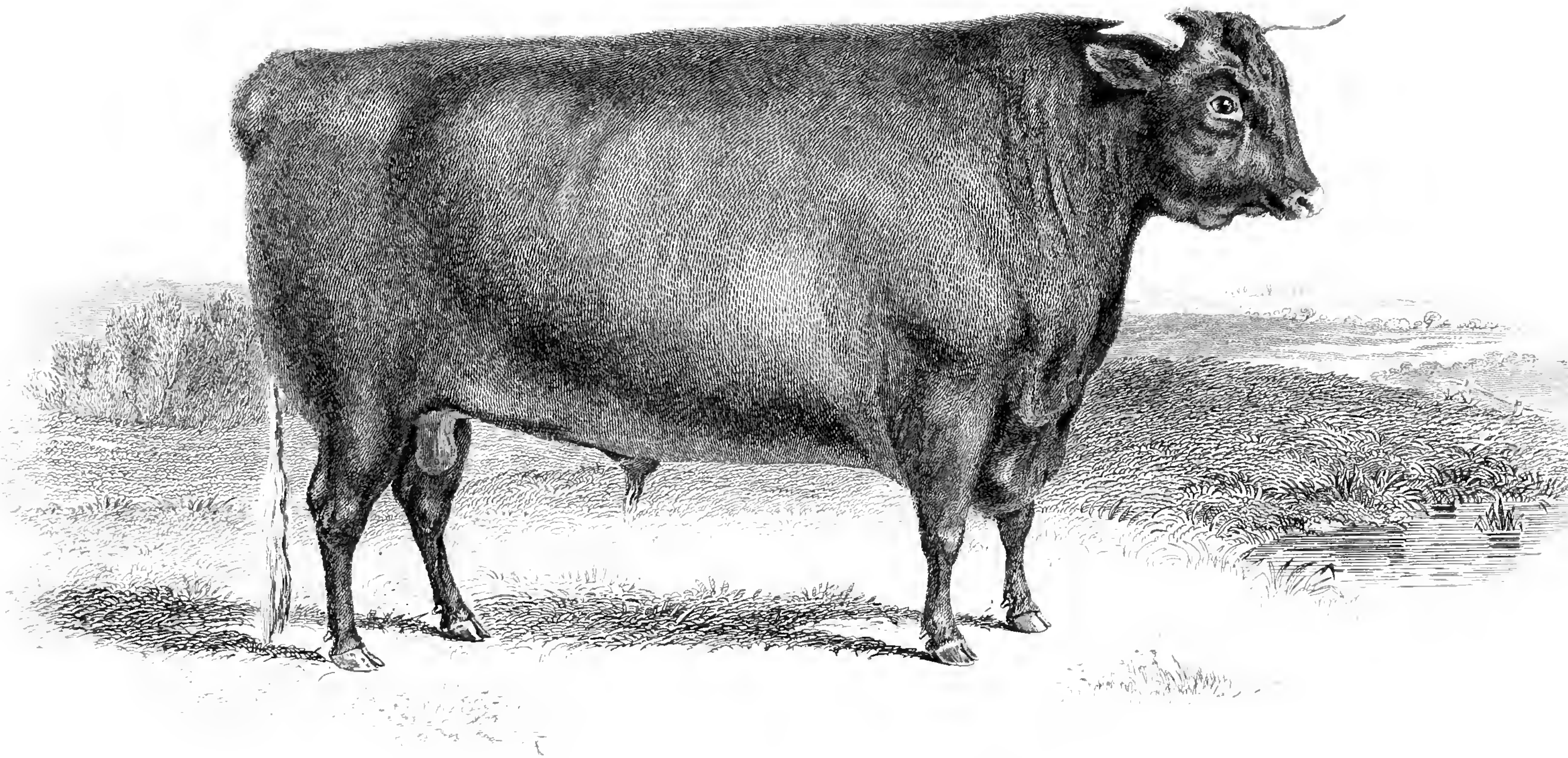
FOREIGN WOOL.

The market for wool is firm, and holders are still rather sanguine that an advance will occur.

LEEDS, Aug. 24.—The great confidence expressed by those well informed that present prices will be fully maintained, judging by the bareness of the continental markets and the healthy state of trade at home and abroad, has induced buyers to operate rather freely. Now that large supplies of German and other Wools have just come into the market, we may confidently hope to see great activity in this branch of business.

BRESLAU, Aug. 22.—Rather more business than of late; all descriptions in good request, and steady prices. Country manufacturers and commissioners continue to be the chief buyers; but besides, we have Rhenish, Saxon, and Austrian purchasers in the market. Fine Silesian clips fetched from 78 to 87 thalers per cwt.; fine Polish 65 to 75 thalers, middle fine 58 to 60 thalers, low ones 50 to 57 thalers: Russian wools 49 to 53 thalers; Hungarian summer wool 46 to 48 thalers; skin wool 55 to 65 thalers; slipes 45s. to 52 thalers; refuse 45 to 55 thalers. Lambs are still neglected, and good qualities to be had at from 70 to 80 thalers. In the whole there have been sold about 2,500 cwts.; but nearly twice as much has been brought in from Poland and Russia. The Berlin market is very lively, home manufacturers being the principal buyers. Low and middling wools at from 48s. to 62 thalers are in best demand; better kinds are likewise requested, and nearly 1,000 cwts. of fine Prussian fleeces at about 70 thalers have been sold to an extensive English manufacturer. Reports from Vienna state that the wool trade there was in a very good position, and prices rising anew. Very large quantities of all descriptions have been taken out of the market by Austrian manufacturers, as well as by English, French, and Netherland firms. Nevertheless, it is believed that in consequence of the approaching pacification of Hungary, provisions will become more abundant, and prices a little more moderate. —Gunsburg, Wool-broker.

Printed by Joseph Rogerson, 24, Norfolk-street, Strand, London.



London Published by Joseph Rogerson, 24, Norfolk Street Strand 18[illegible]

THE FARMER'S MAGAZINE.

OCTOBER, 1849.

No. 4.—Vol. XX.] [Second Series.

PLATE I.

DEVON BULL.

The subject of our first plate, the property of Mr. James Quartley, of Molland, near South Molton, Devonshire, obtained the first prize of Forty Sovereigns, at the Royal Agricultural Society's Show at Norwich, in July last, as the best Devon Bull, calved previously to the 1st of January, 1847.

PLATE II.

THE FLYING DUTCHMAN; Winner of the Derby, 1849.

(For description see page 300.)

THE EXTENT OF WATER REQUIRED IN IRRIGATION.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

It is an old axiom that there is hardly any evil without its consequent good. When pestilence, the offspring of dirt and neglect, spreads its horrors throughout the land, the public attention is roused, temporary and permanent sanitary measures are adopted, the general health and comfort advanced. We all know that before the great fire of London these visitations were frequent, and that then, inattention to public cleanliness was still more lamentable than now. When the fire had levelled a great portion of the City with the ground the plague disappeared with it: but then our cities were mere country towns in size to what they are now. London had not then spread far into Surrey, and even into Essex and Kent. A citizen of those days had a chance of breathing, at least occasionally, a pure breeze. Now all winds that reach the City have to find their way through miles of chimnies and emanations of all kinds. Amid such an outspread of disease-engendering circumstances the subject of better drainage and improved sewerage is at last, in all directions, engaging the public attention. I have long endeavoured to promote this happier state of things by showing the value of those matters to agriculture which the citizen so recklessly commits to the adjoining river. In a former page of this volume (see *ante* p. 193) I endeavoured to show how the fluid matter of sewers might be even profitably employed a second time in irrigation. As local boards of health are now established in various towns (and their number will be most assuredly rapidly extended), these matters will speedily engage their attention. The disposal of the sewage matters will almost, as a matter of course, form in many places a portion of the new arrangements: inquiries will be instituted, information sought for. At such a time it may be equally useful to the citizen and the farmer if I here repeat and enlarge upon what I have elsewhere had occasion to remark (Bell's Messenger) upon the amount of water required for the irrigation of a given extent of land. The probable amount of the sewage draining from any locality will be easily estimated—the extent of land which that amount will be sufficient to irrigate is a fact not so well understood. Let us then endeavour to obtain an approximate estimate by putting together such facts as are in our possession, since it is useless to search, in even practical books, for any information on this head. The practical irrigators of the south of whom I have inquired are unable to give even an approximate estimate; they all however agree that the supply, to be considerably useful, should be large, and the stream of water poured on to the land copiously and rapidly to ensure its sufficient diffusion. I have on former occasions urged upon my readers the profit likely to be attained in many situations where a copious supply of water is attainable from the use of the steam-engine and the pump, for the purpose of irrigation; the facts which I glean from the report of the committee to which I have alluded will materially, I hope, promote the great cause of extended irrigation for which I have laboured. For, amidst a host of uncertain data (since it treats of varying soils and substrata), a useful approximation to the truth is certainly attained by the labours of the committee. They commence by remarking very truly that in calculating the probable value of the sewage of towns to the citizens and to the irrigator, it will be useful to form some estimate, however imperfect, of the quantity of liquid required for the irrigation of a given extent of land. This, it is true, can only be accurately determined by the examination of the soil upon which the irrigating water is allowed to flow, as the amount is not only influenced by the composition of the surface-soil, but also by the more or less porous nature of the substratum on which it rests. It is indeed evident that the immediate soakage from an irrigated soil which rests on a porous sand, for instance, will be rapid; whilst from the same kind of soil, with an understratum of clay, the filtration will be much slower; hence it is certain that the stream of water sufficiently copious for the rapid irrigation of one kind of soil would be too quickly absorbed by the porous substratum of anothor to allow of its diffusion over the surface soil with the same, or, perhaps, sufficient rapidity. Still, as the surface soil in most ordinary cases partakes very materially of the composition of the substratum or rock on which it rests, it can hardly fail of producing useful practical results to the owner of land suitable for irrigation, either by common or sewer water, if we examine the quantity of moisture contained in various soils when *saturated* with water. Upon this question M. Schubler, in a work translated by Mr. James Hudson, gives the results of a series of trials, in which he evinced considerable skill and industry (Jour. R. A. S., vol i., p. 182). This distinguished German chemist defined pretty correctly the meaning of the words, "the power of the earths to contain water" to be "their property of receiving and retaining more or less water within their interstices without allowing it again to flow away by dropping." The results of his trials will be found in the following table, which gives the real amount of water contained in a cubic foot of various earths, when saturated:—

Calcareous sand contains ..	31.8 lbs.
Siliceous sand	27.3
Sandy clay	38.8
Loamy clay	41.4
Stiff clay, or brick earth ..	45.4
Pure grey clay	48.3
Pipe clay	47.4
Garden mould	48.4
An arable soil	40.8
Fine slatey marl	35.6
Gypsum powder	27.4
Fine carbonate of lime	47.4
Fine carbonate of magnesia .	62.5

If we calculate the mean amount of water in these 13 varieties of saturated soils to be equal to 42 lbs. per cubic foot of earth, or 378 per square yard of soil, a foot deep, then 378 4840 (the number of square yards in an acre) gives 1,827,720 lbs. of water needed to saturate an acre of *perfectly dry* land to the depth of one foot, or about 816 tons. If we suppose that the saturation of the soil need only extend to a depth of nine inches, then about 543 tons of water would be sufficient: if to a depth of only six inches, then 408 tons; and if only to a depth of four inches, then 273 tons would suffice. It appears from the recent report of Dr. J. Stark, (Statement on Sewer Water, by Mr. E. Chadwick, p. 49,) that the celebrated Craigenbury meads, near Edinburgh, are annually irrigated by the city sewage about eighteen times. Now, if we calculate that, on an average of months, 250 tons of irrigation water would suffice to saturate the soil (always partially, and sometimes thoroughly previously moistened), then it would require 4,700 tons of water to give these eighteen irrigations to an acre of land. We deem the quantities we have stated, as likely to be an average amount of sewage fluid required for the irrigation of an acre of grass land, to be nearly correct. In the ordinary wasteful way of irrigating land, the leakage of the drains, and the soakage into the substratum, arising from the want of sufficiently rapid flow of the irrigating stream, is very large. Upon the whole, then, by avoiding these errors, taking the average of moderately retentive soils, and, moreover, by raising the water or the sewage fluid to the contemplated elevation, thereby rendering it available for the use of the irrigator a second time, we deem the calculated annual quantity of 4,700 tons per acre not to be far removed from the truth. Some persons may deem 4,700 tons per acre to be an enormous yearly application of water: to such persons, it may be useful to be reminded that the mean depth and weight of rain which falls yearly at King's Langley, in Hertfordshire (Mr. J. Dickenson, Jour. R. A. S., vol. v., p. 151), is equal to 26.61 inches, or 2,695 tons per acre. Of this, from April to September inclusive, the mean depth which fell was equal to 12.67 inch, or 1,283 tons per acre, of which 1,192 tons were lost by evaporation, and only 92 tons filtered away through the soil. From October to March inclusive, the mean depth of rain was 13.95 inches, or 1,412 tons, of which 1,052 filtered through the soil, and only 360 tons evaporated. In some of the northern English districts the fall of rain is double the amount we have shown to descend in a midland county of England. If the intelligent farmer doubts the sufficiency of 250 tons of water to saturate the soil, let him remember that in no period of 24 hours did Mr. Dickenson observe the fall of a depth of rain to be equal to 1½ inch, or 150 tons per acre; and yet how often and how thoroughly does a November day's rain saturate the soil. In making these experiments the surface of the land exposed to the evaporating influence of the sun and wind is supposed to be bare of herbage. In the case of a water-mead densely covered with a luxuriant and rank crop of grass, the evaporating surface is very naturally increased, and the demand upon the soil for moisture is pretty certainly proportionably enlarged. This larger evaporation from a soil tenanted by plants was shown experimentally by Mr. G. Phillips (Ibid., vol. vii. p.307.) He employed in the month of March two metallic vessels of equal size, which were used as mould pots. They were so constructed that no moisture could escape except at the surface. Each pot contained 22.09 square inches of surface at the level of the mould. One pot was filled with mould only, the other with mould containing a polyanthus, and in another experiment three plants of the potato. In 12 days the mould evaporated 1,600 grains, or 6.06 grains daily per square inch, while the pot containing the polyanthus had evaporated 5,250 grains, which for the mould and one surface of the leaves is 4.93 grains for every square inch. In the case of the potato plants in 19 days, the mould evaporated 54,000 grains, the potato plants 3,000 grains. The daily evaporations from one surface of the potato was at the rate of 1.4 grain, and of the polyanthus 2.1 grains, from one square inch. In some experiments recorded by Dr. Hales, the mean evaporation was found to be 15 grains for every square inch of the plant's surface. These facts are well worthy of even the citizen's careful attention, since, taking these fair data, allowing upon an average 250 tons per acre of sewage water to each irrigation (or a depth of 2½ inches), and taking the daily extent of the sewage of the metropolis to be equal to an area of 50 acres, or 3 feet deep (and this is about the truth), we have here offered to us sufficient water for the daily irrigation of 750 acres of grass land. But, as we have seen in the Edinburgh meads, that they are irrigated only 18 days in the year, then we find the sewage of the metropolis is equal to the irrigation of 15,000 acres of water-meads. It is not difficult to estimate the money value per acre to the farmer of the thus applied sewage water. Dr. Stark says ("Chadwick's Statement," p. 49), "The more water each portion receives the larger is the crop raised upon it, and the higher the price got for that crop in the market; so that while the lots which are watered in general only once in a fortnight, bring only from 23*l.* to 30*l.* per acre annually, those which receive a larger supply let for from 28*l.* to 50*l.* per acre. It will not be difficult to arrive, then, at a tolerably correct approximation in value of the sewer fluid of a town. The considerable amount of its money value will be alike most gratifying, not only to the English agriculturists, but to all other true friends of their country; for it is now evident that whilst the Commissioners of Sewers are purifying the air we breathe, and the river waters flowing near to us, they achieve another public good: they will, when all their great plans are completed, be largely and permanently increasing the fertility of the very lands of our country which a former race of commissioners as steadily laboured to impoverish, by the wretched expedient of contaminating the river waters the public were constantly using.

There is, I think, little need of apprehension of the unpleasant nature of the odour emanating from such irrigations. The modern system of flushing the sewer pipes removes their contents too rapidly to allow of any material advances in their putrefaction. The irrigated land will be, of course, as far removed from thickly populated neighbourhoods as possible; and, in case of need, the whole of these matters may be filtered through cheap and fertilizing deodorizing substances, such as a mixture of sand and gypsum powder, or peat charcoal. Of the last-named fertiliser. through the energy and perseverance of Mr. Jasper Rogers, a copious supply will now speedily be available for such purposes; and whenever such impure charcoal is attainable by the English farmer at a sufficiently reasonable rate, he will do well to employ this, not only as a mixture with his ordinary compost, but in all cases where the rich drainage matters or the gases of putrefaction are escaping from and impoverishing decomposing organic matters.

EPIDEMICS AND DISINFECTION.

BY J. TOWERS, MEMBER OF ROYAL SOCIETIES OF AGRICULTURE AND HORTICULTURE.

It is devoutly to be hoped that before this article shall meet the eye the awful, mysterious agent which for nearly twelve months has dealt destruction among the people, may have fulfilled its allotted duty. An opinion certainly is entertained that the prevailing epidemic may be referred to a peculiar condition of the air; whence the expressions "*atmospheric poison*" and "*choleraic atmosphere.*" I am prepared to admit (and reference to the meteorological tables will prove the fact,) that the general phenomena, however propitious they may have been to the operations of husbandry, have not been of a kind to promote health, invigorate the frame, and cheer the animal spirits. Gloom and hazy clouds, alternating in rapid succession with transitory sun-gleams, had been the characteristics of many weeks prior to the 5th of September; and thus the Editor's leading paragraph of the "Gardener's Chronicle" was fully justified:—"No one can have failed to remark how oppressive the atmosphere has been, though comparatively sunless, for the last six weeks; how warm, damp, and suffocating, especially at night. That cholera should follow, with all its horrors, in the presence of such influences—especially in low, ill-drained places—is exactly what might have been anticipated."—*Sept. 8th.*

If we assume that the condition of the air *favours*, if indeed it be not the *exciting cause* of cholera, the remedy indicated is disinfection by the aid of chemical re-agents. The stupendous volume of the atmospheric ocean would appear to frustrate every attempt at purification; but it fortunately happens that man, if he possess energy of character, can do much to disinfect, and render innocuous the inclosed air of his own residence. Some years ago, Mr. Herepath, of Bristol, observed, that "Cholera is only received into the living body through the lungs, and cannot be propagated by inoculation." He added—"The only chemical preventive I depended on, in my numerous exposures to the virus, was chlorine gas; and this I believe to be a perfect one, if the fumigation is complete. A mixture of three parts of common salt and one part of black oxide of manganese should be be placed just inside the street door, and a little common oil of vitriol poured on it."

This process is a homely description of the one used by chemists in the preparation of that astonishing gaseous element, which, till the important discovery by Davy, in 1810, of its true character, was called oxymuriatic acid. The directions are indefinite, and, if followed at hap-hazard, might lead to some disagreeable consequences; since the chlorine so developed, and, without caution, inhaled, would not fail seriously to affect the mucous membrane of the nose and throat, producing great irritation, difficulty of breathing, and much expectoration.

Chlorine gas has little affinity for oxygen, but for hydrogen, and its combinations with sulphur and other offensive substances, its attraction is energetic: hence an extraordinary *deodorising* power. If the exhalations from cesspools and foul drains be the active causes of epidemic fever, and some other infectious diseases, then the efficacy of chlorine gas will neither admit of question nor doubt; and the *chlorides of lime* and of *soda* may be regarded as among the greatest blessings which modern chemistry has been permitted to confer upon mankind. In applying either of these preparations, it has been usual to add a little acetic, muriatic, and even sulphuric acid, to the chloride, in order to promote the more rapid extrication of the gas. But this method is objectionable, because the development so produced becomes too rapid and transitory, and is likely to be followed by unpleasant, if not dangerous consequences.

The best bleaching powder (*chloride of lime*), prepared according to the process of M. Labarraque, ought, if I mistake not, to contain nearly one-third its weight of chlorine; ordinary good samples may be estimated at one-fourth. Thus, if twenty grains be carefully added to a certain known weight of diluted muriatic acid (one part acid to three parts soft water), contained in a phial, and accurately weighed to within one-eighth of a grain, the loss in weight of the whole, after cessation of effervescence, and the complete dissolution of the chloride, will average five to five-and-a-half and six grains. A chloride of this strength is quite competent "to *disinfect* houses and chambers in which there may be small-pox, measles, cholera morbus, scarlet or typhus fever, &c.; and to disinfect bedding, clothes, linen bandages, or lint, before sending to be washed," provided always that the causes of the several maladies or epidemics have, *de facto*, their origin in a miasmatic or tainted condition of the air, through the presence of gases upon which the developed *chlorine can exert* a *chemical* decomposing energy.

Having thus ventured upon theory, I come to consider the most eligible method of applying chlorine gas, so as to keep up a constant supply without any risk to the operator, or any disagreeable redundance. A medical gentleman of great eminence put the question (then novel to me), soon after the approach of cholera to this town, whether I had heard of a combination of *sulphate of alumina with chloride of lime?* He also assured me that the result had been proved. I at first hesitated; but on mixing together *powdered alum* and the *chloride*, both dry, and in about equal proportions, the extrication of a modified chlorine gas was instantly apparent. The action was quickened by trituration with a few drops of water. From that day to the present time (Sept. 12th), I have pursued a course of experiments with a view to determine accurate results; and thus have proved, that *a chloride* of strength sufficient to discharge about four grains of gas from *fifteen grains*, accurately weighed, will require rather more than its own weight (say one-and-a-fourth) of finely powdered alum, added at three several times, to discharge all the gas that can be developed by the operation of the *super-acid* that is found in alum. The expense incurred is a mere trifle: one pound of chloride may cost, at the utmost, 6d.; alum, perhaps, the same. Mix *two ounces* of the former with one ounce of the latter, thoroughly; divide the powder into three quantities, and either put them into three earthen narrow pots, and tie a piece of paper over the mouth of each, or be content to make up three paper packets, each with one ounce of the compound powder. Put one vessel or packet near the front door, another at a back entrance, and a third on a landing of the first floor. If the chlorine meet with a foul *hydroguret* it will decompose it, and lose its own peculiar odour; therefore, whenever *that distinctive* odour shall prevail, it may safely be concluded that the chlorine has been developed in sufficient quantity. I have found that the three ounces so mixed have required no addition or alteration during twenty-four hours; but, should the gas abate, another portion of alum must be added, and so on, according to the strength of the *chloride* till the *alum* ceases to act, when some more of the former will again revive the activity of the compound. Water will not be required in the present moist condition of the atmosphere.

I claim nothing on the ground of invention or discovery; in fact, it appears that a preparation is now sold at a very moderate price. But still it has been thought right to publish the foregoing practical directions for the guidance of those who prefer to experimentalise for themselves.

A few more lines on the theory of atmospheric conditions. *Cholera* ("*cholera morbus*,") has been known for centuries—we may conjecture by Hippocrates. But, to come nearer our own time, did not Sydenham say, "This disease (the cholera of 1699) comes as certainly at the latter end of summer, and the approach of autumn, as swallows at the beginning of spring." Did he not describe all the symptoms, similar *then* to those which now prevail, and which "*frighten the bystanders*, and *kill the patient in twenty-four hours?*"

If cholera is to be referred to an atmospheric poison occasioned by foul exhalations, is its general prevalence throughout the globe, at all times and temperatures, *now*, to be referred to one and the same cause? Do filthy drains, cesspools, and polluted water-courses abound everywhere as they do in great cities? The questions are momentous. Let us by all means cleanse and deodorise in order to remove acknowledged nuisances; but be it ever borne in mind, that in doing the good work incautiously the plague may be extended to a degree that cannot be contemplated without terror.

REMEDY FOR THE HOVE IN CATTLE.

TO THE EDITOR OF THE FARMER'S MAGAZINE.

Sir,—Cows and oxen at this time of year are very subject, from being incautiously turned into damp clover or rich pasture, to become hoven or blown, or, as it is often significantly called, "dew-blown," a term quaintly expressive of the cause of the disease and of its preventive remedy. So sudden are these attacks, and so rapid and fatal are they in their progress, that unless relief be very quickly obtained there is no chance of saving the animal. I have very frequently felt much pained to find the animals dead, which I have been called suddenly to attend to; and my attention has long been directed to some simple means of relief, which might with safety be placed in the hands of the agriculturist; and it is therefore purely in the hope of being serviceable to those who are so unfortunate as to have their stock so affected that I trouble you with this letter, trusting to your well-known anxiety to benefit the agriculturist for its insertion in your widely spread Journal.

There are very many means which a veterinary surgeon may employ with advantage in this disease, and these remedies will naturally depend upon the urgency of the case; the duration of the attack, the nature of the food, and various other circumstances. It is not to be expected that a farmer could attempt to use these remedies, and to change them as occasion would require, as a person who has not closely and most carefully studied the peculiar nature of the animal cannot possess the requisite knowledge to enable him to do so, and there is no animal wherein the gradations and phases of health and disease require to be more intimately known than in the ox tribe.

The principal remedies made use of in this complaint are the introduction of the œsophagus tube (or choke pipe, as it is commonly termed) into the stomach; this instrument, however highly useful as it is in the hands of the experienced veterinary surgeon, is often very dangerous when used by the inexperienced operator, and especially in this disease, where the great swelling which takes place in the stomach compresses the œsophagus in such a manner that it is often extremely difficult to attempt its introduction, and numbers of fatal accidents result from the attempt to use it in these cases. Paunching is another remedy frequently used, and occasionally with great success; but it is, after all, a desperate remedy in unprofessional hands, and I have attended many cases wherein the animals have died in consequence of the operation having been performed. When an animal is paunched by the common method of the knife being plunged into the rumen on the left side, at a point about a hand's breadth in front of the hip, and at an equal distance from the loins, immediate relief is usually obtained; but a great quantity of the contents of the stomach often escapes into the abdominal cavity, and remains there as a source of dreadful irritation. If paunching is to be performed it should be by the trochar and stiletto, which will mainly prevent the results above named, but it is never to be recommended in unprofessional hands, unless as a last resort, as there is considerable care required in the after-treatment of the animal. In some desperate cases the rumen has been opened on the left side, and its contents removed, and the animal has done well. I need not say that this could only be done by a skilful veterinary surgeon. Many medicinal means for the treatment of this complaint are employed by the veterinary surgeon, which are varied or combined, according to circumstances; among these I will only name a few, as many others may become necessary in particular cases, according to the peculiarities shown. They are generally of a stimulating nature to cause the paralyzed stomach to act, or partly stimulant, and partly such as will neutralize the gases evolved in the stomach by forming new compounds. These agents are generally combined with purgatives and simple stimulants, as ginger, cummin seeds, &c.

Spirits of turpentine is a very valuable remedy. Spirits of nitrous ether is an excellent remedy. Tinct. opii highly useful in some cases. Ol. cajeputi, a very useful remedy. Stimulants of any sort may be given on occasions when other remedies are not at hand; even gin, rum, whiskey, &c., &c., have been given with benefit. Ammonia, either as the liquor ammonia or the carbonate of ammonia—this is a most valuable remedy in early cases, as it unites with the sulphuretted hydrogen gas, which is first thrown off, and forms a new inert compound, and also acts as a powerful stimulant to the coats of the stomach.

Chloride of lime in solution in the later cases has often proved useful by uniting with the carbonic acid gas which is thrown off in the latter stages of fermentation; it acts by forming an inert substance, and thus doing away with the distention. A veterinary surgeon in very bad cases is able, through the canala of the trochar, to inject at once into the stomach of the animal any of these stimulants or neutralizing agents with the highest benefit.

Among the purgative agents with which these remedies are usually combined to unload the stomach may be mentioned—

Linseed oil.
Croton oil.
Croton seeds.
Croton oil.
Sulphate of soda (Glauber salts).
Sulphate of magnesia (Epsom salts).
Chloride of sodium (common salt).

The latter is often highly useful, by inducing thirst, and thus setting the bowels in action. Also the hydrargyri submurias (calomel) is a most valuable medicine; generally used, in combination with others, to quicken their action, and specifically to act on the liver, causing an increased flow of bile. A mixture of treacle and soft soap has often had a wonderful effect in causing an action of the bowels when other means have failed. These various means have been stated, as frequently the animals may be relieved of the distension from the gas, but the quantity of food taken has so filled the stomach that it is necessary to be unloaded, as whilst it remains crammed with food, and the rumen in a torpid state, the fermentative process will go on, and a repetition of the hoven will take place.

I have long looked for an agent which could be used with perfect safety by the agriculturist, and at the same time be one of the most likely means of cure, or, at least, which would give such relief as would afford time for other assistance to arrive if necessary. Common hog's lard is an article which can be procured at every farmhouse, and I can speak very highly of its good effects when given in cases of hoven; I have advised the use of it to my friends for the last twenty years, and every succeeding year increases the favourable opinion I entertain of it. I have no hesitation in saying, that if it be given at once when an animal is perceived to be swelled or hoven (in the manner I shall hereafter point out) that relief will be very speedily obtained; but if the giving of it be delayed, more powerful agents may be required; but 19 out of 20 of the common cases of hoven will be relieved by it, and no after-treatment required; and it has this advantage, that the dose may be repeated with safety. To a feeling mind nothing can be more annoying than to be called to a case, and find the animal dead or past recovery, and to know that in all human probability the animal would have been alive under simple remedial means.

If I do not take up too much of your valuable space, I will relate the two following cases, which I think and hope will convince your readers of the efficacy of the plan I propose; and I trust it will not be put aside from its simplicity, as that is the very point I have studied to attain.

Some time since I was sent for by Mrs. Hunt, of Harlington, with a message that her cows had got into the clover, and that one of them was hoven. Before I could get there, or she could be got home to the yard, she dropped on the road, and died. Two others I found blown up immensely in the yard. I told Mrs. Hunt that, though I had plenty of other remedies with me, yet I should wish her to manage those two herself, and I would show her how; and then she would know another time what to do herself, and what to tell her neighbours to do in the same difficulty. I then desired her to get me about a pound and a half of lard, and a three-pint or two-quart jug, and to put the lard into the jug, and fill it up with hot water; and when it was melted, and cool enough, I ordered the men to give half of it, out of a horn or bottle, to each cow, and then to hold the cow's head out straight, while I pressed moderately heavy on the left side of the body, where the stomach blows up most. About a quarter of an hour or twenty minutes afterwards they were able to walk about, and nearly all the gas had subsided, partly by escape up the throat, and the other by the action of the lard on the coats of the stomach. As they were going on comfortably, I left them, and they did very well.

The next case is one that I think will carry with it a very strong evidence of the value of this plan of relief. About a month back the cowman at Mrs. Gostling's, Whitton Place, came in a very great hurry, and told me he had got several of his cows hove, and wished me to see them as soon as possible. He said they had only been out two hours into a fresh piece of grass that had been shut up a fortnight. As soon as he perceived it, he came away for me; and while he and my man were putting a horse into a gig, I put into it what medicines were necessary, and a flexible tube, and was not more than two minutes in starting; and although I had less than a mile to drive to the cows, when we got there three of them were quite dead, and five more blown up so that they would not move, and they required earnest persuasion with the whip to keep them on their legs. I ordered them to be moved as well as they could into the cow-yard close by; and then determined, in this desperate case, to use my remedy. I therefore sent the butler into the kitchen to get about a pound and a half or two pounds of lard, and to put it into a three-quart jug, with two quarts of hot water, and to bring it to me moderately hot. While he was gone, I gave one of the worst cases some castor and linseed oil, with the cajeput oil and spir. ether. nitr., and left one of the worst for the lard, and one also not quite so bad as the first for the same; to the other next-worst I gave the oil, and to the fifth I gave the lard. As soon as I had given them their doses, I had their heads held out straight, and their stomachs well pressed down for some time, by two men spreading their hands out wide over the highest part, towards the hip, till we found the wind break off up the throat, which is much facilitated by letting an assistant, while the head is held out straight, lay hold of the tongue, and give it a good pull now and then—not a violent one, but sufficient to make the cow try to get it away; then let it go again, and it will generally be found that the wind will force its way up the throat directly afterwards. The quantity of lard I gave to each was about a pound, and in half-an-hour, or three-quarters at the furthest, they were all out of danger, and would have eaten food if I had allowed them. Those that had the oil were the quickest relieved. Although I had the flexible tube with me, I did not use it, deeming it necessary in a fair trial to do without it.

I am quite sure you will feel as happy as I shall if the insertion of the above in your valuable magazine should prove the means of saving animal life; and I am quite sure I shall have the thanks of every veterinary surgeon in practice among the cattle districts, as nothing is more painful to both the medical attendant and the owner than their meeting together after the animal has died, which now often happens when every possible exertion has been made to arrive in time to relieve them.

I have no doubt the same plan, if adopted in time with sheep, when blown on clover, would relieve them immediately.

I remain, sir, your obedient, humble servant,

PETER BOUGHTON,
Veterinary Surgeon.

Hounslow, Sept. 22.

THE POTATO DISEASE—COURSE OF TREATMENT SUGGESTED.

TO THE EDITOR OF THE FARMER'S MAGAZINE.

Sir,—Relying on your solicitude to practically, and in the current of common sense realization promote the agricultural interest of the United Kingdom, and thereby all other *domestic* interests of Great Britain, I take the liberty, through the medium of your valuable publication, to call the attention of the agricultural body of this country to the yet, for this season, incipient potato disease, and of suggesting a course of treatment, that, if fairly carried into effect, will arrest its current depredation for this season, and so diminish its aggregate existence after, that for the next and coming years its virulence (even under the influence of the most electrical autumn) will not be injuriously perceptible; and thereby this great staple and all-useful element of national sustenance preserved henceforward to our population, and without which Great Britain would become a yearly attenuating kingdom, till its social and political standard would be trifling in the scale of nations.

After all that has been said and written for the last three years on this subject, much in earnest, but ill-formed conviction, and a *great deal more* in the spirit of learned pedantry, but gross ignorance of the true and natural elements of the subject treated of—from the absurdity of *Smee* to the laughable, but pitiable silliness of the *Irish bog-water cure*—it may, and I feel rather does appear presumptuous in me, an humble individual, to assume a knowledge of a managing and cultivating course, which, if fairly acted on, will—indeed subject to natural influences must, with Divine permission, lead to a progressive, but finally radical cure for this vast predial evil.

But under such a feeling my strengthening assurance in the efficacy of the course I recommend lies in the strong evidence of experience sustained in its theory by nature, and confirmed in its issue by judiciously-directed, but simply-managed, successful trials. The plain natural understanding of the potato disease, with a *consequent* just conception of a curative course of agricultural arrangements peculiarly incidental to its cultivation, which would progressively arrest and finally dissipate the miasm, has not yet been fairly put before the public; and I respectfully affirm that the current disease, commencing in 1845, was the growing accumulative result of weakened, and in most numerous instances over-matured, seeds being generally sown in these islands; as also, but to a less extent throughout continental Europe for the last twenty years, too highly impregnated from over-stimulant manures with organic gases, and thereby divested of those necessarily strengthening and healthily sustaining earthy essences which *thin* and *invigorate* the juices of the potato, and *which*, when possessed, enable it alike to absorb in itself, or, if imparted to excess, to throw back into the surrounding earth, the *oxygenated* stimulants received during growth through its stalk or haulm, and thereby sustain its reproductive vigour and healthily edible qualities.

The main causes that have contributed to reduce the potato essence in general to this state have been excessive nitrogenous manures—shallow ploughing, consequent on the almost-universal prevalence of *drill husbandry*, and general suppression of *spade work*—as also a very prevailing ignorance in the selection of really healthy seeds.

These three causes are of such a tendency as to naturally flow one into the other in aiding to reduce the potato essence to that diseased state which generates a sickly vegetable perspiration; and thus reduced with excess of organic stimulants from simple animal and over-active compost manures, and not having a *maiden* or *deeply-subsoiled new earth* to absorb this perspiration or natural offthrow (the surrounding old earth being similarly impregnated) the consequence has been that the atmosphere instead of the ground is now the widely-impregnated deposit of the miasm thus generated; and that on its spring or winter rarifaction, and absence of electricity during the advanced stages of germination in summer and autumn, but more fixedly as the stalks begin to return their pith to the young potato, depends entirely the safety of the crop.

Subject to these natural influences, which, with as great certainty as any inductive cause can operate, do govern the virulence and extent of this miasm, the effect of the disease this year will not materially injure the aggregate crop in the north or midland counties of England, nor in the well-worked loams or at all deep-cultivated limestone soils of Ireland; and is only to be apprehended as of perceptible injury in the badly-ploughed and porous soils of both countries, and particularly where the old and long-hacked mould surrounds the potatoes; but most of all in such lands, if, at sowing the manure, active compost* or general stable-dung was put in naked contact with the seeds, or if the substratum within the range of the fibres and in contact with the *lower tubers be wet and clammily tenacious.*

Having said *this much* of the growth, continuance, and destructive tendency of this miasm (and a great deal more subject to these principles should be said to impart a clear understanding of the subject, but I am disinclined to trespass for this publication too widely on your valuable space), I now submit the *curative course,* which, under Divine Providence, will to a great extent preserve the partially-injured portion of this year's crop, and effectually eradicate the future seeds of the disease from our soils.

Firstly, then, as to this year's crop, where the sowing was early—say before the 10th of April—and the soil at all renewed by deep ploughing or digging, however blighted the stalks may appear, the tubers are safe, and will continue so, unless there be a great preponderance of old soil around the potatoes. In that case, though the stalks or haulms were nearly closed in their *sap veins* when electricity pressed down the miasm this autumn, and therefore, though destroyed themselves, were so exhausted as not to be able to convey the virus to the bulbs, yet the saturation in the old clay will progressively affect these tubers. Therefore, as regards all potatoes thus circumstanced, either of two courses should be at once adopted, viz., where the soil is tenacious but dry, to press down the surface either by trampling or rolling; this will arrest the flow of the miasm through the earth, and keep the tubers safe; but where the soil is truly old and porous, better at once dig out and pit or store as hereafter stated.

Where the sowing was late—that is, after the 20th or 25th of April—the moment the least darkness affects the stalks, as a general rule it may be best to pull them up, and roll or trample the surface, whether drills or ridges. This done, the potatoes, if the surrounding mould be at all mixed with a share of new subsoil, will suck in so much of healthy earthy juices and nourishment as will establish their maturity, and, proportionate to the nature of the soil, add a little to their growth. The application of these principles (for such, in potato culture, they are) may vary a little under local circumstances, guided by skilful consideration, but in the main they should be acted on.

Secondly, as to the *storing, tilling,* and *seeding* arrangements necessary henceforward to practise in the general cultivation, &c., of the potato crop, so as to finally subdue, and through *natural influences* eradicate, the potato disease; it is certain that our pitting system must be altered, and that instead of making our field-pits for winter and spring storage in the old mould, and then covering the potato heaps indiscriminately with the surface scrapings of the soil. The pits should be made in the most elevated position in a field, having the floor of fine new dry earth, and a considerable portion of the same kind of clay sprinkled through the heap, or, where at all attainable, dry bog or peat mould. Thus done, the perspiration of the potatoes becomes fixedly absorbed in this maiden earth, and not returning in on themselves, as will be the case if surrounded with old clay, which (the new earth), from its unoxygenated state, becomes healthily saturated with this vegetable *offthrow,* and arrests its mixture with the atmosphere, and thereby its contagious or communicable existence, as the seeds of future disease, will be permanently destroyed, and the elements of the miasm, instead of forming pestilential vapours, become part of a new, and to an extent a fertilizing compost; whilst the potato itself, in exchange for this foul perspiration, takes in strengthening earthy essences from contact with this new soil, rendering it more wholesomely nutritious as food, and vastly more reproductive as seed.

Next, in the course of tillage, the general class of manures should not be allowed to come into direct contact with the seeds; but they should be first covered with a thin layer of earth, put on with either plough or shovel, as the culture may be drills or beds, and over that layer the manure spread, and then, in the usual way, finally covered in.

This mode of culture will arrest excessive stimulation in the early stages of the growth, and be sure to impart continuously strengthening nourishment to the fibres as the branch, producing full-sized and healthy tubers, and *that* without generating infectious gases to feed and sustain the existing miasm.

Finally, the selection of seeds (too little known or attended to) should be from a crop sown not earlier, if possible, than the 1st of May in the preceding year, and piled as before directed. In *such* the juices will be always *thin, vigorous,* and equally dispersed throughout the entire potato; whilst in those of over-early culture the juices will be dried up, and the farinaceous predominate over the seminal constitution of the potatoes. So *true* is *this* in principle, and the ignorance of its tendency so injurious in general result, that every farmer or potato grower of an acre or upwards should annually have a proportionate division of ground from which to raise his season's seeds this way.

Market gardeners, and those cultivating for

* This will not apply if the compost be carbonaceous.

summer or early harvest sale, and seeking within the shortest possible time to produce a paying crop, may occasionally vary in their tilling arrangements from those truly fundamental principles of potato culture, &c.; but, to preserve and increase the aggregate crops of the United Kingdom henceforward, these principles must be observed, and, if adopted generally, the future safety and vegetable vigour of this great and good, if not the best of earth's productions for man's use, may, under Providence, be calculated on—a result most earnestly desired, by, Sir,

Your very obedient servant,

JAS. O'SULLIVAN,

Practical Agriculturist.

ON DESTROYING VERMIN.

As a general view of the *principles* by which wild animals are caught, enticed, or driven away, may be useful to some persons, I have here set down a few ideas on the subject. Animals, whether prejudicial or useful as food, are caught or destroyed by means either of enticing or driving them, having reference to their natural faculties and habits, or by using other animals for this purpose to assist us; and this holds good whether it is a gentleman sporting for amusement, a savage hunting for subsistence, or a farmer destroying vermin. Therefore, to catch these we act upon the curiosity, love of other sex, jealousy, fear, hunger, &c.

And first as to curiosity—Light: This is an attraction to everything, whether vegetable or animal; the flower opens itself and turns towards it, the infant tries to grasp the shining candle placed before it, or cries for the moon. The glowworm entices its mate by its light; and we all know how moths and other insects fly to a candle, and singe their wings in the flame. But to confine ourselves to purposes connected with our subject. The naturalist catches many kinds of night-moths (males only) by exposing a light in his room. On going to bed, if you place the lighted candle in another room, it is said all the gnats will fly to it, and leave your room free. A plan sometimes practised by grocers to catch wasps, is to place a lighted candle in the middle of a large pan with water in it; the wasps fly to the candle, singe their wings, and fall into the water. Fishes are enticed by light; and a Frenchman invented a complex machine, with lamps, reflectors, and nets to catch them. Salmon are caught by one man holding a blazing torch close to the water, and another striking the mesmerized fish with a spear. Birds are also thus attracted, as in the practice of lowbelling; where the birds are wakened by a bell, and lured by a flame into a net. Sparrows are often so attracted by a lantern, on dark nights, that they can be knocked down by a stick, and they are also caught round buildings by means of a hand or clap net and flame. These can only be practised on dark nights; but larks are attracted into a net, or made to approach so near as to be shot, on sunshiny days, by means of a revolving glass which reflects the rays; and we all know how fond cage-birds are of viewing themselves in a mirror. As to animals; it seems a providential thing, that while the fiercer animals, as lions, tigers, &c., are afraid to approach fire, many other kinds useful for food are attracted by it. The Americans kill deer in the night by carrying a frying-pan, with a long handle, on the shoulder. This has lighted pitch in it; and is carried so that, while throwing light all round, the man carrying it is not much exposed. The deer stands quite still staring at the light; the man sees the reflexion of the flame in its eyes, and fires with the rifle between them; the danger is that he may kill a dog or calf by mistake. The Chinese catch rats by holding a light before their holes, and killing them when they come to look at it. Phosphoric rat-poison attracts by its light; and I have read of rabbits being driven out of their holes by turning into them land-crabs with short pieces of candle fastened on their backs. In reference to curiosity in general, all animals are inquisitive, and attracted by any peculiar action or sight to which they are not accustomed, and which is not so violent as to drive them away. Take, for example, horses and cows in a field. The Laplanders kill reindeer by laying themselves on the ground, throwing themselves into various postures, when the animals come close enough to be killed with an arrow.

2. Jealousy and Love—Hatred and Fear: All the arts of the fowler are on the first two of these principles. Female or call birds entice the males into snap-cages or nets, or sometimes the young are in the cage and the old bird is enticed. Calls, or imitations of bird's notes, are either the call of the female to the male, or the defiance cry of the male, which causes other males of the same species to rush out to do battle. The calls are either the love-call, the food-call, the call to collect together, or the defiance-call. Many of these are easily mimicked; as that of the corncrake, by scraping two notched pieces of wood together. Most animals, when they make their cry (as when one

loses its companions), are answered by all those of the same kind within hearing. Example: dogs, ducks, and donkies. During the Peninsular war one of our soldiers took advantage of this. The peasants hid up all their ducks and fowls in dark holes and corners, so that they were quiet; but this fellow pinched a live duck he always took with him, whose cry was always answered by other ducks, and these cries roused all other fowls.

Animals are sometimes caught in a similar way to the following:—The Persians kill deer by dressing themselves in the skin of one, or hiding in bushes and imitating the challenge cry; another male hears it, answers it, and rushes out, when he is shot with an arrow. Now, I think, calls might be made for everything, whether bird or beast; both the call of the male to the female and the female to the male, of young for old, and *vice versâ*. Of male's challenge: this, it is true, would only serve one part of the year; but the following would answer at all times. The calling to food, to gather together, or of one lost and seeking its companions. Besides drawing their own species, imitating the cry of weaker animals would draw those preying on it near the spot where they might be killed; as imitating the cry of a mouse might draw out weasels or hawks to within shooting distance—of a pig (in Russia), wolves. Imitating the cry of a stronger animal might prevent the weaker escaping, and make them run into the jaws of danger. Thus, if a man imitated a hawk's cry, it would make pheasants fly to the shelter of a copse, or wildfowl to the shelter of reeds and water, where another person might be placed to destroy them.

An exhibition has been made of a speaking machine. Machines to imitate birds' and beasts' calls, &c., would be infinitely easier to make, and would form a still more interesting exhibition.

In Smith's "Vermin Destroyer" a manner of enticing male dogs and foxes is described, of which I shall only say that it might be extended to many other animals, and would be a more certain means of enticing them to a trap or concealed gunner than food itself.

By imitating the cry and appearance of an animal's mate, rival, or prey, you excite the passions of love, jealousy, and hatred, and make it come within suitable or *shootable* distance.

3. Of Animals trained to aid us: Here we use the natural habits of carnivorous animals to assist us. I need not mention the dog's valuable assistance (according to his species) in pursuing his underground prey, as rat, rabbit, otter, and badger; showing his master the position of feathered game, driving wild-fowl into nets, picking up the dead, chasing the deer, hare, &c. The dog is trained to follow animals on the earth, as is also the cheetah or hunting-leopard; the hawk to fly at birds, and in Persia to assist dogs in hunting hares and even deer; the otter, in India, and the cormorant (its neck ringed) in China, to take fish for his master; so that the denizens of earth, air, and water, have been brought to assist us. In fact, there is hardly an animal but may be trained to assist in the chase. The horse follows the chase with delight, and is sometimes trained to serve as a natural stalking-horse; as also has a bull. A hog has been tamed to stop at game like a pointer; and it is very common for well-fed dogs and cats to go out hunting by themselves and bring home what they catch to their master, preferring caresses and approbation to food.

We may use untrained animals to assist us in various ways on the principle of Section 2. Example 1: In Russia they kill wolves in the following manner. They go out into the forest on a moonlight night with a sledge, behind which a wisp of straw is dragged by a rope twenty yards long. They have a live pig in the sledge with them, and nip its ear to make it squeal. The wolves flock together, mistake the straw for the pig, dash at it, and are shot from the sledge. 2. A hawk is sometimes taken into the fields to catch larks; and being held up and made to flutter, all the larks lie on their backs on the ground in fright, and suffer a net to be drawn over them, and sometimes to be taken up by the hand—other birds are taken in the same way. A cat is tied up—mewing and struggling—near where a person is hid; magpies, crows, &c., come to hoot and persecute it, when they may be shot: or an owl is tied up, and small birds shot. A live pigeon tied to a stake, or even dead ones, will entice other pigeons to light near it and a concealed gunner. By observing birds' actions the presence of other sought-for objects may often be noted, as the chattering magpie gives notice of the approach of weasel, hawk, or cat. The African bee-eater shows where honey is to be found in woods.

In some countries swallows are tamed to fly about rooms and kill the flies, &c. Many people keep a cat, owl, or hawk tied up in the garden to protect small quantities of seeds, peas, or fruit. If one could train hawks to fly about or over the fields of train, and fasten four or five to posts, so that they could be seen, it would be a great protection. A martin or swallow might be employed to forward intelligence in the same way as carrier-pigeons, by removing it first from its home.

4. Predilections and Antipathies: The fondness of rats for oil of rhodium and oil of aniseed, of cats (especially Tom) for valerian and cat-mint, is well known, and often entices them to their destruction. Rubbing the boots with aniseed is said to be a com-

mon trick of dogstealers to entice dogs. It is said that by rubbing the hands with assafœtida fish will let you take them out of the water. The dislike of bulls and turkey-cocks to red colours might, where these creatures are wild, be made a means of procuring them. There are some things used to drive rats away from premises, or to antipathize them. It is said that common mullien, and also garlick-bulbs, sprinkled in stacks, or put where they frequent, will drive away rats and mice; that elder and walnut leaves, both in their natural state and as a decoction, will prevent the attacks of flies on animals and meats, and drive them away, hence elder is so frequently planted near larders, and that a branch of ash leaves drive away gnats. How true these may be I know not; they can, however, be easily tried. W.

Sept. 12.

HEREFORDSHIRE FARMERS' CLUB.

The Quarterly Meeting of this Society was held on Saturday the 15th of September last, in the large room of the Green Dragon Hotel, in Hereford; Marcellus Newton, Esq., in the chair.—Among those present we observed Mr. J. K. Hastings; Mr. T. Clarke, Derndale; Mr. J. B. Vevers; Mr. T. W. Maddy; Mr. Heaford; Mr. B. Lloyd; Mr. Fowler, Hereford; Mr. Racster, Thingehill; Mr. Jennings; Mr. J. Clarke; Mr. W. Jauncey; Mr. Rowan, &c., &c.

The following gentlemen were then proposed and duly elected as members :—Mr. Shutt, Lower Castleton: Mr. Smith, Livers Ocle.

THE GROWTH OF FLAX IN HEREFORDSHIRE.

The Chairman then rose, and begged to call the attention of the meeting to the subject which was intended to be discussed—whether flax could be profitably cultivated in Herefordshire. He believed the gentlemen at the end of the table at which he sat were in a measure unacquainted with the subject; but there were those at the other end who he understood had made the subject of flax-growing their study. If there was any gentleman present who could afford them the necessary information whether the soil of this country was suitable for the profitable cultivation of flax, not having had much experience himself in the cultivation of the article, the meeting would be happy to hear any remarks which might be offered.

Mr. B. Lloyd then rose and addressed the meeting; but his remarks were to a great extent inaudible. We understood him to say that at a former meeting the opinion was entertained that wheat was the most profitable and productive crop that could be grown by the Herefordshire farmer. At that meeting Mr. Rowan had introduced the flax-growing question, and maintained that flax, if properly cultivated, would prove the more remunerative of the two. Some time after that meeting a letter had appeared in the *Hereford Journal*. That letter, which purported to have been written by a Mr. Hill Dickson, and copied by the paper above alluded to out of the *Dublin Freeman's Journal*, accused him (Mr. Lloyd) with having made misstatements relative to the experiment he had made on half an acre of land. He therefore would offer a few remarks at this time. When he made his experiment he had no idea of making use of the fibre, but grew the crop in order to obtain seed. Some time after he had grown his crop a friend suggested to him that he might dispose of the fibre to advantage; but he had failed to find any person in the county of Hereford who understood the dressing of the fibre. He had learned that Mr. Day, of Credenhill, had grown 20 bushels to the acre; and Mr. Brown, of Whitfield, had grown 17 bushels to the acre. The fibre in some of these instances had been used for thatching cottages, and had a very pretty appearance. He did not think that flax was by any means an impoverishing crop, or that its growth acted prejudicially to the growing of other crops in the rotation of cropping, as wheat succeeded well after it. He was of opinion that flax might be grown with advantage, and recommended gentlemen to try the experiment. Mr. Lloyd then handed in a specimen of the fibre grown by himself, which was considered a fair sample.

After a remark from Mr. Hastings,

Mr. Hemming said that a gentleman whom he knew in Lancashire had grown a crop of flax, but had afterwards experienced great difficulty in disposing of it in its raw state; and that he was obliged to have a person from Belgium who understood the culture and dressing of the article; but added that the person to whom it was afterwards disposed of stated that the fibre was sufficiently fine and good to mix with silk, for the manufacture of pocket handkerchiefs.

Mr. Rowan then entered into an explanation of the culture of the article which formed the subject of discussion, the principal points of which are embodied in the following. He stated that, as he had proposed the subject of flax-growing as the topic for the evening's discussion, he had paid considerable attention to it since he brought it forward at a former meeting. He had lately visited Ireland, where flax was grown to a very great extent; and with regard to the importance of its growth in Herefordshire his impressions were stronger now than they ever had been. The growth of flax was of immense interest in many ways. Its importance was not merely one of a national, but of a local character, and peculiarly interesting to the agricultural community. He could see no reason why they should not grow as good fibre in this county as it was possible to grow in any part of the world. Dr. Hodges, with whom he had had conversation, and who possessed a thoroughly practical knowledge of the subject, and to whom he (Mr. Rowan) had submitted an analysis of the elements constituting the soil of Herefordshire, had informed him that in his opinion there could not be soil better calculated for the growth of flax than that of this county, and that here it would prove a profitable article of culture. Some idea might be formed of its value when it was known that the annual imports into Great Britain amounted to 500,000 quarters of seed, and 700,000 tons of oil cake, the cost of which was nearly £2,000,000, and which, with the value of the fibre, was estimated at £50,000,000. He (Mr. R.) possessed several calculations as to the probable profits derivable from its cultivation. He had selected some of the lowest; because bringing forward exaggerated statements would have the tendency of raising expectations which would not eventually be realized. The lowest calculation of expenses would be, per acre, as follows :—

	£	s.	d.
Rent and taxes (a year)	1	10	0
Ploughing, &c.	1	8	0
Two and a-half bushels of seed	1	5	0
Weeding and pulling	1	2	0
Steeping	1	12	6
Scutching 30¼ stone	2	0	0
Cleaning seed	0	6	0
	£9	3	6

The seed should be sown about the middle or end of March, and the crop pulled about July. The product would be nearly as follows :—

	£	s.	d.
30 stone of fibre, at 9s. 6d. per stone	14	5	0
10 bushels of seed at 6s. 6d. per bushel	3	5	0
Husks	0	8	0
	£17	18	0
Deduct expenses of production	9	3	6
That would leave a profit per acre of	£8	14	6

He had seen such crops grown upon the sides of the mountains in Ireland, where there was not more than two-and-a-half inches of soil on the face of the rocky stratum. Mr. Rowan then proceeded to explain the new process of separating the fibre from the husk, in order to produce the flax fit for the market, which mode was adopted by Mr. Schenck, and patronised by the Royal Society for the promotion of the growth of flax in Ireland. In the old system it was usual to select whatever soil they thought fit for the cultivation of flax. It was, however, found in practice that flax did not succeed well after turnips. He apprehened that it was a plant which fed richly on carbonaceous matter. Some persons maintained that they had found it thrive best after corn. He (Mr. Rowan) believed any kind of land was suitable for its growth. A deep loam on a clay subsoil would suit it best, especially if drained. It was necessary that the seed should be sown broad-cast. The land should be prepared something similar to the manner in which it would be for turnips. In selecting seed, one that was plump, shining, and heavy, should be chosen. The thinnest sown parts of the field generally produced the best seed. Before depositing the seed in the soil it should be well prepared by ploughing, and twice harrowed, and the flax sown about two bushels to the English acre. It should afterwards be harrowed with fine harrows, and covered about the depth of an inch. It then remained in the soil until it reached the height of three inches, when it was ready for weeding. This was performed by women and children. Care should be taken in the operation of weeding, otherwise the crop would be damaged. This portion of the business should be done on *all-fours* by the weeders, who should work *against* the wind, as, after they had passed, the wind assisted to raise the plant when it had been pressed forward by the process of weeding. By the observance of that rule the plant would derive considerable benefit from weeding; but if twisted or bent down by careless weeders, it seldom escaped without much injury. The plant termed *"crow's foot"* was that which most infested the flax plantation in Ireland. Nothing was afterwards done until the time when it was fit to be pulled. The plan recommended by the Royal Irish Society was, that it should be pulled as soon as it began to turn brown and the stem yellow, laying hold under the ball, and pulling the longest first. It was of importance this should be attended to, as the longest fibre brought the best price. It would be much the better plan to have a second puller, who should follow in the path of the first. It then underwent the steeping process, for which purpose a steeping pool was prepared of them 12 to 14 feet broad, and 3½ to 4 feet deep. The flax was steeped from 8 to 20 days, according to the temperature of the atmosphere and the quality of the water. River or soft water was most suitable for steeping. Much depended upon the water employed in steeping. The test usually employed for the purpose of ascertaining the fitness of the water was by placing a piece of soap in it, and if the soap became soft and dissolved in the liquid, then it was fit for the process of steeping. When it began to ferment there was a tendency in the flax to rise up out of the water. This should be obviated by placing additional weights upon it. If the woody fibre separated from the flax, it was then ready for removing from the steeping pool; for, if that process was carried too far, the quality of the flax would be injured. The only process which it afterwards required was that of spreading and drying. It was imperative this should receive attention, especially where they had no scutching mills. For the purpose of scutching (under the old system) a piece of wood was used. A piece of oak was best. The flax was taken hold of in the hand, and turned round as they struck it. It was then taken hold of by the other end, and underwent the same operation. This was the method formerly employed in the north of Ireland, when they had no scutching mills; but scutching mills had been introduced into most places of late years. The advantages derived by labourers by the growth of flax would be considerable. A steeping and scutching mill would afford employment to two men and four women for every 50 acres, which would produce 1,800 stone of flax, and 300 bushels of seed. Each acre would employ a woman at 6s. per week, four weeks in the year. They had established a manufactory on the estate of Sir R. A. O'Donnell, at Newport, in the county of Mayo, Ireland, where a different mode of preparing the flax was adopted, by which a much better quality of fibre was obtained. It was harvested in the same way in which they would harvest wheat or other grain, placing the handfuls or sheaves transversely, or by spreading it, so that the air might pass through it. In another process, they pulled the fibre before it was quite ripe. Immediately it was pulled the flax underwent the process of rippling, which was accomplished by means of large iron combs; but by this method the ends of the flax received much injury. [It is the intention of Mr. Rowan to bring before the public a series of letters detailing the various processes at length, and the profits derivable therefrom, and other matters connected with its culture, which induces us to curtail the mass of information delivered by him before the meeting of the club.]

Mr. Hastings wished to know the reason why the culture of flax had been abandoned in various parts of the kingdom, where the experiment had been tried, if it were so highly remunerative as represented by Mr. Rowan.

Mr. Rowan replied that it probably arose from the fact that in most places the plant was cultivated for the seed alone, the fibre not being properly disposed of.

After some remarks from Mr. Racster,

Mr. Rowan said that, in looking over several reports which had been given, he had selected one of the most reasonable estimates for the manure required by the soil as a return for elements abstracted by the crop of flax. He recommended the following compost for supplying the elements of flax:—

	s.	d.
Chloride of potassium, 30lbs.	2	6
Chloride of sodium, 28lbs.	0	3
Gypsum (burnt), 34lbs.	0	6
Bone dust, 54lbs.	3	3
Sulphate of magnesia, 56lbs.	4	0
	10	6

Thus it would be seen that an acre might be manured for 10s. 6d. With regard to the rotation of cropping, he (Mr. Rowan) observed that, on the best soils of Flanders, flax was grown in the third of a seven years' course, or the fifth year of a ten years' rotation. It was not advisable to grow it more than once in a seven or ten years' rotation. This system of rotation cropping was also adopted: First year, potatoes; second year, barley, with seeds; third, cut for soiling; fourth, pasture; fifth, flax, or half flax and half oats; so that flax would come once in ten years. A gentleman of experience recommended the following plan:—First, oats, after grass and clover; second, flax, pulled at the end of July, ploughed and harrowed and sown with rape seed, with artificial manure; third, potatoes or turnips, well manured; fourth, wheat sown in spring, with clover or rye-grass; fifth, hay and clover; sixth, grazing; seventh, oats; eighth, flax or winter vetches, with artificial manures; ninth, turnips; tenth, barley, with rye-grass and clover; eleventh, clover and hay; twelfth, grazing; thirteenth, oats. In Ireland it was usual to plant flax after potatoes, but he should recommend the sowing of it after grain. If old ley was broken up, potatoes planted, and afterwards grain, a good crop of flax would follow. For the generality of soils the Riga seed was preferable, and the Dutch next best. The American seed was not of so good quality as the two former, as it produced a very coarse fibre, when home grown.

After some further conversation, in which the Chairman, Mr. Lloyd, Mr. Racster, Mr. J. B. Vevers, and other gentlemen took part, Mr. Rowan offered to superintend gratuitously the management and culture of any portion of land gentlemen might think proper to plant as an experimetal crop. Several gentleman expressed their willingness to make an experiment.

The CHAIRMAN then moved a resolution to the effect that it was the opinion of the meeting that flax might be extensively and profitably cultivated in the county of Hereford, which was adopted by the meeting.

The proceedings then terminated.

COMPARATIVE TRIAL OF MR. TOMBELLE LOMBA'S PLAN OF CUTTING THE STEMS OFF POTATOES.

In the beginning of last November I planted the early-frame potato, a later white sort, and the queen's-noble, a still later potato. Fresh-slaked lime was spread over the ground, and turned in upon the sets as each row was planted, to prevent the ravage of slugs during the winter. No other manure was used.

I certainly had always entertained the idea that the stem and leaves were indispensable to the growth of the tubers; but after reading your observations upon Mr. Tombelle Lomba's plan, I resolved to try the experiment, as recommended in your Journal.

On the 14th of July, the potatoes being still in flower, I cut off the stems of two rows of the later white sort, and earthed them over about two inches, leaving two rows in their natural state. Adjoining were several rows of the queen's-noble. I cut down three rows of these and earthed them over. Early in July I perceived symptoms of disease (black spots) upon some of the leaves; it spread more after some showers which fell about the 24th. The haulms of the early-frame had then assumed an appearance of natural decay. I cut them all down. They were taken up on the 21st August, all sound, and a fair average crop.

Finding the disease was spreading, and that the stems as well as the leaves of the queen's noble had become much affected, I, on the 14th of August, cut down the remainder, and earthed them over. On the 4th September I caused three rows of the queen's-noble, cut down on the 14th July, and three rows cut down on the 14th August to be taken up. Those cut down July 14th, produced—

1 row, 55 feet in length,		$15\frac{1}{4}$ lbs.,	tubers all sound.	
2 do.	do.	...... $18\frac{1}{4}$	,,	,,
3 do.	do.	...... $16\frac{1}{4}$	,,	,,

The tubers small, the largest-sized weighing 3 oz. Those cut down on the 14th August produced—

1 row, 55 ft. in length,		$44\frac{3}{4}$ lbs.,	32	tubers	diseased
2 do.	do.	.... $42\frac{3}{4}$,,	27	,,	,,
3 do.	do.	... 32 ,,	8	,,	,,

The tubers generally of good average size, the largest weighed 8 and 9 oz. I was, I must confess, disappointed with the result in the first case. I then proceeded to take up two rows of the white potato, cut down on the 14th July, and two rows which had been left untouched. Those cut down on the 14th July produced—

1 row, 55 feet in length,		41 lbs.,	tubers all sound	
2 do.	do.	...... 42 ,,	,,	,,

The tubers generally of a good size; what would, in fact, be called a fair sample, some of the largest weighed 5 or 6 oz. Those rows which had been left untouched produced—

1 row, 55 feet in length,		$60\frac{1}{4}$ lbs.,	7 tubers	diseased
2 do.	do.	...... 69 ,,	10 ,,	,,

The tubers generally much larger, and many weighed 8 oz. The result in this instance is more favourable, and I think it might be accounted for in this way:—The white potato is an earlier sort than the queen's-noble, and, although both planted at the same time, and under the same circumstances as to locality, soil, &c., it came into flower earlier, and I had, as is my usual practice, picked off the first flowers a week or 10 days before the stems of both sorts were cut off. The tubers, therefore, were, in all probability, in a more advanced state, and in a better condition to draw nourishment, by their own vitality, from the soil.

There is, I opine, strong presumptive evidence that the tubers do, as affirmed by Mr. Lomba, grow unassisted by the stem and leaves, as it cannot be supposed they would attain a size to weigh 6 oz. whilst the plants are yet in flower. The difference in produce may probably arise from my having cut down the stems too soon; I think, indeed, the result in both cases, but more particularly in the queen's-noble, clearly proves this to be where I have erred. The error, however, is instructive. It would also appear that the disease is communicated by the leaves and stem to the tubers; for in no instance where the stems were cut off before attacked by the disease are the tubers diseased, whereas in both of the other cases many of the tubers are diseased.

The result of these experiments will, I think, justify the conclusion, that by autumn or early spring planting there is a better chance of a healthy crop, as the plants would, under favourable circumstances as to weather, &c., put forth blossom before the time the disease usually makes its appearance, and by adopting Mr. Tombelle Lomba's plan, there would be a reasonable hope of securing an average crop.

The goodness of the crop, both as to quality and quantity, this year, may, I think, be attributed to the unusually dry state of the atmosphere, and the small quantity of rain that has fallen—not enough, in this locality, during the whole of the summer, to reach to the potato tubers. I first noticed the disease as early as the 19th of June; it was confined to a spot a few yards square, and did not increase or spread to the adjoining plants until rain fell in July. H. Doovile.

Aldhington, near Exeter, Sept. 6.

THE FLYING DUTCHMAN; Winner of the Derby, 1849.

The Flying Dutchman, bred by the late Mr. Vansittart in 1846, was got by Bay Middleton, out of Barbelle, by Sandbeck, her dam Darildetta, by Amadis out of Selima, by Selim—Pot-8-o's—Editha, by Herod.

Bay Middleton, bred by Lord Jersey in 1833, is by Sultan, out of Cobweb, by Phantom. He was the best race-horse of his day, winning the Derby; and never, in fact, having been beaten. As a stud horse he did not so quickly confirm the expectations entertained of him; for from the picked mares of the country, the Flying Dutchman is now the first great winner of his get. In the next degree, however, his stock includes the names of many good runners, as Aristides, Gaper, All-round-my-Hat, Cowl, Marquise, Princess, Alice, Ennui, Planet, Tiresome, and Honeycomb. It will be remembered that Bay Middleton was purchased of Lord Jersey, by the late lamented Lord George Bentinck, for four thousand guineas. After the transfer of the stud to Mr. Mostyn, he was weeded out of it, and is now in possession of the Honourable Sidney Herbert.

Barbelle, bred by Mr. Vansittart in 1836, may now, perhaps, rank as the best brood mare in England, being also the dam of Lord Eglinton's other crack, Van Tromp. Barbelle, too, was a very fair runner in her time, which did not however extend to any great length, the mare being put to the stud at the close of her three-year-old performances.

The Flying Dutchman is a dark brown horse, with no white about him beyond the saddle-marks; he stands about fifteen hands three inches high; has a lean head, with rather a Roman nose, full fiery eye, prominent forehead, and ears carried a little back. He has a strong neck, a little bowed; fine deep shoulders; good girth—measuring five feet six inches—round shaped barrel; powerful back, rising a little on the rump; very strong quarters, well let down; with a light, thin, meanish-looking tail. He has good thighs, immense arms, and very large bone. He stands a little over at the knee, but is altogether a magnificent specimen of the power in a race-horse, though he may never quite equal the grand perfect form of his half brother.

SUMMARY OF THE FLYING DUTCHMAN'S PERFORMANCES IN 1848.

During the past year he started five times and won five:—

The July Stakes, at Newmarket, value clear	£1,110
A Sweepstakes at Newmarket	400
A Sweepstakes at Liverpool	1,200
The Champagne Stakes, at Doncaster	825
The Two-year-old Stakes, at Doncaster ..	560

Rarely as Fortune distributes her favours with a becoming sense of merit, as rarely did she ever smile on a more deserving claimant for them than the noble owner of the Flying Dutchman. One of the most honourable and straightforward men on the turf, we are happy to add he has been one of the most successful. In some measure we really believe the public almost recognize his lordship's triumphs as their own, for it is with such a feeling of confidence they ever know they can back the Tartan jacket. Another good word must be given for the care and ability with which the Leger and Derby winners have been brought out by Forbet, and the honesty and judgment—as he has eminently displayed in some of his last encounters—with which the sons of Barbelle are ridden by Charles Marlow; a fine horseman, who until very lately was allowed to make his great effects on the Alderman's middling wares, and his performances confined to outriding lads and novices on country courses.

APPLICATION OF CHEMISTRY TO AGRICULTURE.

BY A FARMER.

NO. IV.—THE HIGHLAND AGRICULTURAL SOCIETY.

We have more than once, in the course of these papers, adverted to the creditable position which this society has taken in connexion with scientific agriculture. We have also had occasion too frequently to regret the want of information on scientific matters bearing on farming which prevails, even amongst well-informed men. In support of the latter position, attention was directed to what had been passed off as agricultural chemistry upon the Royal Agricultural Society. This corroboration of our views, strong as it was, sinks into insignificance as compared with that furnished by a report of the last meeting of the Highland Agricultural Society. We began these papers by insinuating ignorance amongst farmers and agriculturists alone; now we go further, and accuse no less a personage than her Majesty's Lord Advocate of Scotland of ignorance, not only of the importance of chemistry, but of the necessity of extending a superior education amongst the tillers and owners of the soil. The facts which justify this serious charge are briefly as follow: The Highland Agricultural Society applied for a supplementary charter "to enable the society to issue diplomas, of the nature of degrees, to students in respect of their proficiency in the knowledge of agriculture, and the arts and sciences connected therewith, which would enable them to assume the style and title of 'Fellows of the Highland and Agricultural Society of Scotland.'" A petition to this effect was presented, on behalf the society, to the Secretary of State, and by him referred to the Lord Advocate, for consideration and report. The answer vouchsafed by that dignitary is, that, "*after repeatedly conferring with the petitioners, I have to report my humble opinion that the prayer of the petition should* NOT *be complied with;* and further, if her Majesty lent her royal authority to *such* an institution, it would furnish a precedent liable to great abuse. (Signed) AND. RUTHERFORD." This report was received by the directors with considerable surprise. They were unprepared to find that the petition of a body whose claims in all matters agricultural have been so often recognised by government should be rejected so summarily, no reason for such an answer being assigned, even when demanded by the parties interested. Nor is this all: the directors say that the report contains a positive untruth. Allusion is made to repeated conferences, whereas the only one which took place was on the 10th of April, when his lordship *declined to confer with the deputation*—at least, so say the directors. We are anxious to restrain our criticism within moderate bounds; but it is surely a strange compliment to the agricultural body if *such* a society as the Highland Agricultural Society, second to none in the world in the position which it takes amongst agriculturists—it is, we say, a strange compliment that, if her Majesty's authority were lent to *such* an institution, it would furnish a precedent liable to great abuse; when her Majesty's authority is freely lent to geological, geographical, and a host of similar bodies.

We are at a loss to guess by what mode of reasoning the Lord Advocate arrived at this conclusion, but can imagine it to have been something like the following: On the 10th of April my lord is disturbed out of his afternoon nap by a servant, announcing "the deputation from the directors of the Highland Agricultural Society, to receive an answer to their petition." The Lord Advocate, starting up, scarcely awake, throws his footstool at the servant—"How often have I told you not to disturb me? Tell the gentlemen I am engaged." (Servant disappears.) "What is it these people want?" (Turning over a heap of papers.) "Here it is: a petition from the Highland and Agricultural Society, to enable the society to issue diplomas, &c., &c. Ridiculous! What will people desire next, if her Majesty's authority were lent to *such* an institution? But it is impossible. *Such* an institution! Had been an institution to measure the mountains in the moon, to trace the source of the Hampstead ponds, or to translate 'Punch' into the language of the Caribbee islands, such institutions having great and important objects in view, should have had her Majesty's authority immediately; but such an institution as the Highland Agricultural Society, having for its object only the advancement of agriculture, and the spread of a sound agricultural education, cannot be allowed such privileges for one moment.

"I do not object to any one calling himself 'professor,' or to any institution styling itself a 'college,' however unworthy either may be of such titles; but that the Highland and Agricultural Society should dare to presume to think of forming for itself a college worthy of the name, and by conferring honorary degrees for proficiency—no matter how or where acquired—in the sciences connected with agriculture, and thereby more effectually assisting that important pursuit than all the would-be professors, is a privilege I cannot for one moment allow." The Lord Advocate again falls sound asleep.

What the abuse can possibly be of which the Lord Advocate is so afraid we are utterly at a loss to make out. If he fears that the degree of F.H.A.S. would be too readily granted, that is an abuse which would speedily cure itself, as the honour would cease to be valued, and consequently sought after.

That the efforts of a body of agriculturists to spread a higher system of education should thus be nipt in the bud we sincerely regret, but we would urge upon them to *try again*. To us it seems impossible that the refusal can be persisted in. Had the petition been accompanied with a demand for a grant of public money, the refusal might have been justified. But when it was only a wish to be allowed to help themselves, the case we hope is without a parallel.

At the same time that the petition of the Highland Agricultural Society was thus summarily rejected, an additional charter, conferring exactly such powers as it sought, was granted to the London University; and we perceive by the public prints that the Archæological Society are about to apply for a charter. Should their request be granted, after a similar favour was refused to the agriculturists, we cannot trust our pen to express our feelings on the matter.

But who is "Andrew Rutherford"? We have sought for him in "Punch,"

"In each kettle, each saucepan, each pot;
We sought in the water-but, and found him not."

We congratulate him on his first appearance in public. If he was previously unknown to fame, and was at all ambitious in that line, we assure him of a most extensive notoriety for the future.

To recur once more to our subject; if any argument was needed in proof of the necessity of an extended and improved system of education amongst agriculturists—and consequently bearing out the justice of the Highland Society's application—it is furnished by the speakers at the meeting at which the Lord Advocate's report was read. To Mr. Finnie's remarks we would especially direct attention. He says:—

"It must be a serious disappointment to every one who has either the interest of agriculture or this society at heart that so very large a proportion of the proprietors of land should be lukewarm and indifferent to a matter which not only embraces, but will materially tend to advance the agriculture of Scotland, and elevate its tenantry to a still higher standard of intelligence. I am aware some are exceedingly sceptical as to whether chemistry can benefit agriculture at all. To all such I would respectfully say, such an idea exists from the want of inquiry. And, if not presuming too much on the indulgence of this meeting, I may state, in a few words, in what respect I myself, a practical farmer, have experienced aid from it (applause). I had a field of 50 acres, which I thought, and am sure would have been supported in the same conclusion by nine out of ten of any farmers I might have consulted, would be much benefited from lime. Eight acres were limed at an expense of about 85s., including carriage. It then occurred to me I would have an analysis made of the soil, and was informed it contained a fair proportion of lime. I desisted, treated the whole 50 acres alike as regarded other manures, and, after a lapse of some six or seven years, am now convinced that the lime would have made no return. Then, with regard to another point of my practice. I happened to have some poppy-cake brought under my consideration by a Leith merchant, to whom it was consigned. Never having been known as used for feeding purposes in this country, or, I believe, any other, the offer I had of it was at such a price as to admit of it being used for manure. I bought the poppy-cake; an unfavourable spring ensued, when I was compelled to give my hill-stock ewes forced feeding. I thought of using it, but was deterred, thinking that something deleterious might be in it, and more particularly as lambs were in the question double caution was necessary. I sent, therefore, a sample for analysis, along with another of good foreign linseedcake; and, to my agreeable surprise, it was found to contain not only more oil than the linseed cake, but to be otherwise most likely to suit rearing animals better. I gave it immediately to a breeding stock of 600 ewes, and never had both ewes and lambs brought through in better condition, and in such circumstances at so little expense. Since then, I believe, some of the best breeders have used it, and it has even been sent from this country to India for the purpose of feeding horses, in consequence of the information obtained from me by an extensive Glasgow merchant. I should state, however, that my after experience proves that good poppy-cake is the exception, and not the rule. But I may ask, would I not have lost the particular advantage I secured upon that occasion had it not been for the services of Professor Johnston, the Chemist of the Agricultural Chemistry Association, by whom the analysis was made? But I hold that all I have stated is but a drop in the bucket in comparison with the advantages to be obtained, and which I myself have experienced, from the analysis of portable manures, such as guano, bone, rapecake, and the many manufactured articles now supplied to the agriculturists, and used to an incredible extent, and upon which I may almost say the one-half of the green-crop land in Scotland is dependent. We have satisfactory evidence that our guanos have been adulturated. We have had oyster shells, and such like, ground down and mixed with bone dust; and numerous are the manufactured manures likewise, the fertilizing properties of which we cannot judge of in any other way but upon chemical principles, and in which those that offer them have no further interest than to secure a sale. In illustration, I may state, some years ago I joined with two or three farmers in the purchase of some tons of nitrate of soda. None of us derived any benefit from the application of it. Most fortunately I had some left; got it analyzed by Mr. Kemp, at the college, and then the secret was explained; it was to a great extent mixed with common salt. I heard of a cargo shipped to a party in London; a chemist was ordered to examine it before being taken from the ship. The adulteration was detected, and immediately the ship was ordered off to Scotland, and sold amongst the farmers. I once purchased a quantity of guano from a party in Leith. Professor Johnston had given an analysis of it, but the sample sent to him had been very different from the stock. I found, upon taking delivery, that all was not right. I then had a sample from the stock analyzed, and had no difficulty in procuring an abatement of 10 per cent. from difference of value. I cannot conceive how any agriculturist who expends his hundreds a-year upon portable manures is justified in applying them before being tested, and can grudge a few shillings per annum to obtain a chemist of skill, who could satisfy him as to the purity of the article upon which he is not only expending a large sum of money, but upon the genuineness of which his green crop, and every succeeding crop in the rotation, is dependent; for without knowledge of the nature and properties of the materials employed by the agriculturist, it is evident that the result of many of the laborious and expensive processes incident to his daily occupation must be a matter of mere chance; thus contributing more than anything else to the precariousness of the profits upon which his prosperity depends. I may be told that this is a tenant's question, and let him look after his own interest and he will fare the better; but I hold whatever is necessary for the tenant cannot be dispensed with by the landlord. And if the former, not having a ready and cheap way for analyzing his manure, loses his crop in consequence, is not the landlord's rent endangered? But I would respectfully submit that these portable manures, now so important an element in good farming, and for which I would say a chemist's services are required, leaving every other consideration alone, has done much already for the proprietors of land. It is well known, that during the French revolutionary war, land attained a fictitious value, and, in its downward progress, and before reaching that point, when landlords and tenants should have started again on fair terms, it was arrested by the introduction into this country of those very portable manures; thus affording a full supply of manure in localities where formerly it could not be obtained, and carrying cultivation to land naturally good, but inaccessible to cartage, and causing luxuriant crops of corn and grass where only stinted herbage appeared before. In illustration I may state, that in the year 1814, the declared value of bones imported into this country was somewhere about £500; in 1823 it rose to £15,000; and in 1837 to £255,000. In 1815, the quantity of rapeseed, rapecake, and linseed-cake imported, was only some 16,000 cwts.; in 1837 it rose to nearly 800,000. In 1841, the guano imported was only some 1700 tons; it 1847 it amounted to upwards of 220,000. But, it may be asked, what have those statistics to do with the appointment of a chemist? In the first place, as I said before, our bone dust is adulterated, and not only so, but likewise our rapecake. 2ndly, to such an extent is linseed-cake and rapecake adulterated, that, from a calculation I once saw, if the whole rapeseed and linseed grown on the continent was converted into cakes, it is questionable whether it would amount to what is exported; and we know well to what an extent foreigners use these articles themselves. 3. Then, as to guano, we have a difference in value to the extent of £7 in the price of a ton; and will any be bold enough to say that adulteration can otherwise but exist? and how necessary to have a test applied before purchase! But already we have experienced, in this country, the value of a chemist. In 1841 guano sold as high as from £22 to £28 per ton. In 1842 the Agricultural Chemistry Association came into existence. Professor Johnston analyzed the natural guano, published a receipt for the manufacture of what was then termed British guano, and immediately, upon the attention of manufacturers being directed to it, the public had it offered to them in any quantity. No doubt an increased importation lowered the natural guano to a certain extent; but in consequence of that produced by manufacture, the other was effected to the extent of some £6 or £7 per ton. If, therefore, it has been in a great measure owing to the industry, skill, and perseverance of the Scotch farmer that Scotch agriculture has assumed the proud position it now occupies; if it has been found that tenant farmers were the first to take steps still farther to advance agriculture, by applying science to practice, through the medium of the Agricultural Chemistry Association, which they originated themselves; and now, when the Highland Society, with the reputation throughout Europe of being supported by the landed proprietors, has said, dissolve your Chemistry Association, as we are ready to afford you all the benefits you expected from it, have the farmers not some reason to complain, if this society is unable to fulfil what it has promised, and is willing to confer, in consequence of 1000 out of about 1200 proprietors who are all members of it refusing to give a small pittance per annum for a matter which not only concerns themselves and their tenants, but our national character as agriculturists; and, instead of fostering, thereby damping that enlightened enterprise which evinced itself when they established the Agricultural Chemistry Association? (Applause). I feel confident that no proprietor will be so ungenerous as to suppose I have any want of respect for the landed interest in making these observations. I disclaim being affected by any interested or unworthy motives; my only ambition is, if in my humble sphere I can do anything for that art I practise. For, whether we take a comparative view of the present state of agricultural science with its condition but a few years since, or a glance at the rapid improvements which have been effected in the arts of tillage and drainage—or the superior quality and greater abundance of crops on an average of seasons—or the progressive improvements in the breeding of sheep and cattle—and the striking advantages which the agriculture of this day possesses over that of only a quarter of a century past—and reflect that all such is not confined to England, Scotland, and Ireland, but extends to countries with more favoured climates, and lands naturally productive—well may we conclude that this is not the time to be found unwilling to proceed with whatever may tend to advance the art of agriculture in Scotland" (Applause).

We cordially agree to every portion of Mr. Finnie's remarks; and regret, with him, that the members of the Highland Agricultural Society should be so lukewarm on the subject. We understood that the Agricultural Chemistry Association had been adopted by that body; now it appears, if we rightly understand the matter, the members refuse to allow their funds to be used for that purpose. In this respect they are behind the Royal Agricultural Society, and we are at a lost to account for such a want of spirit amongst the members of the Highland Agricultural Society. The only way in which we can account for it is, either the want of such an education as will enable the farmer to appreciate the assistance of science, or more probably it has arisen from the disappointment which was so generally felt at the result of Professor Johnston's researches, who was for some time chemist to the Agricultural Chemistry Association.

CLYST FARMERS' CLUB.

A meeting of the members of the above club was held on Monday evening, the 3rd September, at Lindsey's Globe Inn, Woodbury. Among the company present were the Rev. W. Bagnell, the secretary, Dr. Brent, the vice-president, Messrs. Venn, Pratt, Warren, Crabb, Ashford, Hallett, C. and E. Carter, &c., &c.

The lecturer exhibited a sample of wheat in the ear, which was allowed by all present to be exceedingly fine, the result of his practice of thin seeding. The stalks were upwards of four feet long, and the ears proportionally long and very full. The seed used was that known by the name of Earl Ducie's.

In the absence of the president of the club, Sir T. T. F. E. Drake, Bart., the chair was taken by

Dr. Brent, who deplored the absence of their worthy president, in consequence of the lamented death of his brother. The Chairman in introducing the business of the club, observed that he had much pleasure in congratulating them on the splendid harvest they had this year had, and hoped it would prove beneficial to them (Hear, hear), and also that they had to be grateful for the kindness of Providence in bestowing it upon them. If prices were not so remunerative as they had been, he hoped they would make up in quantity what was deficient in other years, and thus be compensated for any difference in price. The Chairman then called on Mr. Crabb, for his promised lecture

ON THICK AND THIN SEEDING.

The lecturer having appropriately introduced his subject, said—I would advise farmers to make an experiment on some part of their farm in the same field. Let them drill four pecks at nine inches, and five pecks at six inches, side by side; and also sow broad-cast eight pecks adjoining the same; on the old principle that seeing is believing, each seeding will cause new ideas to germinate in the oldest heads, and a new belief in the least persuadable of farmers. I shall support the practice of thin seeding by the three following arguments, and proceed to illustrate the subject by my own practice :—1st, In a bushel of wheat weighing 63lbs., there are about 600,000 grains, and as there are 43,560 square feet in an acre of land, there would be nearly 14 grains to every square foot sown with one bushel per acre—the yield of an average ear of thickly sown wheat being much more. Now 30 bushels per acre is more than an average crop throughout the United Kingdom : it follows that this quantity, no matter how much has been sown, could have come from the growth of the ears of only one bushel of seed, and that too is allowing one ear to grow from each corn, and 80 corns for each ear ; whereas, no seed will produce more than 10 ears, each of which will have from 40 to 60 corns. This being the fact, of what use can more seed than one bushel be ? or rather let me ask, might it not prove injurious ? for what becomes of the remaining four pecks of seed which are commonly sown ? This I will prove by my next argument. 2nd, In the year 1837 I tilled a field of wheat after mangel wurtzel, at the rate of two bushels per acre ; but I made a mistake in one half of the ridge, sowing it only once, at the rate of one bushel per acre, and the consequence was that the next half ridge was sown three times, at the rate of three bushels per acre. In the winter the thin seeding wheat did not look worth standing ; but in the spring and summer a decided superiority in the growth of the thinner portion became perceptible, and at harvest it was the best in the field. In the same field I hand-drilled nearly a quart of wheat, at nine inches apart, and at harvest this produced 20 small sheaves, which on thrashing I found yielded five pecks of wheat, and which I sowed in an acre field, in the Christmas week, after Swede turnips, to come up in the month of January ; the birds, however, thinned it to such an extent that it appeared to me to be too thin to stand. At harvest it promised well for a good crop. After cutting it I thrashed it, and I had more than 40 bushels per acre, and that at a season not favourable to the growth of wheat. 3rd, Supposing, for instance, we take two pecks of wheat and dibble it in an acre of land, and suppose each corn vegetated and produced three ears on an average, and only 40 grains in each ear, it would produce 60 bushels per acre ; and if even one-third of this were to be destroyed, it is plainly possible to grow 40 bushels per acre, from that quantity of seed. The loss is too considerable to be passed over, were the value of the present system of thick seeding confined to the waste of seed alone. The lowest estimate is, that four millions of acres of wheat are annually grown in England, so that a saving of two pecks per acre in the sowing of wheat would be two millions of bushels ; of three pecks, then three millions of bushels, and this at 7s. per bushel, (which was the price the time I wrote this essay,) would realize £1,050,000 sterling ; and this sum, although it would appear small when divided amongst each individual, would, if laid out judiciously in the improvement of our farms, enable us to bear up against the burthens which now press so heavily on agriculture. Another evil of thick seeding was the impoverishment of the soil, which was to be seen in the spring, when the struggle takes place—thick sown wheat appearing yellow, when all other vegetation puts on its greenest tints. In the past season I made a reduction in the quantity of seed corn. I began thin seeding with five pecks per acre at six inches apart. I next drilled a bushel at nine inches, and a bushel at six inches, and 1½ bushels in my clover ley. I also drilled six pecks per acre after Christmas and after turnips. This quantity of seed per acre I consider to be the medium between thick and thin seeding. I wish however to be fairly understood not to say that a certain quantity of seed must be sown and no more, as all farmers must consider, with reference to this question, the state of cultivation and the nature of the soil of their estates. The lecturer further said—I consider the practice of growing two cereal crops objectionable ; perhaps we could grow winter beans after wheat, then oats or vetches after a crop of wheat, which I consider worth trying. In the best strong soils mangel wurtzel might be grown before wheat with advantage, provided it be a frosty winter to keep the land right. With regard to Lent corn, I drill three bushels of oats, two bushels of peas and beans per acre, which is quite seed enough ; and I wish to impress upon all, that I consider the advantages of drilling all grain crops are very great, and will amply repay the expenses of a drill, even on a farm of 100 acres, in a few years. Drilling at nine inches apart allows the use of the hoe, by which means all the weeds are destroyed, and one crop will remunerate the farmer for his outlay for hoeing ; as all weeds are thieves, robbing the farmer of his land by displacing his corn ; and these improvements in tillage employ more labourers, and kept the land in a fit state for the next crop. It was no economy to grow weeds, nor wheat for the straw: it was corn that most remunerated the cultivators of soil. I beg to observe that I do not state these results as applicable to all the lands in Woodbury, neither have I a wish to set up a scheme of my own, and much less to dictate to the farmers ; my object is to discuss questions such as this with a view to general improvement. I am endeavouring to teach others, who am myself but a learner ; but as experience makes me more perfect, I shall be happy to communicate the result to the public. It was the duty of young farmers to make experiments and go on improving their land, and this they would find their best protection. Thick seeding, they might depend, did an injury to vegetation, in the want of space and air, as shown in copses and plantations, in the dwindling of the plants, and from the fact of the necessity of clearing the undergrowth. Some farmers with respect to their corn crops liked to see their ground covered well: they did not reflect on the space that the corn required; and it frequently happened that such fields of wheat as were thick in winter got disease in March, in harvest sloped away, getting prematurely ripe, producing straw with short ears, and a deficient crop. The lecturer then concluded his address by observing that the increasing millions must be fed on the same quantity of acres, and that it behoved the farmers to use more capital and labour on their farms, and thereby produce a larger quantity of food from the same space of ground.

The CHAIRMAN said, they must be all much obliged to the lecturer for his valuable practical lecture. With respect to Woodbury parish there were very few spots where the principle of thin seeding could be carried out; it must be adopted on better land, for without the land be good and well farmed he felt satisfied it would not answer to any great extent. Although they agreed that the protection to this country that they required was to farm their estates properly, it would take some little time to induce the public to trust too much to it, until they saw little more liberality bestowed in some other quarters. He considered they were in a transitory state, and that it was impossible to say whether the present system would fully prove beneficial or not; however, they must hope for the best. Although he would not advise any one to be rash and speculative to any great extent, he would yet say do not relax in anything having a semblance of being a benefit to themselves and the community at large. Be not frightened with the present low price of corn, for if they could grow 40 bushels where they used to grow but 30, and they got but 6s. to 7s. per bushel instead of 8s., they would find themselves as well off if not better, and in the end do a great deal of good. They must not look to farming as merely turning up the soil with an instrument, but it was with the wonderful aid of chemistry as brought to bear on the soil that they must look for protection. They must find out what medicines any particular land required, as they did persons labouring under any particular disease, and doctor the land as they did patients, by suiting the remedy to the disease, and not expect the disease to come to the remedy, and they would then find things go on much more smoothly. With reference to the subject of thin seeding, the chairman said he sowed a ley of 7 acres, which the wire worm took a fancy to, and eat a deal of it, and in February many of his friends advised him to take it up; but instead of that he dragged it, then rolled it over for three weeks, by doing which he disturbed the wire worm, and of course the wheat took some time to recover the change; he should say that he has now upwards of 30 bushels per acre of wheat from that field.

The meeting was also addressed by Mr. Pratt, Mr. Venn, Mr. Warren, Mr. Hallett, and Mr. E. Carter, who each bore testimony to the advantages of thin sowing, having of course care as to the quality and description of the soil and the state of cultivation of the estate. They also introduced some very excellent and practical remarks as to the management of their respective farms, showing, however, in many instances, that the same management of ground did not always produce the same results; Mr. Pratt advocating the advantages of subsoiling, which he was told no doubt answered well upon his land, being able to go to the depth of 14 inches, but was inapplicable to most of the land of Woodbury. Mr. E. Carter also showed the advantage to be derived from the thin sowing of beans, and instanced a crop now growing of Mr. Buller's, of Whimple, which were planted two and a half feet apart. The attention of the meeting was also drawn to the advantage to be derived from carefully taking the best ears from the sheaves of seed corn, an attention which would repay the farmer for his trouble.

The CHAIRMAN directed attention to the benefit of employing labourers more on estates, and prevent them from applying to the parish. It would pay the farmer better to employ able-bodied men, than to pay for their maintenance in the Union.

Mr. PRATT said farmers should decidedly give them employment if they could, but he thought they had not the means of doing so. He saw a notice on the door of his parish church stating that if the arrears of poor's rates were not paid by a certain time, steps would be taken to enforce them. This was the first time he had seen such a notice. He thought it a bad sign of the times.

Mr. WARREN said he had seen the same at his parish church door.

The thanks of the meeting were then given to Mr. CRABB, for his lecture, to the Vice-president (Dr. Brent), who it was stated invariably made it a rule to attend all their meetings, and to the Rev. W. Bagnell, the Secretary, and the meeting separated.

The next lecture to be delivered in November is by Mr. Warren, on grasses.

ON THE GROWTH AND MANUFACTURE OF CHICORY.—ON MILK AS AN AGRICULTURAL PRODUCTION AND AN ARTICLE OF FOOD.

The following papers were read at the Quarterly Meeting of the Geological and Polytechnic Society of the West Riding of Yorkshire, held on Wednesday the 29th Aug., in Doncaster.

"ON THE GROWTH AND MANUFACTURE OF CHICORY," BY GEORGE WILKINSON, ESQ., OF SHEFFIELD.

Mr. Wilkinson commenced by some observations on the natural history of the plant from which chicory is made. The subject was one of no small importance, when it was considered the great amount now consumed in this country, and that the attention of parliament had been called to the subject. The specimen of the growing plant which he now produced had been grown at Attercliff; and they would perceive that it bore no slight resemblance to a common plant which grew on the high roads and fields in the chalk districts of England. In the preparation of chicory, the roots were first thoroughly washed, then placed in a cutting frame, and arranged by women to be operated upon by the cutters. After being cut into small pieces half an inch in length, the next preparation was that of being dried. It was then exposed to an excessive heat by a process of roasting in cylinders at an intense fire. It was then ready for pulverization, which was done by revolving stones; but it was sometimes ground by means of small mills. When in this state it was sold to the grocer or retail dealer, by whom it was used to suit his own convenience or the taste or price of his customers. And they would perhaps think it a remarkable fact, that whilst coffee was often so largely adulterated with chicory, chicory itself was in its turn no less adulterated, and that by such articles as burnt rags, rope yarn, and other things of a like valueless character. He knew of one manufacturer who had made three distinct articles, in which there was not one of the ingredients of the article itself in its composition: these were pepper, mustard, and chicory. With respect to the crop and its effect upon the land, he said that chicory was not an exhausting crop; on the contrary, far from exhausting the ground, the farmers would find their other crops better than if they had not grown chicory. In a commercial point of view he referred to the increase in the consumption of coffee from 1807, when the importation was upwards of one million pounds, to the last return, when it was thirty-six millions of pounds per annum. The quantity of chicory used was about eleven million pounds, not a fourth of what was consumed in the name of coffee. When chicory was scarce, it was bought at a high price to improve coffee. In answer to a remark that chicory had nothing to recommend it but its cheapness, he would observe that such a dictum involved it own negation, because cheapness was no recommendation for what was worthless. The foreign ingredient, coffee, he maintained, was improved rather than deteriorated by a mixture with chicory. And so far as he was concerned, he should certainly say he should prefer an infusion of coffee with 20 per cent. of chicory to that which was prepared without that article. With respect to its effects upon the system, it was admitted that chicory was good in a variety of ways.

In reply to Mr. Milnes, M.P., Mr. WILKINSON said that in respect to chicory as an article of farming, the price varied from £15 to £35 per ton. The ordinary price would be about £20 per ton in its manufactured state. The land would produce about two tons per acre, and the cost of the cultivation would be about £12 or £14 per acre. It was said to be a profitable crop, and many farmers grew it in the neighbourhood of York.

Mr. MILNES, M.P., said he had seen a large quantity growing in Suffolk, where there was a large mill for its manufacture into the article as required for use. In confirmation of Mr. Wilkinson's statement as to the difficulty of getting genuine coffee, he might mention that in the East he hardly ever got any coffee which did not turn out to be West Indian coffee, The product of the East was so very small as to make it a very dear article. He believed the proportion of chicory mixed with coffee in France was extremely large.

Mr. WILKINSON said the quantity of chicory was 20 per cent. to the coffee. He had used it so for several years, and could speak to the fact that he had had no ill results from it. This closed the subject.

The next paper was by Mr. HAYWOOD, of Sheffield, of which the following is a copy:—

ON MILK AS AN AGRICULTURAL PRODUCTION AND AN ARTICLE OF FOOD.

The milk of the cow, ewe, and goat, has from the most remote ages been used as an article of food, but on account of the superior flavour of that produced by the cow, it has in modern times, in this country at least, been the only kind employed to any extent. The production of cow's milk has, in fact, now become the sole object of a very extensive and important branch of agriculture, viz., the dairy husbandry. It is a great commercial object in its natural form, as well as that of cream in large towns, and a still greater commercial object in the form of butter and cheese in all the country districts, and in all its forms it constitutes a large article of ordinary diet to multitudes of the rural population. In order that I may the more effectually show its intrinsic value as an article of food, and point out the economy which would attend its more extensive use and abundant production, I will first describe its general chemical and physical character. On examining a portion of milk with a powerful microscope we perceive that it consists of a transparent fluid, in which numbers of minute globules, of about the 4-10,000th part of an inch in diameter, are seen to float. It is principally to these globules that the whiteness and opacity of the milk is owing. On leaving the fluid at rest for a length of time, the globules separate in a great measure from the fluid, and rise to the surface in the form of cream; this cream, however, does not consist entirely of these globules, but always contains a considerable quantity of serous portions intermixed. It has been found on analysis to contain on an average in 100 parts:—butter, 4.5; curd, 3.5; whey, 92.0: total, 100. It would appear, therefore, that milk might be divided into three distinct substances, namely, the butyraceous, the caseous, and the cerous—the butyraceous being the portion contained in the small globules, the principal part of which separates on repose; the caseous being the portion which coagulates in the formation of curds, and the serous being the portion remaining in the form of whey and buttermilk. In the process of churning, the thin film which coats each butter globule is oxidised or broken, and the real fatty particles then liberated produce a uniform mass. This butter, however, is not perfectly free from caseous matter, nor can it be rendered so by the process of washing or melting. It is the presence of this small amount of caseine (about 16 per cent.) that renders fresh butter so liable to undergo decomposition, a change which can only be arrested by the addition of a large quantity of salt. Butter, when perfectly pure, possesses all the characters of ordinary fat, consisting of margarine and oleine, but has a different flavour from other fats, in consequence of the presence of three volatile oils, namely, butyrine, caprone, and caprine. These volatile bodies are probably formed from the odoriferous principles contained in food consumed by the cow, as we find them very much modified by those acrid sulphur oils which exist in garlic, horse-radish, turnips, &c. The amount of butter contained in the new milk of the cow is by no means uniform, its quantity at all times depending on the kind and quantity of food consumed, the temperature to which she is exposed, the amount of exercise she takes, and the character of the animal itself. All those vegetable compounds which are called elements of respiration, such as starch, sugar, gum, and oils, may be considered conducive to the formation of butter, for butter is merely the superfluous carbon and hydrogen of the food, which, like ordinary fats, remain unconsumed during respiration. Exercise, therefore, which renders it necessary for the cow to oxidize more carbon and hydrogen to produce motion, and cold, which renders it necessary for the animal to burn more for the purpose of keeping up the ordinary temperature of its body, are both opposed to the formation of butter, while rest and warmth will be favourable to it. Butter, then, will be that constituent in milk which mainly supports respiration, and produces the animal heat and motion. The quantity of respiratory food required by all animals which take severe exercise being much larger than that required for forming the organized tissue of the body, the presence of such a rich principle in milk is of the greatest importance, and is the one on which the young animal which consumes nothing else is mainly dependent for the support of these important processes. There is, however, another principle in milk, which is also of considerable consequence in this respect, viz., the sugar. Sugar of milk is a white crystalline solid, possessing only a slight degree of sweetness, though of nearly the same composition as cane sugar, and of the same use in the animal economy. Ordinary milk is found to contain about 2.8 per cent. of sugar, which is equal in value, as respiratory food, to 1.4lb. of butter: hence 100lbs. of milk would be equivalent to 5.9lbs. of fat, or to 11.8lbs. of starch or sugar, in supporting respiration, and keeping up the heat of the body. This milk sugar is a compound exceedingly liable to undergo decomposition, particularly if placed in contact with a body already in a state of change. The gastric juice of the stomach, or the infusion of rennet, which contains the principle of the gastric juice, converts it into lactic acid with great rapidity. The same change also takes place spontaneously in milk if kept for a long time in warm weather, as we observe in the process of souring; and in this case the other constituent of the milk, the caseine, becomes an insoluble coagulum. It would appear that the caseine in milk is held in solution by a small portion of free alkali, as we find distinct traces of caustic soda when new. A quantity of acids, sufficient to neutralize the alkali, always produces coagulation; and it is in this manner that the caseine is rendered insoluble in the stomach, or by the spontaneous formation of lactic acid in the milk. When the curds produced from milk are drained, well washed, and dried, they form the compound called caseine, of which good milk contains about 7 per cent. This substance differs in composition from the two just described in containing nitrogen as one of its constituents. It consists in 100 parts of

Carbon	55.74
Hydrogen	6.83
Nitrogen	16.14
Oxygen	21.29
	100.00

and is precisely of the same composition as flesh. It is therefore the true nutritive substance in milk, being the one from which all the organized tissue of young animals is formed. In milk it is probably in the best possible form for digestion, being suitable for nearly all stomachs, even those of the most tender age; but when dried, and partly decomposed, as we often find it in the form of cheese, although still of the same composition and adapted to the same purpose, it is not so easily dissolved and assimilated. The amount of this valuable nutritive principle in milk is found to vary considerably, and to depend in a great measure on the quality of the food consumed. The more nitrogen this food contains the greater will be the per centage of caseine in the milk. There are several instances recorded of grass being so poor that animals consuming it could not afford to secrete any caseine, in consequence of the whole of the nitrogen compounds being required for the ordinary vital processes. This is stated to have been particularly the case in certain cheese farms in the south, when it was found quite impossible to produce cheese until such ingredients as had been extracted from the soil had again been restored in manure, and thereby put in a position to grow rich food again. The ingredients found most useful in regenerating this exhausted soil were bones. They supplied two of the most essential constituents of milk, viz., nitrogen and phosphorus, and undoubtedly contributed mainly to its normal production. In addition to the sugar, fat, and caseine, before mentioned, we find in the serous part of milk considerable quantities of phosphates, chlorides, and other salts of potash, soda, lime, and magnesia—in fact, every element which has yet been detected as a normal constituent of the human body, is found here in sufficient quantity and in the best possible form for supporting us in health and strength. 1,000 parts of milk is found to contain—

Water	857
Butter	39
Caseine	70
Sugar	28
Salts	6
	1,000

It would appear at first sight that this large per-centage of water would render the milk very inferior as an article of diet, but when we inquire into the compsition of flesh, potatoes, and other articles of food, we find the per centage of water in them very little smaller than named above. The lean part of butcher's meat contains no less than 74 and potatoes 84 per cent. of moisture. Hence the difference is more imaginary than real. Seeing then that milk contains all the elements of the human body, in a state very little more diluted than we find them in our ordinary animal and vegetable food, let us now inquire if that valuable animal, the cow, is not capable of producing them for us at a much cheaper rate and in larger quantity in this form than she could do in the form of fat and flesh; for considering the ultimate objects of agriculture to be the production of the largest amount of food from the smallest space of land, this question becomes one of considerable importance, for should the cost of producing a given weight of nutriment in milk be only half of that required to produce the same amount in butcher's meat, then it will become the duty of every farmer to facilitate the more extensive productions of this commodity, so that all may be able to partake of its advantages. It is now well understood that all those nutritive and respiratory principles required for the existence and support of animal life are formed principally by plants. The quantity of nutritive matter contained in these plants, however, is not found to be sufficient for the healthy existence of man; he requires that these principles should be put in a more concentrated form, and that part of them should be somewhat modified by the lower animals before they are suitable to his taste, and probably to his existence; hence, a considerable portion of his produce is lost by supporting the lives of such animals as he chooses to make use of for this purpose. The amount of flesh and fat formed by a feeding cow or sheep is very small compared to the amount which it takes in its food; so that we do not, in feeding, obtain more than a fractional amount of what is contained in the vegetable produce. I find, from some of the best authorities, that the maximum amount of flesh which the best animal will put on when fed on the most suitable food is about 233 lbs. in 14 weeks, so that in one year animals of this kind fed after each other might produce 865 lbs. The food consumed in the production of this amount of flesh would be about 30 tons of turnips, containing 121lbs. of nitrogen; 14 cwt. of linseed cake, containing 70¼lbs. of nitrogen; and straw *ad libitum*. Now, in the food of the feeding cow, we have nutriment represented by 191½ of nitrogen, and in the flesh which it produces we have only 24 lbs.; hence, a sacrifice of seven-eighths of the nutriment is constantly made in this, and a much larger portion in most instances where animals are reared and fatted. Surely in times like the present, when every article of food is of vital importance, and which, with a rapidly increasing population, must annually become more so, this startling fact should lead to processes of greater economy, and I shall now endeavour to show that this economy may easily be attained by the more abundant cultivation of milk. From information obtained from some of the principal cow-keepers in the neighbourhood of Sheffield, I find that a good cow will give, on an average, 2000 quarts of milk during the first two months after calving, 1000 quarts during the next three months, 330 quarts during the next one month following, and after this time about 8 quarts per day for seven months more; she will then become dry for two months, and calve again: in the whole 15 months, therefore, she will have given 5000 quarts or 1000 gallons per annum. This milk having a specific gravity of 1.0324, will be equal to 10,324 lbs., and will contain dry caseine 722 lbs., equal to 2,578 lbs. of raw flesh; butter 402 lbs.; sugar 239 lbs., each equal to 521 lbs. of fat. Hence, the cow is capable of producing, in milk, nutritive and fattening ingredients equal in amount to those contained in 3,099 lbs. of butcher's meat in one year; while cows feeding in succession and consuming an equal amount of food to the milk cow, can only assimilate 865 lbs. in the same time, or which is very little more than one-fourth the quantity above named. The amount of produce consumed by the milch cow will be something like the following, viz., 10 tons of turnips, 2 tons of hay, 2 quarters of oats, 5½ bushels of beans, with chopped straw *ad libitum*. The amount of nitrogen contained in the whole of these substances is 170 lbs., and the amount of the same element contained in the nutritive constituents of its milk no less than 125 lbs. Hence, in this instance we have but 45 lbs. expended in the vital animal process, and a comparatively small amount wasted from the food consumed. The production of milk, then, simply considered as a means of rendering useful the nutritive constituents of plants, is more economical than the production of flesh in the proportion of 3½ to 1. And if we even estimate the money-value of the food consumed, and compare it with the selling price of milk and butchers' meat, we shall find the profit to be very much in favour of the former. For estimating the value of turnips at only 5s. per ton, we should have as the cost of the food of the milch cow—ten tons of turnips, £2 10s.; two tons of hay, £8; two quarters of oats, £2; five and a half bushels of beans, £1 10s.—total, £14. While the cost of the food for the feeding cow would be—thirty tons of turnips, £7 10s.; fourteen hundred weight of linseed cake, at 10s., £7—total, £14 10s. The value of 1,000 gallons of milk, at 8d. per gallon, is £33 6s. The value of 865 lbs. of butchers' meat, at 5½d. per pound, is £19 16s. 6d. It will therefore be seen that although the fattening cow consumes food of the same or even a greater value, and would require a greater extent of land to support it, yet the amount of saleable flesh which it put on in one year does not sell for so much as the milk is capable of producing in the same time by £13 10s. But this selling price of milk is by no means a fair representative of its intrinsic value. We must estimate the value of every article of food in proportion to the amount of nutritive and respiratory ingredient which, on analysis, it is found to contain; and if we take ordinary butchers' meat, costing 5½d. per pound, as the standard of comparison, then we shall find that 865 lbs. of such meat sells for £19 16s. 6d.; the 1000 gallons of milk, which contain nutritive and fattening ingredients, equivalent to 3,099 lbs. of such meat, ought to sell for £71. Hence the profit is not only in favour of the producer, but very much so on the side of the consumer; for it will at once be perceived that he is purchasing in milk for £33, an amount of nutritive constituents for which, in meat, he would have to give £71. Hence it is evident that the humbler classes would derive incalculable benefit from a more extensive use of this valuable ingredient; it is, however, very much to be regretted that in the rural districts a small quantity only comes to their hands. Farmers will scarcely give themselves the trouble to produce more milk than is required for their own domestic use, and the labourer is left to acquire a depraved taste for a decoction of one of the most *useless* productions imported into this country, viz., *tea*. I trust, however, that when they become more awake to the advantages which may be derived from a more extensive production of milk, and when railways enable them to distribute it uniformly to all parts of the kingdom, that they, with the liberality and philanthropy which has always distinguished them as a race, will give this boon to the class who are mainly dependent on their exertions.

At the close of the paper a short conversation took place on the subject. One gentleman asked if it were probable that milk would agree with all persons, and whether there was the same power of assimilation in an adult as there was in one of more tender years? Mr. Haywood, in reply, said when milk was taken into the stomach, it must first undergo coagulation; and he saw no reason why the stomach of an adult should not form it into coagulum as readily as that of a child. He thought it would be better if it were more extensively used.

Earl Fitzwilliam said he had heard persons say that milk did not agree with them. The question perhaps was, why did it not? Had the stomach been injured by taking something else.

Mr. HAYWOOD: Perhaps it is, my lord, because they do not agree with the milk. I admit that many persons don't like it (laughter).—Doncaster Gazette.

THE TRADE OF THE PORTS OF THE BLACK SEA AND THE SEA OF AZOF.

ODESSA, AUGUST, 1849.

The export of grain from Odessa during the first six months of the last six years exhibits a considerable increase in the quantity shipped to England. This may partly be ascribed to the circumstance that the whole of Western Europe, in 1847, and consequently also England, suffered from a failure of the crops, and that during the past two years political disturbances checked confidence in transactions with the Mediterranean. But of very far greater influence was the alteration since 1846 of the duty in England. Previously, owing to the sliding-scale of duty upon corn, business between this port and England was very insecure; so much so that it was exclusively carried on by a very few houses, which speculated upon the chance of rising prices. The largest portion of our grain was, therefore, shipped to the Mediterranean, chiefly to Leghorn, Genoa, Marseilles, as also to Trieste and Malta, for consumption, but principally to lie waiting the favourable chance of a rise in the markets in England. English importables will, consequently, show that formerly, upon the rise of prices, a larger quantity of grain came from the Mediterranean than from the Black Sea. This, to a smaller extent, was the case also with our shipments to Holland and Belgium. When, in 1846, the English duties, which had previously been tantamount to prohibitory, were modified, our direct connection with England became much more animated, although the navigation-laws still impeded traffic; and their temporary suspension in 1847, during the famine, took place too late to admit of large direct shipments to England, especially as the ordinary commercial connections are not so readily altered as laws are, but require time to adapt them to new circumstances; and the period from the first announcement, in 1846, of the proposed change of duty admitted of forming and extending direct connections with England, and to apply to the corn trade (become thus of a more solid and permanent character) a considerable amount of capital and intelligence which, from the insecurity of the trade, had previously been otherwise employed. But the time was as yet too short to give this branch of commerce all the extension of which it was capable. In years which promise favourably to the corn trade, from the prospects of a good harvest, we may compute the practicability of exporting hence 2,500,000 to 3,000,000 quarters of corn; but the produce of the south of Russia appears capable for many years of great extension, the increase of population gradually converting the steppes into arable land. We will merely suppose that henceforward the half of our exports of grain are shipped for Great Britain and the northern ports of the Continent, and also, as hitherto, the greater portion of our tallow, wool, and oil seeds; we should consequently be able, in Odessa alone, in favourable years, to load at least 750 vessels, of the average burden of 250 tons; whereas, in the famine year (1847) only 350 English and Russian Black Sea vessels were freighted, and it has rarely happened that more than 70 cargoes were shipped hence for England. The removal, however, of the navigation laws opens commerce to the vessels of all nations; and we propose giving below a summary of the advantages presented by the several ports in these waters.

Odessa is the chief commercial place in the Black Sea. Almost the half of the goods which pass the Bosphorus southwards are shipped here. The commercial houses here have establishments in the harbours of the Sea of Azof, the Crimea, and the various places on the lower Danube, and the greater, if not the greatest, portion, is ordered hence. In all these places grain is the chief article of export, besides which we export the oil seeds, wool, and tallow, which also occupy a considerable number of ships. Other wares, such as metals, wood, flax, hemp, hides, meal, &c., are of much less importance. The major part of our export goods is brought hither by land in waggons drawn by oxen, which can only cross the steppes so long as these afford them fodder for their progress. The arrival of our supplies, therefore, commences in May and June, and continues, with occasional interruption, until late in the autumn (September, October, and November), whereas during winter very little comes in. Although a small portion of the goods sent in may have been purchased before its arrival, by houses here, which is often the case with wool, yet the major part is undisposed of until its arrival, remaining the property of the producers (usually the proprietors of large landed estates), and is then sold, either by them or their agents. Many of them are inclined to realize immediately, and some are even forced to do so, to enable them to load their waggons home, by the purchase money of their produce, with the goods required by the interior. But as the chief influx takes place during the summer months, the enormous quantity with which the market is stocked causes buyers to hold out for low prices. But if this happen at a time when in England and the other places of consumption corn is still standing, but approaching the harvest, it stimulates the spirit of speculation here, in the hopes of a failure of those crops, and the consequent demand for our goods. These circumstances induce many landowners to ship on their own account, receiving the advances they require upon the consignment, and yet hoping to realize longer prices for their goods than those current at our markets;

and pressed to obtain as speedily as possible the required advances, they are often induced to pay higher freights to secure an immediate shipment and conveyance of their goods. Those proprietors who are not satisfied with that portion of the value of their goods which they receive by way of loan, or as an advance upon the shipment, or who may be afraid of the risk of shipping on their own account, and prefer a positive sale of their goods, enable the merchant here at this period of the year to purchase greater stores than earlier, when there is but little goods in the market, or later in the harvest when those in need of money have already furnished themselves with the necessary funds (if this be through loans, and they consequently have paid interest in advance for many months), and are the less inclined to yield for the purpose of realizing. By the cheaper purchases, and also to save the insurance premiums, which increase with the progress of the season, our export houses can afford late in the summer, or during the autumn, to pay higher freights than in the spring, It requires also to be noticed, that in July, August, and September, the greatest part of the newly sheared wool is usually brought from the washing places hither, and in so valuable an article high freights, for the sake of rapid shipment, is an object of less consideration in comparison with increasing rates of insurance, and loss of interest from late shipments, which even might occasion the possible necessity of wintering here. The new linseed also is usually brought to Odessa in August and September, and if it can be shipped to England, the north of France, Belgium, &c., sufficiently early to be used as sowing seed, it will even then be advantageous to pay a high freight in comparison with a deferred shipment for the sake of a lower, which conveys the seed to the place where it is wanted at a season when it can only be used in the oil mills. From all these circumstances, if local circumstances here regulate freights, they must naturally rise in June and July, and keep up until towards the close of the shipping season, becoming lower in the spring, until the renewed arrival of our supplies again sends them up. Naturally, also, external circumstances affect freights here, and sometimes so powerfully, that, as in 1847, they take a course quite the contrary to their ordinary one.

The shipping places on the western and southern coasts of the Crimea are not, as yet, of great importance.

Eupatoria, which is scarcely a harbour, but rather a well-protected roadstead, can export, in good years, about 170,000 quarters of grain, also a few cargoes of wild rapeseed, rather considerable quantities of sheep's wool, some linseed, raw hides, walnut timber, camel's wool, raw silk, and articles of inferior consequence.

Feodosia possesses a pretty little harbour, which in winter is rarely frozen, but its yearly exports scarcely exceed, at present, 68,000 quarters of grain and seed.

Kertch exports very little of its own produce, but goods are shipped and conveyed hither in lighters from the Sea of Azof, for such ships as wish to avoid the quarantine and the Straits of Jenikale. At the entrance of the Sea of Azof there is usually not more than twelve or thirteen feet of water. We may, however, expect that when the quarantine is reduced to four days in the southern Russian ports, and this regulation adopted at Kertch as in Odessa, fewer vessels will load at Kertch, and the majority will, after the performance of the quarantine, proceed to the several ports of the Sea of Azof to load their cargoes, thus gaining in freight, and saving by the four days' quarantine the expenses of conveyance to Kertch, as well as the relatively high premiums of insurance thither, which materially increase the price of the goods.

In the Sea of Azof, Berdranski is the most southerly and best shipping place. Next to which comes Mariapol, and last Taganrog, which, on account of its trade, is the most important of all. The chief articles of export from the Sea of Azof are the oil seeds, of which about 490,000 quarters may be exported from the above harbours in good years. Less wheat is sent thence to England than to the Mediterranean, as the quality cultivated does not suit the English market. The Sea of Azof can export in good years 1,700,000 quarters of grain. The major part of the very considerable exports of tallow and wool, with which from thirty to forty vessels are learly laden, goes to England. We must remember that in ordinary years the navigation of the Sea of Azof is closed by frost for four to five months, as also that vessels which draw more than thirteen feet of water must be lightened at Jennikale, but the depth of water is greater during the early months of the year.

The shipping places on the Danube, among which Galatz holds the first rank, increase yearly in importance, especially since one of the staple articles of those provinces—maize—has become better known and more extensively used in England. As the navigation of the Danube, owing to the shallowness of the water at the mouth—usually not more than ten-and-a-half to eleven feet deep—is suitable only for small craft, and as these cannot be obtained in a sufficient quantity, notwithstanding the comparatively high freights, producers are compelled to transmit the greater portion of the exports of this district to Constantinople, and even to Malta, for further shipment to England; it behoves shipowners, therefore, to turn their attention to this fact, especially as the climate of the Lower Danube is reported by foreigners located there not to be so prejudicial to health as has been represented. From the average of a twelve years' computation, the Danube is closed by ice during six weeks, viz., from the 13th January to the 24th February. We may further observe, that all the provinces which collectively ship their produce at the above-named places, are still young in cultivation, and require only encouragement to produce enormously larger quantities than they have hitherto done, which necessarily would also produce a larger influx of foreign vessels into these waters. As all vessels which intend visiting the harbours of the Black Sea and its adjacent waters must necessarily pass Constantinople and the Bosphorus, it is important for skippers and shipowners to be familiar with the peculiarities of that navigation. A very strong current regularly flows from the Black Sea through the narrow Bosphorus and the Dardanelles to the Mediterranean, and the passage, consequently, can only be made with a very favourable south wind, as the narrowness of these straits renders tacking difficult and sometimes impossible, and steam-tugs being rarely to be obtained, there not being a sufficient number for the purpose. During the summer—July and August—very frequently opposing north winds prevail for a long time, which detains vessels frequently in the Bosphorus and the Dardanelles for a couple of months, exactly at the period when they are in great request in the Black Sea. The paucity of vessels thus occasioned causes a rise of freights, whereas the sudden flocking of numbers of vessels, as happens usually in the spring, depresses them. During the winter, vessels arriving at Constantinople, especially such as belong to ports in the Mediterranean and Black Seas, are often dissuaded from passing through the Bosphorus, particularly if they apprehend that the ports of the Black Sea may be closed by frost: thus a complete fleet collects at Constantinople, which makes for the Black Sea as soon as they have ascertained with certainty that the shipping places are open, and the conjunctive arrival of so many freight-seeking vessels, partly attracted by the higher autumnal freights, occasions a very sudden and considerable decline. The arrival of the autumnal fleet—namely, such vessels as are detained in the Dardanelles and Bosphorus during the prevailing northern summer winds—has a similar effect, although more transitory.

It would, therefore, be better for vessels which arrive during the four or five first months of the year to secure cargoes by charter-party previous to leaving England, Holland, and the northern ports, as they could then obtain adequate freights, influenced by the quotations at the Black Sea ports; whereas for vessels which cannot obtain their cargoes here until June, it would be preferable to come out unchartered than to accept the low offers made at the time of their departure, partly owing to the low freights here. But the practice adopted, with favourable results, by many owners, is to commission an agent here with the freightage of their vessels whilst on their voyage to the Mediterranean or the Black Seas. The mode of transacting business in Southern Russia makes this mode of concluding charter parties as desirable to our merchants as to shipowners. A considerable portion of the trade of these ports with England, Holland, Belgium, &c., consists in the execution of commissions which are usually limited to a fixed price free on board, although allowing an extension of time for their execution. The markets often present opportunities for buying goods cheaper for delivery at the end of a couple of months than those on hand, but merchants are frequently prevented from availing themselves of these chances, being unwilling to take upon themselves the responsibility of the differences of freight, which often makes sudden and important changes. Many commissions remain, consequently, unexecuted, and it is very natural that higher freights will be paid for vessels which may be appropriated to a certain cargo to be shipped sooner or later, and which may be treated for at once, than would be given for vessels the cargoes of which would be dearer, or for vessels for which orders to freight or charter-parties on approbation are sent out, it being uncertain whether there would be ship room, or whether at a fixed period the shipments could be made.

Shipowners who adopt the plan of letting their vessels be freighted in these ports, look forward generally to better freights than those who conclude charter-parties elsewhere; they are certain that their vessels will be taken only by houses which intend shipping, and not by such as speculate upon prices. They secure also a speedier despatch of their vessels, and other advantages, which cannot be obtained away, as in freights concluded at home merchants seek to obtain for themselves such favourable conditions as will secure them against unforeseen circumstances, which may constantly intervene until the arrival of their vessels. Odessa, which regulates the major part of the shipments of the Black Sea and Sea of Azof, and a portion of the business of the Danube, is necessarily the place where such freights are most readily concluded. For the shipping places on the Danube, vessels are preferred which can carry from 800 to 1,200 quarters; although even larger ones find employ, if they, from the state of the water, can pass up. For the ports of the Sea of Azof small vessels are also preferred, and which obtains at Odessa at least five per cent. more freight than larger ones, although at Odessa vessels even capable of carrying from 1,500 to 2,000 quarters are taken up. As the freighters at these ports can scarcely ever examine vessels themselves, they necessarily depend upon the surveyors of insurance companies; it is therefore advisable for vessels to be inscribed in Lloyd's register of shipping, as also in the books of the Paris company "Veritas." Vessels classed A 1 in London have invariably the preference, even over those which are marked with the red dipththong, especially in seasons when the rates of assurance rise; and in favour of the former very advantageous differences are made. They also look if vessels are coppered, and it would appear to be a profitable speculation to copper vessels intended for this trade.—Morning Chronicle.

POTATO CROPS.—I have visited several places round Liverpool, and having made a personal inspection of numerous fields, can safely affirm that the crop here is both abundant and free from disease. Of course there always have been isolated instances of failure, proceeding from entirely local causes, and if I have seen anything like this, it is a very different thing from what we understand by the "potato disease." I may also mention that the market, and other depôts for potatoes, including a host of private dealers, are all well stocked, and all I have seen have the most inviting or prepossessing exterior. I have also made numerous inquiries in the several counties I have traversed, and find the statements all agree as to the general healthiness of the crop. I shall have an opportunity very soon of inspecting the "lazy beds" on the other side of the Channel.—P. F. K.—— Sir,—During the last fortnight the potato disease has shown itself amongst us, though at present principally affecting the leaves and stems, it will in a little time, I have no doubt, descend to the tubers. Of the early kinds many are ripe, and good both in quantity and quality; while later kinds, or those planted at a late period of the year, will be small in size whatever they may be in other respects, for where the disease establishes itself on the stems, they never improve in size.—JOHN DAVISON, Woolley Park, Wantage, Berks, Aug. 27—Gardeners' and Farmers' Journal.

GLEANINGS IN AGRICULTURE.

PLANTS MORE OR LESS NOXIOUS TO CATTLE, &c.—Hunger will often drive cattle to feed upon herbs more or less unfitted for them; yet it will be observed that when they have suffered the ill-effects of their want of caution, they become more wary in future. It sometimes happens, when domestic cattle are turned out into strange pastures, that they perish from eating poisonous plants, which the cattle accustomed to those pastures have learned from experienced to refuse. The more cattle are stall-fed the more likely are they, when turned out to graze, to crop poisonous plants; therefore the farmer who regards his own interest will not suffer any of the plants in the following list to occupy a place in his pastures, corn-fields, hedge-rows, or ditches. Although some of them are readily eaten by the horse, goat, and swine, yet such is no excuse for him to suffer such weeds to rob his land, to the exclusion of far more profitable productions. And be it here remembered that it is not a very easy task to determine positively that a suffering beast is labouring under the effects of poisonous plants. The symptoms by which it may generally be known are, stupor; refusal of food; rolling about, as if from extreme pain. The first thing to be done when it is ascertained that they are labouring under the effects of poisonous plants is to cleanse the stomach-bag by means of the stomach-pump and plenty of clean warm water; when this is thoroughly clean give aperients, followed by carminatives.

1. *Digitalis purpurea* (common foxglove); found in neglected pastures, woods, hedge-rows, &c. Old writers recommended it as a pulmonary and epileptic medicine, boiled in wine and water, without any particular caution; the leaves are now considered as one of the most valuable diuretics in dropsy, either in powder, infusion, or tincture, and as a sedative in pulmonary consumption; but it must be employed with care, as it has great effect in reducing arterial action and retarding the pulse, and this action is frequently exerted suddenly, by the accumulated effects of small doses, so that if the practitioner be not constantly on his guard he may be surprised by the occurrence of fatal symptoms, and lose his patient, even after he has relinquished the use of the medicine.

2. *Conium macutatum* (spotted hemlock); found about the sides of fields, under hedges, and in moist shady grounds; flowers in June and July. The leaves of the hemlock have a rank smell, of that kind which is called narcotic and virose; they affect but little the organs of taste. Taken internally, in no great quantity, this herb has occasioned disorders of the senses, sleep, convulsions, and in some instances death. The root of this plant, both in external applications and when taken internally, is more active than the leaves; yet we have heard of individuals who have taken as much as three and four ounces without any ill effect.

3. *Hyoscyamus niger* (black henbane); ruins and waysides, poisonous.

4. *Cicuta virosa* (poisonous cowbane); common in neglected ditches.

5. *Helleborus fœtidus* (fetid bear's-foot hellebore); chalky pastures and hedges.

6. *Helleborus viridis* (green hellebore); woods and lanes.

7. *Phellandrium aquaticum* (water hemlock); rivulets and neglected ditches.

8. *Colchicum autumnale* (autumnal meadow-saffron); meadows, &c.

9. *Colchicum autumnale album* (white-flowered autumnal meadow-saffron); meadows, &c.

10. *Spiræa ulmaria* (meadow-sweet); moist meadows, hedgerows, and waste grounds.

11. *Spiræa filipendula* (dropwort); moist meadows and pastures.

12. *Toriles infesta* (troublesome torilis); corn-fields and waste grounds.

13. *Caucalis daucoides* (carrot-like bear-parsley); chalky fields.

14. *Caucalis latifolium* (broad-leafed bear-parsley).

15. *Papaver somniferum* (sleepy poppy); corn-fields. Capsules in decoctions emollient; seeds oily, formerly used in emulsions, also strewed on cakes; yield an oil; sold sometimes for that of olive; juice of the capsule dried, English opium.

16. *Pinguicula vulgaris* (common butterwort); bogs and heaths. Juice of this plant is said to kill lice, and heal chaps in cows' udders.

17. *Myosotis palustris* (marsh mouse-ear); damp fields, rivulets, &c.

18. *Cynoglossum officinalis* (officinal hound's-tongue); waysides and ruins.

19. *Cy-noglossum sylvaticum* (wood hound's-tongue); woods and waysides.

20. *Hippuris vulgaris* (common mare's-tail); rills and stagnant waters.

21. *Dryas octopetala* (mountain avens); stony alpine places.

22. *Ballota fœtida* (stinking bastard horehound); hedges and ruins. Decoction of this plant is useful in hypochondrical and hysterical diseases.

23. *Chelidonium majus* (great celandine); damp,

shady places. Juice yellow, acrid; destroys worts, and has been used for ringworm, jaundice, and the itch.

24. *Cardamine impatiens* (touch-me-not cuckoo-flower); moist meadows, &c.

25. *Cardamine amara* (bitter cuckoo-flower); watery places, banks of rivers, &c.

26. *Drosera rotundifolia* (round-leaved sundew); turfy bogs, &c. Plant acrid, caustic; supposed by some people to occasion the rot in sheep. Curdles milk; and the juice is said to remove corns, worts, &c.

27. *Drosera longifolia* (long-leaved sundew); turfy bogs.

28. *Caltha palustris* (marsh butter); river sides, ponds, and moist places. This plant is supposed by some to make the butter yellow; but cows will not touch it.

29. *Ranunculus arvensis* (corn crow-foot); corn-fields. Plant acrid and poisonous to sheep; three ounces of the juice have been known to kill a dog in three minutes.

30. *Ranunculus sceleratus* (wicked crowfoot); watery places. Plant corrosive, ulcerating the places to which it is applied.

31. *Ranunculus flammula* (flame crowfoot); meadows and bogs. Plant acrid, poisonous to sheep; the distilled water is emetic, acting instantly.

32. *Ranunculus acris* (acrid crowfoot); meadows and pastures, in which it is too common.

33. *Polygonum hydropiper* (water pepper); watery places, meadows, &c.

34. *Ballota alba* (common white horehound); way-sides, &c.

35. *Myriophyllum spicatum* (spiked water milfoil); ditches and ponds, &c.

36. *Myriophyllum verticillatum* (whirled water-milfoil); ditches, ponds, &c.

37. *Datura stramonium* (thorn-apple); dunghills, waysides; naturalized from America. Leaves, given internally, bring on delirium, eruptions, and inflammation of the skin; the seeds produce the same effects—they are counteracted by acetous or citric acid.

38. *Solanum nigrum* (black nightshade); dunghills and waste places.

39. *Sambucus ebulus* (dwarf elder); ruins and way-sides. The root of this plant is violently cathartic. The leaves are said to drive away mice, and are supposed to drive away disease from swine if they are littered with it. The berries dye a blue.

40. *Erigeron acre* (sharp erigeron); chalky pastures.

41. *Rhinanthus crista-galli* (yellow rattle); fields and pastures.

42. *Pedicularia sylvatica* (wood lousewort); pastures, &c.

43. *Menyanthes palustris* (marsh buck-bean); watery places, ditches. The leaves of this plant are extremely bitter, and are sometimes used as hops.

44. *Galium erectum* (upright bed-straw); pastures, meadows, &c.

45. *Alisma major* (great water plantain); river-sides, ditches.

46. *Anemone nemorosa* (wood anemone); woods and shady places.

47. *Anemone palustris* (meadow anemone); marshy meadows, sides of ditches.

48. *Anemone vernalis* (spring anemone); pastures, &c.

49. *Scrophularia nodosa* (knotty figwort); woods and hedges; may easily be known by its very rank smell. In some places a decoction of the leaves is used as a wash for the scab in swine.

50. *Sedum acre* (acrid stone-crop); dry sandy places. Juice very acrid; applied internally it blisters.

51. *Linaria vulgaris* (common toad-flax); fields and pastures. The juice, when mixed with milk, is a poison for flies.

52. *Anthemis cotula* (stinking chamomile); corn-fields.

53. *Bryonia alba* (white bryony); woods and hedges. Root acrid, purgative.

54. *Eupatorium cannabinum* (beer marigold); watery places, ditches.

55. *Mercurialis annua* (annual mercury); ruins, waysides.

The above list contains some of the most deleterious plants to cattle, as well as man. When treating of the weeds of agriculture, we shall notice some which are not here made mention of. J. M'Intosh.

Milton Abbey.

REVIEW.

Observations on the Natural History and Economy of various Insects affecting the Potato Crops; including plant lice, plant bugs, frog flies, caterpillars, crane flies, wire worms, millipedes, mites, beetles, flies, &c., &c.

By John Curtis, F.L.S., &c., &c., &c.

This very interesting and really valuable essay has just been published in the "Journal of the Royal Agricultural Society of England*," with the copy-right reserved to the author. It extends over fifty-eight pages, and is very fully illustrated. We need not say that at such a season as the present, while public interest is so nervously alive in reference to the important problem as to whether or not the coming year shall be one of famine or one of plenty, Mr. Curtis's very elaborate treatise, in which he has fully discussed the question with respect to what are the kinds of insects, and how far they are by their attacks likely to affect the health of the potato plant, will be read with interest. The following is a sample of the style and the manner in which he has treated this question: He says the disease which has been termed murrain, being a plague in

* July number.

cattle, ought never to have been applied to the potato; and then proceeds to remark that "amongst the numerous causes that have been assigned for the appearance of this alarming and severe visitation, insects have been frequently taxed as the destructive agents; but I am convinced the calamity is not to be attributed to their presence. It certainly was remarkable that the *aphides* should have swarmed in countless myriads in 1847; but the malady was not then so bad as it was in the previous and succeeding years, which appeared to me to be the most fatal to the potato crops; yet as far as my observations extended the plant lice were so scarce during 1846 that it was with difficulty I could find specimens, and I did not see a single *aphis* on my potatoes in 1848, notwithstanding the crop was worse than it had ever been in my neighbourhood, more than half of them being rotten. The appearance of the *aphides* in such unprecedented swarms may fairly be attributed to the same cause as the potato rot, namely, certain conditions of the atmosphere; for it is generally admitted that the appearance of a species of an insect in unusual abundance may be the effect either of some exciting influence, as of electricity, or of a congenial temperature, creating a climate favourable to the increase of the animal, such as heat and moisture. In other instances it is no doubt owing to the absence of animals and parasitic insects in the previous year, whose province it would have been to have kept within bounds these troublesome enemies to man.

"If, however, the prevailing disease amongst the potatoes cannot be traced to the presence of insects, there is a large number of species which prey upon, and undoubtedly injure to some extent, the most healthy crops, and of these the history will now be given. It will be better to divide them into those which affect the foliage, and others which infest the roots, first in a sound state, later in a diseased state.

"Aphides, or Plant Lice.—Many varieties of these insects are found upon the leaves of the potatoes during the spring and summer months; indeed, so long as the foliage remain succulent. Their first appearance depends upon the mildness of the weather, for when it becomes cold they do not generate, or at any rate very slowly, so that the species disappear; but if a plant be taken and protected in a greenhouse or a sitting-room their economy is not interrupted, even in the winter, as one sees by the pelargoniums being covered with aphides when they are neglected. I have at this time (January) two tulips in a pot, the convoluted leaves swarming with *aphides*, allied to the one infesting the peach trees: the apterous females are daily bringing forth young, and the pupæ are hatching and producing winged females. But to return: I very much doubt if there be any species exclusively attached to the potato, for the one named *Aphis vastator* by Mr. Smee appears to me to be identical with my A. Rapæ which inhabits turnip leaves, and was described and figured in this Journal in 1842. In confirmation of my views, I may state that in April Mr. F. J. Graham has detected the *Aphis Persicæ* upon the potato leaves in his vinery; the beginning of May Mr. Denham found *A. granarius*, or an allied species, in some abundance on the potato leaves at Broxmouth Park. On the 5th of June, 1847, I observed on my potato haulm the hop-fly *(A. humili)* and the turnip plant louse *(A. Rapæ;)* on the 13th also a species without honey-tubes; on the 17th several belonging to a group separated from Aphis, and called Schizaneura; and in July, Aphis Fabæ, the broad-bean louse, was in some force upon the potatoes, whilst it was swarming upon other vegetables and garden flowers; for instance, the shoots of dahlias, the underside of the leaves of the convolvuli, French and scarlet beans, beet, and parsnips, were literally covered, and black, with the winged females, sticking in close packed phalanxes, and in that position they died by the end of July or earlier, without killing any of the plants, to the best of my knowledge.

"No one acquainted with cultivation will attempt to deny that the plant-lice have the power to destroy a crop; for instance, the horse and broad-beans were a light crop, and entirely failed from the attacks of *Aphis Fabæ* in many districts, in 1847; but in that very year the potatoes in gardens, where the aphides were abundant, proved sound crops; whilst in 1848, where no *aphides* could be found, the tubers were worse than at any former period. That *aphides* will puncture the leaves, there can be no doubt, and so incline them to wither; but there is no proof of their poisoning the sap and causing the rot. Indeed, it is only when plants are smothered with them, as we see beans, turnips, hops, and roses occasionally are, that their presence causes any real mischief, and then it simply arises from the local exhaustion produced by the abstraction of the sap from the leaves or young shoots; and, of course, when the circulation is impaired and the cellular tissue is deprived of its nourishment and dried up, the foliage becomes spotted and withers; but in no instance have I seen the *aphides* on the *potatoes* in sufficient numbers to destroy the crop or even to injure the produce."—Gardeners' and Farmers' Journal.

CLEANSING THE BARK OF FRUIT TREES.—This operation should be performed in early spring, as well as in midsummer. The rough, loose parts of the bark should be scraped off, as well as moss and other parasites. The bark should then be covered with the following mixture, as high as the operator can reach with an ordinary long-handled white-wash brush:—Five pounds soap, one pound fine salt, one pound sand, two pounds potash, two pounds nitrate of soda, dissolved or mixed with water to the consistency of cream, and thoroughly rubbed upon the bark. Many kinds of insects are kept from the trees by a solution of whale-oil soap alone, and many such as are resident in the crevices of the bark are destroyed by salt. The fine sand is intended, during the rubbing, to scratch the outer coating of the bark, and thus assist the other ingredients for more perfect action. The potash and nitrate of soda will decompose or soften the dead parts of the bark, so that during the summer they will be thrown off by the healthy action of the growing bark. If the above mixture be applied in dry weather, it will become so hard as to remain during several showers, and thus have time to perform its office. Trees with smooth bark, such as the plum, many of the cherries, &c., should be rubbed with a wet, rough, woollen cloth, in a few hours after applying the mixture; this rubbing will cause the sand to clean the surface so perfectly as to give the bark an improved and more healthy surface. Trees so cleansed are not so likely to be revisited by insects as those left with their natural surfaces, nor are they as likely to become bark-bound. Indeed we have never known a tree to exhibit the disease called *bark-bound*, the surface of the trunk of which had been softened by a soap-wash in early spring. The cherry, apricot, peach, and nectarine are subject, when left to their natural state, to this disease, and it has usually been attributed to too rich or too moist a soil; and underdraining and slitting the bark lengthwise with the knife are the usual remedies. The one is expensive, and often impossible where choice trees are planted; and the other is barbarous and unsightly, causing exhalation of gum and consequent canker. In any case, a few applications of soap to the surface of the part hide-bound will remove the difficulty, and the mixture before recommended may be applied, slightly warmed, when required to soften the bark of a hide-bound tree.—*The Farmer and Mechanic* (An American periodical).

WILLIAM COBBETT ON POTATOES.

It is to *fashion* that the potato owes its general cultivation and use. It is the fashion to extol potatoes, and to eat potatoes. Every one joins in extolling potatoes, and all the world like potatoes, or pretend to like them, which is the same thing in effect.

The notion is, that potatoes are cheaper than wheat flour. The word cheap is not quite expressive enough, but it will do for our present purpose. I shall consider the cost of potatoes, in a family, compared with that of flour. It will be best to take the simple case of the labouring man.

The price of a bushel of fine flour, at Botley, is, at this time, 10s. The weight is 56 lbs. The price of a bushel of potatoes is 2s. 6d. They are just now dug up and are at the cheapest. A bushel of potatoes, which are measured by a large bushel, weighs about 60 lbs., dirt and all, for they are sold unwashed. Allow 4 lbs. for dirt, and the weights are equal. Well, then, here is toiling Dick with his fonr bushels of potatoes and John with his bushel of flour. But, to be fair, I must allow, that the relative price is not always so much in favour of flour. Yet, I think you will agree with me, that upon an average, five bushels of potatoes do cost as much as one bushel of flour. You know very well, that potatoes in London sell for 1d. and sometimes 2d. a pound; that is to say, sometimes 27s. 6d. and sometimes 55s. the five bushels. This is notorious. Every reader knows it. And did you ever hear of a bushel of flour selling for 55s? Monstrous to think of. And yet the tradesman's wife, looking narrowly at every halfpenny, trudges away to the potato shop to get five or six pounds of this wretched root for the purpose of saving flour! She goes and gives 10d. for ten pounds of potatoes, when she might buy five pounds of flour with the same money! Before her potatoes come to the table they are, even in bulk, less than five pounds or even three pounds of flour made into a pudding. Try the experiment yourself, sir, and you will soon be able to appreciate the economy of this dame.

But to return to Dick and John; the former has got his five bushels of potatoes, and the latter his bushel of flour. I shall, by and by, have to observe upon the stock that Dick must lay in, and upon the stowage that he must have; but, at present, we will trace these two commodities in their way to the mouth, and in their effects upon those who eat them. Dick has got five bushels at once, because he could have them a little cheaper. John may have his peck or gallon of flour; for that has a fixed and indiscriminating price. It requires no trick in dealing, no judgment, as in the case of the roots, which may be wet, or hollow, or not; flour may be sent for by any child able to carry the quantity wanted. However, reckoning Dick's trouble and time nothiug in getting home his five bushels of potatoes, and supposing him to have got the right sort, a "fine sort," which he can hardly fail of, indeed, since the whole nation is now full of "fine sort," let us now see how he goes to work to consume them. He has a piece of bacon upon the rack, but he must have some potatoes too. On goes the pot; but there it may as well hang, for we shall find it in continual requisition. For this time the meat and roots boil together. But what is Dick to have for supper? Bread? No. He shall not have bread, unless he will have bread for dinner. Put on the pot again for supper. Up an hour before daylight, and on with the pot. Fill your luncheon-bag, Dick; nothing is so relishing and so strengthening out in the harvest field, or ploughing on a bleak hill in winter, as a cold potato. But, be sure, Dick, to wrap your bag well up in your clothes, during winter; or, when you come to lunch, you may, to your great surprise, find your food transformed into pebbles. Home goes merry Dick, and on goes the pot again. Thus, 1,095 times in the year Dick's pot must boil. This is, at least, a thousand times oftener than with bread and meat diet. Once a week baking, and once a week boiling, is as much as a farm-house used to require. There must be some fuel consumed in winter for warmth. But here are, at the least, 500 fires to be made for the sake of these potatoes; and, at a penny a fire, the amount is more than would purchase four bushels of flour, which would make 288 lbs. of bread, which at 7 lbs. of bread a-day, would keep John's family in bread for 41 days out of the 365. This I state as a fact, challenging contradiction, that exclusive of extra labour occasioned by the cookery of potatoes, the fuel required in a year for a potato diet, would cost, in any part of the kingdom more than would keep a family in baker's bread for 41 days in the year, at the rate of 7 lbs. of bread a-day.

John, on the contrary, lies and sleeps on Sunday morning till about seven o'clock. He then gets a bit of bread and meat or cheese, if he has either. The mill gives him his bushel of flour in a few minutes. His wife has baked during the week. He has a pudding on Sunday, and another batch of bread before the next Sunday. The moment he is up, he is off to his stable, or the field, or the coppice. His breakfast and luncheon are in his bag. In spite of frost he finds them safe and sound. They give him heart, and enable him to go through the day. His 56 lbs. of flour, with the aid of 2d. in yeast, bring him 72 lbs. of bread; while, after the dirt and peelings and waste are deducted, it is doubtful whether Dick's 300 lbs. of potatoes bring 200 lbs. of even this watery diet to his lips. It is notorious, that in a pound of clean potatoes there are eleven ounces of water, half an ounce of earthy matter, an ounce of fibrous and strawey stuff, and I know not what besides. The water can do Dick no good, but he must swallow those eleven ounces of water in every pound of potatoes. How far earth and straw may tend to fatten or strengthen cunning Dick, I do not know; but at any rate, it is certain that while he is eating as much of the potato as is equal in nutriment to one pound of bread, he must swallow about fourteen ounces of water, earth, straw, &c.; for down they must go together, like the Parliaments' bread in 1800 and 1801. But suppose every pound of potatoes to bring into Dick's stomach a sixth part of the nutritious matter, including in the gross pound all the dirt, eyes, peelings, and other inevitable waste. Divide his gross 200 lbs. by 6, and you will find him with 50 lbs. of nutritious matter for the same sum that John laid out in 72 lbs. of nutritious matter, besides the price of 288 lb. of bread in a year, which Dick lays out in extra fuel for the eternal boilings of his pot. Is it any wonder that his cheeks are like two bits of loose leather, while he is pot-bellied and weak as a cat? In order to get half a pound of nutritious matter into him, he must swallow about fifty ounces of water, earth and straw. Without ruminating faculties, how he is to bear this cramming?

But Dick's disadvantages do not stop here. He must lay in his store at the beginning of winter, or he must buy through the nose. And, where is he to find stowage? He has no eaves. He may pie them in the garden if he has one; but he must not open the pie in frosty weather. It is a fact not to be disputed, that a full tenth of the potato crop is destroyed, upon an average of years, by the frost. His wife, or stout daughter, cannot go out to work to help to earn the means of buying potatoes. She must stay at home to boil the pot, the everlasting pot. There is no such thing as a cold dinner. No such thing as women sitting down on a haycock, or shock of wheat, to their dinner, ready to jump up at the approach of a shower. Home they must tramp, if it be three miles, to the fire that ceaseth not, and the pot as black as Satan. No wonder that in the brightest and busiest seasons of the year you see from every cottage door, staring out at you, as you pass, a smoky-capped, greasy-heeled woman. The pot, which keeps her at home, also gives her the colour of the chimney, which long inactivity swells her heels.

Now, sir, I am quite serious in these my reasons against the use of the root, as food for man. As food for other animals, in proportion to its cost, I know it to be the worst of all roots that I know any thing of; but that is another question. I have here been speaking of it as food for man; and if it be more expensive than flour to the labourer in the country, who, at any rate, can stow it in pies, what must it be to tradesmen's and artizans' families in towns, who can lay in no store, and who must buy by the ten pound or quarter of hundred at a time. When broad-faced Mrs. Wilkins tells Mrs. Tomkins, that, so that she has "a potato" for her dinner she does not care a farthing for bread, I only laugh, knowing that she will twist down half a pound of beef with her "potato" and has twisted down half a pound of buttered toast in the morning, and means to do the same at tea time, without prejudice to her supper and grog. But when Mrs. Tomkins gravely answers, "Yes, ma'am, there is nothing like a potato; it is such a saving in a family;" I really should not be very much out of humour to see the tete-a-tete broken up by the application of a broom-stick.—*Cobbett's Year's Residence in America.*

ON THE CONSTRUCTION OF A PAIR OF COTTAGES FOR AGRICULTURAL LABOURERS.

BY HENRY GODDARD, ARCHITECT AND SURVEYOR, OF LINCOLN.

FIRST PRIZE ESSAY.

(From the Journal of the Royal Agricultural Society of England.)

The leading features of this communication being the plans, specification, and estimate, and as the views of the author are clearly defined therein, it is his intention as concisely as possible to confine his observations to an explanation of them, recording at the outset that no reference has been made to any published work, and that to a long residence in one of the most important agricultural districts in the kingdom is he indebted for his acquaintance with the subject. In preparing the accompanying plans it has been his—

Object.—To attain at the smallest cost the greatest amount of comfort and convenience in the construction of suitable residences for the large majority of the *bonâ fide* agricultural labourers. In effecting this, it has been his desire to avoid excess in cost and size, and the sacrifice of interior comforts for the sake of pictorial effect. It has also been his aim to avoid, if possible, the creation of facilities to induce the tenant to "let off" a portion of the rooms which are designed for the exclusive use and due classification of his own family.

Situation, Aspect, Soil, &c.—Such a variety of circumstances, both natural and local, have to be considered in determining upon sites for the erection of labourers' cottages, that the adoption of any fixed rules seems almost impracticable. It may not be amiss, however, to suggest that a plot of land abutting upon, and at a level of from two to four feet above a good road, forming part or being in the immediate vicinity of an allotment of land available for spade husbandry, and possessing facilities for efficient drainage, seems most desirable; and in all cases care should be taken that the habitation of the labourer is not too remote from the locality of his daily avocations. The aspect should be south, or as nearly so as can be obtained, and the value of the situation would be enhanced if protected on the north and east from the inclemency of the weather, but the close proximity of forest trees should be avoided as having a tendency to deteriorate the value of the garden ground, and in the autumn to clog up the gutters and spouts of the cottages with dead leaves. A good soil of easy cultivation, with a substratum of gravel or sand, is essential, or (when the prevailing prejudices are overcome) a piece of used-up old grass-land, sufficiently elevated for draining purposes, would not be unsuitable.

Exterior Arrangements.—The cottages are proposed to be built in pairs, and should be placed at a distance of five or six yards from the road, leaving a small space for the cultivation of flowers, herbs, and the smaller kinds of garden produce; and the good feeling which it is desirable should exist between the occupants, is most likely to be secured by rendering them as independent of each other as circumstances will permit. With this view a separate entrance is made to each, and in the minor arrangements the pump only is used by both tenants. If further separation is desired, it may be accomplished by planting a privet fence between the two in front, and a post and rail fence at the back, and making the pump with a double handle to work both ways. The author conceives it to be objectionable to make the entrance-door fronting the road, not only on account of its publicity, but because an indolent tenant is in the habit of throwing the ashes and other refuse matters into a heap immediately before the doorway, owing to its remoteness from the rear of the house. In the plan it will be seen that a receptacle has been provided within an easy distance of the door, to render such a practice unnecessary and inexcusable.

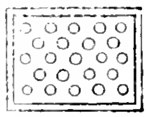
Interior Arrangements. — As the surest preventive of the house becoming a residence for two families, and as being more consonant with the wants and means of the labourer, one living-room only is provided, which is approached by a small porch for the sake of privacy and warmth. The fireplace is recessed in the wall, and leaves an available space for household purposes of 13 feet by 11 feet in the clear (being equivalent to 13 feet by 12 feet 6 inches where the chimney-breast and cupboard project into the room). The window is designed with a small recess on each side to receive fall-back shutters. The only door (except the outer one) in the living room communicates immediately with the staircase, scullery, pantry, and coal-place. The scullery is 8 feet 6 inches by 7 feet in the clear, and is fitted up with a boiling-copper and stone sink. Another external, or "back door," and a second fireplace in the scullery, are purposely omitted for the reasons before mentioned. If it is deemed advisable to have either one or the other, the former may be placed between the pantry and coalplace, and the latter beside the copper in the scullery. Neither of these alterations are recommended; another door wou d make the living room much colder, and, under any circumstances, the cooking required for a labourer's family is never of such magnitude as to require two fireplaces, or to render the living room even in summer (when the fire is seldom used except morning and evening) so hot as to be unhealthy. Immediately contiguous to, but apart from the living room and scullery is a convenient pantry, the floor of which is intended to be 16 inches below the level of the others, leaving sufficient height for suspending bacon and other provisions from the joists above, and permitting a bench to be placed at the end nearest the porch to receive milk and other articles requiring a cool temperature. In addition to a sufficiency of shelves, a cupboard is proposed to be fixed at a height of three feet above the bench for the safe custody of such articles as are usually deposited in a similar convenience beside the fireplace in living rooms of cottages. The upper story is divided into three separate bed-rooms, and from the mode of construction adopted, a larger amount of space is secured to these rooms than low walls and high pitched roofs would permit. The height of each room is 8 feet, and the dimensions are—No. 1, 11 feet by 10 feet; No. 2, 11 feet by 7 feet 6 inches; and No. 3, 8 feet 6 inches by 7 feet, containing 860, 645, and 469 cubic feet respectively. One room only (the largest) is provided with a fireplace, which will be found quite sufficient both for ordinary and extraordinary occasions. One might be placed in every room if required, without deranging the plan. A convenient closet is obtained at the top of the stairs, and another in a recess adjoining the fireplace in Bedroom No. 1.

The Out-Offices.—It is very objectionable to make these indispensable adjuncts form part of the cottage itself; and equally offensive to good taste (if isolated) to have such a primitive outline as indicates most unmistakeably their respective uses. In the plan the two extremes are avoided, and a situation is selected within easy reach of each cottage, and they are so contrived as to conceal as much as possible the purposes for which they are designed. Within the enclosure accommodation is made for keeping a pig; and where such a practice is not interdicted, it is better to build a suitable place than leave the tenant to exercise his ingenuity upon old wood and thatch, and supply the deficiency in a manner most offensive to the eye, and prejudicial to the health of those around him.

Materials, Construction, Supply of Water, &c.—A difficulty arises here in laying down rules for universal adoption; the geology of the district, local customs, and the facilities of transit may interdict it; the author has, however, endeavoured to hit the rule rather than the objection, by suggesting as the most applicable—brick for the walls, Baltic timber for the carpenter's work, and Welsh slate covering for the roofs. It must be distinctly understood notwithstanding, that any variation in the materials will not affect the general arrangements. All the window-frames are proposed to be of wood, as being more economical and agreeable than iron or stone; and the squares not being large, the outlay for renewal, in the event of breakage, will be so trifling as to offer no inducement for the occupant to substitute a piece of old newspaper for a square of glass. The eaves of the cottages project, for the sake of appearance and better security of the walls. The water from the eaves on the south front is conveyed into the drain leading from the sinks in the sculleries, by which means any refuse will be effectually washed away at every fall of rain, and on the north side a sufficiency of water may be collected in water-butts (for the use of the tenants) placed against the outer walls of the staircases. The hard water pump (communicating with a well) is placed against the back wall of the cottages exactly central between the two, and the waste water therefrom will communicate with the drain; in districts where the springs are at a considerable depth below the surface the well may be dispensed with, and a water-tight tank substituted, into which the water from all the eaves should be conveyed.

Warming and Ventilating.—To ensure the carrying out of these essentials to a poor man's comfort, simplicity and economy must be borne in mind, consonant with which, and being at the same time more agreeable to the habits and customs of Englishmen, open fire-places are recommended, viz., "Nicholson's improved cottage-range" for the living room, and a small sham stove for the bed-room fire-place. Iron or lead pipes, heated by hot air, water, or steam, however effective they may be in operation, form but a poor substitute for the cheerful fire, however small, which is most agreeable to the sight and pleasant to the feelings of an agricultural labourer after a cold wet day's work. The living-room and bed-room No. 1, having each a door, window, and chimney opening (considering their capacity also), have sufficient facilities for ventilation. The scullery is ventilated by the insertion of an air-brick

in the outer wall; the pantry by similar means, one air-brick being built in the wall beneath the seat of the porch, and another at the opposite end under the floor-joists above; the two smaller bed-rooms to have a perforated wood ventilator



in each ceiling, and an air-brick in each gable above the ceiling on the north and south fronts.

Cost.—In the following calculations bricks are supposed to be worth 30s. per thousand, lime 12s. per chaldron of 32 bushels, and sand 3s. per ton; the estimate may therefore be deemed a maximum one, and may be reduced in every instance where landed proprietors make their own bricks, and the lime and sand are procured upon the estate. The substitution of stone in districts where it is abundantly and easily worked would effect a considerable saving, and a further reduction may also be effected in the items of timber and carriage, where plenty of the former is available and the latter is not a matter of consideration:—

Note.—Although this essay was considered the best, it is not of course recommended by the society as giving a *perfect* plan. The out-offices seem open to several objections. The height of the surrounding wall would render the enclosure very offensive, unless the privies, as well as pig-pounds, were constantly cleansed. The pig-pounds are too confined, especially the sheds, the form of which is not good. The privy doors should not be opposite each other.—Chichester.

The depression of the pantry-floor would be inconvenient when it is washed, and I should prefer a south-west aspect.—J. F. Burke.

SPECIFICATION AND ESTIMATE

Of the several Works required to be done in the erection of a pair of Labourers' Cottgaes.

Diggers' and Bricklayers' Works.

Specification	Rods.	yds.	ft.	Item	s. d.	£	s.	d.
The necessary excavations to be made for the foundations of the several walls and pantries, the soil to be well rammed down to the walls as they are carried up, and the surplus to be levelled round the outside as may be directed	0	20	0	Cube digging foundations	0 5	0	8	4
The whole of the bricks required to be sound, hard, square, and well-burnt kiln bricks, those for external facings to be selected for their hardness and evenness of surface. The bricks for the weatherings and splays to be moulded to the proper forms. The mortar to be composed of well-burnt lime and clean sharp sand in approved proportions, well mixed upon a clean hard floor								
The whole of the brickwork to be laid in old English or Flemish bond, with close joints, every third course being heading bricks, every course to be well flushed with mortar, and the exterior to be well pointed and jointed	7	86	0	Superficial reduced common brickwork	£9	65	17	4
					s. d.			
The upper course of the strings, chimney shafts, and copings to be bedded and jointed in Roman cement	0	70	0	Lineal top course in cement	0 2	0	11	8
The chimney flues to be 10 inches square in every part, the turns and gatherings being made as easy and smooth as possible, and the insides to be well pargetted with prepared mortar				Flues measured solid	..			
The jambs and arches of the living-room fire-places to be built with stock bricks in fine mortar, leaving sufficient projection to receive the plastering				Extra to 2 chimney-breasts	5 0	0	10	0
The walls of the sculleries, pantries, and coal-places to be pointed and twice lime-washed				Pointing and whitewashing	..	0	10	0
The bricklayer is to find labour and materials for setting a range in the living-room, copper and sink in the scullery, and sham stove in bed-room No. 1 in each cottage				Setting 2 kitchen ranges	6 0	0	12	0
				Do. 2 coppers	7 6	0	15	0
				Do. 2 stone sinks	4 0	0	8	0
				Do. 2 sham stoves	3 0	0	6	0
				Carried over	..	69	18	4

Diggers' and Bricklayers' Works—continued.

	Rods. yds. ft.		s. d.	£ s. d.
		Brought over	..	69 18 4
The steps to the pantries to be of common bricks on edge, and the floors of pantries, sculleries, and coal-places to be paved with common bricks flatwise; the floors of the porches, living-rooms, and staircases to be laid with the best local paving-bricks, bedded and jointed in mortar		No. 2 brick steps on edge	2 0	0 4 0
	0 19 0	Superficial common brick flat paving	1 3	1 3 9
	0 40 0	,, pavor brick flooring	2 0	4 0 0
A brick bench to be formed in each pantry, covered with paving tiles, bedded and jointed in Roman cement		No. 2 brick benches	..	0 7 0
				75 13 1

The Offices.

The same stipulations as to materials and manner of executing the works described for the House are to apply equally to the Offices.

	Rods. yds. ft.		s. d.	£ s. d.
Proper excavations to be made for the ash-places, privies, vaults, and drains	0 14 0	Cube digging	0 5	0 5 10
A well to be sunk between the cottages and the offices (to be calculated at 5 yards deep), 3 feet 6 inches in diameter in the clear, steined with brick, and domed over at the top with a man-hole left therein, having a flag-stone cover with flush ring let in	0 5 0	Lineal well sinking and steining	10 0	2 10 0
		No. 1 flag-stone cover with flush ring let in	..	0 5 0
The whole of the brickwork to be pointed and jointed on both sides	1½ 0 0	Superficial reduced brickwork	£9	13 10 0
The floors of the ash-places, vaults, and privies to be paved with common bricks, laid flat, and the pigsties with stone pitching	0 8 0	,, common brick flat paving	s. d. 1 3	0 10 0
	0 15 0	,, stone pitching	1 6	1 2 6
Small drains of tiles laid in tempered clay and jointed with cement, laid at a depth of eighteen inches below the surface, to take the waste water from the sink and pump. These drains to be calculated at 30 yards in length for the two cottages, and any excess beyond that quantity to be paid for as extra	0 30 0	Lineal tile drains	1 0	1 10 0
				19 13 4

Mason's Works.

	Ft. In.		s. d.	£ s. d.
The steps to the porches to be of tooled Yorkshire or other hard stone, 4 inches in thickness and 12 inches wide	0 8 0	Lineal 12 by 4 tooled steps	1 0	0 8 0
The window sills to be 3 inches thick and nine inches wide, properly weathered and throated	0 31 0	„ 9 by 3 window sills	1 0	1 11 0
A tooled stone hearth and back hearth to be laid to each sitting-room fire-place	0 20 0	Superficial tooled hearths	0 9	0 15 0
A rubbed stone sink, 3 feet by 1 foot 8 inches, to be fixed in each scullery with a brass stench-trap let therein, and brick on edge tunnels to convey the water therefrom into the drains on outside the wall	0 10 0	„ 5-inch rubbed sinks	1 6	0 15 0
		No. 2 brass stench traps and letting in	3 6	0 7 0
A 2½-inch round-nosed stone seat to be built in the walls of each porch as they are carried up	0 15 0	Superficial 2½-inch tooled seats	0 9	0 11 3
				4 7 3

At the Offices.

				£ s. d.
A 6-gallon stone trough to be provided and fixed to the pump, and a small feeding-trough to each pigsty		No. 1 6-gallon trough	—	0 5 0
		„ two small troughs	—	0 7 0
A stone cover to each vault		„ two stone covers to vaults	—	0 12 0
				1 4 0

Slaters' and Plasterers' Works.

	Sq. Ft. In.		s. d.	£ s. d.
The roofs to be covered with the best Bangor ladies' slating on 1½ by ¾ Petersburgh red wool laths, to have 2½-inch lap, and each slate to be secured by two copper nails, the under side being well pointed with lime and hair ..	11 75 0	Superficial ladies' slating	22 0	12 18 6
The ridges to be covered with the best ridge stone, or Staffordshire tiles	0 66 0	Lineal ridge cresting	0 6	1 13 0
The lime for the plasterers' work to be of the best quality, the sand clean, sharp, and well washed, and the laths stout single fir laths.		Carried over	—	14 11 6

Slaters' and Plasterers' Works—continued.

	Yds. Ft. In.		s. d.	£ s. d.
		Brought over ..	—	14 11 6
The ceilings of the upper story to be lathed, plastered, and set fair; and the walls of the same with those of the living rooms, to be rendered and set fair	72 0 0	Superficial lath, plaster, and set	1 0	3 12 0
	220 0 0	,, rendering on walls	0 6	5 10 0
The quarter partitions in the chamber story to be lathed and plastered on one side, and pane-drawn on the other	$41\frac{1}{2}$ 0 0	,, lath and plaster, and pane-drawing ..	1 6	3 2 3
The floors of the chamber story to be run with plaster on laths, 5 pecks to the superficial yard, and to be two coats pane-drawn underneath	62 0 0	,, plaster floor and pane-drawing ..	2 9	7 15 6
A chamfered skirting, $5\frac{1}{2}$ inches deep, to be run in cement round the living-rooms, finishing flush with the plastering upon the walls	0 78 0	Lineal 5-inch cement skirting	0 3	0 19 6
				£35 10 9

At the Offices.

	Squ.			£ s. d.
The roofs of privies and pigsties to be covered with slating as before described	1 20 0	Superficial ladies' slating	22 0	1 4 7

Carpenters' and Joiners' Works.

	Squ. Ft. In.		s. d.	£ s. d.
All the timber to be that known as the best middling Memel, the deals Archangel or Petersburgh red deal, and the whole to be sound well-seasoned, and free from large and dead knots, or other defects				
Sufficient centering to be provided for all apertures requiring them		No. 8 small centres	0 6	0 4 0
A tier of bond timber, $4\frac{1}{2}$ by $2\frac{1}{2}$ inches, to be laid throughout all the walls, to receive the timbers of the chamber floor, and to be connected through the chimneys by strong iron hooping	0 187 0	Lineal $4\frac{1}{2}$ by $2\frac{1}{2}$ inch deal bond	0 2	1 19 0
Lintels 3 inches in thickness, and the breadth of the wall to be supported, to be laid over all internal apertures, with 6 inches' wall hold at each end; and a sufficiency of wood bricks to be inserted to receive the door and window linings	0 22 0	Cube fir in lintels and bricks	2 6	2 15 0

Description				Item			£	s.	d.
The floors of the chamber story to be of thorough joists wrought and chamfered; those over the sitting-rooms, pantries, and porches to be 7 by 2 inches, and over sculleries and staircases $5\frac{1}{2}$ by 2 inches	0	336	0	Lineal 7 by 2 inch wrought joists	0	3	4	4	0
	0	168	0	,, $5\frac{1}{2}$ by 2 inch ,, ...	0	$2\frac{1}{2}$	1	15	0
The roofs to be framed with four pair of lock couples and other timbers of the following scantlings, viz.:— Principles .. $4\frac{1}{2}$ by 3 in. Wall plates .. $4\frac{1}{2}$,, 3 ,, Ridge-board .. $5\frac{1}{2}$,, 1 ,, Valley rafters .. 7 ,, $1\frac{1}{2}$,, Cross-ties .. 7 by $1\frac{1}{4}$ in. Purlins .. $5\frac{1}{2}$,, 3 ,, Rafters .. 3 ,, 2 ,,	$10\frac{1}{2}$	0	0	Superficial lock couple roofing	25	0	13	2	6
The valleys to be lined with $\frac{3}{4}$ deal 9 inches wide on each side, and the gutters to the chimneys to be laid with $\frac{3}{4}$ deal on proper bearers	0	63	0	,, $\frac{3}{4}$-inch valley boards	0	3	0	15	9
	0	10	0	,, ,, gutter boarding and bearers	0	6	0	5	0
A $\frac{3}{4}$-inch beaded facia, $4\frac{1}{2}$ inches wide, to be fixed to all the eaves and gables	0	146	0	Lineal $4\frac{1}{2}$ by $\frac{3}{4}$ inch beaded facia	0	3	1	16	6
The bed-rooms to be ceiled with joists 3 by $1\frac{3}{4}$ inches, notched into the rafters underneath the purlins	3	90	0	Superficial ceiling floors	10	0	1	19	0
The quarter partitions are to have $2\frac{1}{2}$ by $1\frac{3}{4}$ inch wrought and chamfered studs, cross-braced where necessary	3	10	0	,, quarter partitions	10	0	1	11	0
All such timbers as may be requisite to complete the several works which may not be expressly described, are to be of the same relative strength as those specified; and all straps, ties, dogs, or other ironwork necessary to the firm construction of the carpenters' works to be included in the contract				No. 4 pairs dogs to roofs	2	0	0	8	0
All the doors to have $1\frac{1}{4}$-inch rebated casings, of sufficient width to stop the plastering	0	120	0	Superficial $1\frac{1}{4}$-inch rebated linings	0	6	3	0	0
The entrance-doors to be $1\frac{1}{2}$ inches thick, framed, cross-braced, and covered with 7-8ths boarding, hung with 16-inch cross-garnet hinges, and secured by a 9-inch stock-lock, one 9-inch barrel bolt, and Norfolk latch upon each door	0	36	0	,, $1\frac{1}{2}$-inch framed and braced doors	0	10	1	10	0
				No. 2 pairs 16-inch cross garnets	1	6	0	3	0
				,, 2 9-inch stock-locks	2	6	0	5	0
				,, 2 8-inch barrel-bolts	1	0	0	2	0
				,, 2 Norfolk latches	1	3	0	2	6
The remaining doors of the cottages to be $1\frac{1}{4}$-inch four-panel square-framed, and hung with 3-inch butt hinges; and each door to have a 4-inch boxed-spring latch, with bolt fixed upon it, except, to the pantries, which are to have 6-inch rim locks, and the doors to coal-places brass turn-buckles	0	170	0	Superficial $1\frac{1}{4}$-inch four-panel square framed doors ..	0	9	6	7	6
				No. 13 pairs 3-inch butts and screws	0	6	0	6	6
				,, 9 ,, 4-inch spring latches	1	0	0	9	0
				,, 2 6-inch iron rim locks	2	6	0	5	0
				,, 2 brass turn-buckles	0	6	0	1	0
The dimensions of all the doors, when finished, are marked in the respective openings upon the plans in red ink				Carried over	..		43	6	3

Carpenters' and Joiners' Works—continued.

Description	Squ.	ft.	in.	Item	s.	d.	£	s.	d.
				Brought over	..		43	6	3
All the windows to have solid deal frames, with oak sunk and weathered sills, and $1\frac{1}{2}$-inch ovolo sashes; the single-light windows, and one light in each of the others, to be hung with $2\frac{1}{2}$-inch butts, and secured by a suitable fastener	0	146	0	Superficial Yorkshire windows	0	9	5	9	6
				No. 14 pairs $2\frac{1}{2}$ butts and screws	0	5	0	5	10
				„ 14 hasps and staples	0	4	0	4	8
The windows of the living-rooms to have $\frac{3}{4}$-inch ledged shutters, hung with T hinges, and back laps to fold into the recess on each side, and to be secured by 18-inch spring bar and 6-inch bolt to each window; $\frac{3}{4}$-inch plain linings, and 1-inch window-boards, to be fitted in each recess	0	51	0	Superficial $\frac{3}{4}$-inch ledged shutters	0	6	1	5	6
				No. 4 pairs T hinges, 4 ditto back laps	..		0	4	8
				„ 18-inch shutter-bars	1	6	0	3	0
				„ 2 6-inch bolts	0	6	0	1	0
	0	15	0	Superficial $\frac{3}{4}$-inch plain linings	0	5	0	6	3
	0	6	0	„ inch window boards	0	7	0	3	6
Three-quarter inch beads, to be fixed round the doors and windows of the rooms described to be plastered	0	360	0	Lineal $\frac{3}{4}$-inch beads	0	$1\frac{1}{2}$	2	5	0
Three-quarter inch square skirting, $3\frac{1}{2}$ inches wide, to be fixed round bed-rooms No. 1	0	78	0	„ $3\frac{1}{2}$ by $\frac{3}{4}$-inch plain skirting	0	$2\frac{1}{2}$	0	16	3
The staircases to have inch rounded treads and $\frac{3}{4}$-inch risers on strong carriages, inch beaded stringboard and facia, 3-inch newels, 2-inch rounded handrail, and inch-square balusters	0	90	0	Superficial inch treads and rises, with newels, hand-rail, &c., complete	1	0	4	10	0
A $\frac{3}{4}$-inch ledged, cupboard front 4 feet high, to be fixed across the end of each pantry; and a similar one to the recess beside the fire-place in each bed-room, with suitable hinges and fastenings	0	47	0	Superficial $\frac{3}{4}$-inch ledged cupboard fronts	0	6	1	3	6
				No. 6 pairs 2-inch butts and screws	0	5	0	2	6
				„ 4 cupboard locks	1	0	0	4	0
				„ 4 cupboard bolts	0	6	0	2	0
Twenty-five feet superficial of inch deal shelves upon proper bearers, to be fixed to the pantries and closets of each house, as may be directed	0	50	0	Superficial inch shelves and bearers	0	6	1	5	0
A small ventilator, 12 by 9 inches, of inch deal, perforated with 12 holes $1\frac{1}{4}$ inches diameter, to be fixed in the ceilings of each small bed-room in such part as may be directed				No. 4 small ventilators	1	6	0	6	0
Plain wood margins to bed-room fire-places				„ 2 plain margins	2	6	0	5	0
							62	9	5

At the Offices.

Description	Squ.	ft.	in.	Item	s.	d.	£	s.	d.
The roofs over privies and pigsties to be lean-to roofs, with timbers of scantlings as before described	1	10	0	Superficial lean-to roofs	20	0	1	2	0
The doors to the privies to be $\frac{3}{4}$-inch ledged, hung with 14-inch cross-garnets to $1\frac{1}{4}$ rebated stiles. A 4-inch bolt to be fixed upon each door	0	22	0	„ $\frac{3}{4}$-inch ledged doors	0	6	0	11	0
	0	22	0	Lineal $5\frac{1}{2}$ by $1\frac{1}{4}$ inch rebated casing	0	3	0	5	6
				No. 2 pairs 14-inch cross garnets	1	3	0	2	6
				„ 2 4-inch bolts	0	6	0	1	0

			s. d.	£ s. d.
The privies to be fitted up with inch seat and front boards on proper bearers, and the walls of the ash place to be covered with chamfered capping, dove-tailed at the angles and tied into the walls	0 22 0	Superficial inch seats, rises and bearers	0 6	0 11 0
	0 14 0	Lineal chamfered capping	0 4	0 4 8
The pigsties to be divided by strong oak slab-fencing on proper rails, and the doors to be formed of the like materials, and hung with hooks and bands to sawn posts, and secured by hasps and staples	0 36 0	Superficial oak fencing and rails	0 6	0 18 0
		Two pairs hooks and bands	2 0	0 4 0
		Three sawn oak posts	1 6	0 4 6
		Two hasps and staples	—	0 0 8
The pump to have oak standards and top, and inch beaded boarding		One pump-case	—	0 12 0
				4 16 10

Smiths' and Ironfounders' Works.

Description	Ft. In.	Item	s. d.	£ s. d.
To provide 6 cast-iron air-bricks for each cottage		No. 12 cast-iron air-bricks	0 9	0 9 0
Provide a 24-inch iron pan, with door and furnace-bars complete, for each scullery; a 38-inch improved kitchen range (manufactured by Nicholson of Newark) for each living-room, and a 20-inch sham-stove for 1 bed-room in each house		,, 2 24-inch furnaces complete	20 0	2 0 0
		,, 2 38-inch kitchen ranges	42 0	4 4 0
		,, 2 20-inch sham-stoves	5 0	0 10 0
The eaves in the recesses of the north and south fronts to have $3\frac{1}{2}$-inch cast-iron half-round spouting, securely fixed to the feet of the rafters, and 3 tiers of 2-inch descending pipes, with cistern heads and discharge-shoes to convey the water therefrom, as shown in the elevations	0 33 0	Lineal $3\frac{1}{2}$-inch eaves-spouting	0 6	0 16 6
	0 32 0	,, 2-inch descending-pipes	0 8	1 1 4
		No. 3 heads, 3s.; 3 shoes, 2s.	—	0 15 0
		,, 3 bends	3 0	0 9 0
				10 4 10

Plumbers', Glaziers', and Painters' Works.

			s. d.	£ s. d.
The valleys and chimney-gutters to be lined with 5 pounds lead 18 inches wide, and to be flashed with similar lead	$4\frac{1}{2}$ cwts.	Of lead, including laying	24 0	5 8 0
All the windows to be glazed with good seconds glass in putty, and to be left clean andperfect at the completion of the works	Yds. Ft. 0 100	Superficial, seconds glass in putty	0 6	2 10 0
		Carried over ..		7 18 0

Plumbers' Glaziers', and Painters' Works.—Continued.

	Ft.	In.		s.	d.	£	s.	d.
			Brought over			7	18	0
The floor-joists to be stained brown with boiled oil and umber, and the joiners' and iron-work usually painted to have three coats of good oil colour, finished stone colour inside and chocolate outside, the woodwork being previously well knotted and stopped.	70	0	Superficial staining brown	0	2½	0	14	7
	108	0	,, 3 coats in oil, common	0	5	2	5	0
			Fourteen windows, 3 coats, 2 sides	2	6	1	15	0
						12	12	7

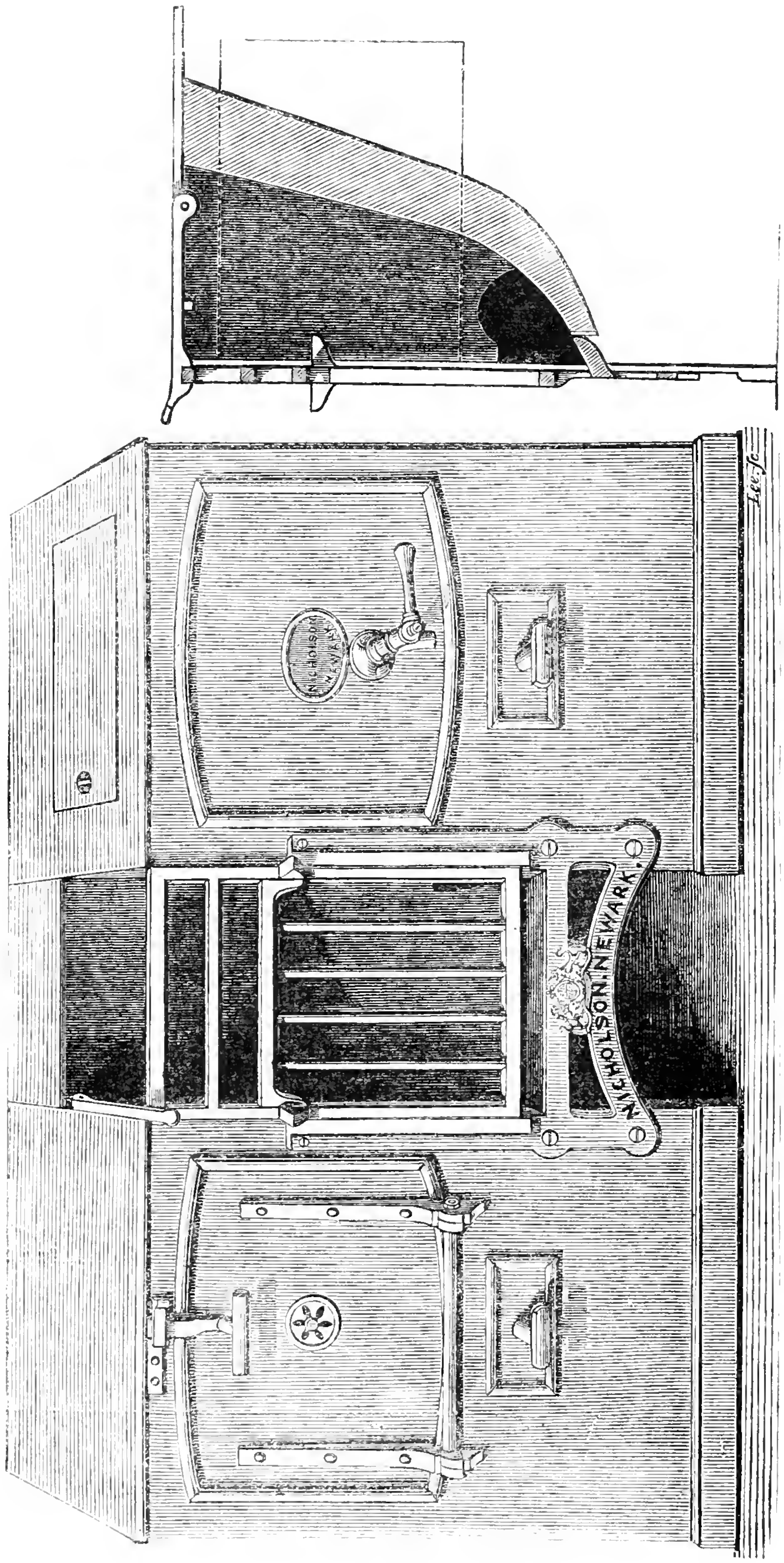
At the Offices.

	Yds.	Ft.		s.	d.	£	s.	d.
A lead suction-pump, to be fixed as shown, with strong working-barrel 1¾-inch suction-pipe, calculated at 7 yards in length, and the necessary bucket, sucker, and iron-work complete			No. 1 suction-pump	—		2	5	0
The doors and casings of the privies to be painted three coats, and the pump-case also	10	0	Superficial 3 coats painting	0	5	0	4	2
						2	9	2

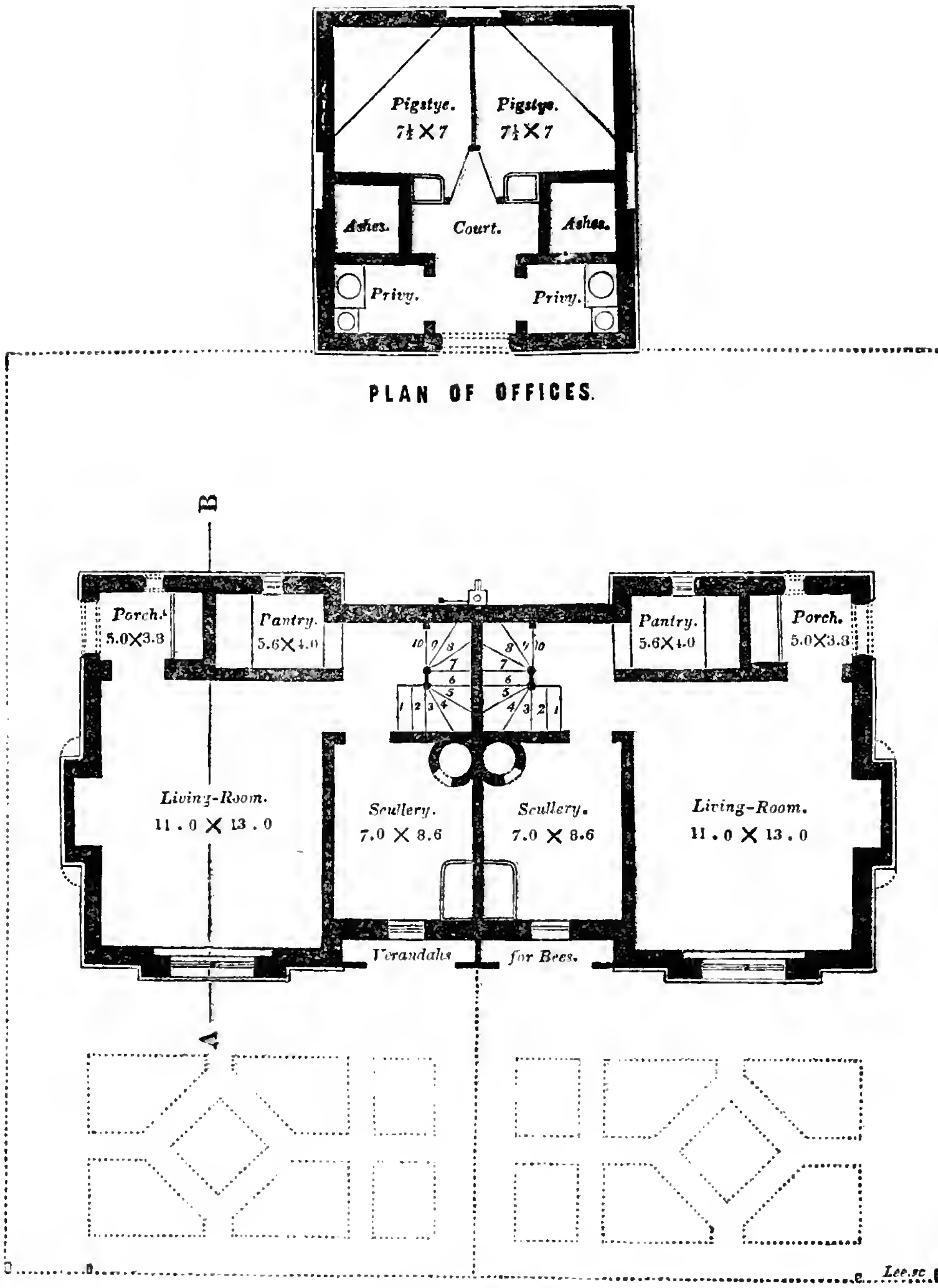
Summary of Estimate.

	At the Cottages. £	s.	d.	At the Offices. £	s.	d.
Diggers' and bricklayers' works	75	13	1	19	13	4
Masons' words	4	7	3	1	4	0
Slaters' and plasterers' works	35	10	9	1	4	7
Carpenters' and joiners' works	62	9	5	4	16	10
Smith's and ironfounders' works	10	4	10	—		
Plumbers', glaziers' and painters' works	12	12	7	2	9	2
Total	200	17	11	29	7	11
If bricks are made by the proprietor, stone for walling procured upon the estate, or other local advantages are available, deduct from these amounts at least 10 per cent.	20	2	0	2	18	10
Total	180	15	11	26	9	1

The verandah is an ornamental appendage, and will cost £3 15s. for the two cottages.

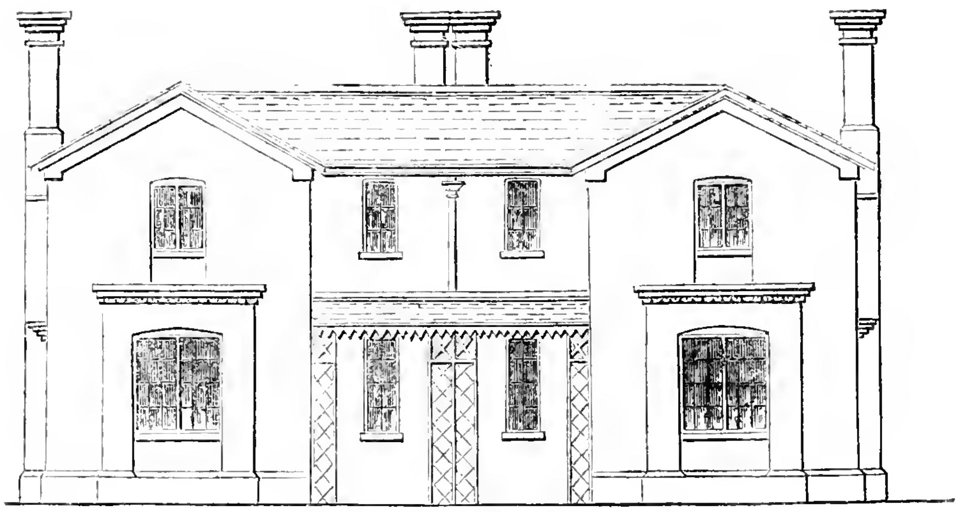


13-INCH COTTAGE GRATE FOR 3-FEET 4 INCHES OPENING.

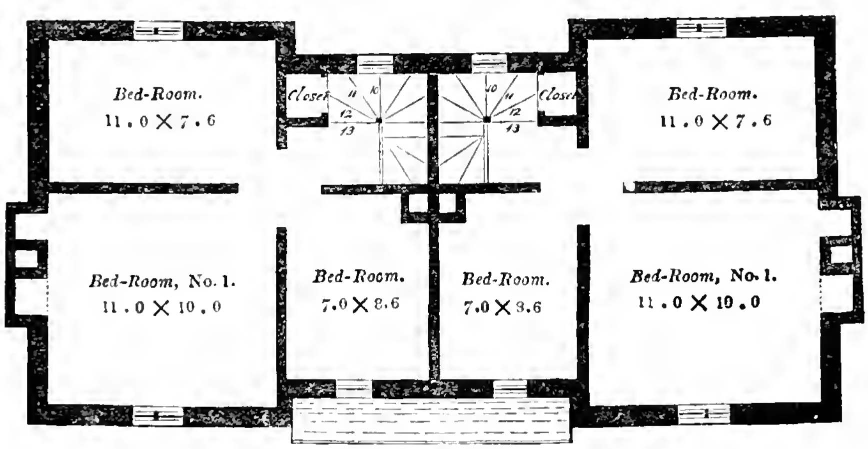


GROUND PLAN.

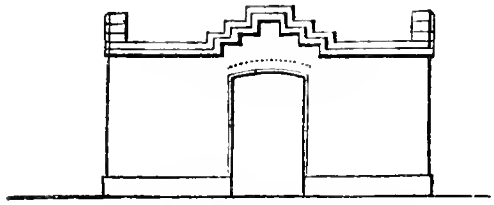
Road.



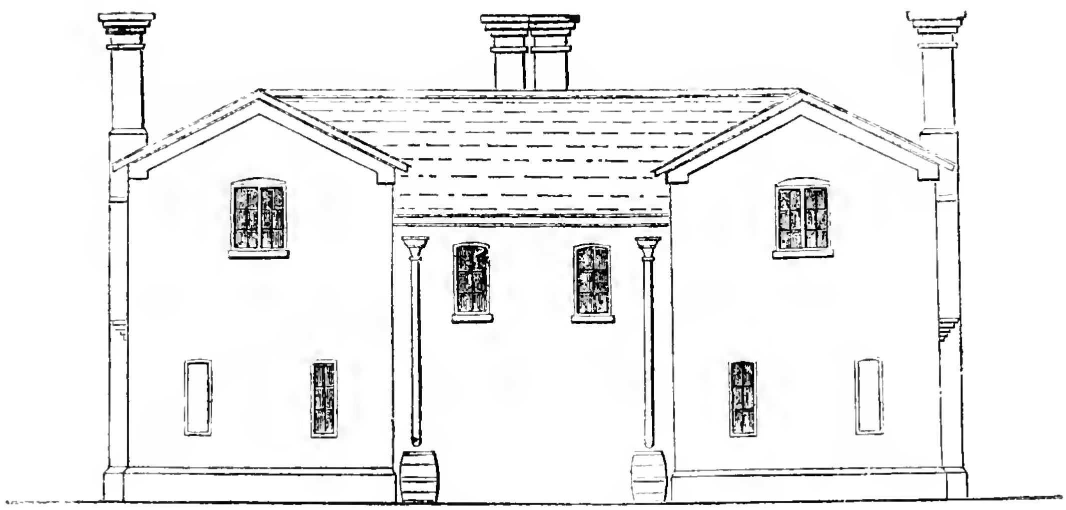
SOUTH ELEVATION.



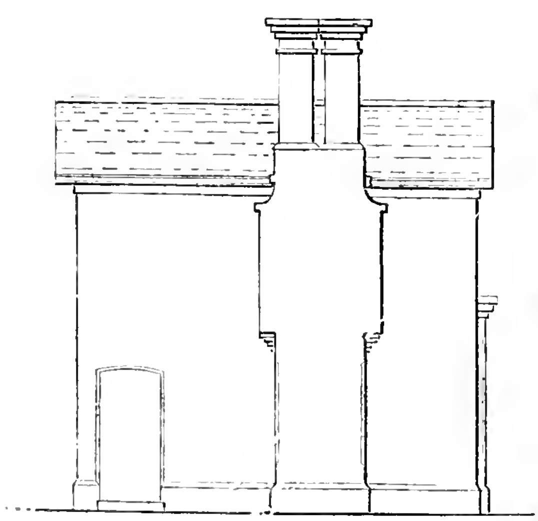
CHAMBER PLAN.



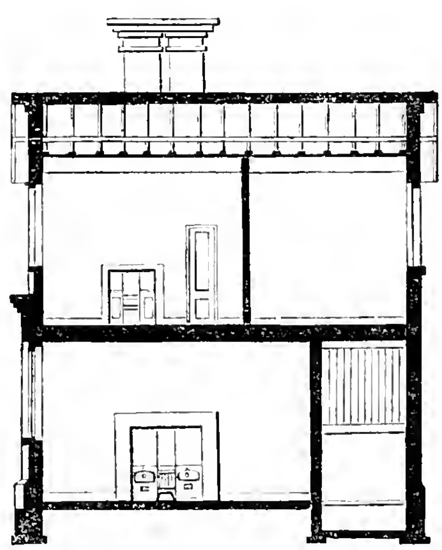
ELEVATION OF OFFICES.



NORTH ELEVATION.



WEST ELEVA ION



SECTION ON THE LINE A B

BOG EARTH, ITS USES AND IMPROVEMENT.

BY M. M. M.

Peat is a condition of the soil common within a certain range of latitude, and bog is a term applied to all peat when saturated with water. Bog, therefore, consists of a series of strata of dead vegetable matter, so antiseptic as to resist decay, and a superstratum of living vegetable matter on the surface, all saturated with water and holding it like a sponge. Like that also it admits of compression and dilation by the supply or deficiency of moisture, and so far is this the case that in some instances the low land becomes so elevated as to be absolutely changed into a hillock, and there are cases where strange commotions and changes take place; and the instances of moving bogs in Ireland and elsewhere, which have appeared so unaccountable, are attributable to this cause alone.

The extent of bog or peat earth in the United Kingdom is not very easy to estimate with accuracy. In Ireland the extent is estimated at from 2,800,000 to 3,000,000 acres. In England the fens of Cambridgeshire, Lincolnshire, Huntingdonshire, Northamptonshire, Suffolk, and Norfolk alone, extend over 680,000 acres, while Chat Moss is 11,520 acres. In Scotland there is still less aggregate information, but, in round numbers, one million of acres is not too much; and assuming an equal area in England, we have something approaching to five millions of acres of bog-earth in the United Kingdom.

Bog-earth in one respect differs from the category of soils, inasmuch as it does not always—indeed it seldom—partakes of the nature of the subsoil on which it rests. The sandstones, the granites, the limestones, have generally soils resting upon them of a character resembling, in general at least, the nature of the rocks on which they rest, and from which they have generally been disintegrated. A geological map, however, will give no kind of idea of the composition of a peat, because the moss of which it is composed differs so materially in its composition from the subsoil, inasmuch as it derives the most of its elements from the air or from water, and lying low it is more likely to derive its mineral matters also from the elevated ridges above it, than from the subsoil or rock below. Hence little idea of the character of the moss can be formed from its situation, or the strata on which it rests, as a general rule; still in situations like the fens of Lincolnshire, and those adjoining the estuary of the Great Level, it is quite probable that the bog will in a very great degree partake of the universal character of the sea-water, and contain chlorine, iodine, and the other mineral constituents prevalent in it.

Peat or bog-earth, is confined, as we have before stated, to no particular geological formation. The Fens, for instance, are on the Oxford clay, the Chat Moss on the red sandstone, the Scottish bogs on the granite, and the vast Irish bogs are principally on the latter formation.

Origin and Formation of Bogs.

A river is a channel through which the moisture from land springs, and rain, finds its uninterrupted way to the ocean; when mountains surround a deep valley on all sides, and the water accumulates, then is a lake formed; but when there is a low flat surface unadapted to the holding of deep water, and an impervious soil, as in the instance of the Oxford clay at the fens, or the red sandstone of Cheshire, so that the water becomes stagnant, a degree of semi-putrefaction takes place—a nidus is formed for the seeds of the fungi and musci which are floating in the atmosphere, and green vegetable forms of a low and indistinct character stretch themselves throughout the mass—aquatic grasses spread—the cryptogams get hold on the mass until the whole becomes one vast mass of living vegetation. In this state the laws of nature prevent it from continuing long—a struggle takes place between race and race—now one class, and now another assert their dominion—and as one set dies off it forms the bed of another, so that layer after layer is formed of a fibrous character; but sufficient of the tannin principle prevails, and sufficient moisture and pressure prevail to render the mass free from decay beyond a certain point. To this point it will go, and there it will remain for a period perhaps entirely indefinite. Into this, however, foreign matter may be occasionally introduced. Land springs in the sides of the hills which surround it may carry down in solution lime or magnesia, or other matter, and thus give to the peat a mineral character different from pure peat moss.

So much for the formation of bog on impervious low-lying plains; but small and shallow pools or lakes may be filled up by the bog-forming process above described. The state between wet and dry of the margin may, if undisturbed, excite the development of aquatic grasses, and the consequent accumulation of mud. On this the parasites will form, and continually tend to fill up the margin, and by small degrees form an inner circle of mud, which again undergoes a similar process, until the time is conceivable when the whole lake will become a mass of bog-earth, flow moss, or sterile peat, as it is called in one or other situation of the country.

So much for natural formations of peat-bog; they are processes similar to the wise provisions of Almighty superintendence for the great natural changes which are going on around us, and which show the admirable adaptations which exist for affording enjoyment and scope for the largest possible range of animated beings.

There are circumstances when an accident may tend to the formation of bog-earth. The case mentioned in the *Philosophical Transactions*, if well founded, is a very remarkable instance. The Romans under Ostorius having slain many Britons, drove the remainder into the forest of Hatfield chase, in Yorkshire, as a refuge, which at that time was said to be lowland, growing timber. The Conqueror, thinking he had them effectually in his grasp, took the advantage of a south-west wind then blowing, and set fire to the resinous trees, thinking to utterly destroy them. To avoid the effects of the fire, the Britons cut down a considerable number, and the wind blew down some of the largest which withstood the entire action of the fire and the axe. The fallen trees distracted the course of the slowly flowing rivers, and hence a large bog was formed by the stagnant water—the present site of Hatfield chase, so celebrated by Mr. Pusey in his account of Mr. Gossip's improvement there, by the addition of the soil from the old bed of the Don. Any other similar process of obstructing the free course of a stream, will necessarily lay the foundation of a bog by the accumulation of mosses, ferns, and mud.

The plants which generally compose the great bulk of peats, are the cotton grass (*Eriophirum*), rushes (*Eleocharis*), whence hair-like fibres run so far and so long amidst the decayed mosses; these with the *Sphagnun*, and other varieties, compose a great bulk of the bog-earth we meet with. When there are extensive and deep accumulations, the lower strata begin to change their appearance. The light fibrous mass becomes consolidated, a change comes over its character, it turns a deeper black, a bituminous deposit takes the place of the lowest strata of moss, and the process of coal formation is no doubt incipiently going on: so remarkable are the changes of large bodies of matter, for the change of bitumen to coal is not greater than the change of decayed moss to bitumen. In a recent paper read before the Royal Society, in the character of the changes of the valley of the Mississipi, there was an account given of the black mud which is being washed down from its delta, and this was borne away to the ocean at a lower stratum of that stream, and which marks the wake of the vessels as they navigate that river.

The formation of peat, however, is restricted to certain limits. In the tropics the decay of vegetable matter is so rapid, and the evaporation of stagnant water so great, that there is hardly time for the formation of peat-bog, and it is found in practice that the range of temperature between the parallels of some 40 to 55 degrees of latitude is necessary to its formation. Professor Johnston says, that though on the plains of Italy no peat is formed, yet on the higher Appennines it may here and there be met with among the marshy basins, and on the undrained mountain sides; this we apprehend is due to the temperature of these hill sides approaching that of the temperate regions between the parallels of latitude indicated above.

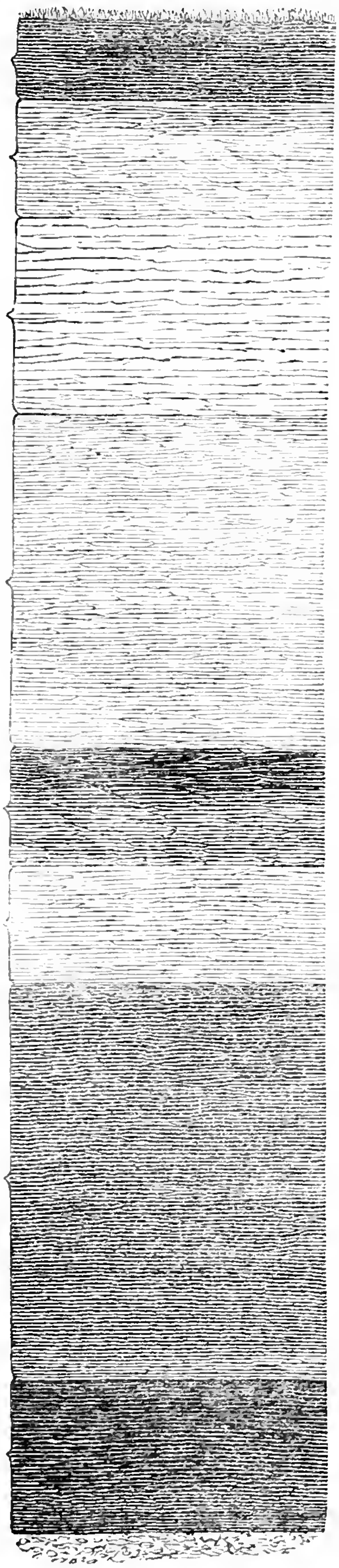
Composition and Uses of Peat.

There is a manifest difference in the different varieties of peat—as to colour they are red and black; as to composition they clearly depend on the nature of the decayed vegetable matter of which they are composed, and of the saturation in kind and degree they are subjected to from the surrounding district. Thus a bog consisting of a swamped forest of oak will be powerfully antiseptic, and will abound in tannin; one formed of the bed of a tidal marsh will abound in common salt; while every other modification will exist dependent on the alluvial deposit, or the springs by which it is permeated.

The accompanying sketch of a section of that celebrated bog, the Bog of Allan, in Ireland, is very instructive as to the varying composition of the same peat at various depths in different strata. Thus while the uppermost deposit is a mass of fibrous moss, the bottom is a black bituminous concrete: or, while the middle is a conglomeration of twigs and woody matter, it separates between the oily peat and that which is dry. Hence to take any one sample will far from represent the character of the mass. The Irish bogs, moreover, are of two distinct kinds—the black bog, most prevalent on the hill sides, and the red bog, more common on the plains; and we believe that while the one will be found the most productive of bituminous and inflammable materials, the other will contain the more oleaginous matter.

Nothing has startled the public more, nor afforded more matter for the wondering gossip-mongers of the age, than the statement of Mr. O'Gorman Mahon. He stated, on the faith of an eminent chemist, that the peat bogs were to be an interminable magazine of chemical ingredients of great value; and Lord Ashley went further, and furnished the details of the value of the materials which might

DESCRIPTIVE SECTION OF 38½ FEET OF THE BOG OF ALLEN.



be obtained from them. He also stated the great amount of reliance to be placed in the character of Mr. Owen, who was the author of these wonderful discoveries. Every ton of peat he said cost £5, and cost of labour upon it was some £8 more. In 100 tons, Lord Ashley says, there are of carbonate of ammonia 26,062lbs., worth £32 10s.; soda 2,118lbs., value £8 16s. 6d.; vinegar 600lbs., value £7 10s.; naphtha 30 gallons, value £7 10s.; candles 600lbs., value £17 10s.; Camphine oil 600lbs., value £5; common oil 800lbs., value £3 6s. 8d.; gas, value £8; in all waste ashes, value £1 13s. 4d.: equal to £91 16s. 1d. Mr. O'Gorman Mahon expected from this discovery a reduction in the price of oil, from £90 to £95, to the sum of £30; and to reduce iodine from £17 to £5, making out a similar reduction in the several articles of produce of which this peat was capable of being distilled into.

The pleasure of this promising, too promising dream, which reminded us more than anything else of the calculations of the father of the celebrated Tristram Shandy, has been somewhat softened down by the letters of Mr. Owen, who has made experiments at a cost of £20,000, but is sorry to say that the scheme has not yet realized his expectations. Like Tristram's father, "whenever he took pen and ink in hand, or set about the simple expense of paring, and burning, and fencing in the ox moor, &c., with the certain profit it would bring him in return, the latter turned out so prodigiously, that you would have sworn the ox moor would have carried all before it: for it was plain he should reap a hundred lasts of rape at twenty pounds a last, and the very first year, besides an excellent crop of wheat the year following; and the year after that, to speak within bounds, an hundred —but in all likelihood an hundred and fifty, if not two hundred—quarters of beans and peas, besides potatoes without end."

To the rescue of the Irish bogs, however, has come out, Mr. Richard Oxland, of Plymouth, with the Dartmoor peats. 100 tons he says produced—

		£	s.	d.
Charcoal, 33 tons	value	33	0	0
Peatine, 100 gallons	,,	10	0	0
Common oil, 50 gallons	,,	2	10	0
Naphtha, 30 gallons	,,	7	10	0
Acetic acid, 168 gallons	,,	16	8	0
Crude tar, or vegetable tallow, 33 cwt. 14lbs.	,,	16	10	0
Sulphate of ammonia, 7½ cwt.	,,	5	12	6
Gas	,,	8	0	0
Ashes	,,	3	6	8
		£102	17	2

The soda, Mr. Oxland explains, is not found in the peat, but is merely used in the production of the other ingredients. In the recent list of patents is one for extracting the inflammable materials from peat by means of hot and cold blasts—evaporation and condensation, as we imagine.

Professor Johnston, when occupying the office of chemist to the Scottish Agricultural Chemistry Association, analyzed black, white, and Dutch peat, and gave the results of each as follow. The two former from Paisley moss:

	White.	Black.	Dutch.
Organic matter / Charred turf	54.12	3.02	25.77
Potash and soda, sulphates of	6.57	5.16	2.78
Alumina	2.99	2.48	11.19
Sulphate of lime	10.49	21.23	16.35
Carbonate of lime	8.54	3.50	1.21
Oxide of iron	4.61	18.66	—
Oxide of manganese and magnesia	—	—	3.39
Phosphate of lime	0.90	0.40	1.24
Silicious matter	10.88	43.91	37.24

Before incineration by treaty with alcohol, the Professor obtained 1.75 per cent. of wax and resin from the natural peat soil of Lews.

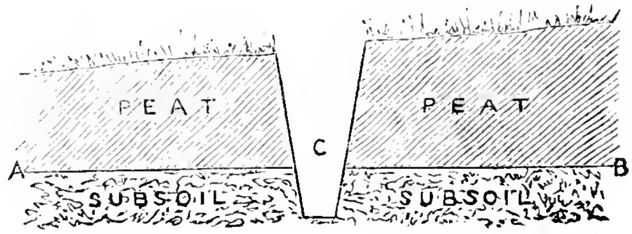
Mr. Jasper W. Rogers is well known as an untiring advocate of peat ashes as a deodorant, and promises great things both to the health and the pocket from the use of these for deodorising the cloacæ of London. He urges the value of the Irish peat-charcoal as an absorbent, being capable of absorbing eighty per cent. of water, and keeping it locked up for the benefit of the soil, and taking up also the offensive gases of the night soil.

This, he says, is one of the most valuable of manures, being one-third charcoal, and two-thirds night soil. His calculations also make out that a family of six in London, would in the course of a year, if subjected to the influence of the agents, yield £30 per annum. The cost of the charcoal he makes out to be £15 per annum, leaving a clear profit of £15 per annum—or in the whole of London a saving of three millions per annum.

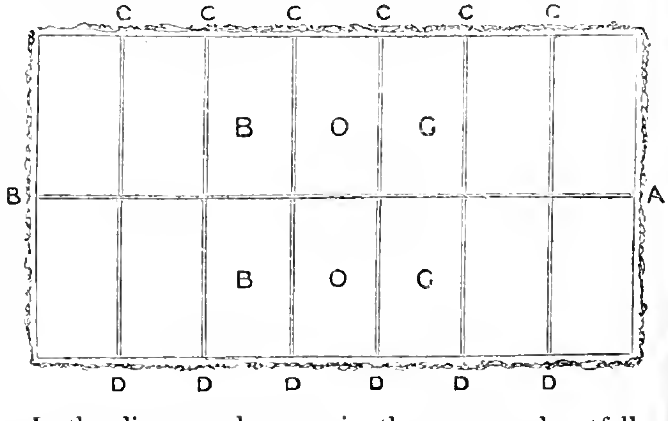
On the subject of peat charcoal Mr. Raynbird, in his prize essay, says, "Carbon or charcoal, either prepared from wood or peat, may be said to derive its use as a manure from its property of absorbing moisture, as well as from its power of taking up the different gases, particularly ammonia. Charcoal by absorbing moisture keeps the soil sufficiently damp for the vegetation of the young plants, besides giving out its stores of ammonia and other gases to assist in their future growth. Another valuable purpose to which peat charcoal may be applied is that of fixing the ammonia and other volatile bodies that arise from liquid manure; and it may also be used for the same purpose by mixing it with the common manure heap."

Improvement of Peat soils.

The reason why peats are firmer, as we have seen, is the presence of stagnant water; on these, plants suited to moisture and to coldness will grow and progress, while the same moisture and coldness will prevent the decomposition of the half decayed mosses, and the only reason why these are present and dominant is, that no other plants will grow. Hence an outlet must be made for the water, but a new element has entered into the aid of the water. The spongy texture of the soil holds the water both by mechanical and capillary attraction, and until this is got away there is no hope whatever for any cultivated crop. The first great object is to intersect the whole with sufficient main drains to carry off the whole of the water which may afterwards drain from the land. Finding out the lowest level, and obtaining all the advantage of outfall practicable, one main drain must, if possible, go deeper than the peat, thus:



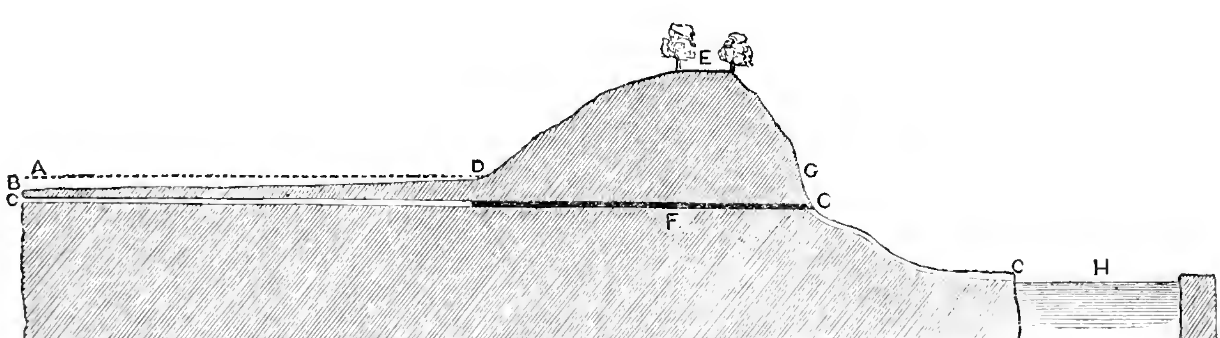
A double object will be served by this process. The great weight of the water is at all times resting on the impervious substratum; a conduit cut below this will immediately cause a current in the direction of AB of the section above, as well as from the body of the peat itself; whereas if the drain was cut only to the point C, the whole would be re-absorbed in the mass of the peats. Another advantage is that if a drain is cut in peat alone, there will always be so much enlarging and diminishing of the matter of the peat, that the drains will soon have the tendency to fill in. The most convenient mode is to cut the bog into as many squares as possible in the first instance, because there is with this mode the advantage of extending the frequency of the drains on a principle, and with accuracy without much admeasurement.



In the diagram above, A is the supposed outfall, and B is the head; the line A B being the line of the main drain; C D C D are sub-mains, and by these the whole is reduced to a system of tapping. All these, we suppose, cut into the firm, impervious subsoil below. These must be allowed to run until the bulk of the saturation is drained off, and immediate consolidation and drying succeed. If the process above does not take off a sufficient quantity of water to allow the tool and the foot to operate readily, it will be perceived that each of the rectangular portions is just as capable of being intersected in the same way as the above, and this may be carried out to any extent that may be deemed necessary. It does not always happen, however, that the drains can be cut to the requisite depth in the first instance. They may require taking out piecemeal: it sometimes happens that the moss is so springy and spongy, that this process is quite necessary before any permanent drains can be cut. In speaking, therefore, of aiming to penetrate the sub-stratum, it must quite be understood as a process which is necessary to the permanent recovery of the bog, rather than as a primary operation to be effected in the very first efforts at improvement.

The principles adopted by Mr. M'Culloch, at Auchness, are those of which we so highly approve, that we cannot refrain from giving an outline of them. Naturally the moss land was worthless, of a brown colour, and very light. It is too deep to be cut entirely through, but the depth gone to is as much as practicable, and at the very least 54 inches. "The drains are made at intervals from 18 to 24 feet apart. A greater space than this has been found comparatively unsatisfactory. A certain portion is reclaimed every year, the first operation on which is to cut the drains within 18 inches of their full depth, in which state the land is left to subside and consolidate for a few months. The drains are then cut to their full depth, and after being laid with tiles and soles are filled up."

The moment the water begins to be abstracted, a subsidium of the surface of the peat will take place. This will arise from two circumstances. The water insinuating itself between the porous peat causes it to swell and expand in every direction, and this being abstracted, a natural shrinking takes place; but the admittance of the oxygen of the air has also the effect of decomposing the matter of the peat, and so far causing a degradation of the surface. The drainage of Everton Car was a remarkable instance of this peculiarity. The drainage was laid out under the direction of competent parties, and lying lower than the Trent, into which it must discharge itself, an engine was put up, but no sooner had the whole of the operations of drainage been carried out, than the whole Car settled down, and the drainage was found inadequate to the new and altered condition of the soil. Another effort was made to remedy it, and by this means great power was obtained over the water, but the soil still subsided, and, so much so, that when a sudden rain came from the high lands of Nottinghamshire, the whole was flooded. In order to prevent this subsidence from being still more fatal to the cultivation of the soil, the water is kept in a dry season about three feet below the surface, and although this is very objectionable as regards the productiveness of the crops, as being affected by the presence of water so near the surface soil, still it would be a lesser evil than allowing the surface to subside so low as to be liable to be totally covered in a season of sudden rains. We are acquainted with an estate of which the accompanying diagram will give a very accurate idea. The low part of the farm was peat bog. The high-lying land superior grass, and the latter separated the former from the river which was at the bottom of a rich alluvial valley. The effect was, that as the surface receded, the drains became relatively shallower as regarded it; and as



SECTION OF DRAINAGE OF LAND AFFECTED BY SUBSIDENCE.

A D Original level of the land.
B D Level to which it has at present subsided.
C The drain.
F The tunnel drain.
D E F G The hill through which the drainage had to pass.
E A Turnpike-road.
H The river into which the estate was drained.

the drains, and above all the tunnel, did not, and could not sink, there was a continual liability in the whole of the land B D to flood. The only remedy for this is obviously to deepen the tunnel; but this single instance should be a beacon to warn all improvers of peat bog, that in cutting outlets they should be careful to exercise the greatest possible degree of caution, lest the whole of the expense and outlay should become useless, or nearly so, as it was in the case cited above.

The land once bog thoroughly drained—and a frequent drainage will be found necessary as the capillary attraction of the bog is so powerful that drains do not drain very far, there is then a vast mass of inert vegetable matter, amongst which few plants will live. There is a want both positive and relative of mineral matter—most frequently of sand, and lime, and alumina, but chiefly of the first-named article only.

There are two ways of removing this difficulty. The first is by burning out the vegetable matter on the surface, and so altering the relative proportions of the mineral constituents, with that part of the soil at least, which occurs on the surface—leaving washing, oxidation, and the multifarious changes, mechanical and chemical, which drainage and cultivation combined exert upon reclaimed bog to effect the changes necessary to the development of cultivated plants. On the subsequent treatment of his improved moss land, described above, as quite worthless, Mr. Caird, of Baldoon, describes Mr. M'Cullock's plans. After drainage "the land is thinly ploughed, and the surface which is so tough with heather roots that it is not possible to break it down with the harrows, and from its peculiar character is found unprofitable to burn, is carted off to fill up holes and irregularites in the ground. The under moss is then ploughed and harrowed frequently during the summer, and a favourable time taken to cart on sand or gravel (from an adjacent bank), which is applied at the rate of 300 loads to the acre. This is immediately spread over the surface and ploughed in, in which state the ground remains during the winter. In spring the manure is applied, and the seed planted in the same quantities and manner as on the remainder of the farm." The cost of the entire process was about ten pounds per acre.

No sensible person would, after the experience so many have dearly bought, think, we apprehend, of sowing a white crop on improved peat land. To take this step is a certain failure. Green crops, which require large portions of carbon, are those which ought always first to be taken to decarbonize the soil, and then white crops may be taken with impunity. A striking instance of this is given in the North Riding of Yorkshire *Prize Report*, p. 17. Mr. Rob, of Thorpfield, dug over some peat land, and expended from £4 to £6 per acre in this process, and £4 17s in draining per acre Part of this land was sown with oats, in order to get the mass somewhat reduced, but the crop was less than the seed sown. The remainder was ploughed, harrowed, and three chaldrons of lime applied per acre in the same season, and turnips were drilled with bones. These turnips were consumed upon the land with sheep, to which a quarter of a pound of linseed cake was given per head per diem. Oats were then sown, and the produce was seventy-eight bushels per acre! Surely this should be a caution to all who are too ready to set about growing corn.

The object of the improver is to obtain green crops, and all the rest must and will follow. If possible some sand or clay, or road scrapings should be obtained, or the soil from the drains, if any, should be carefully spread on the surface. We do not say that lime will not accomplish all that is necessary—so surprisingly will plants substitute one mineral for another in their constitution—but inasmuch as the quantity to apply is generally very large, and as the former materials can be generally had for little more than the cost of cartage, and lime has to be purchased, one hundred tons of sand, clay, gravel, road scrapings, or soil of any kind, and three or four tons of lime, will be found all that is necessary to place the whole in a condition fit for the growth of green crops. On such soils the lime acts in a way peculiar to itself. Applied as it should be in the state of hydrate, or water-slaked, immediately after the clods have fallen, it operates to aid very rapidly the decomposition of the inert vegetable matter of the soil—forms combination with the free sulphuric acid, which often occurs in peat, and which it changes into gypsum, as well as modifying the whole of the soil with which it comes in contact by decarbonization of the inactive soil.

But this is not all. Peats, abundant in carbon and the sulphates, and sometimes in the chlorides, are generally remarkably destitute of the phosphates—elements of all others, perhaps, the most desirable for the growth of all crops, but especially green crops. Hence we find that bones, of all other manures, are the most useful to peat soils; and most providentially that kind of manure is so portable and easily applied, and requires so little cartage, that it is well adapted physically, as well as chemically, for such soils. It is by no means certain whether bones, raw or dissolved, are the most serviceable upon peat soils. We are not aware of any experiments being made on soils very recently reclaimed; but we infer from the presence of sulphuric acid in most recent peat soils, that the advantage in this respect obtained on other soils will not be realized in these—at any rate, to the same extent—

and the raw bones will, under ordinary circumstances, give off their sulphuric acid in such soil with as much freedom as the plants will require it from them. Whether it is the change in the gelatine by the tannin of the bog, or whether there is sufficient free acid in it to take up the lime of the bones, is not, perhaps, yet settled, nor easy of solution.

There is, moreover, this difference between a peaty soil and an ordinary one: that, in the former case, *lime and bones* may be applied to the same crop with impunity—nay, with advantage—while in ordinary circumstances they will be found to neutralize each other in a most remarkable manner.

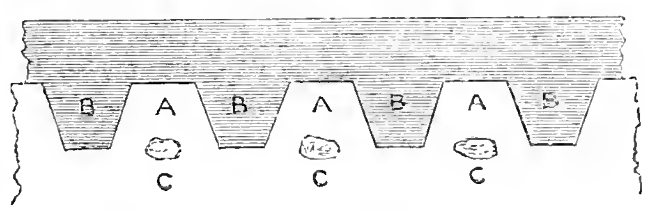
The sheep-treading of peat earth is, of all others, perhaps the very best preparation for corn crops, and especially wheat. For this reason a small quantity of linseed cake given to the animals will serve the two-fold purpose of keeping them longer upon the land, and so improving and consolidating it by their droppings and treading. But the oleaginous character of the cake itself will have the tendency to bind the too elastic particles of the peat together, and render the soil more fitting for the roots of corn plants, which otherwise would have, in a soil so porous, to overcome a too large supply of oxygen.

As to the after-cultivation of peats, it is only necessary to say: where the peat is of the chloritic character, oats and mangel wurzel will be indicated. Mr. Raynbird, in his supplement to his "Prize Essay on Suffolk," thus speaks of the cultivation of a farm in the fens. It "consists of about 300 acres; the soil is a peat 5 feet in depth, under which there is a beautiful clay or marl. The dyke drainage is very good. Within the last nine years the occupier of this farm has twice marled the whole of it, each time spreading from 250 to 270 loads per acre (27 cubic feet per load); in all, say 500 loads per acre, at an expense of £8 per acre. Nine years ago the total produce was under 200 coombs, reckoning all kinds of seed (of which there was very little wheat), and there was no stock except horses and colts. The price of cutting wheat was then 5s. 6d. per acre. At this time (1846) the produce is more than quadrupled. Large numbers of sheep are fed both in summer and winter, cattle are grazed, as well as a considerable number of pigs. Wages this year for cutting wheat are 12s. per acre. Wheat has taken the place of cole seed. Mangel wurzel, swedes, and common turnips are as good as I have ever seen, and a regular system of four-shift husbandry is adopted:—

1st. Mangel-wurzel, swedes, and white turnips, folded off by sheep, or carted off for cattle.
2nd. Oats, barley, or wheat.
3rd. Red-clover or rye-grass.
4th. Wheat.

"About three horses are employed to the 100 acres, 54s. per acre are paid for yearly labour, and the drainage tax is about 5s. per acre. The wire-worm is one of the greatest enemies of this district; but by growing a crop of mustard this evil has been found to be lessened. Eight to ten pecks of wheat are drilled as seed per acre; half a peck of coleseed per acre is drilled; twelve bushels of bones per acre are considered the best manure for cole; twelve bushels of bones, with five loads of farm-yard manure, is given for the turnips."

The great difficulty experienced in all crops is to obviate the effects of drought and frost. They both affect the plants, but in different ways. The drought causes the fibres to shrink, and a general cracking of the soil takes place. This exposes the roots of the plants to the action of oxygen, and the plants sicken, and the produce is stunted. On the frost exercising its expanding and contracting effect on the soil, the wheat plant is often thrown out, and the soil absolutely refuses to afford a firm seed-bed to the roots of the plants. The turnips suffer less by this; but an ingenious and simple contrivance has been adopted to earth-up the turnips when sown on the flat in a slight degree, so as to obviate the necessity of sowing by the ridge system. This is effected by a piece of grooved wood following the drill, so that the indentation in the wood may follow the coulter of the drill, and the projecting pieces may throw up the earth so as to leave the impress of the section of the wood, as under:



Here the pieces of wood B B make the interstices of the furrows, and leave the ridges A A, in which the manure C C and the seed are deposited on the flat. Thus, in the ridging there is no loss of moisture.

The following is the mode in which Chatmoss was improved, or the cultivated part of it.

The bog consists of a long, coarse, sedgy grass, and heath, tough enough to enable a man to walk upon it in most parts; but after boring through the surface vegetation there is a mass of soft peat thirty-four feet deep, then six inches of clay, below that two or three feet of quicksand, and at the bottom of all hard clay. The railway, in fact, is carried over the surface and floats upon this bog. Many efforts have been made to reclaim Chatmoss. The late Mr. Roscoe attempted to drain 2,000 acres, but failed; chiefly from laying open his drains too deep and too far apart. A company, under the direction of Mr. Reed, have since accomplished the object. This was in 1832. The following is the process by which the reclamation is effected:

The drainage was the first step to improvement. This was effected by cutting open parallel ditches 66 yards apart, 4 feet wide at the top, and sloping down to 14 inches at the bottom, and 3 feet 6 inches deep. In a wet floating mass like this moss it was not possible to sink the ditch to the whole depth at once. The first two soils being out, it was then left for time to consolidate the surface. The covered cross drains, 10 yards apart, laid 3 feet deep, and running into the open ditches, were commenced; but in forming these, as well as the open drains, it was necessary to allow some time to elapse between the different operations, that the water might to some extent run off. The hollow drain was made by the top sod, dried by exposure to the air, being wedged into the open cut, and the peat thrown in again upon that to fill up. When the surface was partially dried, the heath and other plants growing upon it were set on fire, and burnt off as closely as possible; and by ploughing and cross ploughing, and cutting up the sods with a roller armed with knives (the ingenious contrivance of Mr. Reed), he was enabled to destroy the tough and elastic character of the surface. After this process, marl, which was found at the southern edge of the moss, was, by means of a moveable railway, laid on the top, to the amount of 100 cubic yards to the statute acre; the average distance which the marl had to be removed being about two-thirds of a mile. Whilst these operations were in progress, I went over the moss with Mr. Reed, and remember that both men and horses were obliged to work with pattens or flat pieces of wood attached to their feet. By means of the Manchester and Liverpool Railway, then in full operation, Mr. Reed was enabled to bring from the former town any quantity of manure; and he found that a mixture of night-soil and ashes were preferable to anything else. By growing a crop of potatoes in the first instance, the different particles of moss, earth, and manure, became so thoroughly blended together, that the soil formed would produce anything; and wheat, clover, and oats followed each other in successful rotation. Since Mr. Reed left, some years ago, the management has been entrusted to Mr. Evans, now of the Haigh Foundry, Wigan; and it has been discovered by experience that it is not adviseable to grow wheat or clover on such lands. Turnips, oats, and potatoes, are considered the best crops; and instead of marl, which is both bulky and heavy to move, it is now ascertained that salt mixed with lime is the most effective instrument in destroying the mossy nature of the surface, and prepares it for a first crop of potatoes; these grow exceedingly well on moss lands unmarled, but if marled their failure is as general as on other soils.

In improving peat there is another great advantage, that you may add to it any kind of new matter whatever. Chalk, lime-stone either pure or magnesian, sand, shells, clay, marl, hedge-sides, road-scrapings, stones—nay, any kind of new matter, however worthless in itself it may be; and the ordinary safeguard we find it necessary to exercise in these cases may be safely dispensed with, the peat affording as great a counteracting medium for barren sand as for the caustic phosphates of the magnesian lime; and, indeed, we are by no means certain that, dismissing the fact of the mountain lime often containing phosphoric acid—a constituent *most* desirable for peaty soils—that the magnesian lime in itself is not the best application of the two.

Sowerby, Thirsk, Yorkshire, Sep. 10.

ON THE USE OF RAPECAKE AS FOOD FOR STOCK.

By Ph. Pusey, M.P.

Two kinds of oilcake, as is well known to farmers, are used in high cultivation—one the refuse of flaxseed, linseed-cake, for the feeding of stock; the other, a less expensive article, the refuse of rapeseed, as a manure for wheat. Having been informed by a French farmer that it is the practice in French Flanders to mix rapecake with oilcake in the proportion of one to two for the nobler purpose, I tried the experiment last winter, when linseed cake cost about £9 and rapecake about £5 per ton.

The cheaper cake, having a hot taste, was mixed with the other at first in the proportion of one-tenth, and the fatting tegs, half-breds chiefly, but a few of them Downs, ate the mixture with little reluctance. The admixture of rapecake was gradually increased until it reached the proportion of one to three, or one-fourth of the whole, when symptoms of mutiny showed themselves, and we did not think it expedient further to adulterate the rations, but continued at that proportion; and among more than 400 tegs so fatted no mishap occurred from the use of rapecake, though occasional symptoms of purging arose. The rapecake was tried with some fatting heifers,* but as they did not take to it readily, and were in an advanced state, I did not think it worth while to

* I propose, however, trying it next winter for cows kept in the yard upon mangold-wurzel and barley-straw, as was done successfully last year on Sir Robert Peel's farm at Drayton Manor. Unless the cake scoured the cows, it must, if given in moderation, improve, I should think, the quality of the milk.

press the point with them, for fear of throwing them back in condition. In Flanders, however, horned cattle are fed partly with rapecake. The most decided success was with about 60 old Down ewes, which, having borne twin lambs, were kept apart as usual to receive better food. These being more sharply set than the fatting tegs, allowed my shepherd gradually to increase the proportion of rapecake until *no linseed-cake was given at all.* This of course is an important saving, if the cheaper cake be as nourishing as the dearer one. In that important respect my shepherd could observe no difference; but the question seemed to be fit for chemical analysis, and was referred by me to Mr. Way, whose answer was satisfactory, being as follows:—

"I have had an analysis made of the rapecake you sent me: it contains

Nitrogen	5·23 per cent.
Oil or fat	11·63 per cent.

In neither of these particulars does it much differ from linseed-cake, of which I have examined eleven specimens, containing on an average

Nitrogen	4·60 per cent.
Oil or fat	11·90 per cent.

The oil is in general about from 12 to 14 per cent."

As these two ingredients, nitrogen and oil, represent in Mr. Way's opinion the feeding properties of cake, science appears to confirm the experiment, and I cannot but hope that it may be useful to farmers, as justifying a saving of some considerable amount in preparing their sheep for market. I will only add, that though the use of rapecake as food has had no bad consequence with nearly 500 sheep of my own, I hope that any one who is disposed to give it a trial, will do so gradually and with caution, lest any unforeseen injury be the consequence.

Pusey, May 21, 1849.

—Journal of the Royal Agricultural Society.

THE DUTY ON BRICKS.

The *Shropshire Conservative* has the following remarks upon the duties on bricks:

"The duty on bricks was 2s. 6d. per thousand when first imposed in 1784, but was increased at different periods from 1794 and 1806, in aid of the war expenditure, to 5s. 10d. per thousand. Additions have been made, higher rates levied on the finer kinds of bricks, and drawbacks allowed for damages, which make the present duty to stand at or near to 7s. per thousand. Though this be a considerable addition to the price of a cottage containing 15,000, or to an ordinary street-house containing 50,000 bricks, the evil operation of the tax is not seen in the enhanced cost of price: the house is in many essential parts weakened by the absence of bricks which should be used to give it solidity. But the evil influence of the tax is more apparent when examined at the brickfield, where the article is in process of manufacture. There a certain mould of legal size must be invariably used. A builder might come and say he was desirous of bricks of different sizes, that he might build a house better apportioned, as to strength and solidity, in its different parts; but the exciseman says: 'Not so; the law has settled the size of bricks, and the quality too.' The builder may rejoin: 'Is my experience in the construction of dwellings and churches and railway arches to go for nothing? Has the world learned nothing since 1784?' The exciseman says: 'Railway arches might not be known in the year 1784; but the law of that time has ruled what kind of bricks you are to build them of.' Next, there are the makers of the bricks. In the neighbourhood of large towns the excisemen visit the brick-fields pretty regularly, to take an account of the work done—perhaps once a day; but in remoter places they cannot do so, unless there were an exciseman appointed to each place of work. For this reason, villagers or farmers who would make their own bricks to build their own houses must not do so, because they have not an exciseman living beside them. They must send to great distances, where it is convenient to make the article under the supervision of the excise. Even where the officers visit the works once a day, the inconvenience and loss to the operatives at work are ever recurring. They are bound to lay their moulded clay down on certain spaces, and on those only, from which they must not remove the pieces until account has been taken of them for duty. Nor must they lay more on those given spaces than the officer allows: if full, they must stop work. If rain falls, and reduces the moulded clay to mud, or otherwise disfigures it, so as to be unfit to be sent to the kiln for burning, the duty must be paid, though the clay be returned to the pit, to be again worked up for the moulder. The lost labour falls to the operative brickmaker, while their employers lose the duty. Those accidents from weather would seldom occur if the makers were allowed to remove their bricks at any time, or lay them in any place. In every respect the brick duty is an unqualified evil."

PRACTICAL VENTILATION.

BEING RULES AND INSTRUCTIONS OF EASY APPLICATION FOR VENTILATING PUBLIC BUILDINGS AND PRIVATE APARTMENTS, WITH PRACTICAL SUGGESTIONS FOR THE CURE OF SMOKY CHIMNEYS.

BY R. S. BURN.

Although we do not intend to adduce many of the striking evidences in our possession, illustrative of the evil effects of foul air on the human system —still, believing as we do, that much is needed to arouse many individuals to the danger of breathing deteriorated air—we hope our short introductory remarks will prove to such of some benefit.

A large supply of pure air is as necessary for the support of life as nourishing food. This is evident when we consider the nature of air—its healthy or unhealthy action on the human frame, just as it is pure or impure in its quality. The change from pure to impure is effected by the operation, which is a constant action in the body; the result of which is a continual interchange between the blood and the atmosphere; the air receiving from the blood the carbonic acid gas, and other impurities; and the blood receiving from the air a large proportion of its oxygen, thus imparting to it the purifying and life-supporting principle. Now, when we consider that it is upon the proper action of such operations that the health of the body depends, need we wonder at the many and fatal diseases which result from the repeated inhalation of the same portion of air?

"Independent," says an able writer on the subject, "of the more serious evils, there are various minor evils that often prey upon the constitution when the air is of inferior quality; the long-continued action of the vitiated air gradually undermines the tone and strength of the stomach; the appetite diminishes, and the citadel or mainspring of the constitution being thus disabled or destroyed, all the other powers of the system also gradually give way."

Dr. Guy states that consumption is caused in many cases amongst the poorer classes, who are confined in over-heated and ill-ventilated workshops at sedentary occupations; and he says decidedly, that he believes non-ventilation to be a more fatal cause of disease than all others put together. Dr. Robinson of Newcastle says,—

"Among the many diseases which have been directly traced to this source, may be mentioned typhus and other malignant and pestilential fevers —consumption, and the different forms of scrofula, disordered digestion, and nervous complaints; whilst, as a predisposing and aggravating cause of disease, its noxious influence extends throughout every variety of bodily affliction to which mankind are subject."

In addition to its influence in generating disease, defective ventilation also materially contributes to its propagation: a certain degree of concentration generally appears to be necessary for, and invariably predisposes to, an attack of fever. We could go on multiplying examples of the bad effects of foul air in the human body; but we shall refrain from further investigating this very interesting subject, and conclude our introductory remarks, by quoting the words of an eloquent writer on the subject:—

"Nor is there one among the many questions thus forced upon the attention of every civilised community, which is in itself so important, or the correct solution of which is so indispensable to the preservation of health, as the investigation of the *best and simplest means* for providing, in every space occupied by human beings, a gradual but constant interchange of air. Innumerable are the catastrophes, some of sufficient magnitude to occupy the page of history, which testify to the necessity for man carrying out in his dwelling the same principle upon which nature has proceeded in the fabrication and endowment of his body. She has, by a simple and efficacious process, provided for the ventilation of his lungs; and it is for him, using the reason with which he is blessed, and imitating the beneficent provisions indicated by science, to direct through every place which he inhabits a gentle current of that invisible atmosphere, which was intended to be the source of life, but which has hitherto been too frequently a transmitter of disease and death."

In ventilating buildings we have endeavoured to attain to a mode not requiring expensive machinery, or complicated arrangements. Being aware that a very considerable degree of ignorance prevails as to the importance of ventilation, and that many are deterred from carrying useful plans into effect from the fear of incurring great expense, we conceive the best way to remove the prejudice, is to prove that, in the case of ventilating buildings already constructed, the expense is inconsiderable, while the incorporation of the plan with a building not executed, the expense is truly a trifle. As a fitting introduction to our rules, we propose giving a few remarks on the nature of ventilation.

Ventilation proper may be divided into two classes—artificial and natural; the former being effected by means of machinery, as fanners, pumps, screws, &c., and we may here specify firedraught;

and is divided into two modes, called the "plenum" and "vacuum" impulses—the plenum consisting of machinery for pumping or forcing air into the interior of a building, allowing the foul air to escape by openings provided for its exit; the vacuum, of machinery for *extracting* the foul, and allowing the fresh air to enter by the chinks of the doors and windows, or through proper apertures. Natural ventilation, on the contrary, does not depend on machinery for its effects; but, in the words of Dr. Reid—

"It is a process by which movements are induced and sustained in the air, in the same manner as wind is produced in the external atmosphere. The specific gravity of air, when deteriorated by respiration and combustion, the two great processes which deteriorate air in the interior of buildings, is, under ordinary circumstances, lighter than that of common air; it gives way, accordingly, and is pushed upwards by the purer and denser air. Let us imagine an apartment occupied by a number of persons standing on a porous floor, and the roof taken off; at ordinary temperatures the air vitiated there by the human frame requires no mechanical power to remove it. The superincumbent pressure is diminished by the expansion induced in the air as it is heated, but the external atmosphere is permitted to have free access below as well as above to the porous floor. Its power, therefore, preponderates, and an upward movement is the necessary consequence, which is accompanied by the introduction of the fresh and the removal of the foul air. An open roof is, however, inadmissible; protection is required from the weather, independently of other arrangements; the openings must therefore be contracted, a greater velocity of discharged air must therefore be obtained. To effect this, if a shaft or box be extended from any opening near the ceiling to the external roof and atmosphere, the column of warm air which soon fills it increases its power, and effectually establishes a current, by means of which the vitiated air will be withdrawn from the body of the building."

In all cases where the nature of the building will admit of it, natural ventilation should always be adopted, it being, when once effected, completely inexpensive in its operation. Having thus avowed our preference for the system unincumbered with machinery, or having arrangements difficult to be understood by that class who will generally be found to have their management, we will now proceed to the more immediate consideration of our subject.

Air, when expelled from the lungs, after being used for the purposes of respiration, being composed principally of carbonic acid gas, one of the heaviest of our gases, it has been argued that foul air having a downward tendency, by the preponderating influence of the carbonic gas, the foul air should be extracted from the interior of the building by the *under* part, allowing the fresh to be admitted at the top. The specific gravity of common air being 1·000, while that of the carbonic acid gas is 1·527, it must be evident, say the advocates of this system, "that in a building where human beings are assembled, the carbonic acid gas *must* fall to the ground, thus forming a stratum of air which cannot possibly be removed by an upward current." Plausible as this plan seems in theory, in practice it is found altogether wrong, inasmuch as it is now established beyond a doubt, that when air is expelled from the lungs, so much animal heat is imparted to the resulting compound, (carbonic acid gas, azote, and watery vapour,) that it has an upward tendency of considerable force. A very familiar illustration of the truth of this may be found by breathing in a still atmosphere in a frosty day. The heat, which is thus derived from the body, the expelled air retains for a considerable time, but on cooling, the superior density of the carbonic gas prevails, and a downward tendency is the result. Hence the necessity for speedily conveying the foul air from the interior of the building. In practice, then, it is found that the best mode of ventilating is by extracting the foul air from the top, and admitting the fresh at the bottom of the building.

Heated air, to pass out from the interior of a building by any other course than an upward one, must be forced by currents artificially produced: the wind may sometimes be taken advantage of, but it cannot be depended upon, neither is it unvarying in intensity of action. From this will be seen the absurdity of having apertures as are often provided in the gables or ends of buildings for allowing the foul air to escape.

In ventilating buildings, two things must be borne in mind; and as upon these depend the success of the plan, particular attention should be paid to them. First, the supplying the interior with fresh air; and second, the extracting of the foul. And here attention is requested to the fact, the evidence of all experience goes to prove the truth of—that *no foul air can, by any possibility, be removed from the interior of a building, however well arranged the means for its exit may be, unless an ample supply of fresh air is admitted into it.* On this point no mean authority says: —

"A moment's reflection will satisfy the *mere* student as to the truth of the position, that unless a new portion of air be admitted into any ordinary apartment, the portion which is already there will not be expelled. It is the force of the air entering that causes the heated air to be expelled. It is necessarily impossible to have ventilation without a movement of air."

In making provisions, then, for the admission of fresh air, due regard should be had to the source from whence it is derived. If much dust and extraneous matter should be near the base of the building, the air should be drawn from a source some distance from the ground, but led by conduits in the wall (the entrance to which may be below the eaves) to the under part of the building, where it should be admitted to the interior. In buildings already constructed, forming these ventiducts would be attended with considerable expense; to prevent which, the apertures should be made at the lowest part of the base of the building, and their orifices covered with horse-hair cloth or finely perforated zinc, which will prevent the dust, &c., from entering. Should the air be admitted at once to the interior, that is, close to the walls, no ventiducts will be required; but should the air be wished to be led to the interior, say the passages of a church, or some distance from the walls, ventiducts must be employed to conduct the air to its place of exit. For this purpose metal pipes, or, what would be cheaper, wooden boxes with air-tight joints, covered externally with a composition of tar and sand, (one part of the latter to three of the former,) will be found to answer well. In the generality of buildings, as churches, &c., the fresh air should be led to some distance from the walls. In churches the passages will be the best place. The apertures for the ingress of fresh air in the passages or floors should be covered with iron gratings, with holes not larger than one inch in diameter; beneath this a plate of zinc, with perforations 120 to the square inch, and in contact with the iron grating, should be placed. These precautions being taken, the air in its passage through the apertures will be so diffused that the rush of air will be almost imperceptible. Instead of zinc, horse-hair cloth of a fine texture may be applied below the grating with advantage, especially in cases where the air supplied to the interior is loaded with impurities. The apertures for the admission of fresh air, wherever placed, should be disposed at equal distances round the building—if possible, in every wall—so that, from whatever quarter the wind may blow, an aperture may be placed so as to receive its influence. Having provided means for the admission of fresh, attention must next be paid to the extracting of the foul air. The apertures for its escape should always be placed at the highest part of the ceiling, as the air will naturally ascend there. It will be evident how much more easy it is to ventilate a church with a sloping roof highest in the centre; the heated air will at once find its way to the highest part, even although it should strike the galleries in its upward course. If the nature of the building will admit of it, the area of the apertures should be distributed over the ceiling in more than one place. Supposing the area of aperture of a church is required to be three square feet, if three apertures of one square foot each be placed at regular intervals in the roof, the building will be more speedily ventilated than if one aperture, of three square feet area, was alone used. In cases where there is an inner roof or ceiling, thus forming an empty space between it and the external roof, the foul air should on no account be allowed to enter into it, as by spreading itself beneath, and coming in contact with the cold outer roof, its ascending power will be diminished. The plan almost invariably carried into effect, where ventilation in such a case is attempted, of having louvres or spaces in the external roof *only* for the foul air to escape, is just as wise as if a miller, instead of leading the water from the pond to drive his mill in one large dam, endeavoured to do so by leading it in a variety of small rills or pipes, regardless of the loss sustained by friction and waste. We have even seen cases in which ventilators were fixed on the outer roof, while the inner ceiling had no communication whatever with the empty space, and the interior of the building being in fact hermetically sealed. The absurdity of this plan is so apparent that it is needless to condemn it otherwise than by the mere mention of it. It may, however, be adduced as one of the many proofs we could bring forward of the utter ignorance of many architects and builders of the philosophical principles of ventilation practically applied.

The rules for ascertaining the area of the exit-aperture or apertures for any kind of building, are as follows:—"The power of ventilation," says Tredgold, "should obviously be adapted to the greatest number of people the building is to contain at one time; and it is obvious that we had better err in excess than in deficit." Perhaps a few examples in round numbers will afford a more distinct view of the quantity of air it is desirable to change in a crowded room. According to deduction made by the same eminent engineer, four cubic feet per minute will be required for each individual. Therefore, when a room contains 200 people, there should be 800 cubic feet of fresh air supplied to the interior every minute, and of course the same quantity withdrawn. Four hundred people will require 1600 cubic feet per minute, and so on in the same proportions. As the rate of ascension of the vitiated air, in the tubes prepared for its exit, depends upon the difference of temperature of the external air, and of that in the tubes or interior of the building, the greater the difference the greater the velocity of ascent; it follows then, that in summer it will be more difficult to ventilate a building than in winter. On the assumption that there will not be a greater difference in summer between the external and internal atmosphere, Tredgold founds the following rule—*Multiply the number of people the building contains by four; and divide this product by forty-three times the square root of the* *height of the tubes, and the quotient is the area of the ventilating tube.* By the height of the tubes is meant, the height from the floor of the room to the place where the air escapes to the atmosphere. If there are more tubes than one—that is, if the area of the exit aperture found by the above rule can be conveniently divided and disposed in more than one—the different ventiducts leading from these apertures should be all of the same height, as, if not, the tall ones would overpower the short, and adverse currents would result. When the *fresh* air is led to the interior by simple apertures in the wall, their area should be double that of the foul air ventiducts; but if it is led to the passages, or some distance from the wall, in wooden boxes or pipes, these should be made of the same area as the foul ventiducts. We here give sketches and descriptions of good specimens of valves, for regulating the admission of fresh and the egress of foul air.

Fig. 1.

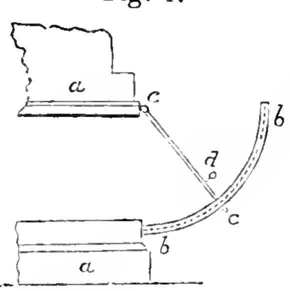


Fig. 1, is a section of a valve, to be used when the fresh air aperture is near the ground; *a a* is the wall, *b b* an iron quadrant fixed in the wall to the end of the aperture; this quadrant has a groove or slit, as shown by the dotted line; this allows a thumb or pinching screw, attached to the hinged valve *c c*, to traverse up and down therein; the valve is moved by the handle *d*, and is fixed in any position by the thumb-screw.

Fig. 2.

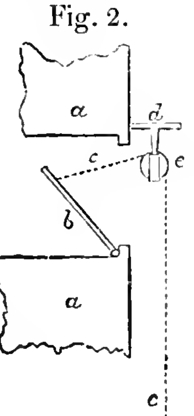


Fig. 2 is a valve for a fresh air aperture at the top of the wall, *a a* the wall, *d* the iron staple supporting a bracket for hanging the wheel *e*; this bracket is fixed in the wall, *above* the aperture and at its centre; a chain or rope *c c* is passed over the wheel or pulley *e*, and attached to the hinged valve *b*; the rope near the ground should have a counterpoise weight attached to it, to balance the valve; by a simple index, the valve cane b shut to any required degree, by moving the counterpoise up or down the face of the index.

Fig. 3 is a section of part of a foul air ventiduct, showing the construction of a simple valve for regulating the egress: *a* is the ventiduct or wooden box; a board *b*, ornamented on the under part, larger in diameter than that of the ventiduct, is hung in the manner shown; *b* is the valve; *c* the rod for suspending it, sliding in, and supported by two rods or bars stretching across the box; the cord or chain passes over the two pulleys, and is produced to any convenient part of the interior, where it should be provided with a balance-weight and index.

Fig. 3.

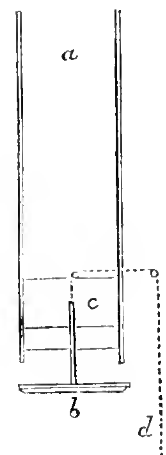


Fig. 4.

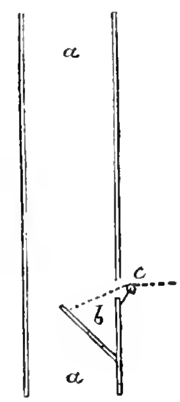


Fig. 4 is a section showing a different construction of valve: *a a* is the ventiduct; a valve, *b*, is fitted to the interior, and hinged at one side; the rope for working it passes over the pulley, *c*.

The foul air ventiducts should all be properly finished at top, to prevent the wind being blown down them. They should project above the ridge of the roof, at least 18 inches.

Fig. 5

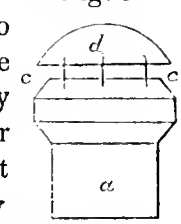


Fig. 5 is an elevation of a top recommended by Tredgold, which we have adopted in practice: *a* is the part for fixing it to the ventiduct; the cover, *d*, made circular or conical, prevents any down-draught, and the angular edges, *c c*, create an upward current in the tube, by the course which they cause the wind to take. The tops should be made of thin metal, and painted black.

Ventilation of private apartments.—Many plans have been promulgated in connexion with this part of the subject; but, generally speaking, they are too scientific in their arrangements to admit of their general adoption; we will therefore confine ourselves to the elucidation of those plans which are simple, unexpensive, and have been proved to be effectual.

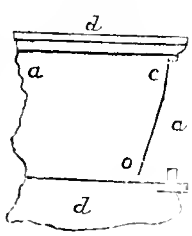
The supply of fresh air to the interior of a dwelling apartment should not depend upon such casual means for its admission as the crevices of doors and windows, but apertures of proper dimensions should be provided. The ventilators used by T. Toynbee, Esq., of London, are cheap and efficient. That used for the admission of fresh air is a plate of finely perforated zinc, having to each square inch 220 holes; this is placed in the window, in the uppermost row of squares, and the one furthest from the fire-place. The ventilator for extracting the foul air is a simple modification of Dr. Arnott's plan, which we may term the "suspension valve." Mr. Toynbee describes it as follows:—

"It consists of a square iron tube, of from three to six inches diameter, and so long, that the outer orifice should be flush with the wall of the apartment, and the inner one enter the chimney; these tubes are usually from four to six inches in length. At the orifice entering the room, there is either a plate of perforated zinc, or a piece of fine wire-work, from the upper and back part of which hangs a piece of ordinary or oiled silk, which acts as a valve, so as to allow the warm and vitiated air to pass up the chimney, and prevent any smoke from entering the chamber."

Fig 6 will give a pretty good idea of this valve; *a a* is the iron box; *c o* the flap or valve of silk; *d d* the wall of the apartment.

We have been very particular in describing this plan, convinced of its great utility and value as a cheap and efficient means for ventilating apartments. The cost of the window ventilator is 2s., and of the chimney 3s.; these prices include fitting up. So much for their cheapness; as to their efficiency, Mr. Toynbee makes the following statement:—

Fig. 6.



"The effect on the health of the patient, I have observed, is to accelerate the cure, and to alleviate the symptoms, so as to give great comfort to the patient; the people remark that the ventilation has carried away the smells and purified the place. I am now continually applied to, by the friends of those whose rooms have been ventilated, to bestow upon them a similar boon."

And here we would direct attention to a fund which has been the means of doing much good amongst the poor classes; we allude to the Samaritan fund in connexion with the St. George's and St. James' Dispensaries, which was established for the purpose of supplying the sick poor with flannels and nutritious food, and for *ventilating their apartments*. In the latter way, the committee have declared it to be the result of their experience, that proper ventilation is one of the most important curative means. We trust that this institution will have many imitators throughout the country. In place of the zinc plate, in houses of a superior class, Baillie's transparent glass ventilators may be used with advantage.

An architect of some note communicated to the writer a plan for ventilating apartments, which he had applied to gentlemen's villas with some success. It must, however, be incorporated with the building when first constructed. At the ceiling of the apartment, above the cornice, he makes a narrow opening; this communicates with a channel formed between the lath and plaster, and the beams on which the laths are nailed. The foul air is led to apertures formed on the outside walls beneath the eaves, thus affording for it a clear escape from the room. The fresh air is admitted by openings made in the walls beneath the windows, communicating with holes made in the skirting of the room, or in the floor; in the latter case, the carpet covers the apertures, and serves to diffuse the air. In this plan, each room must have an independent channel for the escape of the foul air.

As in many cases the poorer classes shut up the ventilators, impressed with the absurd idea that they are dangerous, William Hosking, Esq., proposes the following plan to be adopted, which cannot fail to be effectual:—

"A sweet-air flue should be made within the outermost jamb of every chimney breast, from the bottom to the top, and opening into the outer air free from all communication with the smoke flues, and not liable to be contaminated by them. This should open out at the lowest level again, either directly under the floor, or by a horizontal flue with a grated mouth, so that it may be fed with air from both ends. Every fire should be fed, by an opening from such flue behind the cheeks and back of the grate, with the fresh air, perforations underneath the grate admitting it to the fire, and other perforations to the room generally. Ninety-nine out of a hundred of the poor would never suspect the mode of access of the outer air, and they would breathe fresh air in spite of themselves."

As a means for withdrawing the foul air, the suspension valve should be used. We do not agree with Mr. Hosking that the current of air established near the fire-place, by the action of the draught, would effectually draw off all the foul air of the room. This is contrary to general experience; moreover, it would not be desirable to put it in operation. Were such a plan available for withdrawing the foul air, one bad effect of it would be the drawing of the current of foul air past those sitting round the fire-place.

Having thus briefly described efficacious and easily attainable modes of ventilating apartments, independently of all casual means, we would, in conclusion, recommend every one, in addition to adopting these plans, to ventilate their apartments by opening on every possible occasion their doors and windows. The currents produced by such means are health-giving and health-restoring draughts. There is much nonsense promulgated about the danger of draughts. We have many a day sat in a thorough draught, even in the depth of winter, and never yet caught cold. Many are in the habit of doing so likewise. In India, draughts, the very life of the inhabitants, are artificially produced. We do not assert that sitting in a draught is fraught with no danger in some cases; with the habit of living in close, confined, over-heated apartments subject to no current, no wonder that many catch cold on being exposed to a draught. In reference to this subject, Dr. D. B. Reid says—

"It would be well for those who suffer from draughts and currents, and who constantly declaim against any movement of air, to consider that their bodies have been so formed that the air never stagnates round them during life; that a slow but equal and continuous current ever moves around the living frame; that it is not the mere movement of air which is the cause of offence, but the movement of air in proportions of a character uncongenial to the condition of the system at the moment; that even the most delicate ladies, who express their horror of draughts and currents, practically increase from time to time the movement of air that impinges upon them in warm atmospheres with their fans, producing an agreeable and refreshing atmosphere with air which is opressive and offensive, when not assisted by their inordinate movement."

But though advising all to air their apartments well, by opening doors and windows, we would at the same time earnestly recommend every one, as they value their health, to have a plan of ventilation, independent of all such casual means, instantly carried into effect. A few shillings can never be better spent. We know of people travelling to far distant countries to gain health by change of air, ignorant of the fact, that by the judicious expenditure of a few shillings, they would have found it nearer home—nearer than they could well anticipate. A walk in a gentle breeze will often cure a headache; by a window being drawn up or a door opened, the same effect will often be obtained. Not taking into account the injurious effects of foul air in the body, we cannot conceive, even as a matter of taste, how people should be found to prefer foul and fœtid to the sweet air—

"That trembling floats from hill to hill,
From vale to mountain—with incessant change
Of purest element."

We will close this part of the subject by expressing our hope, that our remarks will tend in some measure to direct more particular attention to this important subject of domestic ventilation.

A smoky chimney has been well characterised as one of the most annoying of our house discomforts. Annoying as it undoubtedly is, it is matter of astonishment that, with one or two solitary exceptions, no really successful remedy has ever been applied to overcome it. However, our surprise is considerably lessened, when we consider that the generality of individuals who have directed their attention to the subject, have been utterly ignorant of the philosophical laws which regulate the movements of heated air. Neglecting or entirely overlooking the study of these, they have depended upon various plans and machines for effecting a cure, the most of which have been constructed in complete defiance to all natural laws. It is matter of regret that scientific men should have so long considered this subject beneath their notice. We free them from the imputation of inability to cope with its difficulties, but we blame them for their indifference, more especially as, by turning their attention to the subject, they would not have compromised their professional dignity, which we suspect they were afraid of doing. Of late years, however, we have seen engineers and scientific men, high in their respective professions, who have not thought it unworthy of their professional attention.

From the result of some experience in the observation of cases, and from long-continued study of works on the subject, we humbly conceive that the key to the solution of the difficulty of curing smoky chimneys, lies in the proper application of a fact, the axiomatic truth of which the result of all experience goes to prove, independent of its theoretical accuracy—that *heated air cannot ascend a flue or chimney, with force sufficient to overcome opposing currents, unless a due supply of fresh air is supplied below, at or near to the fire-place.* Those acquainted with natural philosophy will recognise in this a modification of the well-known principle of impenetrability. Now, by the proper application of this principle, we do not hesitate to say, that any chimney, however bad, will be effectually cured; so unvarying is it in its operation, that whenever a chimney smokes, we may rest assured that the supply of air is deficient below—that some opposing current has overpowered the ascending smoke and heated air. We do not remember of ever seeing a case in which the opening of a door or window did not restore the *natural* current, and cure the smoke. Had the course of the air admitted by the door or window been traced, it would in every case, without exception, have been found rushing directly to the fire-place. Many rooms smoke on account of the air therein being drawn therefrom, to supply a larger fire in another apartment not properly supplied with air; were the two rooms supplied independently of each other with a sufficiency of air, the chimneys in both rooms would draw well without smoking. We know of one instance in which almost all the chimneys in one house smoked; the course of the current was examined, and it was found that a large stove in the laundry actually drew its supply of air from the fires below, through the medium of the staircase. The laundry after this being well supplied with air, the other chimneys ordinarily drew well. A fire which has been in operation all day in a sitting-room, in the same floor with a drawing-room, has overpowered the newly kindled fire in the latter, by drawing the air therefrom for its supply; the newly assembled visitors have been obliged to vacate the apartment. A person at all acquainted with the subject would have at once discovered the cause, and by the opening of a door or window in the sitting-room, through which a supply of air could have been obtained independent of the drawing-room, the difficulty could at once have been obviated. In this case, the sitting-room fire habitually drew, when its doors were shut, its supply from the drawing-room. We could cite numerous examples of the truth of our principle, but we do not consider it here necessary. Having drawn attention to the fact, we doubt not that all observations hereafter made will corroborate its truth. We will finish our remarks by giving our practical rules and suggestions, so as to admit of parties taking advantage of our plan. The course of the current in a smoky room must first be found; this will best be done by taking a small taper, or a piece of smouldering brown paper emitting smoke; by holding this quietly in the room, the direction the flame or vapour takes is that of the current of air: if it leads to the fire-place of a stronger fire in another apartment, rest assured this derives its supply from the room smoking; supply the room with the strong fire-place with air by means of the following plan, and the room will smoke no longer. But to every room in a house would we recommend the following plan to be carried into effect, whether such rooms be smoky or not, whether they smoke by supplying fires in other apartments, or by opposing currents caused by wind forced down the chimney.

From the open air lead a pipe, varying in size according to the size of the room or grate (not less than two inches in diameter for a bed-room grate), from a hole made in the wall to the space beneath the hearth-stone, immediately below the space where the fender usually stands; let an orifice be made in the hearth-stone, above the termination of the fresh air pipe, covered, if so wished, with a small iron grating; let a few apertures be made in the fender, or louvre-shaped openings may be substituted in the place of holes, to prevent dust and ashes going into the air aperture in the hearth-stone. The ventilating grate recommend by Wm. Hosking, Esq., previously mentioned, may be used with advantage, instead of the plan we have here given—ours is much more simple, and easily carried into effect. Better err in making the pipe for supplying the air too large than too small; the fire will take no more air than it actually requires; the surplus, if any, will supply the inhabitants, if the room is supplied with a foul air extracting valve.

Chimneys smoke very frequently by being made too large in the interior (indeed all are made at hap-hazard); in such cases the heated air is often found to be ascending by one side, while the fresh air is actually coming down the other to supply the fire: consequently, the ascending column of heated air being considerably cooled, any opposing current has a great effect in retarding it; hence, such chimneys invariably smoke in high winds. Chimney-flues should not be made larger than is absolutely required for the exit of the heated air. There are rules for calculating the sizes, but we do not conceive it necessary to give them here. A very absurd practice obtains amongst many practitioners, of contracting the orifice of the chimney at the bottom nearest the fire-place: "It is like," says Tredgold, "contracting the aperture of a pipe which supplies a jet." Chimneys, to go well, should be contracted at top; we give the following rule for ascertaining the required degree of contraction:—

Let 17 times the length of the grate in inches be divided by the square root of the height of the chimney in feet, and the the quotient is the area for the aperture at the top of the chimney in inches. I had a grate of 15 inches, with a chimney 36 feet high, to which the contracting top was to be fixed; $17 \times 15 = 255$—and the square root of 36 is 6, therefore $255 \div 6 = 42\frac{1}{2}$ inches for the area of the top, and the diameter of a circle $42\frac{1}{2}$ in. area is nearly $5\frac{1}{2}$ inches.

Fig. 7.

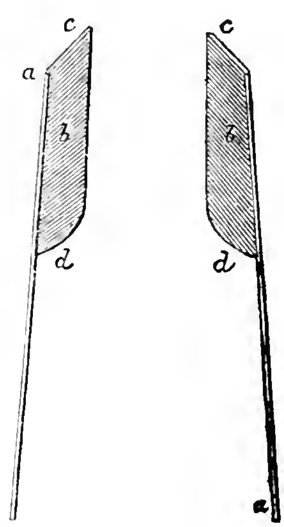


Figure 7 represents the mode of contraction; *a a* is the chimney-can; *b b* the iron part for contracting the bottom part should be rounded as at *d d;* the parts *c c* should be made angular, as shown; the angular faces facilitate the passing of the wind over them. Chimneys sometimes smoke in particular winds; this is caused by the wind striking on some particular part of the adjoining house, or the chimney-stalk, of which the chimney forms itself a part, or by being projected along or across the roof in a peculiar way, causing a descending current in the chimney. This difficulty may be obviated by contriving and fixing a cap or cowl so designed, that the apertures for the escape of the smoke may be turned away from the quarter in which the chimney smokes. The top represented in (fig. 5) has been adopted with great success in blow-downs. As a really efficient cap or top, we can earnestly recommend Kite's (of London) Diamond Deflecting Chimney-top. It has been adopted by the Honourable the Commissioners of Woods and Forests.

While recommending the plan of contracting the chimney-top, in accordance with Tredgold's rule, as a great conducive to a chimney-flue working properly, and the adoption of properly contrived cowls or tops in cases where wind creates opposing currents, we are decidedly of opinion that no chimney can be insured to draw well, at all times and in all circumstances, unless a due supply of fresh air is provided below; and that for economy and certainty of success, the best mode of supplying that air is by leading it in pipes or conduits from the open air, so as to be independent of all other sources.

We trust that the suggestions and rules we have given will be found to be of some practical use. To the subject of ventilation we may return in a future number; if so, we will consider our principles as applied to farm-buildings, stables, cow-houses, drying of grain, and other important purposes.—Journal of Agriculture.

ON THE GROWTH OF WHEAT IN RELATION TO CLIMATE AND TEMPERATURE.

We extract from the *Doncaster Gazette* the following paper under the above title, which was read by the Rev. W. Thorp, Vicar of Misson, at a meeting, lately held at Doncaster, of the Geological and Polytechnic Society of the West Riding, of Yorkshire:—

"It is the vegetation of a country which decides the social habits of a people, and determines the conditions according to which men gather into various societies. The inhabitants of the South Sea Islands enjoy, with little exertion, the splendid fruits of the banana, the bread fruit, and palm; while the people of the north laboriously cultivate the less fertile soil to secure their support by the scanty fruit of the cereals. In some parts of the Phillipines the earth is so exuberantly fertile, that four crops per year are gathered in—two of rice, one of melon, and one of maize; while in the extreme north of Europe the husbandman is content with a miserable crop of barley. The bread-fruit tree in the tropics produces so abundant a crop, that three trees are quite sufficient to maintain a man for eight months. The great discoverer, Cook, says, 'Whoever has planted ten bread-fruit trees has fulfilled his duty to his own and succeeding generations as completely and amply as an inhabitant of our rude clime, who, throughout his whole life, has ploughed during the rigour of winter, reaped in the heat of summer, and not only provided his present household wtih bread, but painfully saved some money for his children.' On the table lands of the East India mountains around the valleys of Cashmere and Nepaul, the people enjoy in the summer the delicious fruits of the tropics, and in winter cultivate the northern cereals. Under such various conditions by which the food of the people of different countries is raised, there must naturally be a corresponding variety in their social arrangements. Hence the great influence which the presence of a luxuriant vegetation has on the civilisation and prosperity of nations. But the vegetation of a country is determined by the heat and moisture which is received; for, if we examine this from the extreme north of Europe to the torrid zone, we find as we change the latitude a continual change in the physiognomy of the vegetation. And again, if, in the torrid zone, we ascend from the level of the sea to the top of the highest mountains, which there often rise above the limit of perpetual snow, we find the same order of changes more or less defined. In ascending these mountains the same climates are passed through which corresponds to burning Africa, the temperate lands of Europe, and of frozen Spitzbergen; and as the elevation changes so does vegetation. The beautiful banana and the majestic palm in the tropics are not found above the height of 8000 feet, but near the limit of perpetual snow are the grasses and other plants of Northern Europe. The change of latitude is not, however, accompanied by a corresponding change in heat and moisture, owing to the several causes which I shall shortly mention. First.—Inland localities are colder than sea-coast ones of the same latitude. Second.—Winds and rain, or the absence of the latter are other perturbing causes. Third.—The east coasts of continents and isolated masses of land in the northern hemisphere are colder than the west coasts of the same latitudes. Hence it becomes necessary, neglecting latitude, to connect places having the same mean annual temperature by what are called isothermal lines; which lines, although in the tropics and near the equator, run parallel with the parallels of latitude, yet in the temperate zone run very irregularly, and, as a rule, in the interior of continents, fall south of the latitude, and on the coast rise north of it; while on the the west coast they range on the south, and on the east coast rise to the north. The isothermal lines, therefore, indicate with tolerable accuracy the general vegetation of particular countries, but are of little use when we apply them to the growth of any particular plant, as of wheat; for the isothmeral heat includes the heat of the whole year. But some plants are nearly at rest during winter, and the surrounding temperature has little influence on them; so that the mean temperature of different seasons, and of single months, are chiefly to be observed. For when plants unfold their leaves in spring, when they blossom in summer, and form their fruit in autumn, everything depends on their receiving, during these important periods, that degree of temperature which is appointed them by nature. Thus barley, oats, and spelt are cultivated in the north of Europe at very high latitudes—at 69 deg. and even 70 deg. north latitude—as at Lyngen, Alten, and on the frontiers of Norway, Sweden, and Russia; while on the plateau of Southern Peru, on the shores of the great lake of Titicaca, where is perpetual spring, and is clothed with rich and beautiful vegetation at a height of 12,000 feet, only oats and barley ripen; but wheat will not ripen, since the summer temperature never rises sufficiently high for this purpose. What this temperature is I shall inquire immediately. So with the vine, which requires, in order to produce good wine, at least five months of a mean heat of 60 deg. Fahrenheit. If September and October have not this degree of heat, the wine is sour. For these reasons, therefore, that the temperature adapted for wheat is not indicated by latitude, nor by isothermal lines, but simply by a country having a certain number of days of a certain summer heat, or by the isothermal heat of Humboldt, let us examine its production in the three astronomical zones of the earth, viz., the torrid, temperate, and arctic circles; for its cultivation fails north of 60 degrees. These three zones, however, are too extensive, and include so many forms of vegetation, that Meyer has marked out smaller ones, and has divided each hemisphere into eight smaller ones. To begin the description with the torrid zone, called by Meyer the equatorial zone: the equatorial zone embraces, on both sides of the equator, a zone of 15 degrees of latitude, and a mean annual temperature of 80 degrees—a heat which, in union with a high degree of atmospheric moisture, calls forth an extraordinary profusion of vegetation. In several tropical countries wheat and the northern cereals are grown in winter often in the very places where tropical fruits are grown during the summer months. Meyer saw this in the neighbourhood of Canton, and Royle mentions it for India, where, in some parts in winter, the vegetation has a perfectly European aspect, and many species of true European genera make their appearance. The low elevations at which wheat is grown in some parts of the tropics is remarkable: at Victoria, in the province of the Carracas, with 10 degrees of north latitude, at the height of only 1,600 feet, and in the island of Cuba in 20 degrees north latitude, at still lower altitudes. Nay, in the Isle of France, in 20 degrees south latitude, it grows close to the seashore. Similar instances have been observed in the island of Luçon, but here the mean heat is very much lowered by the prevailing monsoons. Wheat is cultivated at a great elevation on some of the uninterrupted plains of the Himalaya mountains, but probably higher on the plateau of Tacora, in the district of Cabul. It is cultivated in all parts of Chili, where there is sufficient water from the sea, to the height of 5,200 feet, and the Chilian, wheat is of excellent quality. The extraordinary productivenesss of wheat in some tropical countries has been stated by Humboldt. In Mexico he observed wheat plants with 40, 60, and even 70 stalks, the ears of which were almost equally well filled, and contained from 100 to 120 grains each. In the equatorial part of Mexico the produce is 24-fold, and in plentiful years 35-fold. Yet in the tropical part of America the yield of maize is 800-fold, where it thrives best in a hot and damp climate; and 100-fold is looked upon as a poor crop of this grain in tropical countries. Yet in colder countries the yield is still smaller. In California it is 70-fold. In Mexico (in the subtropical zone of Meyer), beween the parallels of 20 degrees and 40 degrees north latitude, the culture of wheat first begins at the height of 2,500 or 3,000 feet. At Vera Cruz and Acapulco, according to Humboldt, fields of wheat are first met with at the height of 3,600 feet, and ascend above 9,000 feet. On the plateau of Southern Peru, wheat fields of extraordinary productiveness lie at the altitude of 8000 ft. (Meyer), and at Cangallo, at the foot of the volcano Arequipa (south lat. 16 deg.), wheat succeeds well even as high as 10,000 feet. In the north of Mexico the produce is 17-fold; in La Plata 12-fold. In the middle temperate zones of Europe, viz., in France, wheat is cultivated to the height of 5,400 feet, and according to De Candolle, rye is cultivated at 6,600 feet. The limit of corn culture on the Alps of Tyrol is at the height of 3,800 feet; in the Tyrolese mountains, 4,500 feet; and Monte Rosa, 5,880 feet. In Hungary, Croatia, and Sclavonia, the average produce is from eight to ten-fold. In Europe the cultivation of wheat ascends above 62 degrees north latitude; indeed, Schonw gives 64 degrees as it polar limit on the west side of the Scandinavian peninsula, but remarks that it begins to be of importance below 60 degrees north latitude; and in our northern latitude, which is approaching its polar limits, its cultivation is attended with great expense. The soil frequently requires draining, fallowing, manuring, drilling, and weeding—several of these operations to which the more southern countries are strangers; and after all our endeavours, the yield depends upon the season in some manner not yet hitherto understood, or, as I before mentioned, by our reception of a certain number of days of a certain summer heat, *i. e.*, on the northern heat of Humboldt. Mr. Lawes has satisfactorily proved in some experiments detailed in the Journal of the Royal Agricultural Society, that season alone can make a difference of one-third in the quantity of the crop. Upon the same field from whence seven unmanured crops had been taken, and no manure applied in any case, he found a difference in quantity in the years 1844, 1845, and 1846, to be as follows :—

	1844.	1845.	1846.
Quantity of Wheat per acre	Bushels. 16	Bushels. 23	B. P. Q. 17 3 3

So that the difference in quantity between the years 1844 and 1845 was as 16 to 23, or 7 bushels per acre, or nearly one-third. But it has been remarked that moisture has great influence. The quantity of rain which falls in any given locality is much the same taken on an average; but the quantity, when compared with the general and equal distribution of that quantity, throughout the several days and months of the year, is of inferior consideration. A great quantity at the same time is rather hurtful than beneficial; whereas those moderate but genial showers which regularly fall on a soil calculated to receive them, are sources of fertility to most of our cultivated plants. Wheat, however, requires very little rain, since in Australia, where are produced the best wheats that come to England, at Adelaide, during those months which correspond with our months of May, June, July, and August, are only 3.88 inches, while at London during the same months, are 8.49 inches (more than twice as much) ; or there are 60 days rain at the latter, and 19 days at the former place. There is no doubt whatever that the temperature of our different summers, and especially during the months of May, June, July, and August, determines the quality of the grain. At Adelaide, in Australia, the mean temperature for these months is 79 degrees, while the mean temperature for London is 60 degrees. And for the same reason, in spite of the wretched system of agriculture which prevails in Spain, Poland, and Sicily, the the quality of their corn is superior to that which is produced by the skill and capital of the British farmer, in ordinary years. The Dantzic red wheats, grown even in the Carse of Gowrie, have proved to to be inferior to those grown in countries adjacent to the Baltic; showing, says Lawson, that the climate is not so well adapted. And the quality as determined by weight is of the first importance, for in some years the bushel of wheat will only yield 42 lb. of flour, while in other years 52 lb.; making a difference in every acre yielding 30 bush. of 300 lbs. of flour, and this making more and better bread than an article of inferior quality. In the experiment before referred to by Mr. Lawes, he found a difference in the weight per bushel made by temperature in the years 1845 and 1846 (on land unmanured and cropped successively for seven years), of 7¼ lbs., the weight being, in 1845, 56½ lbs., and in 1846, 63¾ lbs. And by an examination of the meteorological tables published by Mr. Luke Howard, it is found that the mean temperature of these four months varies in different years from 57.4 degrees to 63 degrees (nearly 6 degrees of Fahrenheit). But the manner in which the mean temperature of the month is calculated by meteorologists renders their registers nearly useless in this inquiry, since it is the custom in every month to take the highest and lowest temperatures that any night and day afford, and to call the mean of these extremes the mean temperature of the month. Hence, whatever may have been the heat of a certain number of days in each month one cold night falsifies the whole, and reduces unnaturally the mean temperature. For example: during 23 days of the present month the lowest temperature of any day is 61 degrees; there are séveral days 66 and 68 degrees, and six days above 70 degrees, but one cold night of 37 degrees reduces the mean to only 55 degrees. But surely this cold night, or the cold nights during May, June, July, and August, do not injure wheat at all. A farmer never complains of the frosts in these months, and their prevalence during these months exert a beneficial influence upon the production of wheat, and therefore a register of day temperature is required. For strictly and physiologically it is by the action of light accompanying the heat that all nutrition in plants is effected; the yellow or tithonic rays of the sunbeam have alone the power of fixing carbon. Heat itself acts a subordinate part; and immedietely after sunset the leaves of plants no longer decompose the carbonic acid of the air, and they sink into a passive condition. The gaseous bodies brought from the ground by the roots percolate the delicate tissues and escape into the atmosphere. Hence plants exhale carbonic acids at night and oxygen in the daytime, and Dr. Duper, speaking of the carboniferous era, justly concludes :—' If plants have once grown in these latitudes with excessive luxuriance, and in short spaces of time withdrawn large quantities of carbon from the air, this is a result which is connected not so much with internal or external temperature as with variations in the brilliancy of light.'—(p. 96, Chemistry of Plants.) I have, therefore, no doubt that a register of these four months of the temperature and quantity of light emitted, would at once afford an index of the growth and production of our wheat and other cereals ; but as long as meteorologists confine their observations to the extremes of day and night, these are perfectly valueless in any inquiry about agriculture. In the year 1846, when Mr. Lawes produced from the exhausted field the weight of $63\frac{3}{4}$ lbs. per bushel, the mean temperature of May, June, July, and August, was 63 degrees, and he concludes thus:—'If I could depend upon a constant climate in England, similar to that of 1846, I could produce annually 40 or 50 bushels of wheat upon an acre with the same facility that I now produce 33 or 34; but as it is, *i. e.*, as the seasons are, were I to supply the proportion and quantity of mineral organic manures necessary to produce 50 bushels, in a wet and cold summer it would unduly develope the circulating condition of the plant, its vascular structure would be increased to an injurious extent, and the crop would be laid Those who farm highly often experience this misfortune, and consequently dread a wet summer.' Making, therefore, allowance for bad seed-times which occasionally prevail, for frosts in winter which constantly injure more or less the wheat upon some wet soils, and some varieties of wheat more than others, and also for wet seasons, I therefore conclude that, because the produce in the tropical and subtropical zones of the earth is in some parts enormous, that the wheats of Australia (12 to 39 degrees S. lat.), with a mean temperature in the months of May, June, July, and August, of 79 degrees, are of the finest possible descriptions, that the wheats of Spain, Poland, and Sicily, are superior in quality to ours, that Mr. Lawes, with a mean temperature of 63 degrees in these four months grew wheat on a barren field weighing $63\frac{3}{4}$ lbs. per bushel, while with a temperature of 58 degrees he could only produce, under the same conditions, wheat weighing $56\frac{1}{2}$ lbs.; and with a temperature of 60 degrees 3 seconds, that weighing $60\frac{3}{4}$ lbs. (these weights and temperatures being proportionate), that the quality of our grain, and indirectly and generally the quantity of our produce of wheat, are dependent upon the exalted temperature of the months in question. And hence—1. In all comparative chemical and agricultural experiments concerning the productions of wheat, climate, or the temperature of the season, is an element to be taken into the calculation. 2. A knowledge of the precise effect (if it could be ascertained) which the climate of these four months has upon the produce of wheat, would enable the statesman and the farmer to predict, the one of the forthcoming value of his crops, and the other the consequent condition of the country. 3. If the quality and quantity are determined by science, and the experiment of Mr. Lawes be even an approximation to the truth, the postulate of one of our well-known writers on political economy in his book On the influence of the Corn Laws, must be received with great suspicion—'that extensive crops are the result of cultivation stimulated by high prices.'"

After a vote of thanks had been passed to the chairman, the meeting separated.

ON THE STOPPAGE OF DRAINS BY A STONY DEPOSIT.

FROM LORD PORTMAN.

TO MR. PUSEY.

Dear Pusey,—I wish to call the attention of those persons who are engaged in draining land, to the accompanying statement of facts tending to show the importance of ascertaining the quality of the water which is to pass through the drains, before selecting the material of which they are to be formed. I have seen many cases where drains built with stones, made with broken stones, filled with boughs of trees or with poles of alder or larch, made with tiles and soles (as each person has thought best), have been stopped, adjacent to turf-wedge drains made from 20 to 40 years before, which were running perfectly. I have in some cases satisfied myself that a deposit has attached itself to these materials, and has more or less impeded the drainage, and that no deposit has been made in the turf-drains by the same water; but I have not hitherto ascertained with sufficient accuracy the real cause of the stoppage, though I have little doubt, from what I now know, that a chemical analysis of the water would explain it. In tile-pipes I have not yet seen any similar stoppage, but my experience of pipes is not yet sufficient to justify me in saying that they would not be liable to similar obstructions. I believe that the aid of the chemist and of the geologist are essential to the permanent success of the drainer. I now give you one case in full detail, sent to me, at my request, by my friend Mr. Gooden, of Compton House, near Sherborne, from whom I received the water and the deposit, whereof I send you a copy of the analysis made by Professor Way.

Yours truly,

Bryanston, April 28, 1849. PORTMAN.

"Although I have been doing a great deal of draining of late, I have been a good deal staggered as to its being an improvement of long continuance. Twenty years ago a large pasture field of mine was drained under the old and exploded system of turf-draining. There is a carrier of stone of large dimensions in the field; this was choked some weeks since, and I had it opened a long distance up, and, to my surprise, I found the whole drain *completely closed* with the *incrustration* from the water; the substance is precisely the same as that we find in our boilers. The field in question is 29 acres of old pastur the soil of which is a loam with a clay subsoil. It was drained in the year 1829, it being then in a wet state. The drainage was effected partly by what is called turf or wedge-draining, and partly by stone. There was a stone drain strait down the field, into which some of the side drains emptied themselves; it was a good sized drain, capable of carrying a large body of water. The expense of draining this field, being chiefly labour, was £50. From being quite in a wet state, it soon became dry; the drainage appeared completely successful, and so it remained until the winter of 1848. At this time the field appeared again wet; but in the neighbourhood of the stone carrier particulaly so. In January of this year, 1849, on walking over this piece of land, I found it looking generally bad, the soil was spongy, the herbage looked unhealthy, and some places presented all the appearance of an incipient bog. I have no hesitation in saying that this field was in a much worse condition than it was before it was drained. I therefore determined to open the stone carrier, which was done on the 13th of January. We found the drain completely choked with a deposit from the water. The substance is hard, and in some places the stones of the drain were so bound together with incrustation, that it required the pickaxe to divide them. When the drain was first opened, the water poured down it in large quantities; it has been opened nearly a month, and the stream could now easily be carried by a $1\frac{1}{4}$ inch pipe. I am happy to say the land presents a very different appearance, and is nearly dry. With regard to the drainage of this field there can be no doubt that it was very imperfect. But still the stoppage of the stone drain with a deposit from the water has caused me to doubt whether draining, in some localities, is a substantial improvement of long duration. Where the water is what is called 'hard,' and liable to form a deposit, the same thing may happen in pipes as has occured in my stone drain.

"You ask, 'How have the turf-drains answered in my field, which was drained 20 years ago?'

"I have had some opened and particularly examined, and I find, with scarcely any exception, that the water in them runs very well. The deteriorated state of the field seems to have arisen from the stoppage of the stone carrier, because, as many of the turf-drains led into this stone carrier, the drainage of some acres was necessarily stopped. The stone drain is still open, and the side turf-drains run freely into this opened carrier. I am rather disposed to think that the deposit in the drain must be formed, in some measure, of earthy matter petrified by the water; the carrier drain had no stone bottom, so that probably uneven surfaces were formed, and thus from time to time earthy deposits may have formed.

"I send you a bottle of the water and a lump of the deposit, of which I hope you will obtain an analysis. The drainage question is one of greet importance to us. Of this I feel satisfied that a great deal of money is sunk in draining, and unless it is done well, that is, on scientific principles, we might as well not drain our land at all.

"J. Goodden."

FROM MR. WAY.

"I send you the analysis of the water and the deposit: you will readily observe that the composition of the water sufficiently accounts for the deposit, which indeed it closely resembles in character. The quantity of carbonate of lime in the water is not however excessive, and it must require some time to form so large an accumulation. From the analysis it is quite clear that the drains are stopped, not mechanically, but by a chemical precipitate; this is evident by simple inspection of the substance: the deposit is principally carbonate of lime, and I believe the phenomena you mention may be referable to the following causes: the stone drain would probably for the most part be only partly filled with water, and would leave opportunity for the escape of the carbonic acid, by which the carbonate of lime is held in solution; the result being a crystalline deposit of this substance, which in time would choke the drain. I must add that the stone acts like a piece of bread in a glass of champagne, in affording points for the escape of the gas.

"In the turf-drains, on the other hand, there would most likely be a gradual evolution of this gas from decomposition of vegetable matter, and the water, remaining fully charged with carbonic acid, would not afford a deposit, or, if at all, in smaller amount. From the small size of turf or wedge-drains, I can quite understand that they would not be filled up, because they must contain less air for the carbonate acid to escape into, and fewer points of escape for it even were other circumstances favourable.

"Analysis of a deposit taken from a stone drain:

"Carbonate of lime	86·38
Sulphate of lime	2·52
Magnesia, common salt	traces.
Insoluble matter, sand, clay, &c.	10·22
	99·12

"N.B.—The sand and clay are deposited mechanically in thin layers, obvious to the eye, between the thicknesses of carbonate of lime.

"Analysis of the water passing through the drains:—

"Solid matter in a pint of the water 3·160 grains, consisting of:—

"Carbonate of lime	2·123
Sulphate of lime	0.270
Magnesia	0·058
Common salt	0·216
Silica	0·338
Vegetable matter	0·154
	3·160

"T. Thomas Way."

—Journal of the Royal Agricultural Society of England.

OPERATION OF THE DRAINAGE OF LAND ACT OF 1846.

The bill which received the royal assent for promoting the advance of money by private parties for the drainage of land, was not introduced into Parliament until a select committee of the House of Lords had reported that such a measure was desirable. The attention of the committee was naturally directed, in a great measure, to the effects of the Drainage Act of 1846, and their report supplies some interesting information on that point. The first witness examined was Mr. William Blamire, one of the English Enclosure Commissioners, in whom the superintendence of the statute of 1846 was vested. We extract from this gentleman's evidence the chief passages regarding the working of the Act in Scotland :—

A grant of two millions of money was made by Parliament in the year 1846, and parties had the power given to them of applying to your board to borrow a sum not exceeding £10,000 for the purpose of draining?

In the original bill no limit was assigned as to the extent of the applications ; it was found, however, before the meeting of Parliament, that more than the whole amount of money had been applied for, and Sir James Graham, in the House of Commons, moved that the grant to each individual should be limited to the sum of £10,000. The original grant was simply for the purpose of draining, but after the distresss in Scotland became so severe, from the failure of the potato crop, Government thought it prudent to extend the provisions of the act, and to allow, in cases of the reclamation of waste land, the expenses of trenching and fencing : that was done by the Amendment Act.

Has the whole of that money been applied for?

The whole of the money was applied for almost immediately upon the country understanding and seeing their way as to the mode in which the machinery of the act would be put in motion ; in the first instance, there was so great a dread that the expenses would be so very large as to prevent an immense number of people making any application at all ; after the provisions of the act, however, were properly explained, so great was the desire on the part of the landowners, and more especially those in Scotland, to avail themselves of the provisions of the act, that we received in fourteen days applications for upwards of a million of money : we received, immediately after the two millions were lent, applications for upwards of half a million more, and I do not know to what extent the applications would have gone if it had not been generally known that the funds were exhausted. I have no doubt if the money could have been obtained we should have had applications for many millions.

You have a particular form, have not you, which you send to parties upon their applying for a loan?

The process is an exceedingly simple and inexpensive one : a party makes application for a certain amount, stating what are the lands to be improved, and generally the mode under which he proposes to improve them ; upon the receipt of that application, the Commissioners send an inspector to examine the land generally, and report upon the expediency of the proposed works, and also the best manner of carrying them into execution, no objections being taken by the parties having charges upon the land ; the Commissioners apply to the Treasury for power to issue the provisional certificate, which is an undertaking on the part of the Government to advance a certain sum of money on certain security, when satisfied, through the Commissioners, that the work has been fitly and duly executed : the terms upon which the money is advanced are $6\frac{1}{2}$ per cent., paid half-yearly for 22 years, which covers both the principal and the interest—the interest is something less than $3\frac{1}{4}$ per cent., the fund for the repayment of the principal is something more than the other $3\frac{1}{4}$: the provisional certificate having been issued, the landowner proceeds to execute the work at his own convenience, and at such times as may best suit him, he forfeiting the unexpended portion of his loan if the work is not completed in five years. When a certain quantity of work has been completed, the landowner makes application to the Commissioner for an inspection, in order to enable him to receive his money : if the drainage accounts are kept in a simple and clear form, and the work well done, the expense incident to that process is very trifling : upon receiving a certificate from the inspector that the work is properly executed, and that the permanent improvement in the land will not be less than $6\frac{1}{2}$ per cent., the Commissioners report the circumstances to the Treasury, and then receive an order to pay over the money. The process is a very simple one, and so far, I believe, has given great satisfaction, more particularly in Scotland, where the larger proportion of the two millions is in course of being expended. Scotland will receive £1,640,000, England £360,000.

Has not a great deal of the money in Scotland been lent upon entailed estates?

We make no difference in entertaining the application, whether the estate is an entailed one, or held in fee; but a very large proportion of the £1,600,000 has been lent upon entailed estates: in the first instance, the landowners generally entertained great fear of making applications where their property was subject to any incumbrance, upon the ground that the parties having those charges would object to an additional and a prior charge being imposed upon the property. Many timid landowners hesitated. I had a great correspondence, and so had the office upon that point; and after a short time we completely disabused the minds of the landowners upon it, by satisfying them that the only objection that would be taken would be, that they were not borrowing a sufficient sum of money for the improvement of their estates, because the party having the charge was a party to be very largely benefited.

Inasmuch as his security was worth a great deal more than it was before?

Yes; and inasmuch as one has never met with any instance where the permanent improvement in the value of the property would not amount to more than 6½ per cent. In many instances we are satisfied that the permanent improvement, where the works are scientifically and sufficiently executed, would amount to 14 or 15 per cent., and in some particular cases to a great deal more even than that.

Your inspector in the country views every drain prior to its being covered in, does not he?

No; we take this precaution in the preliminary inspection: it is one of the directions of the Board to the inspector to ascertain under whose superintendence the works are to be placed, and to report to the Board whether that individual is really trustworthy: if the report is in favour of the trustworthiness of the party superintending the works for the applicant, we do not feel that we ought to subject the landowner to any expense that can fairly be avoided; the inspector, when going to certify the accuracy of the work, would have examinations made here and there to see that the drains are of the depth generally specified, and that the work is properly executed, and to exercise his own discretion in satisfying the Board that there has been no want of care, and no trick, in fact. We have had more instances than one where drains have been represented to be four feet deep, but which, upon testing them, we found at a certain distance from the outfall not to be more than two feet; in those cases, of course, our confidence is destroyed, and we feel it necessary to keep a sharp look-out after the parties for the future, and we disallow the money till the work is properly done. In Scotland it is very usually the case that the occupying tenants are the parties charged with the execution of the works: in those cases a very much more strict supervision is absolutely necessary, because the interests of the occupying tenant and of the landowner are not identical; the tenant too frequently has the mere object of getting the drains executed in a manner that will, as he believes, answer his more temporary purposes, without reference to the permanent interests of the estate.

The Committee have been speaking of the drains which have been generally made in Scotland; they have been constructed either with tiles or stones, have not they?

Every variety of drain has been made use of in Scotland; in moss, wedge-draining and open sheet draining have been adopted; there has been a great variety of modes of draining. The Commissioners have done all they could do fairly, as it appeared to them, without acting in a very arbitrary manner, to discountenance the use of stones in draining, and I am glad to be able to say, from the erection of numerous tileries in various parts of Scotland, that during the next season I hope we shall have very few drains put in with stones: proprietors generally are now satisfied without having reference to the superior efficiency of tile drains, but, looking merely to the cost of draining by tiles is so much less, that, for their own sakes, they are willing to adopt them where they can be had.

With regard to the proportionate expense, would that not depend upon whether there was a large quantity of stones upon the land,or not?

No: I think I could show clearly that it would be much cheaper to buy tiles at the ordinary price than to use stones, even if you have those stones in the field.

Is the preference owing to the difference in the expense, or the great superiority of tiles over stones?

We believe that the tiles are so infinitely superior to stones, that, except in particular stations, where you get your stones down to a rock foundation, it it is highly impolitic to use stones at all. There are few situations where stone drains will not choke up in process of time, unless they are put in in so expensive a way as to be a perfect substitute for a tile.

Are you not aware that in Scotland, in many instances where this money has been borrowed, the tenant has undertaken to pay 6½ per cent.?

Yes, we know that; in these cases we are bound, as I stated before, to exercise a very strict supervision to see that the work is properly performed, because there have been cases of deception where the tenant has a mere temporary interest.

Are you also aware that many landowners in

Scotland pay $1\frac{1}{2}$ per cent themselves, the tenant paying 5 per cent.?

We do know that fact, though not officially.

You do not object to making an outfall to take away the water from the drains, do you?

No, we sanction very large expenses in making outfalls, as being essentially necessary for the drainage of the estate.

Do you exercise any discretion as to the price?

If the proprietor should think fit to expend a large sum of money which would appear to us unnecessary, and a sum beyond what $6\frac{1}{2}$ per cent. would pay, we should only allow for those works a sum that would meet the payment of the $6\frac{1}{2}$ per cent., and that we are occasionally necessitated to do: we have instances in Scotland where, in the reclamation of waste land, so large a sum as £22 to £24 an acre has been expended in the three items of drainage, trenching, and fencing, and that is in cases where the parties proposed to create new farms; how far they may find it to answer their purpose I should think is doubtful. I think, adding to £25 an acre the expense of farmsteads and roads, and all the other expenses incident to the creation of a new farm, would not answer. The act, it would appear to me, most wisely provided for the extension of arable land in pastoral districts generally, because in many situations it is almost impossible to say of what value the extension of his arable land may be to a stock farmer. Many of the large pastoral sheep farms in Scotland have so very small a proportion of arable land, that the farmers are obliged to send their young stock down to the low country, a distance sometimes of 200 miles, to winter, and then only obtaining a very precarious and bad winterage; whereas, by obtaining an extension of arable land upon their own farms, they can winter their stock at home, giving them a proportion of turnips, without which they cannot keep young sheep in health. Therefore, it is impossible to estimate what the advantage of a certain addition to the arable land attached to a pastoral farm may be: but it is a widely different thing to contemplate the creation of new arable farms in a situation of that sort, where pasturage is not the great consideration.

Will you explain to the committee what is the operation of trenching as a permanent benefit to the land?

The operation of trenching is, in fact, subsoiling with manual labour to the depth of 12, 14, or 18 inches, according to particular circumstances.

And removing stone and rock?

Yes, and levelling the surface; in many lands so reclaimed pits have been dug out, and there are great peat pots and inequalities of the surface which require to be levelled.

In that case how do you secure that it shall be a permanent benefit?

If the land is at once put into a fit state for arable husbandry, we suppose it will always so continue, that land being in situations where arable land is of very great value as contrasted with pastoral land.

You have never advanced money for trenching without draining?

No, we have no power to do so; the act is a drainage act, and drainage must be the foundation.

You are not authorized to pay for fencing, except it is for the purpose of reclamation, where draining has been carried out.

Certainly not.

ON THE ADVANTAGES OF ONE-HORSE CARTS.

BY JESSE FRENCH.

Some few years since, while discussing the subject of agricultural economy with my late father, I remarked to him that farmers generally incur unnecessary expense in the number of agricultural carriages they purchase; that the occupier of a farm of from fourscore to a hundred and fifty acres must have four or five manure-carts and two or three waggons for carrying hay and corn, several of which are of no use during nine-tenths of the year, but stand about to rot, are sent to be repaired, or occupy a shed that must also be occasionally repaired; and that I thought we ought to make the same carriages carry the hay and corn that carry the dung. But at that time I was dissuaded from making the attempt, and till the year 1842 continued to carry my corn upon two waggons; and then finding one of them not worth repairing, had almost given the final order for a new one at the cost of £45, when I read in a newspaper Mr. Pusey's recommendation of the one-horse cart system as worthy of a trial. Accordingly, I proceeded to fit up four dung-carts for carrying corn, at a very few shillings' expense, and after the following manner:—Two poles, each the length of the axletree, were placed across the cart, one before and the other behind; each of these was made fast by two wooden pins passing through the pole into staples in the sides of the cart. Two other poles were placed lengthways, one over each wheel, forming lades. Next, by placing a sheep-gate with the points uppermost upon the shafts, immediately before the body of the cart, a high front was formed to keep the load from coming in contact with the horse; or rather a fore-ladder, made after the fashion of a sheep-gate, the rails extending high enough to prevent the sheaves, when thrust forward in loading, from resting on the horse's back. This was secured, leaning a little forward, by a rope or chain, with each end fixed to the fore corners of the cart. A tail-ladder of similar construction was fastened in the same way behind.

With three such carts I proceeded to carry wheat, and in four hours, with one man to pitch, picked up about 3000 sheaves, having half a mile to carry them. Whoever, then, might ridicule my novel mode of proceeding, was welcome to pick up more in the same time, and with the same number of hands, with as many waggons and horses as he pleased.

Having pursued this plan of carrying corn and hay for two years, and one of my neighbours having followed my example last year, I draw the following conclusions from the observations I have made:—That in carrying bound corn, the one-horse cart system has several advantages over that of waggons; and in carrying loose corn or hay, though the loader and he that throws it off may complain, and strong prejudices, the effect of habit, may possess the minds of all the hands employed, there is upon the whole no disadvantage. Three carts will generally be sufficient, where the distance does not exceed half a mile, for one cart to be always loading; and for every additional half mile, one additional cart will be about sufficient; but this will depend in a great measure upon the road.

In carrying hay, the small farmer, with his three horses and one waggon, is desirous to get it into large rows, that with a long fork he may get up a big load in a short time; and, having done so, several hands must accompany the waggon to unload; thus time is wasted by the men in passing from the field to the stack, and much labour is spent in getting it into large rows, which more than neutralizes the advantage of getting it up in big pitches. If two waggons are used, at least four or five horses are necessary to keep each waggon moving as soon as disengaged from loading or unloading; and the hands engaged in stacking often have to wait when one waggon is empty before the other arrives. If three waggons are used, all may go on with perfect regularity, but from six to nine horses are requisite; and, provided you work single-handed, that is, with one to pitch, one to load, and one to throw off, those hands could do quite as much work with three or four one-horse carts (as the distance might require) as they would with three waggons, let them have as many horses as they may; for a man can always pitch as much hay or corn in the same time upon carts as waggons; and with this additional advantage, with his one-horse cart he has but one horse to manage, while with two or three horses the leader will be apt to turn round and trample on the corn, or get into some mischief while the man is at work, unless he has a boy to mind them, who might perhaps be employed to advantage some other way.

But, upon large farms, it is usual to work double-handed, that is, with two to pitch, two to load, two to throw off, a man to drive between the field and the stack, and a boy to set forward in the field; and before such a well-appointed band one would think that all the corn in the parish must soon disappear. But, as an example of the relative advantages of this double-hand system with three waggons, and the single-hand system with one-horse carts, I mention the following facts:—The harvest last year being hindered by unfavourable weather till Monday, August 19, on that day wheat-carrying generally commenced full drive, and more corn was got up in a few days than usual. On Thursday evening, mutual inquiries being made, it was found that Mr. Q ——, with three waggons upon the *double-hand* system, had got up about forty acres of wheat in the preceding four days; but that in the same four days, with four dung-carts, with one horse in each, and working upon the *single-hand* system, Mr. Y —— had got up 26 acres of of wheat, and seven acres of peas. And I may add, at the same time, in something less than three days, with three one-horse carts and one man to pitch, I had got up all my wheat—16 acres, and 5 acres of clover hay.

When working upon the double-hand system the waggon must be set, as well as may be, to accommodate both pitchers; and if the man on one side has the wind, or the higher ground in his favour, the man on the other side must have a corresponding disadvantage; but the single man pitching upon a cart may turn it about as may be most convenient to himself, taking the benefit of the wind or the higher ground, as he pleases. Hence the large farmer, who works upon the double-hand system with waggons, might gain advantage by dividing his party into two, each party working with three carts or four, as the distance might require; or might get in a large quantity of corn with one team, while the other might be at plough: and the small farmer, whether he has been accustomed to use two waggons or but one, might benefit by working his horses in carts, inasmuch as there would be no loss of time by the men passing from the field to the stack, first to load, and then to unload, nor any waiting for the carriages loaded or empty.

There certainly are various things which a farmer may have to carry for which one-horse carts are not adapted, as timber and hop-poles, which in Kent and Sussex are often carried a long distance. In the same district many farmers bring their hay from the marshes, a distance of from three to eight miles: for this purpose small carts are not so convenient; but for carrying hay, and particularly where it has to be carried a considerable distance, a small cart may be enlarged by this expedient:—The draught-staples being generally about a foot from the ends of the shafts, by attaching rings to their extreme ends for the horse to draw by, the wheels will be thrown a foot further behind the horse; consequently the fore-ladder may be fixed a foot forwarder on the shafts. This will allow for the tail-ladder to lean further back, so as the load may balance. By thus lengthening the load, and keeping it a good width, as much hay may be loaded as a horse will be well able to draw.

It is generally supposed that the nearer the wheels are to the horse the lighter will be the draught; but it is important to bear in mind that the weight on the horse's back will be less in descending a hill, and the strain upon the belly-girth less in ascending, the further the horse is from the axletree. Hence it will be advisable, when new carts are to be constructed, to make the shaft a good length, that the horse may be placed forward or backward, according to the kind of load he may have to draw. The shafts, terminating in an iron clasp or socket with a ring at the end, will not only serve for the horse to draw by when occasion may require, but preserve them from decay when resting on the ground.

It may not be amiss to remark that a good belly-girth, buckled tight, is important; that a fore-ladder and tail-ladder to fasten by chains are preferable to fixed standards, as they may be adjusted to suit the balance of the cart or the height of the horse; and that for sheaves to ride safe without a rope, a right method in loading should be observed: the sheaves being laid in rings should pitch to the centre, and nearly stand on their heads in the top.

Looking at my carts, fitted up in the rude manner they are, much improvement may be made in the construction of carts to suit the general purposes of agriculture; and there are many persons who will not adopt the one-horse cart system, whatever be its advantages, till a cart of more sightly appearance is presented to their view. On the other hand, should the present low prices of produce continue, if no advantage is to be gained beyond the saving of the expense of a new waggon when one of the old ones is worn out, there are many persons who will adopt it as an acceptable alternative, as soon as the practicability of their doing so without disadvantage is made plain to their understandings. And although ONE good four-horse waggon may, for many purposes, be very useful upon a farm, carts constructed to contain about thirteen bushels, and to discharge the load by shelving (with moveable side and fore-boards, to make them capable of containing about double the quantity, when rough dung, &c., are to be carried, and upon each of which at other times, when hay or corn is to be gathered in, may be fixed a frame as wide as the wheels, or as much wider as may be thought fit, and which also may be of any useful length, provided the shafts are proportionably long), will answer all the purposes proposed so well, as to render, upon a great majority of farms, *several* waggons for carrying hay and corn an unnecessary incumbrance.—Journal of the Royal Agricultural Society.

LAW OF LANDLORD AND TENANT.

AMOUNT OF COMPENSATION FOR TENANTS' IMPROVEMENTS.

LETTER I.

TO THE TENANT-FARMERS OF GREAT BRITAIN AND IRELAND.

FELLOW COUNTRYMEN,—The Committee of the Coleraine Tenant-Right Association having requested me, as their Secretary, to make a public appeal to you in favour of certain alterations in the laws which regulate the relations between landlord and tenant, I venture, though thoroughly sensible of my inability in reference to the subject, to call your attention to the grievances for which we seek redress. For the sentiments which I may express, I alone will be responsible; but I shall endeavour to advance nothing that is not fully accordant with the sentiments of all the members of our Society.

Many of you must be aware that the present law of real property in these lands had its origin in the feudal system, which prevailed throughout Europe during the dark ages, and that it was framed consequently for a state of society essentially different from what now prevails. Important changes in these laws have been introduced, from time to time, to meet the wants of a more refined and civilized age; but still there are some maxims and principles embodied in the law of landlord and tenant very much out of keeping with the spirit of the nineteenth century. Thus, it is still a maxim of law that whatever is affixed to the *freehold*, during the currency of a lease, becomes *part of the freehold*, and cannot be removed by the tenant at the end of his term, but reverts to the landlord. Whether the tenant build a house or only plant a tree, the same principle applies; he may enjoy the shelter of both during his term, and perhaps by registration he may secure the tree to himself. But the house he must abandon, no matter how valuable, because the law decides that it is a part of the land, and that it cannot be removed without committing *waste*, and exposing himself to a suit at law. Now, in Ireland this principle is found to work very mischievously, retarding the improvements of the country, and often compelling the humbler class of tenantry to live in filthy hovels, when they would otherwise provide themselves with comfortable homes. It is not surprising, therefore, that in this country, where it is not the practice for landlords to erect farm-houses or offices, gates, or fences upon their lands, the tenants, who generally hold from year to year, should desire some better security than their present precarious tenure, before expending their labour or capital in what are usually denominated *permanent improvements.*

Even in England, where the landlord usually puts both land and houses in the best condition, before letting his farms, it has been found a serious grievance that the tenant cannot have compensation for any additional offices which he may be obliged during his term to erect, or for other expenditure which he may incur for the benefit of his farm. A remedy for this, among other evils, was provided in Mr. Pusey's bill of last session; but this bill was thrown out in the House of Lords, and an opportunity is still afforded of analyzing its provisions, and considering whether they were sufficiently comprehensive, or whether the law of landlord and tenant requires a far more extensive reform. Whatever may be the case in England, I think it can be easily proved that Mr. Pusey's bill would have been utterly inadequate to meet the evils of the present laws of tenure in this country. To expose some of these evils, and thus indicate the extent of the required remedy, is the principal object of these letters. So far as the tenant-farmers of Great Britain and Ireland are labouring under common grievances, it would be good policy for them to unite in seeking a common remedy. And where there are peculiar or local evils requiring redress, those who are exposed to their influence may fairly claim the sympathy and assistance of all the rest; especially if it should be found that the laws of *real property* are at the root of all the grievances complained of, whether common or special. In England, these laws, by permitting the preservation of game to the most extravagant extent, without regard to the interests of the unfortunate tenant, or of the community at large, have occasioned mischiefs, and have led to crimes, almost unknown in Ireland. In Scotland, again, the law of *entail* has been so construed and administered, contrary to the practice in England and Ireland, that it is found most injurious and oppressive, not merely to the occupiers of the land, but also to its owners, the class for whose benefit the system was established. In parts of Ireland, again, by the sanction and consent of the landlords, whether expressed or implied, the occupying tenants have been permitted to acquire a sort of property in their holdings, by buildings and other permanent improvements, effected by themselves or those from whom they derive title by inheritance or purchase; and this property, though recognised neither by law nor by equity, as against their landlords, is frequently all that they possess. This property, if it may be so termed, is generally known as *the tenant-right interest in the land*, being held only at the will of the landlords; and, seeing that it is now threatened with extinction, owing partly to the encroachments of the more needy and less conscientious of the landlords, partly to the reduced value of agricultural produce consequent on free trade, and partly to the legislative measures that have been proposed for the compensation of future improvements, *without regard to the past*, it is but natural that the tenant-right farmers of Ireland should make a vigorous effort to have their peculiar interest recognised and protected, in any law which may be enacted for the encouragement and compensation of tenants' improvements. Nor can they be blamed for seeking to interest in their behalf the tenant-farmers of England and Scotland, especially when they are in a condition to offer to the latter their co-operation for the removal of such grievances as the present game laws in Great Britain, and the present system of entails in Scotland.

Let it not be supposed from this proposal to the tenant-farmers of the United Kingdom to take common measures for their mutual support, that any undue protection of class interests is intended. On the contrary, the proposed reforms, though nothing more than measures of justice, as between class and class, are mainly supported as conducive, and even necessary, to the well-being of the community, and especially to the prosperity of the industrial classes. And it is chiefly by reason of their general utility, as affecting the public interests of the state, that there can be any hope of carrying measures which are opposed by the great majority of that most powerful class, the landed proprietors of Great Britain and Ireland.

To return, then, to the question of compensation to the occupying tenant for his outlay in what may be termed *permanent improvements*, this was one of the subjects embraced in Lord Devon's commission of 20th of November, 1843, he and his fellow-commissioners being directed "to report as to the amendments, if any, of the existing laws, which, having due regard to the just rights of property, may be calculated to encourage the cultivation of the soil, to extend a better system of agriculture, and to improve the relation between landlord and tenant" in Ireland. These commissioners displayed the utmost diligence in their inquiry, visited every county in Ireland, examining upon oath more than 1,100 witnesses, and at length made their report on the 14th February, 1845. This report, which is very minute and elaborate, contains the following passage respecting compensation to improving tenants:—

"Although it is certainly desirable that the fair remuneration to which a tenant is entitled for his outlay of capital, or of labour in permanent improvements, should be secured to him by voluntary agreement rather than by compulsion of law; yet, upon a review of all the evidence furnished to us upon the subject, we believe that some legislative measure will be found necessary, in order to give efficacy to such agreements, as well as to provide for those cases which cannot be settled by private arrangement. We earnestly hope that the legislature will be disposed to entertain a bill of this nature, and to pass it into a law with as little delay as is consistent with a full discussion of its principle and details. We are convinced that in the present state of feelings in Ireland, no single measure can be better calculated to allay discontent, and to promote substantial improvement throughout the country."

It would be difficult to exaggerate the importance of such a testimony, embodying as it does the deliberate convictions of so many competent and impartial witnesses, comprising the most experienced and intelligent members of every class in the community. But, if additional proof be wanted of the justice of providing legislative compensation for the tenants' improvements, it may be found in the fact, that, during the last 15 years, since the matter was first mooted in Parliament, all the great parties in the state have introduced bills into Parliament in order to provide such compensation. After the publication of Lord Devon's report, Sir William Somerville, as Chief Secretary for Ireland, introduced a bill into the House of Commons, on behalf of the present Government, in the session of 1847-8, to amend the law of landlord and tenant, by enforcing a certain degree of such compensation. Similar measures had previously been introduced by Lord Stanley, who is now considered the leader of the Protectionist party, and by Lord Lincoln, on behalf of Sir Robert Peel's administration. Within the same period, three private members of Parliament, Mr. S. Crawford, Mr. Pusey, and Mr. Drummond, introduced as many distinct bills, dealing with the same subject matter, and in each of these bills, also, the principle of compensation was embodied. It would, therefore, be a mere waste of time to urge at greater length the necessity of compensation.

But the nature and extent of the compensation which ought to be provided is a question of greater difficulty, and one which has given rise to the utmost difference of opinion. Mr. S. Crawford has laid down the broad principle that the tenant-farmer who, by substantial improvements, increases the letting value of his holding, and whose tenancy may be determined before the beneficial effects of his improvements are exhausted, is entitled, upon the determination of his tenancy, to receive *from the incoming tenant* the full value of his improvements, as then unexhausted, no matter how many years he may previously have enjoyed their full benefit.

All the other Statesmen who attempted to settle this question by legislation, have merely endeavoured to secure to the improving tenant the full benefit of his improvements during a limited number of years, that he may be fairly remunerated for his outlay. Now, which of these principles is the sound one, having the sanction of justice as well as of public policy? This preliminary point involves the merits of the whole question, and must not be hastily disposed of. I am fully persuaded, with Mr. Crawford, that the tenant-farmer should enjoy the full benefit, and not the temporary use merely, of the result of his own capital and industry; and I propose now to examine some of the arguments upon which an opposite conclusion is founded. It must ever be borne in mind, as connected with this question, that the landlord, being the owner of the soil, is the party primarily interested in its permanent improvement; and that he, as such, has always enjoyed the opportunity of improving it to the utmost, by the expenditure of his own capital, and of deriving the entire benefit of such expenditure from the increased rent which it would enable him to obtain. This privilege he would still enjoy in accordance with Mr. Crawford's principle; and wheresoever a moderate outlay, judiciously applied, may have the effect of greatly enhancing the value of the land, the landlord would have himself alone to blame, so far as the tenant is concerned, if he were not the first to develop the hidden resources of the soil.

But if the landlord be unable or unwilling to make the effort, or run the risk required for making a substantial addition to his income, the occupying tenant is the only other party who has an opportunity of adding permanently to the value of the soil. Indeed, for this purpose the tenant is in more favourable circumstances than the landlord, being continually on the spot, able to superintend every operation, and in some cases to invest his labour, as well as his capital, in lasting improvements: Why, then, should not the tenant, if a man of enterprise and industry, be at liberty to increase the value of his holding to the utmost, and to enjoy to the full that increased value which he himself would create? To this it is sometimes alleged in reply, that a few years' enjoyment of the improvements is of itself sufficient to remunerate the tenant for his outlay; and that, after he has been reimbursed for his care and expense, he should have no further claim, either in equity or in conscience, on the improved value. Now, this is a specious reply; but observe the fallacy and injustice which lurk under it. The landlord is allowed to lie by, awaiting the result of his tenant's experiments; and when these are favourable, he is permitted to recognise the tenant as his agent, and to monopolise all the benefit of the undertaking, after the tenant's first outlay is liquidated, if indeed the allotted time be long enough for that purpose. But, if the tenant's experiments should fail, if he should ruin himself while trying to improve his farm, there is no agency then; the tenant's operations are repudiated, and he himself is, perhaps, stigmatised as a fool for his pains. But, if the landlord is to reap the benefit of a successful speculation, why should he not be liable to the damage of a failure? It will not serve, by way of reply, to allege how amply a small expenditure of capital is generally recompensed in agricultural works. If the profits were as large as they are represented to be, there is the less excuse for the landlord, who, knowing this, fails to realize them honestly, by the outlay of his own capital. But those who are most conversant with farming affairs are well aware how much money must often be expended without the slightest chance of an adequate pecuniary return, and how often the fairest and most reasonable expectations, of a profitable undertaking, are signally disappointed.

Under these circumstances, the fair and rational construction of the tenant-farmer's duty would be that he should merely restore the land, at the end of his tenancy, in as good condition as he found it in at the commencement. At present the law will punish him for *waste*, if the land have been deteriorated during his tenancy; it will not reward him if the land be improved by his exertions to double or quadruple its former value. The law is, therefore, regarded as one-sided and unfair, or at least as incomplete in its provisions. And when it has once been conceded that compensation should for the future be secured by law, it is difficult to suggest any just measure for the amount of compensation, except the actual value of the improvements at the end of the tenancy. The law should not be changed at all, if it be not found to work injustice. It should not establish a faulty standard of compensation, if such a sound and safe one can be pointed out. Now, what is the charm, it may be reasonably inquired, in 14, or 21, or 31 years, or in any fixed number of years, to insure to the tenant-farmer a fair return for his outlay within that period? The natural effect of such a provision would be to limit the improvements of the tenant to those which would hold out a very clear prospect of large and speedy returns, and so far to cramp his energies and restrict his progress. But, just as we sometimes see the farmer now expending his money without twelve months' secured possession of his tenement, so we may fairly infer would he then occasionally be found undertaking works for which he would have no adequate return within the statutable period. And then, as now, would the question be raised whether the landlord could, in such a case, *justly* enter into another man's labours; and then, as now, would Virgil's famous epigram be aptly applied, "*Sic vos non vobis mellificatis apes.*" So far as the restricted compensation would deter the occupier from improving, the landlord would clearly be no gainer, while the tenant would suffer, if his projected works were calculated to be ultimately productive, though not within the limited period: and the landlord, in that case, would lose the additional guarantee which they would offer for the security and prompt payment of his rent. And, meanwhile, the community at large, as we shall presently see, would be a loser to a still greater extent.

But we must resume the subject again, as I have already occupied sufficient space for a single letter, and would not wish to encroach unduly on the columns of those journalists who may feel such a regard for your interests as to give circulation to the opinions, however unworthy the occasion, of your devoted friend,

S. M. Greer,

Secretary to the Coleraine Tenant-Right Association.

Sgringvale, Coleraine, August 30th, 1849.

HEREFORDS VERSUS SHORTHORNS AND DEVONS.

Sir,—In these times, when every description of agricultural produce is so depressed, it is absolutely necessary for farmers to endeavour to find out the most profitable mode of cultivating their land; and there are few subjects more worthy their attention than what is the most profitable stock to keep upon their farms. We have heard a great deal of the superiority of shorthorns, of their early maturity, &c.; but I am inclined to think that the sun of their prosperity is fast declining. It will be found that a shorthorn cannot be made fat at an early age without very high keep, and farmers will find it rather an unprofitable trade to force a bullock with cake and corn, and sell him at 3s. 6d. a stone; and if he is left to a more mature age, when he can be made fat with the common vegetable production of the farm, such as grass, hay, swedes, and mangold, then he will be a great, coarse, lumbering animal, too big for the market.

Now, sir, I am convinced that a Hereford bullock can be made fat at an early age, upon such food, when he shall not exceed a hundred stones, and be quite fat enough too. This is what I wish to prove; and in order to bring the three most approved breeds fairly into competition, I offer the following challenge:—

I hereby offer to show four Hereford steers, whose ages shall not exceed two years and three months, and four whose ages shall not exceed one year and three months, at the next Smithfield Show in December, against eight shorthorns and eight Devons, of similar ages, for a sweepstakes of one hundred sovereigns for each lot; with this stipulation—that each lot shall have been bred by one man, and that they shall have lain at grass at least four months this summer, without having had anything but what they got there. As Mr. Keary has asserted in his *Prize Essay* that it takes ten months longer to make up a Hereford than it does a shorthorn, I must labour under a great disadvantage; however, I will take my chance for that. I think, sir, I have a right to expect that this challenge shall be accepted, or that we shall hear of no more *Prize Essays*, containing such unfounded, and calumnious assertions. But this is not all. I am willing to test their hardiness as a breeding stock, as well as their feeding properties. In order to do this, I propose to turn my two-year-old heifer, which gained the first prize at Norwich, into a pasture with the two-year-old shorthorn and two-year-old Devon heifer, which obtained the first prize in their respective classes, and let them remain there till the next meeting of the Royal English Agricultural Society at Exeter, next July, giving them nothing but what they can get, except a little hay from the 5th of November till the 5th of May; the heifers to be shown at Exeter for a sweepstakes of a hundred sovereigns each. But in case the owners of either of the heifers should object to the amount of the stake, I am ready to show them for nothing, if the society will consent to give a cup to the winner; and I do not know how they could lay out their money better, for this is a question of the utmost importance, and one that ought to be decided as early as possible, and can only be settled by the animals being brought into close contact in the way I propose. If any shorthorn or Devon breeder can point out a fairer way of testing their respective merits than the one I have proposed, I shall be ready to meet him in any way he likes. I am not nice to a shade how the experiment is tried, so that the animals are brought fairly into competition with each other. I hereby declare that I am ready at all times to produce Hereford beasts against any other breed in the United Kingdom, either as rearing or feeding stock, and to back my opinion. I suppose, after having seen Mr. Hobbs's cow and my heifer at Norwich, Mr. Keary will allow that there are such things as *grey* Herefords, though he did not happen to know it before.

Before I conclude, I must beg to give a word of advice to my brother graziers. If they are desirous of trying Hereford bullocks, let them go down to Hereford fair, on the 19th of October, when they will see the finest show of bullocks the world can produce, and there they can choose for themselves, and not trust to buying them of jobbers, who buy a cheap sort, chiefly bred in Radnorshire, out of Welsh cows, and bring them up into the country where the breed is little known; and by this means they are led to form an unfavourable and unjust opinion of the breed, probably never having seen a good-bred one in their lives. My only object, Mr. Editor, is to establish the truth, and to show to the farmers of England what is their real interest.

I remain, your obedient servant,

J. R. Smythies.

East Hill, Colchester, September 18.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—BIRMINGHAM.

AGRICULTURAL STATISTICS OF IRELAND.

G. R. Porter, Esq., F.R.S., read a most important paper on the agricultural statistics of Ireland, which we give almost entire, omitting only a number of figures, of which the results are admirably stated in the course of the paper. It ran as follows:—"A volume of considerable interest and importance, entitled 'Returns of Agricultural Produce in Ireland in the year 1848,' has very recently been distributed to the members of the two Houses of Parliament, and it is thought that a short abstract of its contents may prove interesting to the section. This volume more than fulfils the promise set forth in its title-page, since it comprises also the returns of agricultural stock and produce in the preceding year, 1847, and thus enables us to draw a comparison between the two years as regards this most important branch of the national industry, under circumstances which give to such a comparison an interest far greater than it would have possessed at almost any other period. The returns have been obtained at the desire of Lord Clarendon, under the direction of that most intelligent and energetic public officer, Captain Larcom, of the Royal Engineers, who, it will be remembered, read before this section at the meeting of the association held at Cork, in 1843, a very valuable and elaborate paper on the census of the population of Ireland in 1841; in which paper a considerable amount of information was given that will admit of the comparison as respects some matters connected with agriculture being carried back to the year 1841, The returns embraced at both periods the number of farms or holdings, distinguished in different classes, according to their average contents, information of deep importance considering the faulty—it might rather be said the fatal, subdivisions of the soil in that island; and it must be gratifying to learn that a change in this respect is going forward, if not so rapidly as could be wished, yet more rapidly than could have been expected from the known tenacity wherewith the Irish cottier had previously adhered to his patch of ground. The condition of the country in this respect in each of the years above mentioned was—

	1847.	1848.
Farms from 1 to 5 acres ..	£125,926	£101,779
,, 5 to 15 acres. .	253,630	225,251
,, 15 to 30 acres. .	150,999	146,725
,, above 30 acres.....	137,147	140,817
Total number	£667,702	£614,572

The number of holdings not exceeding an acre were—

In 1847.....................	62,447
In 1848.....................	44,262

The paper read by Captain Larcom, on the census returns, did not give the number of these small holdings in 1841, but we may fairly presume that it must have been greatly beyond the number ascertained in 1847, seeing that the next smallest description of farms, those of one to five acres, had then decreased in the proportion of three-fifths, while those above 30 acres have increased in a three-fold proportion. The next census returns, which will most probably be made under the direction of Captain Larcom, who so ably conducted the census of 1841, will doubtless be made to exhibit the effect which this change produces upon the course of employment. The fact has on previous occasions been noticed, that while in England and Scotland the proportionate number of the population employed in raising food has been decreasing in a very remarkable manner, the contrary result has been experienced in Ireland. It was ascertained, at the census of 1841, that in Great Britain 1,000 persons engaged as occupiers and labourers, in raising food, provided for the wants, in that respect, of themselves and of 2,984 persons; while in Ireland the like number of persons—viz., 1,000, so engaged, provided food for no more than 511 persons beyond themselves. In 1831, the number of occupiers not employing labourers—the lowest description of farmers—in England was 94,883, out of a population of 13,000,000; whereas in Ireland, a population of 7,700,000 furnished 564,274 of such small farmers. A great part of these have changed, or, it is to be hoped, will change their condition by becoming hired labourers for others, and as their employers will necessarily be in possession of some capital, the labour employed by them will be rendered more effective than it could be under the old order of things, where the farmer of a mere patch of ground had usually little or nothing more than his bodily exertions to assist in developing the resources of the soil.

The amount of land under cultivation applied to the production of different kinds of food, and the actual produce in each of the years 1847 and 1848, are given in the returns; but it is necessary to explain, that owing to the unsettled state of the country, it was found impossible to collect returns in the counties of Waterford and Tipperary, so that in drawing a comparison between the result of last year and of 1847, we must deduct the returns for those two counties. The total number of acres under cultivation in 1847 was found to be 5,238,575. If we deduct therefrom the area cultivated in Waterford and Tipperary, 432,977, the remainder will show the extent which is fairly to be brought into the comparison—viz. 4,805,598. The acreage under cultivation in 1848 was 5,108,062, showing the gratifying fact, that an increase has been made in one year of 302,464 acres, exclusive of the two counties here mentioned. If the increase in those counties has kept pace with that of the remainder of Ireland, the increased breadth of land brought under cultivation in one year has amounted to 329,715 acres, or more than 6 per cent.

The produce in 1847, if we deduct that of Waterford and Tipperary, was—

Wheat	2,389,815 qrs.
Oats	10,950,414 do.
Barley	1,251,432 do.
Bere	230,144 do.
Rye	58,632 do.
Beans	82,402 do.
	14,962,839

Potatoes	15,102,828 brls. of 20 st.
Turnips	5,146,490 tons.
Green Crops	913,439 do.
Flax	347,856 cwt.
Hay	2,001,673 tons.

The stock of various kinds that existed at the time of the last census (1841), and in 1847 and 1848, afford a strong commentary upon the distress occasioned by the failure of the potato harvest. It appears that, comparing 1847 with 1841, the number of horses was lessened by 54,348; but the deficiency on farms not exceeding 15 acres amounted to 163,692, while there was actually an increase on farms above that area of 109,344. Of asses there was an increase of 21,714; but on the small farms there was a falling off in the number of these animals amounting to 32,955, while there was an increase in the larger holdings of 54,669. With respect to horned cattle, there was an increase of 527,114; but this was wholly experienced on the larger farms, there having been on those not exceeding 15 acres, fewer in 1847 than in 1841 by 336,471, and consequently more on the larger holdings by 863,585. The number of sheep was less on the whole, in 1847 than in 1841, by 109,565; but the deficiency on the small farms was 529,226, while there was an increase on the larger. The greater deficiency has been experienced in regard to pigs and poultry, which in Ireland are especially domesticated animals, and, as might be expected, the falling off is found chiefly among the cottier class. On the larger farms, those above 30 acres in extent, there were 42,643 more pigs in 1847 than in 1841; whereas on all the smaller holdings the difference was very greatly in the other direction. On farms not exceeding one acre the numbers were 295,048 in 1841, and only 19,108 in 1847. On farms from one to five acres, there were 251,587 in 1841, and only 21,422 in 1847. In the next division, between 5 and 15 acres, the numbers were 350,825 in 1841, and no more than 80,098 in 1847. Persons holding from 15 to 30 acres kept, in 1841, 215,340, and only 113,864 in 1847; while on farms above that size, the numbers which were 240,301 in 1841, had advanced to 282,984 in 1847. The entire deficiency of this description of stock between the two periods was 835,625, or more than 60 per cent.

The diminished number of poultry was 3,378,279 upon 8,334,427, or 40 per cent, which, as in the case of the pigs, applied entirely to the smaller farms. On those above 15 acres there was an increased number, amounting to 1,048,974, showing that the lessened number on the smaller farms was 4,427,253. The lessened number of pigs is clearly referrible to the failure of the food upon which those animals are usually kept in the cabins of the peasantry; and as regards poultry, it could hardly be expected that a starving people should continue to rear things so easily convertible into food, or into that which would procure food for the owners. These facts, which are proved beyond controversy by the inquiries of the Irish government, place in a very conspicuous light the disadvantage of peasant holdings, as compared with farms which, from their extent, require to be cultivated by persons who, possessing some capital, are not driven, on the occurrence of the first calamitous season, to measures destructive of their own future prosperity, and injurious to the public at large. The question of the advantage or otherwise of maintaining a class of peasant proprietors, is one upon which it would not be advisable to dilate on this occasion; but the figures brought forward in the returns under examination appear to be so important, as exhibiting the consequences of farming without the needful appliances, that it was impossible to pass them by without this one word of comment.

The table exhibiting the number of acres devoted in 1847 and 1848 respectively to the production of the different cereal grains, show a result for which we could hardly have been prepared. There was a falling off in the breadth of wheat sown of 178,125 acres, or 24 per cent. upon the quantity in 1847. Of oats there was a lessened sowing of 278,464 acres, or 12½ per cent. Of barley the cultivation was lessened by 40,352 acres, or nearly 14 per cent. On the other hand, the tendency to continue dependent for a great part of their daily food upon potatoes has been shown by the Irish peasantry in the marked increase of the land devoted to their growth, which amounted to 458,783 acres, or 160 per cent upon the number of acres so employed in 1847! We hear but little of injury sustained by this root at present, and may expect that the misery through which that peasantry had to pass consequent upon the destruction of their staple produce will be forgotten, and that they may be willing to remain in dependence upon the success of this lowest description of food, and thus be liable at any time to a recurrence of the horrors of famine.

We are now, for the first time in the history of this country, enabled to record with anything approaching to accuracy the actual and comparative result of two consecutive harvests. The result is such as to prove—if indeed any proof to that effect could be required—of how much, of what vital importance it is to know the truth upon this most momentous subject. We have seen that the breadth of land devoted in 1848 to the cultivation of the cereal grains was much less than in the previous year, and the figures which record the result of that cultivation serve to show that the actual produce of the land, in all its most important objects, was such as greatly to aggravate the evil thence to be expected. It appears, upon calculation, that the produce of the cereal grains in bushels, and of potatoes in tons, in each of the two years, was as follows:

		1847.	1848.
Wheat............	(bushels)	31.4	22.0
Barley............	„	39.0	37.3
Oats	„	41.8	37.6
Bere	„	44.6	39.7
Rye..............	„	40.6	39.2
Potatoes...........	(tons)	7.28	3.87

If the deficiency here shown were equally great in Great Britain, we can be at no loss to account for the very large importations of foreign grain imported during the twelve months from August, 1848, to August, 1849, and which importations, great as they have been, would seem to be in no degree beyond our requirements.

The quantities so entered have been as follows:—

Wheat................	4,323,645	quarters.
Barley	1,323,827	„
Oats	1,221,883	„
Rye..................	220,829	„
Peas	266,475	„
Beans	530,177	„
Maize................	2,287,283	„
Wheat flour, 3,508,375 cwt., equal to........	1,002,393	„
Total	11,177,512	quarters."

A short discussion took place on this paper, the chief feature of which was an expression of opinion that if statistics of the same kind could be had regarding the produce of England, they would be most invaluable.

Thanks were voted to Mr. Porter for the paper, one of the speakers remarking that but for that gentleman they would probably never have heard the important facts which had been made known to them.

CALENDAR OF HORTICULTURE.—OCTOBER.

RETROSPECT.

The weather, with westerly winds, continued dry, and often sultry, from the 21st to the end of August. There was a prevalence of gloom, or hazy masses of clouds suddenly formed, which at once obscured the transitory gleams of hot sunbeams. The atmosphere was not healthy to man; and as there had been scarcely any rain during five weeks, the ground became parched and dusty. Potatoes were favoured by this season, and turned up far more mealy in quality than had been anticipated. The three first evenings of September exhibited vivid corruscations of lightning. We had, hereabout, very little thunder, and scarcely any rain. But these electric commotions brought an entire change of wind, the current becoming and remaining easterly till the 9th evening. The fourth day was remarkably close and oppressive; otherwise the sky became more clear, and the air lively. Another change to the west took place on the 9th, and subsequently there was an ample supply of rain. Vegetables, of course, improved much, and the supply promises to be fine and abundant; turnips are coming on now (14th), and the character of the potatoes will be spedily determined.

Gardening is carried on very extensively about Croydon; the produce is very great, but the system is negligent, aud requires that reform which a careful observation of the symmetry and beautiful order of the market-gardens near London might well induce. Weeds and litter are disgraceful and useless: let them be banished from all gardens everywhere, for they not only do mischief among crops, but are capable of producing much valuable manure, if deposited in heaps, with lime, salt, and wood ashes.

OPERATIONS IN THE KITCHEN GARDEN.

Mushroom-beds—if there be any in the open ground, make them up now without delay; but the practice so particularly urged last month, is much to be preferred.

Plant *cauliflowers* and early *broccoli* in frames, and for hand glasses, about the end of the month. Three or four plants are put under each glass, the soil having been made previously rich and light. Good rotten dung, with a pint or so of *pure guano* to each large barrow, is perhaps the best manure for all the brassica tribes. Set one glass over each patch, and keep it close down till growth commence; then prop one side, opposite to that of the wind, and generally let it down at sunset.

Cabbages for hearting—double dig the ground, bringing up the lower spit to the top; manure the lower spit; but the plants will thrive best and be more healthy in the new raised soil, for it is undoubtedly proved that all the tribes thrive to perfection in *fresh* maiden earth.

"Lay into the ground purple and white broccoli, within a few inches of their lower leaves, letting their heads face the north." We find these directions now, but Mr. Knight insisted on a much earlier period. The mode of trench-planting in August, so often urged by me, would appear to meet every purpose.

Endive—tie up for blanching; or, having collected and secured the leaves, cover each plant with an inverted large pot. Attend to it, and in a few days the bleaching will be complete—if neglected, and the weather prove hazy and damp, the endive will decay and be worthless.

Dig *potatoes*, and store them in a dry cold cave or cellar, not in pyes or earth pits. Look over the store, and reject all the doubtful tubers—if the disease is ever to be averted by man, it will be by planting a pure and untainted stock in dry soil, without rank dress, and I am inclined to suggest, in charcoal dust or charred peat.

Secure some *carrots*, for temporary supply, and go on to do so with *parsnips, beets* and *Jerusalem artichokes*, till frost threaten to stop the work; then lay up a store for winter.

Lettuces—black seeded Gotte, Bath cos, and brown Dutch, may go into frames to come into use in the early spring. The Gotte can be planted in a warm sheltered border, or if the soil be wet, upon ridges, with a trench on each side. Damp is as injurious as frost, while a few mats timely thrown over hoops, will secure the plant from the latter. Should the winter prove mild, G. Lindley, with whom this variety was a great favourite, says—"It will come in three weeks sooner than the tennis ball," and other better known sorts.

Dress the beds of sweet and pot herbs—*balm, burnet, chamomile, hyssop, marjoram, sage, savory, tarragon,* and *thyme* of both kinds.

Clear *asparagus* beds and rows. Remove the haulm after cutting it close over; weed, and sweep away the litter and seeds; manure the alleys, if any there be, and rake the surface of the beds. There is no occasion, now, to cover them with manure, the plants are hardy, and all enrichment, with a copious dressing of common salt, ought to be given after the turn of the year, when nature prepares to start, and the first developments under ground are commencing.

Small salad—If a constant succession is required sow *mustard* and *cress* in shallow boxes, or broad pans, in frames or pits; a rather sunny spare room, or light cellar, will do; the floor of a vinery is very suitable. Earth up *celery*.

Sow a few hardy and early *peas*, also *beans*, by way of experiment; but these things suffer so much in the winter, and by depredation under ground, that little is to be expected. In dry weather dig and trench, reversing the surfaces, and manure the bottom with fresh dung and vegetable remains, the latter well salted.

Forcing asparagus—Various are the methods recommended. Masses of tree leaves, fresh as they fall, with the grass rakings of the park or meadow, cannot be surpassed, the bed being renewed as succession is required, every three or four weeks, from October to the end of February. Brick pits are the preferable recipients of the manure and soil, but turf pits, with rough wooden frames, will suffice.

Hardy Fruit Department.

Peaches (cling-stones), still on the trees, must be protected from flies, and also the ripening clusters of grapes: we never saw so wretched a crop as the vines have in many instances produced. Next year, from the ripe state of the wood, and the repose the trees have experienced, the crop we opine will be abundant.

Early *peaches, nectarines, apricots,* should be so openly trained toward the middle of the month, as to admit all the sun possible, in order to complete the ripening of the wood; but as to pruning and close nailing in, prefer February. A wired trellis to which the branches can be tied, within an inch and half of the wall, is much to be preferred.

Apple and *pears,* as dwarfs and espaliers—cut back to the spur eyes after the wood is fully mellowed.

Gather the fruit, as it becomes ready, in fine and sunny weather. The best pears ought never to be left beyond the 15th if frost threaten. Wipe, and note each sort of fruit, and carefully deposit it in a cool dry situation. Cider apples may be permitted to heat and transpire in heaps for a short time; but cider should not be made till frost comes on; and when made, and in cask, we recommend that a stout muslin bag, containing a pint of bruised charcoal, be suspended mid-way in the liquor of each hogshead; this simple process, always safe at least, it is stated will secure the liquor from acescence, ropiness, and injurious fermentation—"try all things," that cannot do injury.

Plant carefully and efficiently, as to the position of the roots, every kind of fruit-tree and shrub, then mulch the earth with decaying leaves or fern.

Floral Departments and Shrubbery.

Remove litter of every kind; fork-dig the surface of the flower-beds, and if any herbaceous flowering plants are to be introduced, do it early. Sweep and roll the walks after careful weeding, and make the lawn quite neat. A winter garden, by simple order, may be made a very pleasing object, even without the ordinary decorative adjuncts; but a weedy, neglected surface, however rich and costly the plants may be, is always disgusting.

Evergreen plants can be safely transplanted, provided great care be taken to expand the roots, so that fine soil may touch every fibre; the younger plants succeed best, and grow more rapidly. Do the work about the third week. The following will prosper under the shade of common trees—*Daphne laureola, Cotoneaster,* with its lovely red berries after delicate whitish blossoms, *Rhododendrons, Arbutus uva ursi, Hollies, Gaultheria, Tree box, Garrya elliptica,* blossoming in November—*Berberris acquifolia* and *intermedia* should be planted more in front of the evergreen plots.

Roses of all sorts require rich soil, the ground to be taken out (for standards) fully two feet, and made up with rich loamy turf, mixed with plenty of decayed manure. A mulch of horse-droppings and half-decayed leaves, three inches deep, may lie over the roots all winter.

Philadelphus (mock orange), *lilacs,* and every deciduous tree that sends up suckers, should be deprived of them. These ramblers are in themselves very offensive, and, moreover, fail to produce any flowers.

Ornamental climbers comprise many species of *Clematis* or *Virgin's Bower, Glycine sinensis, Escallonia rubra, Magnolia grandiflora, Rosa Banksia,* and *Noisette.* Several varieties of *honeysuckle* (*Lonicera*), &c., should be neatly trained, and secured either by ties on trellis, or nailed against the walls.

Hedges, deciduous or evergreen, ought to be cut with the knife; shears bruise the wood and disfigure the leaves; and with evergreens it will be better to trim out the projecting shoots. Hawthorn must, however, be cut with shears or the pruning hook, working upwards at every stroke.

Half-hardy Plants.

Hydrangeas, fuchsias in pots, &c., that are inert during winter, should be placed in a dry situation, so cold as to prevent them from sprouting. Deep pits with saw-dust at bottom give capital protection; the glasses kept off when the air is dry, but ready to be put on in rainy weather and severe frosts. *Heaths, camellias, azaleas* of the green-house species, must have a full exposure to air, and never be permitted to crowd each other. It is a folly to bury plants under the stage of a greenhouse, they are there exposed to dirt and drip, and cannot prosper or be in health. The greenhouse ought to be always clean, dry, and airy : a damp foul atmosphere is one of the greatest enemies to the plants kept in it.

FINAL RETROSPECT.— The weather has remained perfectly fine, with a barometer higher than has been observed for many weeks. The air has become more buoyant, cheerful, and, I believe, healthful, during the last week. Potatoes remain fine and very abundant, at half-price; so mealy that we begin to retrace those of by-gone days. Be it remembered that a diseased stock must have been planted, more or less, since 1845; hence, it can be no matter of wonder that the stems *underground* became cankered in June; and, as a consequence, that the plants above the surface, so affected, must fail. We hear of very few tubers *found* diseased, and diggers assert that they find few or none so affected.

The autumnal equinox is at hand; wind northerly; appearances warn us of the probability that the winter will be dry and keen.

J. TOWERS.

Croydon. Sept. 20.

AGRICULTURAL REPORTS.

GENERAL AGRICULTURAL REPORT FOR SEPTEMBER.

Although some rather large quantities of rain fell in most parts of England about the middle of the month, the weather, taken as a whole, has been very favourable for the ingathering of the crops. Harvest operations, even in the most northern localities in England, have been brought to a successful close; and it is gratifying to observe that they have been carried on with perhaps fewer interruptions than in almost any previous year. The wheats, as well as all spring corn, have reached the stack-yards in excellent condition, and it would, we conceive, be a somewhat difficult matter to find a sprouted sample. Opinions, however, still differ as to the acreable produce of the new crop of wheat. It cannot be doubted for a moment that instances can be recorded in which the yield does not come up to the growers' expectations; but we have no hesitation whatever in asserting that the total produce is considerably in excess of that of last year, and much superior in quality. The quantity of spring corn is certainly above an average. All over the kingdom, but more particularly in what are termed the forward districts in England, the stocks of old grain are now almost wholly exhausted; hence the supplies now offering in our various markets are of the present year's growth. To keep pace with the demand thrashing must progress rapidly, notwithstanding that the foreign importations are likely to interfere with the sales of home-grown produce.

The large stock fairs have been tolerably well attended; yet the actual business transacted in them has been by no means satisfactory. Prices have ruled very low, although most of the beasts and sheep brought forward have changed hands.

At one period of the month there were symptoms of an improvement in the value of wheat, all over the kingdom; but the immense pressure of foreign supplies speedily brought our markets down to nearly, or quite their previous level. It is to be remarked that the quantities of grain received this year from any particular port have been smaller than in the ordinary run of seasons, New York alone excepted. Still, however, it is placed beyond a doubt that, as all nations are now producing for us, and as the Navigation Laws are repealed, the importations, though gradual, will be fully adequate to our extraordinary requirements. That consumption is going on to a very great extent must be evident to all who peruse the weekly and monthly returns of the deliveries of foreign corn in this country. The importers appear determined to act upon the principle of selling at almost any price immediately on arrival, rather than incur landing and warehouse expenses. So long as such a state of things exists—and we see every prospect of its continuance—so long shall we have heavy and depressed markets. The stock of foreign corn at this time in bond in the United Kingdom is under 100,000 qrs. The turnip crop is turning out remarkably good. Scarcely an instance can be noticed in which any serious failure of the plant has taken place. Carrots and swedes have progressed steadily : their produce is undoubtedly good. Very conflicting accounts have reached us respecting the potato crop. Some parties have intimated that the disease has done serious mischief to the winter crop; others, that very few traces of the disease are to be met with. Upon this head we have made the most extensive inquiries; and we feel bound to assert that our candid impression is that, taking the country generally, the losses will be comparatively small.

The produce of winter fruit this year is turning out good. Owing to the prevalence of cholera, very little business has as yet taken place in it, and prices rule very low.

Hop-picking has been nearly concluded in some districts. The supply is unquestionably smaller than was that of last year; and it is thought the duty will not come up to £90,000.

Letters from Ireland and Scotland are to the effect that harvest-work has gone on satisfactorily. The yield of the new wheats, barley, and oats is quite an average one.

Our stock markets have somewhat fluctuated. As the supplies have increased to some extent, the advance in the quotations noticed at the commencement of the month has not been supported.

REVIEW OF THE CATTLE TRADE DURING THE PAST MONTH.

In the early part of the month (owing chiefly to the then prevailing warm weather preventing the arrival of anything like receipts of country-killed meat up to Newgate and Leadenhall markets) there was a much better feeling exhibited in the demand for each kind of stock in Smithfield; hence prices had, in most instances, an upward tendency. Towards its close, however, from the jobbers having purchased liberally at the various fairs and other agricultural marts—and which circumstance produced heavy supplies, especially of beasts—the general trade became exceedingly heavy, and the whole of the advance (from 2d. to 4d. per 8 lbs.) paid by the butchers up to the 17th of the month, was lost.

We have frequently remarked that the numbers of stock at present on most farms are large; and that, while the importations from abroad continue unrestricted, there is very little prospect of any permanent rise in the value of live stock in this country. Passing events show the accuracy of our conclusions, and we regret to state that, in numerous instances, fat stock has been disposed of in Smithfield, for some time past, at prices scarcely above those formerly paid for store animals. Our candid opinion is, that not one shilling of profit has been realized, either by the jobbers or graziers, for many weeks past!

Up to the present time, the arrivals of beasts and sheep, as well as calves and pigs, into Liverpool, from Ireland, have been comparatively small, though, on the other hand, of superior quality. It is evident, therefore, that our prices do not remunerate the Irish farmers, although we think it possible that some demand for barrens will shortly spring up for the western and midland districts. With some few exceptions, foreign stock continues to reach us in bad condition. Some efforts have been made by the Dutch graziers to cross the native breeds with our South Downs. The legs of the animals now arriving are thus somewhat shortened; yet their general symmetry is undoubtedly bad. There appears to be only one circumstance in favour of the foreign stock, and that is, it carries an immense quantity of internal fat, compared with the weight of the carcass. The depressed state of our markets has kept back very large supplies which otherwise would have reached us.

The ravages committed by the epidemic have subsided to some extent; nevertheless, instances of severe individual losses have reached us. In all parts of the country—indeed, we may say, of the United Kingdom—the supply of pasture herbage has now become small. Recourse has, therefore, been had to dry food, the quantity of which on hand is unusually large.

The annexed supplies of stock have been exhibited in Smithfield market:—

Beasts	19,868 Head.
Cows	447
Sheep and lambs	168,350
Calves	2,080
Pigs	1,957

COMPARISON OF SUPPLIES.

	Sept., 1846.	Sept., 1847.	Sept., 1848.
Beasts	18,611	22,492	21,714
Cows	447	456	421
Sheep and Lambs	154,260	161,340	161,230
Calves	2,167	3,324	2,707
Pigs	2,591	2,137	3,153

The bullock droves have been thus derived:—

	Head.
Northern districts	5,100
Eastern, western, and midland, ditto	6,700
Other parts of England	1,900
Scotland	350

COMPARISON OF PRICES.

Per 8 lbs., to sink the offal.

	Sept., 1847. s. d. s. d.	Sept., 1848. s. d. s. d.	Sept., 1849. s. d. s. d.
Beef from	3 0 to 4 8	2 6 to 4 0	2 10 to 3 10
Mutton	3 8 to 5 4	3 4 to 5 0	2 10 to 4 0
Lamb	4 2 to 5 8	3 8 to 5 0	4 0 to 5 0
Veal	4 0 to 5 2	3 2 to 4 2	3 0 to 3 6
Pork	4 0 to 5 2	3 10 to 5 0	3 2 to 4 2

The foreign importations have not been extensive, as will be seen by the following comparison:—

IMPORTS INTO THE METROPOLIS.

	Sept., 1847.	Sept., 1848.	Sept., 1849.
Beasts	4,000	4,301	4,214
Sheep and lambs	14,683	21,681	17,649
Calves	1,362	1,625	743
Pigs	270	55	528
Total	20,315	27,662	23,134

At the northern outports about 5,200 head of stock have been landed, mostly from Rotterdam. Only about 60 oxen have come to hand at Southampton from Spain.

Newgate and Leadenhall markets have been but moderately supplied. Generally speaking the demand has been in a sluggish state, at barely stationary prices.

NORTH-EAST OF SCOTLAND.

Harvest has now commenced in all the earlier parts of this district—that is, along the whole of its seaward border, from Montrose in east of Forfar, to Nairn on the Moray Frith, and along the banks of the lower portions of the rivers—the Dee and the Don, the Spey, and the Ythan—by which it is intersected. In the more inland portion of the district, lying towards the sources of those rivers, it will be eight or ten days, or perhaps in some of the high-lying and later parishes, even a longer period, before the cutting of oats be general. The harvest is from ten days to a fortnight later than it was last year. We are now able to form a tolerably correct estimate of the produce of the crop which we are about to reap; and, first, as to oats, which are almost the exclusive grain crop of the district. Taking the district generally—one portion of it with another, and one sort of soil with another—the crop may reach an average; it will certainly not exceed this, either in bulk of straw or in produce of grain. The oat crop is in a great measure dependant for its productiveness in grain, and to a great extent also for its bulk in straw, upon the weather during the month of June and the first part of July. The weather, at this important period during the present season, was very unfavourable to vegetation, a superabundance of moisture in spring having been immediately followed by a severe cold drought during the latter part of May and the whole of June, with a tendency to frost during the nights. This unseasonable weather kept vegetation of all kinds in check, and on very thin and open soils, the severity of the drought stinted the growth of oats to such an extent, and forced them into ear with so limited a length of straw, that all the favourable weather that we have since had has not been sufficient to extend this crop, on such soils, to even an average length, or at all events not to an average bulk. The sudden and continued drought had likewise an unfavourable effect upon stiff and retentive clay soils; and consequently the crop upon many of these soils is far from heavy. At the first of July, we had altogether the prospect of a very light crop; but the weather afterwards became remarkably favourable for promoting growth, and the corn lengthened out, after coming into ear, to such an extent as to render the crop considerably heavier than its appearance and progress during the earlier stages of its growth had given us reason to anticipate. We have no great confidence, however, as to the increase of produce that is likely to be ultimately realized by growth at a late period of the season. We must bear the important fact in mind that the ear was formed under unfavourable circumstances; and though the fine weather that we had during last month made the corn stretch out considerably in length of straw, the ear could not be increased in size nor in the number of grains that it bore. It is a necessary consequence of the nature of the season that the crop is comparatively heavier in the late districts than in the earlier. In the former—that is, in the upland districts of Aberdeen and Banff shires—some danger is anticipated, in consequence of its lateness, from night frosts. In Morayshire, where wheat is grown to some extent, it is a good crop; while in the eastern district of Forfarshire, it is stated to be more or less blackened, and thereby so much injured as to render it probable that the produce will be below an average. Bear and barley are in general good crops. Grain crops of all kinds have advanced rapidly towards maturity during the last two weeks. In Morayshire, which is the earliest portion of the district embraced by our report, a great proportion of the wheat and oats, and the whole of the barley, are already in the shock. Previously to the heavy rain of Wednesday last, there was comparatively very little corn lodged this season: this was partly owing to the absence of those winds and heavy rains which commonly visit us at a rather earlier period of the season than they have done this year, and partly to the less fortunate circumstance that there are very few fields of any very extra luxuriance of growth. Turnips remained extremely backward during the earlier part of the season; but the fine growing weather that we have had during the last five or six weeks has gone far to make up the deficiency that previously existed; and with tolerably favourable weather during the few weeks of harvest, we may expect to have a very fair, or even, perhaps, an abundant crop of this invaluable root. For some small extent of turnips that has been already let, high prices (from £7 to £10 per imperial acre) have, we understand, been obtained. This, however, at present is the necessary consequence of the scarcity of pasturage, and of the necessity that many are placed under of tying up a portion of their cattle in order to keep them in condition. Potatoes are more or less affected with the disease throughout the district. The malady, however, is evidently much mitigated in its form and character, and is not proceeding with anything like the virulence and destructive energy with which it swept over the country in 1846. It seems, if not halting in its progress, to be at all events proceeding much more slowly than formerly. The haulms are, indeed, in many cases, either partially or wholly destroyed; but the tubers, which were far advanced to maturity before the disease commenced, are, up to this date, very little if at all injured. A very considerable breadth of potatoes was planted this season; and it is to be hoped, from the present position of matters, that a great proportion of them will remain safe. The hay crop, in this as in other districts, was almost a failure; and the supply of pasture grass has been very short throughout the season: to such an extent is this the case at the present time, that it will be with some difficulty that we will be able to keep our more advanced stock in suitable condition till the turnips are anything like fit for pulling.—15th September.

DEVON BULL.—The following was received too late to appear in the usual place:—The Devon Bull represented in our first plate this month took the Sillifant prize of £10 at the Devon Agricultural Society's Show at Exeter, in May, 1847; and the prize as the best old Bull from the same Society in May, 1848. His sire obtained the Sillifant prize for the best yearling at Exeter, in 1844; the Society's prize of £10, in 1845, as the best old Bull; and the first prize in the second class at the Royal Agricultural Society's Show at Shrewsbury. His grandsire was only shown at the Barnstaple Agricultural Society's Show, in 1842, when he gained the first prize, which was open to all England. His g. g. grandsire gained the first prize at the Royal Agricultural Society's Show at Bristol. His g. g. g. sire gained the first Sillifant prize ever awarded, in November, 1835, and in 1839 he obtained the prize at Exeter as the best old Bull. James Hill, Esq., of Knowle House, Dunster, is now the owner of the subject of our plate.

METEOROLOGICAL DIARY—1849.

Barometer.			Thermometer.			Wind and State.		Atmosphere.			
Day.	8 a.m.	10 p.m.	Min.	Max.	10 p.m.	Direction.	Force.	8 a.m.	2 p.m.	10 p.m.	Weather
	in. cts.	in. cts.									
Aug 22	30.27	30.16	61	65	62	Westerly	gentle	cloudy	cloudy	cloudy	dry
23	30.16	30.12	60	66	61	N.W. North	calm	cloudy	cloudy	cloudy	dry
24	30.16	30.12	58	75	63	N.E., E. by S.	airy	fine	sun	cloudy	dry
25	30.13	30.09	59	72	64	Var., W. by N.	calm	fine	sun	cloudy	dry
26	30.13	30.03	58	75	63	Westerly	lively	fine	sun	fine	dry
27	30.03	29.96	59	69	60	N. Westerly	gentle	cloudy	cloudy	cloudy	dry
28	29.96	29.90	55	69	61	W. by N., by S.	gentle	fine	sun	cloudy	
29	29.90	29.90	59	71	65	W. by North	gentle	cloudy	variabl	cloudy	dry
30	29.90	29.83	61	74	64	W. S.W.	gentle	cloudy	cloudy	cloudy	dry
31	29.85	29.85	52	75	65	Westerly, N.E.	gentle	cloudy	cloudy	fine	dry
Sept. 1	29.84	29.60	58	68	60	N. Easterly	brisk	cloudy	cloudy	cloudy	rain
2	29.71	29.76	59	75	62	E. by S., by N.	variabl.	fine	sun	cloudy	dry
3	29.87	29.98	59	75	65	S. East	variabl.	fine	sun	cloudy	rain in
4	30.05	30.10	59	74	64	N. East	still	fine	cloudy	fine	night
5	30.10	30.10	60	76	60	Easterly	lively	haze	sun	fine	dry
6	30.10	30.11	59	75	60	E. by South	lively	fine	sun	fine	dry
7	30.13	30.16	54	73	56	N. East	gentle	fine	sun	fine	dry
8	30.16	30.09	53	69	58	Easterly	calm	cloudy	sun	fine	dry
9	29.91	29.66	49	66	56	S. by E., by W.	gentle	fine	sun	cloudy	dry
10	29.50	29.38	54	65	58	S. West	gentle	fine	sun	cloudy	rain
11	29.20	29.10	53	65	53	W.S.W.	lively	fine	sun	fine	showers
12	29.09	29.10	52	58	49	S. West	gentle	cloudy	cloudy	cloudy	much rai
13	29.14	29.97	48	59	52	W. by N.	gentle	cloudy	fine	fine	showers
14	30.10	30.16	49	60	55	W. by N., by S.	gentle	cloudy	sun	cloudy	dry
15	30.19	30.16	53	60	56	W.S.W.	gentle	cloudy	cloudy	cloudy	dry
16	30.16	30.17	50	62	58	S.W., N.E.	calm	cloudy	cloudy	cloudy	dry
17	30.29	30.34	52	67	53	N. East	airy	fine	sun	fine	dry
18	30.36	30.39	42	58	48	N. by West	airy	fine	cloudy	cloudy	dry
19	30.43	30.43	46	65	52	N. by W. by E.	gentle	fine	sun	fine	dry
20	30.44	30.30	48	58	51	N. by E.	airy	cloudy	cloudy	fine	dry

ESTIMATED AVERAGES OF SEPTEMBER.

Barometer.		Thermometer.		
High.	Low.	High.	Low.	Mean.
30.410	29.410	76	36	57.8

REAL AVERAGE TEMPERATURE OF THE PERIOD.

Lowest.	Highest.	Mean.
52.86	68.	60.42

WEATHER AND PHENOMENA.

August 22.—Close and overcast. 23.—Gloomy, haze. 24.—Beautiful, cloudy evening. 25.—Fine, close. 26.—Fine, cloudy masses. 27.—Gleams, much wavy cirrus. 28.—Variable. 29.—Gleams and clouds. 30.—Oppressive: clouds and alternating gleams. 31.—The same, clouds like smoke.

LUNATIONS.—First quarter, 25th day, 4 h. 56 m. in the afternoon.

Sept. 1.—Profuse rain, lightning at night, also on the 2nd and 3rd evening. 4.—Hazy and oppressive. 5.—Fine and cheerful. 6.—Remarkable arches of clouds thrice recurring, brilliantly illuminated at sunset. 7 and 8.—Very fine.—9, 10, and 11.—Fine, but changeable on the 11th. 12.—Early rain and showers. 13.—One shower, gentle, sweet air. 14.—Fine. 15.—Overcast. 16.—Overcast, gloom. 17.—Beautiful. 18.—Cold keen wind. 19.—More sunny and warmer. 20.—Signs of a change, more overcast.

LUNATIONS.—Full moon, 2nd day, 5h. 18 m. afternoon; last quarter, 9th, 6 h. 55 m. afternoon; new moon, 16th, 4 h. 2 m. afternoon.

REMARKS REFERRING TO AGRICULTURE.—The cool and rather wet days of the second week did much service to the turnips, and some kohl rabi is in use now for cattle. The fine dry weather since the 12th has been most favourable to the latter harvest. Clover is very promising. Rain is rather required on our dry soils. J. TOWERS.

Croydon, Sept. 21.

AGRICULTURAL INTELLIGENCE, FAIRS, &c.

ABERYSTWITH FAIR, (Monday last.)—The sales of live stock were made at the same low figures mentioned in the report of Towyn fair, held the same day.

AMERSHAM FAIR, Wednesday, Sept. 19.—There was a good attendance of farmers, but dealers were very short in number. The number of Sheep and Lambs that were brought for sale was by no means numerous, though they appeared in first-rate condition; still there was very little desire for purchasing at the commencement of the fair, but as the day advanced the trade improved, and very few lots of either remained unsold; to complete purchases, the farmers, much against their will, had to accede to a reduction from the price they had asked. The show of Pigs was limited, and trade was by no means brisk. In the show of Cows there was a moderate supply, the greater portion that was offered for sale being chiefly from the neighbouring farms, but owing to the bad qualities which some possessed very little notice was taken of them, while those of beauty and quality and full in milk met with ready purchasers at £13 to £17. Of horses the show was limited, and some of which had a very unsaleable appearance, but those of an excellent description met with purchasers. The business on the whole was by no means very cheering to the farmers; many of them bore evident signs of sympathy being shown towards them, on account of the low price at which their stock was disposed of.

ASHBOURN FAIR.—MONDAY: The show of horned cattle was a tolerably good one; there was a large number of fat beasts offered for sale; but they moved off very slowly, and only a limited number was sold; beef realized from 5d. to 5½d. Good milking beasts were scarce, and sold well at advanced prices. There was a good demand for milkers at better rates, but the supply was small. Barren beasts met with few purchasers. The supply of fat sheep was large, and a tolerable number of sales were effected, mutton being about 5d. per lb. Store sheep were not much inquired after, and prices were very low. The horse fair was rather slenderly supplied, not many valuable ones being shown, and little business was done. TUESDAY: There was a full average quantity of cheese, but scarcely so much as at the last September fair; owing, probably, to many dairies in this district having been previously disposed of to factors On the whole the quality was good, and not a few samples were of a very superior kind. Nearly all the cheese brought into the fair was sold, though somewhat slowly, and farmers had to submit to a decline of 4s. or 5s. per cwt. on the prices realized at the fair in March. Samples of rather an inferior kind sold as low as 42s., good useful cheese at from 43s. to 45s., superior at from 46s. to 49s., and we heard of one dairy of very superior Staffordshire selling at 50s. The average price of the whole may be put down 44s. 6d. or 45s. per cwt.

BALLOCH FAIR.—The show of horses was not numerous, and the demand was slack. Amongst the sales effected was a pair of splendid draught-horses, which were purchased by Mr. Maxwell, of Dargavel, for £100. These horses were bought in the neighbourhood by Mr. M'Kinlay and Mr. William Clark, and were much admired. Scarcely any saddle horses were on the ground. The class of horses which in 1847 would have cost £40, could, at this market, have been purchased for £30.

BERWICK FORTNIGHTLY MARKET, September 17. —The show of cattle and sheep was small, but a few good sheep. There were only two lots of what may be called fat, which came from Mr. Calder, Fairneyside, 4 polls, which left the market unsold; the other lot came from Mr. Forster, Kenstone, 2. Numbers shown: Fat cattle, 6; lean, 20, principally Irish; sheep and lambs, 457; cows, 11. A very dull market, and few of any kinds changed hands. The prices of fat averaged from 5s. to 5s. 6d. per stone; ewes, 5d.; young sheep, 5½d. to 6d.; and lambs, 6d. per lb., and few shown. Cows from £9 to £12 each; and little or no business was done among the Irish cattle. The present promising appearance of the turnip crop causes the farmers and others to withhold any cattle nearly fat, so as to be in readiness for the turnips; we may therefore expect our market to be well supplied in a short time with good fat.

CARLISLE FAIR, Sept. 19, was not such a good one as expected, and consisted principally of shorthorns, Galloways, west Highlanders, Shetland or Isle of Skye, besides a quantity of Irish cattle. Most of the Scotch beasts were yearlings, very few three or four year olds being offered for sale. The show of Irish cattle was a very good one; all apparently in excellent condition. Milch cows were very scarce, and what were there brought higher prices than has been quoted for some time. There were nearly 100 fat cattle on offer (many more than there has been for years), the business in which was very brisk; nearly all being disposed of at from 20s. to 23s., sinking offal. The show of sheep was very scanty, there only being five lots of ewes—two of Cheviots, and one of blackfaced in the market: the prices for the two former ranging from 16s. 6d. to 19s., and for the latter 13s. Cheviot lambs sold at from 7s. 6d. to 11s.; but the sale of this stock was slow. The show of horses was very large, and to all appearance a very good one; many excellent horses were bought up by south-country dealers. Good useful road and harness horses sold at between £30 and £40. Strong draught-horses, for farming purposes, at £20 to £30. Taking the fair altogether it seemed a pretty good one; but the attendance of buyers was not so numerous as might have been expected, considering this is the last Carlisle fair of the season.

CHIPPENHAM MONTHLY MARKET was largely supplied with cattle. Beef, sold from 9s. to 9s. 6d. per score; mutton, 5d. to 5½d. per lb.; lamb, 6d. to 6½d.; Veal, 5d.; Pork, 8s. 6d. per score. The cheese market was abundantly supplied, so full was the market house and yard that the cheese was obliged to be pitched on both sides of the pavement half way up the town, and many waggons and carts were not unloaded at all, but their contents were bought and removed directly. We can safely say there were 250 tons, which met a ready sale; new broad doubles, 44s. to 51s. per cwt.; old, 50s. to 52s.; prime cheddar, 40s. to 66s.; thin 30s. to 32s.; prime thin 32s. to 44s.; loaves, 50s. to 60s.; skim, 20s. to 24s.

DURHAM FAIR was well attended both by buyers and sellers, but the general exhibition of stock was neither numerous nor of first rate description. Of fat cattle in particular there was a very limited supply, but the few shown were of excellent quality and quite ready for the butcher, and commanded better prices than we have heard named at any of the markets for some time. The show of milch cows, both in point of numbers and quality, was respectable, and a good many sales effected, but at moderate rates; this kind of cattle having perhaps depreciated more in value during the last two or three years than any other. Steers and heifers, in forward condition, were in some demand, and brought prices equal to late fairs, and not much below those of last year—the average for nice heifers being from £10 to £11, and steers from £9 to £12. The market was pretty well cleared of these descriptions of cattle by buyers from the north—an unusual feature in the fairs in the county of Durham. Of stirks and lean cattle of all kinds there was a large supply, but comparatively few were sold. They had generally a poor appearance, and a large proportion of them would be driven away without the owners having been asked the price of them. The sheep fair was worse than the cattle fair. The show consisted almost exclusively of lambs, of which nearly 3000 of all kinds and of good average quality were on the ground. The transactions throughout were of an extremely dull character, and sales difficult to effect at considerably reduced prices compared with last year, and fully 1s. to 1s. 6d. below those obtained at Falkirk and Brampton in the commencement of the week. The best lots of crosses fetched 10s. per head, while Cheviots ranged from 5s. 6d. to 9s. 6d.; only a few, however, reaching the latter figure. Want of money amongst the farmers is the chief cause of the present bad markets. The horse fair was of a very inferior description. There were a few useful looking draught horses, which were sooner brought up than might have been expected for the season of the year.

GLOUCESTER MONTHLY MARKET, (Monday last.)—There was a good supply of fat sheep, and those of good quality fetched full $5\frac{1}{2}$d. per lb.; inferior, 5d. Beef was rather scarce. Prime young Heifers were worth $5\frac{1}{2}$d.; second quality, 5d. Business on the whole was dull.

HARLING FAIR, Sept. 18.—Nearly all the sheep were sold. Although the quantity penned exceeded greatly that of last and the two preceding years' September fairs, the quality was also very good, the chief part being in excellent condition. First-rate ewes sold at an advance of 2s. each; prices for best, 36s. to 40s. each; others at from 30s. to 32s. do. Shearlings were also sold more readily, as were best ewe lambs, full 1s. each dearer, with a good demand. Best keeping-sheep, 35s. to 36s. each; smaller do., 30s. to 32s. do. Lambs, first quality, 26s. to 28s. each; second do., 22s. to 25s. do.; small do., 17s. to 20s. do. Cows and heifers-in-calf more in demand, at from £14 up to £18 each. The horses shown were generally good animals; useful cart-colts made from £25 to £30 each.

KINGSDOWN FAIR was abundantly supplied with stock of all kinds, but very few of the animals exhibited were in prime condition. The supply, however, was much larger than the demand, and the small amount of business done was consequently on very low terms, particularly in sheep. Fat beef fetched from 8s. to 9s. 6d. per score, but little was offered for sale, while of store beasts there was such an abundance, that large numbers were driven away unsold.

KINGTON FAIR.—The show of stock was indeed abundant in the extreme, both in cattle, sheep, lambs, and pigs. The supply was far greater than has been for some years past, and has not hitherto been excelled either in quality or condition. A fair amount of business was done, but at prices very much upon the decline. As morning progressed, business assumed a more brisk aspect, and a vast number changed hands, but at prices affording little or no profit to the seller.

LEWES SHEEP FAIR, (Friday last.)—The number of sheep penned exceeded 30,000. There was also a good sprinkle of lean neat stock and horses, and Mr. Thomson displayed a large collection of agricultural implements. The fair opened with a brisk demand for all sorts of sheep, but at prices about 25 per cent. less than last year. This was rejected by the flockmasters, who were prepared to make a large deduction, but so great a sacrifice as that required could not be submitted to, and consequently the fair flagged up to two o'clock, when some few sales were effected. Mr. Hampton disposed of two lots of ewes to Lord Hastings and the Hon. C. C. Cavendish, for 34s. A few lots of lambs were also sold at 17s. and 18s. After dinner, some other sales were made at the following rates:—Wethers from 26s. to 30s.; ewes, from 20s. to 34s.; lambs, from 10s. to 25s.; but there was generally experienced what may be called a dull and heavy sale, arising from no want of buyers, but from a seeming determination on their part to make no purchase but at a greatly reduced rate. The sale of rams was rather brisk.

LOUTH FAIR was well supplied with stock of all kinds. Beef realized from 4s. 6d. to 4s. 9d. per stone, and mutton from 4d. to $4\frac{1}{2}$d. per lb. The attendance of jobbers was tolerably good, but for both fat and lean things prices ruled low, and several failed to exchange hands even at prices anything but remunerative.

MALDON FAIR was well attended; the show of stock was extensive, there being upwards of 1,500 beasts and more than 6,000 sheep and lambs on the ground. On the first day, transactions were exceedingly slow all the morning, but towards the afternoon more sales were effected, still a large proportion of the stock was driven off unsold. There was a good attendance on the second day, and more purchases were made at prices much lower than this time twelvemonth; beasts were from 20s. to 30s. per head less: sheep and lambs, from 5s. to 10s. less. The supply of horses was very good, and considerable business was done in them.

NEWARK FORTNIGHT MARKET.—There was a large quantity of stock, and buyers were more spirity than for some time past; the market may be quoted considerably brisker, and a fair quantity of business was done. There were 690 sheep and 60 beast penned.

NORTHAMPTON FAIR, Wednesday last, was larger than for several years past. Good wether mutton was sold at about 3s. 4d. per stone; fat ewes at about 2s. 8d. Good useful store ewes were readily sold at prices according to quality. A great many fat beasts were sold at lower prices. There was a large supply of cheese of all descriptions. The prices ranged from 4d. to 7d. per lb.

PARTNEY FAIR.—The show of sheep was not quite so large as has been usual at the September fair. A large number of buyers were in attendance, and sales of lambs and store sheep at prices somewhat in advance of the last fair were readily effected. Fat sheep were the turn lower. A pen of 100 drape ewes, belonging to Mr. Vessey, of Halton, attracted much attention, and realized 42s. per head, being the highest price obtained in the fair.—The beast fair on Wednesday was neither in numbers or quality quite so well supplied as on some former occasions. Stores made rather less money. Coarse beef, 5s.; middling, 5s. 6d.; and prime 6s. per stone. About two-thirds of the beasts sold.

READING FAIR.—The quantity of cheese pitched was less than has been known for years, the total quantity not exceeding 400 tons. The supply of best Wiltshire doubles was particularly short, and they were much sought for. Middling qualities were a complete drug. Of Somersets the show was unusually good. The prices realized were as follows:—Best Somersets, 60s. to 68s., seconds 45s. to 54s.; best Wilts doubles, 50s. to 54s., an exceedingly fine dairy reached 56s.; half cowards, 35s. to 42s.; skim cheese, of which there was but a small supply, 26s. to 30s.; best north Wilts, 56s. to 63s. Up to 4 o'clock two-thirds of the quantity pitched remained unsold, which made a good show for the second day's fair. On the whole, the prices differed from 6s to 10s. on middling sorts, but on best cheese prices only varied 5s. from last year. We are informed that large quantities of the best cheese were disposed of at the station, to London dealers, without being brought into the fair, which may, in some measure, account for the great falling off from the quantity usually pitched. In the horse fair business was excessively dull. There was a very great supply of the inferior descriptions, for which it was almost impossible to find purchasers; really superior horses were scarce, and met with a ready sale at good prices. Of cow cattle there was also a very large quantity on offer; good fresh milch cows in great request, and sold, with the calves, at from £12 to £15, or even £16; there were an abundance of the inferior kinds, which were almost unsaleable, except at very low prices; those which were disposed of realized from £6 to £10; two-year-old heifers, £5 to £7. There were but few fat beasts, for which the demand was any thing but good. We noticed several lots of fat hogs, for which higher prices were demanded than purchasers would accede to, and they remained unsold; some, however, were disposed of, for which 8s. 6d. per score was the average price. Store pigs were in good supply, and they realized about the same prices as have been lately paid.—*Reading Mercury.*

ROCHDALE FORTNIGHT FAIR, Sept. 17.—There has been a full average attendance of country farmers, graziers, and cattle dealers. Calving cows were selling at extremely low prices, and a moderate number were disposed of. Drapes and barren beasts were a drug, and were very low in prices. Good old hay and straw were much the same as our last report.

THATCHAM FAIR, Monday last, was tolerably well supplied with sheep and cattle, and some very fine oxen were exhibited by Mr. Wm. Hobbs. The trade in the morning for sheep was dull, but towards the close of the fair most of the sheep exchanged hands, at about the prices of the late Wilton fair. The cattle trade was dull, but a fair share of business was transacted in the sale of horses. The silver cup, for presentation to the largest purchaser in number of stock, was awarded to Mr. Wm. Breed, of Amersham, Bucks.

TOWYN (WALES) FAIR, on Monday, was well supplied with animals, but the purchasers were few, and the prices offered very low; great part of the bullocks were unsold, the owners trusting to a livelier demand at the fairs this week held at Machynlleth and Dolgellau; but there were a few two-year-old bullocks sold at from 4*l*. 5s. to 4*l*. 10s. per head, such as brought 7*l*. per head at Towyn fair last December.

WESTON ZOYLAND FAIR.—There was a large show of cattle, but very few of superior quality; they realized 9s. 6d. per score, but ordinary kinds would only fetch 7s. 6d. to 7s. 9d. per score. Good horses very scarce, and business, on the whole, was very dull.

REVIEW OF THE CORN TRADE

DURING THE MONTH OF SEPTEMBER.

Though there is still some quantity of corn abroad in the northern and backward parts of the kingdom, the harvest has been so far completed as to allow us to offer an opinion as to the general result.

The breadth of land sown with wheat last autumn was fully equal to that of ordinary seasons, the seed was well got in, and the first stages of its growth were favourable. The spring proved wet and cold, and at one period the plant wore any thing but a promising appearance. Subsequently, however, the temperature rose, the fields assumed a healthy colour, and sanguine expectations of a good crop began to be indulged in. The effects of a cold, wet spring, and a want of sunshine in the early part of the summer, were, however, apparent for a considerable period; the plant was in many places thin on the ground, and it arrived at maturity later by ten days or a fortnight than in favourable years. During the blooming time we had high winds, which gave rise to predictions of a sinister character. Still the ear set well, and as the period for harvest drew near, fear subsided and hope was strengthened. Cutting was scarcely commenced until towards the end of July, and even in the southern counties the syckle was hardly in active operation until the first week in August; but when once the work was fairly commenced, it made rapid progress, being less frequently interrupted by rain than in ordinary seasons. On the 1st of September comparatively little corn remained abroad on the south side of the Humber. Taking this section of the kingdom, we have no hesitation in affirming that the wheat sustained less injury from weather during the process of harvesting than is usual, taking one year with the other, and we are therefore of opinion that the quality will in general be fine. The exception is, perhaps, confined principally to some of the counties along the east coast; but any defect which the new wheat grown in Lincolnshire, Cambridgeshire, &c., may exhibit, must be attributed to the fact of the crops having been a good deal lodged and beaten down by heavy rain in July. and not to bad weather during harvest time. In Yorkshire and further to the north reaping was not generally commenced before the 20th August, and little corn was carted till September. For about a week in the early part of the month the work was interrupted by wet; on the 12th, with the new moon, the weather became fine and settled, and between that time and the 20th scarcely any rain fell; it is consequently fair to infer that the greater proportion of the crops must have been well secured; and judging from the tenor of the reports lately received from the northern counties of England, we are inclined to think that the produce there has been equally good as that of the south. It may, therefore, be regarded as tolerably certain, that in point of quantity, the crop of wheat in England exceeds that of average seasons. The quality varies materially in different districts and on different descriptions of soil. A large portion of the growth of the south is very fine, weighing 62 to 63, and in some cases 64 to 65 lbs. per bushel. The home, the midland, and the western counties will, we think, furnish the best samples, less rain having fallen in those districts than in the eastern and northern parts. Most of the samples of new Lincoln and Cambridge wheat which we have hitherto seen have contained green and immature berries; still on the whole the produce is good, and 62 to 63 lbs. may be considered the common weight per bushel, notwithstanding the defect mentioned. How the wheat harvest may terminate in Scotland remains to be seen. During part of the present month the weather has been highly propitious in the north, but early in September more rain fell there than with us. In the south of Ireland wheat is reported to be above an average crop, and of very good quality; in the north of the island a portion is still abroad.

It will be at once apparent from the foregoing remarks, that the general result of our inquiries leads us to believe that, taking the kingdom collectively, we have ample reasons to conclude that the produce of this year's wheat harvest will prove better in every respect than that of last season, and we are disposed to estimate it above that of average years, both as regards yield and quality. In reference to the spring-sown crops the accounts are not less favourable, and taking the aggregate amount of corn grown in Great Britain, we are fully convinced that the surplus, as compared with the growth of what may be considered propitious seasons, is considerable. How far this excess in the produce of corn may be neutralised by a failure in potatoes is yet uncertain. That the disease to which the potato has been liable of late years has again attacked the root, cannot be questioned; and that the disorder has spread since the commencement of the present month is equally sure. We are nevertheless inclined to take rather a favourable view of the matter, and feel pretty certain that in England and Scotland the blight is much less general, and the disease far less virulent, than in any previous year since its first appearance. The grand question is, no doubt, to what extent does it exist in Ireland? and shall we be again called upon to furnish supplies of food to the sister isle, or will she have a surplus to ship to the English markets? It has always been a matter of much difficulty to obtain authentic information respecting the crops from Ireland, and the difficulty is now fully as great as in previous years. The most conflicting reports are put forth in respect to the potato disease, and it is almost impossible to arrive at anything like a definite conclusion.

That the future range of prices will in a great measure depend on the extent of the failure of the potato crop in Ireland, cannot be questioned; but, even if it should prove as serious as last year, the effects would be less disastrous, inasmuch as the produce of grain is far greater this season. All the accounts agree in stating that the yield of wheat to the acre has been large in the south of Ireland; and oats, the staple crop, are highly spoken of, as well in reference to quantity as quality. It may also be worthy of remark than an accumulation of stocks of Indian corn has taken place there; for, since new potatoes have been procurable at moderate rates, comparatively little Indian meal has been consumed, and the large supplies of Indian corn which have arrived have, therefore, been stored to wait any demand which may hereafter arise. Should the failure of potatoes be only partial, Ireland would probably be in a position to send some quantity of wheat and oats into the English markets; but, even if this should not be the case, if the amount of food raised in the sister isle should only prove sufficient for the wants of her inhabitants, the cessation of Irish demand would tell on prices here.

Our own opinion is that England will not be called upon to furnish supplies for Ireland; and believing, as we have already stated, that the produce of human food in the British islands is greater than in good average years, we view the probable effects of unrestricted importations, under the circumstances, with considerable uneasiness. Prices have already been depressed to a low point, a point at which we deem it impossible for the British farmer to grow corn with any advantage to himself. New red wheat, of good quality, may at present be bought in many of the markets in the agricultural districts at 40s.; fine malting barley at 30s.; and oats at 18s. per quarter. Ruinously low as are these rates, we can hold out little hope of more remunerating prices being obtained hereafter. At the moment quotations are, it is true, relatively lower here than they are abroad; but that prices will give way in the principal corn-growing countries of Europe, and be regulated by ours, we feel perfectly convinced. We are consequently by no means sanguine as regards the future, though at the same time we should not recommend precipitation in selling, as we do not deem it likely that prices will go much lower than they are at present during the autumn; and when winter shall have put a temporary stop to shipments from the north, some slight rally may perhaps occur.

The fluctuations in the value of wheat have been rather important during the month. In the early part the tendency was decidedly downwards, and in some of the country markets sales were made at very low terms: afterwards a reaction occurred, and the rise from the lowest point has in many cases amounted to 2s. and 3s. per quarter. This advance was caused by the moderate nature of the deliveries from the farmers, and the necessity of millers employing a considerable portion of new in mixing with the old foreign wheat. Latterly the supplies from the growers have slightly increased, and there have been symptoms during the last week of anxiety to sell.

At Mark Lane the alteration in quotations has not been so great as at some of the provincial markets. Nearly the whole of the English wheat brought forward since our last has consisted of new, and the greater part of the supply has been from Essex and Kent; independently of what has come by railway, the weekly receipts coastwise have averaged rather over 3,000 quarters.

On Monday, the 3rd instant, there was a good show of samples on the Essex and Kent stands; the quality and condition being satisfactory. Factors were not disposed at first to make any concession; finding, however, that the millers would not pay former rates, a decline of 2s. to 3s. per quarter was ultimately acceded to, when a clearance was immediately effected. From that time up to the 10th prices remained nearly stationary; on the day last named a further reduction of 1s. to 2s. per quarter occurred, but since then the tendency has been the other way, and though business has not been brisk, the last-named fall has been recovered, prices of new wheat being now only 2s. to 3s. per quarter lower than they were at the close of August. On Monday last, the 24th instant, good runs of red Essex and Kent realised 42s., and picked samples 43s. to 44s.: white from 44s. to 48s., extra 50s. per quarter. Hitherto we have had no supplies from the east coast worth naming, the shipments from Lincolnshire, &c., having been directed to the north, where higher prices have been paid than could have been obtained at Mark Lane.

The arrivals of wheat from abroad into London have been liberal, upwards of 20,000 quarters having been received weekly. The value of foreign has been pretty nearly regulated by the price of English; the fall was to about the same extent on the former as on the latter in the early part of the month, and within the last fortnight importers have succeeded in obtaining prices 1s. per quarter above those at which sales were made on the 10th September. The country demand has at no period of the month been active, and our own millers having mostly imported to some extent direct, have not bought much at Mark Lane. The transactions have consequently been altogether on a retail scale, and a considerable proportion of the supply has been landed for want of purchasers. Good Polish Odessa wheat may now be had at 35s. to 37s.; fair red Baltic, Hamburgh, and Belgium at 40s. to 42s.; and the finer sorts, such as Rostock, Wolgast, and other descriptions most liked by our millers, at 43s. to 44s. per quarter. Dantzig has realised 46s. to 48s., superior parcels 50s. per quarter. At these prices importations could not be made at present without loss to the importer, and it is consequently not improbable that, after what may still be on passage to this country shall have arrived, the foreign supplies may for a time be small.

No alteration was made in the nominal top price of town-manufactured flour until the 10th instant, when it was put down to 40s. per sack. This concession, and the upward movement which subsequently took place in the value of wheat, induced the bakers to buy rather freely for a week or ten days, and the contracts entered into by the millers between the 10th and 17th were sufficiently extensive to oblige them to purchase wheat somewhat largely, which for a time influenced the market. We are inclined, however, to think that their immediate wants have now been supplied. Stocks of foreign flour are reduced into a very narrow compass at this port, and of the little remaining only a small proportion is fresh. The value of the latter has consequently undergone no change of consequence, sweet sound qualities of American having commanded 24s. to 24s. 6d. per barrel, and superior marks of French 35s. to 36s. per sack.

The receipts of flour from Norfolk and other eastern counties have for a long time past been unimportant, owing to prices having been higher in the Yorkshire and Lancashire markets than with us.

The farmers have hitherto thrashed new barley sparingly; and, as yet, the supplies have been of so moderate a character, as to cause this grain to maintain its value better than wheat. Superior malting qualities have at no period since harvest been higher than they are at present. The first sample of new brought to Mark Lane early in August was sold at 31s. per quarter; and most of what has since appeared has been placed at from 30s. to 32s. per quarter, the latter figure being realized for choice lots on Monday last, the 24th instant. The commoner sorts have not sold so well; but only a small proportion of the supply of English has consisted of inferior quality.

The arrivals of barley from abroad have been rather liberal, importers have nevertheless remained tolerably firm, and in the value of the best heavy qualities very little change has occurred. Inferior and out of condition parcels have, however, been rather pressingly offered of late, and very fair quality, weighing 51 to 52 lbs. per bush., may be bought at present at 21s. to 22s. per qr.

The operations in malt have not been by any means extensive; sellers have, nevertheless, displayed much firmness, and the business done has been at prices similar to those current at the close of August.

The market has been abundantly supplied with oats throughout the month. From our own coast we have had fair arrivals of new of excellent quality; from Scotland, good receipts of prime old oats; from Ireland, a few small lots of this year's growth, not very dry, but otherwise of fair quality; and from abroad, upwards of 100,000 qrs. have reached us, mostly Russian. The dealers have consequently had a plentiful choice of quality, notwithstanding which they have conducted their operations with considerable caution, and sellers have been under the necessity of giving way. Really choice corn, whether of home or foreign growth, has been held at nearly former rates, and needy buyers have been obliged to pay prices very little below those at which they might have bought at the end of last month; say good feed English and Scotch 21s. to 23s., fine potato 23s. to 25s. per qr. The new Irish have been held at 18s. to 20s., which rates have been reluctantly paid. The principal business of the month has been in Riga and Archangel oats, but to induce purchasers to act, it has been necessary to accede to a reduction of fully 1s. per qr. The greatest depression occurred on the 10th September, upwards of 60,000 qrs. of foreign having arrived during the week immediately preceding; fair qualities of Russian were on that occasion sold at 15s. to 16s. per qr., and other descriptions at corresponding rates. The following Monday rather more firmness was exhibited by factors; they failed, however, in realizing higher rates, and since then the supplies have more than kept pace with the inquiry.

Beans of home growth came forward rather sparingly in the early part of the month, but the deliveries have since increased, and though prices have not generally been quoted lower, the turn has been in favour of the purchaser. Very good tick beans have lately been sold at 25s. to 26s. per qr., and other sorts at corresponding terms. The stock of Egyptian having been much reduced, holders have continued firm, and notwithstanding the downward tendency which prices of English have exhibited, the value of Egyptian has rather crept up than otherwise.

The supply of peas has about kept pace with the demand, and quotations have undergone very little change; fine new white peas have commanded 32s. per qr., and other descriptions corresponding terms, being very nearly the same as the prices at which sales were made about the close of last month. The quantity of old foreign on the market is still considerable; good white have been freely offered at 27s. to 28s., and parcels mixed with black at 25s. to 27s. per qr., without leading to much business.

In the early part of the month Indian corn was neglected; the increasingly unfavourable accounts respecting potatoes received of late from Ireland has inspired sellers with confidence, and enhanced terms have been asked for cargoes to arrive, 26s. to 27s. per qr. having been demanded for fine Galatz, and corresponding prices for other sorts. Hitherto, however, we have had few Irish orders, and as little disposition has been manifested to speculate in the article, the bargains closed at the enhanced terms demanded have not been important.

The general character of the weather on the continent of Europe has been similar to what has been experienced here, and though the crops have at times been threatened with injury, the harvest has on the whole proved favourable, as well in the north as in the south. The quality of the new wheat is almost universally well spoken of, which is a pretty sure proof that the yield cannot be very bad.

By the most recent advices from the Baltic, we learn that only small supplies of the new produce had up to that time come forward; and as stocks of old were nearly exhausted at the principal ports, prices had, notwithstanding the want of an export demand, been tolerably well maintained.

Our Dantzig letters inform us that holders of really fine high mixed wheat had refused to sell below 44s. to 45s.: that good Volhynian had been firmly held at 43s., and fair high mixed at 41s. per quarter, free on board. Some charters had been closed for London at 3s. 4d. to 3s. 6d. per quarter.

At Konigsberg, on the 15th September, prices had a downward tendency; from the general tenor of the reports from the last-named place, it would appear that the harvest in that neighbourhood had turned out very favourably.

From Rostock, Stettin, Wolgast, Anclam, and Stralsund, the accounts as to the yield and quality of the crops are of a satisfactory character; as, however, only small supplies had been brought forward by the growers, previous prices had been well supported at all those ports, and, as yet, good red wheat, of 61 to 62 lbs. weight, could not be put free on board at any of the ports in the Lower Baltic, from whence the best sorts are shipped, below 37s. and 38s. per quarter. Freight from thence to London would not exceed 3s. per quarter; but the premiums for insurance are now increasing, which would of course add to the cost here. At present there is certainly no encouragement to consign to Great Britain; but it is highly probable that, when the deliveries from the growers shall have increased, and it is found that English orders do not come forward, quotations will give way on the other side.

At the near continental ports considerable excitement was caused by the news that wheat had risen 1s. to 2s. per quarter at Mark Lane on the 17th instant. This advance was immediately followed by a rise of fully 2s. at Hamburg, 1s. to 2s. at Rotterdam, and at most of the French markets a similar improvement was insisted on. The more subdued tone of the advices from hence have probably, ere now, caused a reaction; still, prices are too high on the other side to allow of consignments being made to the English markets with any chance of profit.

About a month ago very unfavourable reports reached us from the other side of the Atlantic, respecting the probable result of the harvest in the United States; indeed, some parties began to predict that the yield of grain would be so bad there, as to render it probable that America would, as in 1835 and 1836, have to import from Europe. This notion appeared to us altogether extravagant; and according to the most recent advices, it seems that the crops of wheat, Indian corn, &c., had proved abundant, excepting in Ohio and some of the adjoining states. Till then, however, prices had been firmly maintained at all the ports on the seaboard, owing to the smallness of the stocks in store. The prevailing impression was, that the growers had a large portion of the crop of 1848 still on hand, and that before the close of the inland navigation rather large supplies would reach the east coast from the interior.

CURRENCY PER IMPERIAL MEASURE.

	Shillings per Quarter. OLD.		NEW.	
Wheat, Essex and Kent, white	40 to	50	44 to	48
Ditto, fine selected runs	—	—	48	50
Ditto, red	40	44	41	43
Ditto, extra	42	46	43	46
Norfolk, Lincolnshire and Yorkshire	40	42	—	—
Ditto, white	42	48	—	—
Barley, English, malting and distilling	—	—	26	28
Ditto, Chevalier	—	—	29	31
Ditto, grinding	—	—	23	25
Malt.. Essex, Norfolk and Suffolk	—	—	58	59
Kingston, Ware, and town made	—	—	58	62
Oats, Essex and Suffolk	—	—	16	18
Lincolnshire and Yorkshire (Polands)	—	—	18	20
Ditto, feed	—	—	15	18
Devon & West Country, feed	—	—	15	17
Northumberland and Scotch, feed	—	—	20	25
Dundalk, Newry, and Belfast, potato	—	—	18	20
Limerick, Sligo, and Westport, potato	—	—	17	20
Ditto, feed	—	—	16	18
Cork, Waterford, Dublin, Youghal, and Clonmel, black	—	—	14	17
Ditto, white	—	—	16	18
Galway	—	—	13	15
Beans, Mazagan	—	—	25	28
Tick	—	—	30	35
Harrow	—	—	32	36
Pigeon, Heligland	—	—	34	38
Windsor	—	—	28	30
Long pod	—	—	26	28
Peas, non-boilers	—	—	27	28
White, Essex, and Kent, boilers	—	—	29	31
Ditto, fine Suffolk	—	—	29	33
Maple	—	—	29	31
Hog and grey	—	—	28	29
Flour, best marks (per sack of 280 lbs.)	—	—	35	40
Norfolk and Suffolk, ex-ship	—	—	30	33
Rye	—	—	23	24

FOREIGN GRAIN.

	Shillings per Quarter.	
Wheat, American	41 to	43
Canada	36	43
Dantzic and Konigsberg	43	46
Dantzic, fine white, extra quality	47	51
Stettin and Hamburgh	39	43
Danish	36	39
Rostock, Pomeranian and Rhine	39	43
French and Belgium	41	43
Mediterranean, Odessa, and St. Petersburgh	35	37
Black Sea (nominal) hard to soft	35	37
Buck or Brank	24	26
Barley, malting	23	25
Grinding and distilling	18	22
Hamburgh, Dantzic, Konigsburgh, and Riga	18	22
Danish, Mecklenberg, and Pomeranian	18	20
Oats, Dutch, brew, Poland, Friesland, and Groningen	18	22
Danish and Swedish	15	17
Russian	15	17
Beans Small	30	34
Egyptian	21	23
Peas, white boilers	28	30
Yellow ditto	29	31
Non-boilers	26	28
Maize, white	25	27
Ditto, yellow	26	28
Flour, American, sweet	23	24
Ditto, sour	21	23
Canadian, sweet	22	24
Ditto, sour	21	22
French, per sack	32	36

Rye Meal (per ton) .... £6 0s. to £6 10s.

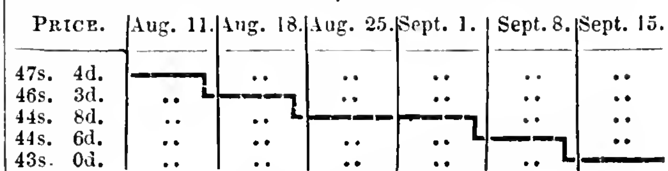
Indian Corn Meal (per brl. of 196 lbs.)...... 15s. to 16s.

IMPERIAL AVERAGES.

For the last Six Weeks.

	Wheat.		Barley.		Oats.		Rye.		Beans.		Peas.	
Week Ending:	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Aug. 18, 1849..	46	3	26	1	19	0	27	5	31	9	29	2
Aug. 25, 1849..	44	3	26	4	18	10	26	5	32	2	28	8
Sept. 1, 1849..	44	8	26	3	19	3	27	0	32	3	28	6
Sept. 8, 1849..	44	6	26	9	18	4	25	11	31	2	29	7
Sept. 15, 1849..	43	0	27	1	18	6	26	7	30	8	30	1
Sept. 22, 1849..	41	9	27	1	17	10	25	11	29	9	30	0
Aggregate average of last six weeks	44	2	26	7	18	8	26	6	31	4	29	4
Duties	1	0	1	0	1	0	1	0	1	0	1	0

DIAGRAM SHOWING THE FLUCTUATIONS IN THE AVERAGE PRICE OF WHEAT during the six weeks ending Sept. 15, 1849.



PRICES OF SEEDS.

BRITISH SEEDS.

Cloverseed, red 35s. to 40s.; fine, 45s. to 50s.; white, 34s. to 42s.
Cow Grass (nominal)........................—s. to —s.
Linseed (per qr.).. sowing 54s. to 56s.; crushing 40s. to 42s.
Linseed Cakes (per 1,000 of 3 lbs. each).. £9 0s. to £10 0s.
Trefoil (per cwt.) .... 14s. to 18s.
Rapeseed, new (per last) .... £28 to £29
Ditto Cake (per ton)................. £4 5s. to £4 10s.
Mustard (per bushel) white.. 6s. to 9s.; brown, 8s. to 10s.
Coriander (per cwt.)....................... 16s. to 25s.
Canary (per qr.) new .... 76s. to 86s.
Turnip, white (per bush.) —s. to —s.; do. Swedish, —s. to —s.
Tares, Winter, per bush............... 5s. 0d. to 5s. 6d.
Carraway (per cwt.)........ 28s. to 29s.; new, 30s. to 34s.
Rye Grass (per qr.) .... —s. to —s.

FOREIGN SEEDS, &c.

Clover, red (duty 5s. per cwt.) per cwt......... 30s. to 40s.
Ditto, white (duty 5s. per cwt.) per cwt......... 24s. to 42s.
Linseed (per qr.) .. Baltic 36s. to 42s.; Odessa, 40s. to 44s.
Linseed Cake (per ton).................. £6 0s. to £8 0s.
Rape Cake (per ton)................. £4 5s. to £4 10s.
Coriander (per cwt) .... —s. to —s.
Hempseed, small, (per qr.) 32s. to 35s., Do. Dutch, 35s. to 36s.
Tares, (per qr.)........ small 24s. to 26s., large 28s. to 33s.

An Account of the Total Quantities of Foreign Corn imported into the principal ports of Great Britain (viz., London, Liverpool, Hull, Newcastle, Bristol, Gloucester, Plymouth, Leith, Glasgow, Dundee, and Perth) in Thirty-one Weeks ending Sept. 12th, 1849, since the 8th of February preceding (including the quantity of Wheat and Wheaten Flour loosed from bond on that day), and the amount that would be available for revenue, if the Tariff proposed by Lord John Russell in 1841 was levied on this supply.

	Quarters.	Tariff per qr.		Amount for Revenue.		
Total Importations from Feb. 8 to Sept. 12, 1849:		s.	d.	£	s.	d.
Wheat and Wheaten Flour...	3,344,239	8	0	1,337,695	12	0
Rye and Rye Meal	80,781	5	0	20,195	5	0
Barley and Barley Meal	605,921	4	6	136,332	4	6
Oats, Peas, and Beans.........	1,118,818	3	4	186,465	16	8
Imported during the week ending Sept. 12, 1849:						
Wheat and Wheaten Flour...	99,853	8	0	39,941	4	0
Rye and Rye Meal	3,448	5	0	862	0	0
Barley and Barley Meal	60,691	4	6	13,655	9	6
Oats, Peas, and Beans.........	85,907	3	4	14,317	16	8
Total	5,399,658	..		1,749,465	8	4

HOP MARKET.

BOROUGH, Monday, Sept. 24.

Somewhat more activity is noticeable in our market than at the date of our last report, and the finer descriptions of the new arrivals have been mostly cleared off the market. The duty is called £80,000.

Sussex Pockets	126 to 140
Weald of Kent ditto......	140 to 160
Mid and East Kent ditto ..	150 to 220

Horton and Hart.

WORCESTER, (Saturday last.)—Our new Hops, which are of very superior quality, continue to sell freely at prices varying from £6 10s. to £7 7s. The duty is declining, and no one will now back 8,000. In old Hops not much doing, but prices firm.

HOP-PICKING has commenced generally in the neighbourhood of Ledbury. The crop in most places near this is complained of both in quantity and quality.

HIDE AND SKIN MARKETS.

			s.	d.		s.	d.	
Market Hides,	56 to	64lbs.......	0	$1\frac{1}{4}$	to	0	0	per lb
Do.	64	72lbs.......	0	$1\frac{1}{2}$		0	$1\frac{3}{4}$	,,
Do.	72	80lbs.......	0	2		0	$2\frac{1}{2}$	,,
Do.	80	88lbs.......	0	$2\frac{1}{4}$		0	$2\frac{3}{4}$	,,
Do.	88	96lbs.......	0	$3\frac{1}{4}$		0	$3\frac{3}{4}$	,,
Do.	96	104lbs.......	0	$3\frac{1}{4}$		0	4	,,
Do.	104	112lbs.......	0	6		0	0	,,
Calf Skins		....	2	0		5	0	each.
Lamb Skins		....	1	8		2	8	,,
Horse Hides		....	7	6		0	0	,,
Shearlings		....	1	6		2	2	,,

TIMBER.

	£	s.	d.		£	s.	d.
Baltic Timber, per load of 50 cubic feet..	2	17	6	to	3	15	0
Yw. Deals, per standard hundred .	11	10	0	..	15	10	0
Deck Deals, per 40 feet 3 in.	0	17	0	..	1	4	0
Pipe Staves, per mille	105	0	0	..	125	0	0
Lathwood, per fm. of 4 feet........	9	0	0	..	10	10	0
Petersburgh, Riga, and Archangel .... Yw. Deals, per stand. hundred ..	12	0	0	..	14	0	0
White........................	10	0	0	..	11	0	0
Yw. Battens..................	12	0	0	..	14	0	0
Riga Logs, for 18 feet cube	3	0	0	..	4	0	0
Stettin Staves, per mille of pipe..........	75	0	0	..	125	0	0
Swedish Timber, per load	2	10	0	..	3	0	0
Go[illegible]nb. Yw. Deals, per 100 12f. 3in. 9in...	18	0	0	..	23	0	0
White ditto	16	0	0	..	19	0	0
Yw. Battens, per hd. 12 ft. $2\frac{1}{2}$ in. 7 in.	11	0	0	..	14	0	0
Christiania Yw. Deals, per hd. 12ft. 3in. 9in.	24	0	0	..	25	0	0
White ditto......	21	0	0	..	22	0	0
Quebec and St. John's Spruce Deals.. per 100, 12 ft. 3 in. 9in.	14	0	0	..	17	0	0
1st qual. yw. Pine Deals, per st. hd.	13	0	0	..	16	0	0
Second do. do...............	9	0	0	..	10	10	0
Third do. do...............	7	10	0	..	8	10	0
Red Pine Deals, per hd. 12ft. 3in. 9in.	17	0	0	..	22	0	0
Red Pine Timber, per load	3	0	0	..	4	0	0
Yw. ditto	2	15	0	..	3	15	0
Birch ditto	3	0	0	..	3	10	0
Elm ditto	3	5	0	..	3	15	0
Oak ditto	4	10	0	..	5	0	0
Standard Staves per mille standard	60	0	0	..	70	0	0
Puncheon Staves, per mille	14	0	0	..	18	0	0

MAHOGANY, &c.

Mahogany,	St. Domingo	$5\frac{1}{2}$d.	to	1s.	9d. per foot.
	Cuba	$5\frac{3}{4}$		1	0
	Honduras.	$4\frac{3}{4}$		1	0
	African	5		0	7
Cedar	Havana	$5\frac{1}{4}$		0	$6\frac{1}{2}$
Rosewood.	Rio	12*l*. 10s. to 18*l*. per ton.			
	Bahia..................	9	0	14	

BARK.

Per load of 45 cwt.

English, Tree..............	£14	0	0	to	£15	10	0
Coppice..................	15	0	0		17	0	0

FLAX.

BELFAST, (Friday last.)—Flax: fine, 60s. to 65s.; good, 56s. to 58s.; good middling, 49s. to 52s; middling, 40s. to 45s.; coarse, 34s. to 40s. per cwt.

WOOL MARKETS.

BRITISH WOOL.

LEEDS, Sept. 21.—There has been rather more demand for Wools this week, especially of a deep-grown and half-bred character. Prices are firm.

LIVERPOOL, Sept. 22.

Scotch.—The arrivals of all kinds of Scotch of the new clip is on a fair scale, and rather more business has been done in Laid Highland, at about our quotations, if anything rather in favour of the buyers. White is not much inquired for. There is only a moderate demand for Crossed and Cheviot Wool, at our quotations.

		s.	d.		s.	d.
Laid Highland Wool, per 24lbs....		7	9	to	8	6
White Highland do.................		10	0		10	6
Laid Crossed	do...unwashed	9	6		11	0
Do.	do....washed	10	6		12	6
Laid Cheviot	do...unwashed	10	0		14	0
Do.	do.. washed	14	0		18	6
White Cheviot	do... do.	20	0		22	0

Foreign.—As is usual when the public sales are progressing in London, we are never very active here, most of the trade being up there.

FOREIGN WOOL.

CITY, Monday.—The imports of wool last week included 3,179 bales from Port Philip, 104 from Bombay, 1,352 from the Cape of Good Hope, 42 from Germany, 1,739 from Sydney, 244 from Spain, and a few parcels from Jamaica, &c.

The public sales are going off steadily, a very small portion having been withdrawn, and prices appear to be rather fuller in some instances, though no decided alteration can be noted.

LEEDS, Sept. 21.—There has been only a dull market again for foreign Wools this week; prices however remain firm, the prospects of the trade being generally considered encouraging.

BRESLAU, Sept. 19.—Since our last report business has lost nothing of its previous vivacity. Very extensive transactions took place in fine Silesian clips at from 75 to 85 thalers. in lambs at from 70 to 90 thalers, as well as in low Polish and Russian wools at from 50 to 52 thalers; good refuse was very much requested at from 50 to 58 thalers, and skins at 55 to 65 thalers per cwt. The chief purchasers were again French, Austrian, and Saxon houses, as well as numerous country manufacturers. The prices of the finer descriptions were 3 to 5 per cent. higher, those of the lower ones something less. The quantity sold in all was about 2,500 cwts. The character of the approaching autumn market, beginning at the end of the present month, will very much depend upon the result of the present Leipzig fair, where great stocks of woollen manufactures are expected to make their appearance. At Berlin there continues equally a great briskness in this line, and nearly 12,000 cwts. have been sold during the space of four weeks. Good clothing wools are principally wanted; prices in the same proportion as here. Inland manufacturers and spinners, as well as English, Hamburgh, and French houses, were the chief buyers—even a Spanish firm made some acquisitions. Reports from Vienna state that fine and superfine wools are in great demand, at high prices; middling and low ones on the contrary proportionately neglected, in consequence of large arrivals from Hungaria.—Gunsburg, Wool-broker.

Printed by Joseph Rogerson, 24, Norfolk-street, Strand, London

ERGOT AS IT APPEARS ON RYE, RYE-GRASS, AND OTHER GRASSES.

THE FARMER'S MAGAZINE.

NOVEMBER, 1849.

No. 5.—Vol. XX.] [Second Series.

PLATE I.

HEREFORD BULL.

The subject of our Plate "Sir David" by "Chance," dam "Duchess," by "White Nob," g. d. by "Old Sovereign," obtained the first prize of 40 sovereigns in Class 1, at the Royal Agricultural Society's Show at Norwich, in July last. He is the property of Edward Price, Esq., of the Court House, Pembridge, Herefordshire.

The following is a list of the Prizes obtained by this animal:—

In 1846 the first prize of 20 sovereigns, in Class 2, at the Royal Agricultural Society's Show at Newcastle.

In 1847, at the Hereford Candlemas Bull Show, a prize of 5 sovereigns.

In 1848, at the Ludlow Agricultural Meeting, the sweepstakes of 3 sovereigns, with a cup value 20 sovereigns, amounting in all to 45 sovereigns.

At the same meeting he was shown with four of his offspring, and obtained a prize of 5 sovereigns.

At the Leominster Agricultural Meeting, with four of his offspring, a cup given by Lord Bateman, value 5 sovereigns.

In 1849, at Norwich, the first prize of 40 sovereigns as described above.

And in September, same year, at the Ludlow Agricultural Society's Meeting, the sweepstakes of 3 sovereigns each, with 20 sovereigns added, amounting to 42 sovereigns.

The total value of the prizes taken by "Sir David" was £172 10s.

PLATE II.

For description of this plate see article "On the presence of a Parasitic Fungus on the Grasses, hitherto only considered of importance when observed on Rye; particularly in reference to its producing Abortion in Cows," page 390.

TRUE OFFICE OF EARTHS AND SOILS.—No. 1.

BY J. TOWERS, MEMBER OF ROYAL SOCIETIES OF AGRICULTURE AND HORTICULTURE.

A short time since an article so entitled came under notice, and attracted serious attention. It is a subject of grave import, especially as so many opinions have been hazarded and theories proposed since the agricultural lectures were delivered by the late Sir Humphrey Davy. I propose now in the first instance to extract the substance of the paper, and then to comment upon its leading points, which in themselves are sufficiently interesting. The original appeared, I believe, in *The Phytologist*, and was written by Mr. Newman, author of a work on the British ferns. It stated that although so much had been written on the subject of gases evolved and absorbed by plants, and the obvious numerical preponderance of the breathing pores (*stemmata*) in the leaves and branches over those of the roots, still the broad assertion that *the office of the earth in relation to plants is precisely equivalent to its relation to animals*—namely, to maintain them in the position most suitable to their well being—had never yet perhaps been made in print. The great phytological fact of this relationship was forcibly impressed on the writer's mind, by seeing how beautifully hyacinths blossom with their roots immersed in water, without one particle of earth which they could possibly reach. He had constantly asserted his belief on this point, but had always been laughed at as a theorist and visionary. Each succeeding year, however, had diminished the number of those who assert that plants feed on earth as man feeds on meat, bread, and potatoes. Nevertheless, by far the greater number of those with whom we converse religiously believe that this is the fact; and most farmers look on a rich soil as being direct food for their wheat, as much so as a sack of barley meal is food for their pigs. Now the truth is the very converse of this—*the earth feeds on plants*—owes what is called its richness and good properties to plants.

These facts are not only interesting in themselves, but the ends to which they are applicable would furnish almost a new era in existence. Nature has provided in the earth the best possible receptacle for the roots of plants; yet this position might admit of modification, for we have to consider whether our object in cultivation be to carry out the designs of nature, or to make nature subservient to our requirings. If the latter, it is quite certain that art can be employed with advantage; for, we have only to call to mind our common fruits and vegetables as examples. Thus, although plants best achieve their destined ends when rooted in the earth, a doubt may be admitted whether in turning them to our uses most profitably, a better receptacle might not be found—in a word, if it be ceded that earth is in no wise the food of plants, then *cæteris paribus,* the most unproductive lands, as for instance the heathy sands of Surrey, may be rendered equally productive as the soil of the Golden valley, for we have only to make use of the sand in conformity to the object of nature as *a receptacle of roots,* and then, having learned what is the true food of plants, to supply that food in the most profitable manner.

It is now generally admitted that carbonic acid gas is this food; but leaving this question, it is certain that the food of plants, whatever it may be, is evolved from certain chemical preparations, with greater effect than from the richest and most highly manured earth. Poverty of soil thus becomes a nonentity—rotation of crops a mere amusement; for once admit that *earth is simply a medium of support to the roots,* and you invest it with a property that you cannot wear out. Every common and heath may be made to produce wheat at the will of the cultivator, and the supply must ere long greatly exceed the consumption, since that very description of food which causes so much difficulty would become more abundant than the most zealous philanthropist could desire.

Thus far, with a few abbreviations, the substance of Mr. Newman's article. Its theory is startling, but not more so than is the bearing of the quotation from the *North British Agriculturist,* which follows:—"The operations of ploughing, harrowing, &c., joined to draining and burning, constitute the means long and still employed to obtain the needed mechanical condition of the soil; though it must not be forgotten that some very important chemical effects are also brought about by the same influence. Experience has taught us that plants will grow in sand, in sulphur, or in any other insoluble and inert substance, provided the necessary fertilizing materials are supplied; from which it follows that the composition of the insoluble portions of a soil are but of little consequence, provided the caloric [heating] and soluble constituents be present."

The theory deducible from the agency of pure insoluble earths, and of the manures which are required to induce fertility, must be separately considered; at present we will confine our observations to the bold assumption that the earths proper perform no other office than to furnish an appropriate matrix, wherein plants are supported, retained in their due position, and duly supplied with moisture.

The analysis of earths by the process of Sir Humphrey Davy and Dr. Henry would be found quite inadequate to meet the scientific questions of the present day. In order, therefore, to convey some idea of the components of a really good and fertile native loam, I subjoin a table, the result of an analysis by Professor Johnston, of 1000 parts, the fidelity of which few will be inclined to question—

1	Silica, or pure sand ..	648	earths.
2	Alumina, „ clay ..	57	
3	Lime	59	
4	Magnesia..	8	
5	Oxide of iron	61	metallic earths.
6	Oxide of manganese ..	1	
7	Potassa	2	alkalies.
8	Soda	4	
9	Chlorine, as muriatic acid	2	acids.
10	Sulphuric acid	2	
11	Phosphoric acid	4	
12	Carbonic acid	40	
13	Organic matter, capable of being converted to oxygen, hydrogen, and nitrogen gases	97	
	Loss or waste ..	15	
		1,000	

Setting aside the organic matter, we may, I think, arrive at something like an idea of the way in which the foregoing acids combine with several bases in order to produce saline matters suitable to plants; for it must be remembered that not one of the elements above noticed exists, pure, as such, in the vegetable cells or tissues. The lime as it is found in earths is in the condition of a carbonate (chalk). The 40 parts of carbonic acid, No. 12, would, according to the table of equivalents, combine with about 51 parts of this lime. The sulphuric acid, 2 parts (No. 10), with something less than $1\frac{1}{2}$ of lime, would produce gypsum. The phosphoric acid (No. 11) 4 parts, with about $4\frac{3}{4}$ of the lime would combine and yield the phosphate called bone-earth, or sub-phosphate of lime. The 2 parts of chlorine as muriatic acid would seize 1 3-5ths of the soda, and become common salt, leaving an excess of soda uncombined, unless as a silicate. The magnesia (No. 8) is left in the same predicament, though, as in fine guano, it might exist as an ammonia phosphate. However, there are losses or waste to the extent of 15-1000th parts in the total proceeds; we may then presume that volatile acid gases and water have been evolved and driven off. As an approximation, therefore, the bases of the good soil, as they naturally existed before analysis, might thus be arranged:—

1	Silica	648.0
2	Alumina	57.0
3	Chalk	91.0
4	Magnesia	8.0
5	Oxide of iron	61.0
6	——— manganese	1.0
7	Potassa and soda, as silicates	5.0
8	Muriate of soda (salt)	3.6
9	Sulphate of lime (gypsum)	3.5
10	Phosphate of lime	8.75
11	Organic matter	97.0
12	Silicate of lime	4.0
	Water	12.15
		1,000.0

Allowing for errors in all such calculations, we may be certain that an earth so constituted is excellent in quality, and may therefore be taken as a comparative standard.

ON CHARCOAL AS A FERTILIZER.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

Several recently announced experiments with charcoal as a manure show pretty clearly that its use is extending. It would, I think, be far more rapidly introduced as a profitable application to the soil, if it was not too often regarded as a manure only available in certain localities. This conclusion, however, correct in certain inland districts, such as on the centre portions of many large sand and chalk formations, is not so often the case as is generally believed.

The peat of the United Kingdom offers in many districts the means of an inexhaustible supply. Other varieties of cheap organic matters adapted for being *charred* (not burnt) are found in many places. Where water-carriage is readily available such matters may be procured from considerable distances. It must be ever borne in mind, in preparing such impure varieties of charcoal, that it is the charring of the vegetable matter that is the great object. The fire must be so regulated that it may be readily extinguished whenever the charring point is attained. From a neglect of this precaution many an otherwise well planned trial has been rendered useless; since if the combustion is allowed to proceed unchecked, till the carbon is entirely consumed, the remaining ash consists only of the earthy and saline portion of the peat. The analyses of various peat-ashes prepared under different circumstances shows this pretty clearly. The Dutch ashes, so celebrated in Belgium, contain hardly any charcoal; they in fact owe their fertilizing powers as a top dressing for artificial grasses to containing a large per-centage of sulphate and carbonate of lime. Some peat-ashes from Paisley Moss, analyzed by Professor J. F. Johnston (*Elements of Agricultural Chemistry*, p. 189), contained, specimen No. 1, (a white ash) 54 per cent. of charcoal; No. 2, (a black peat-ash) only 3 per cent.: the first had evidently been prepared so as to retain as much of the charcoal as possible, the last had been burnt to excess. A variety of peat charcoal, analyzed by Mr. Phillips (*Gardeners' Chronicle*, 1849, p. 643), contained—

Carbon	79·24
Hydrogen	2·20
Nitrogen	0·54
Oxygen	6·44
Sand and clay	2·48
Oxide of iron	1·66
Phosphoric acid	0·34
Silicate of potash	0·98
Common salt	2·53
Carbonate of lime	1·85
Sulphate of lime	1·44
Loss	0·30

Even the common coal-ashes of our fires contain a large proportion of charcoal. These were analyzed by the late Professor Fowne (*Johnson and Shaw's Farmers' Almanac*, vol. iii., p. 333), and also the ashes from coke. He has given, in the following table, the proportion of silica and the carbon together; but still the amount is undoubtedly large, although, as I have before observed, it varies according to the care bestowed in their combustion. In 100 parts of each, Professor Fowne detected—

	Staf-ford-shire Coal.	New-cas-tle Coal.	Staf-ford shire Coke.
Sandy and unburnt charcoal ..	64·0	87·6	76·8
Oxides of iron and manganese, alumina, and phosphoric acid	9·8	3·6	7·0
Carbonate of lime	12·8	1·0	4·6
Sulphate of lime	2·44	0·54	3·8
Alkaline sulphate, with trace of chloride and sulphuret......	0·4	1·26	0·8
Water	8·8	4·6	4 6
Trace of magnesia, and loss ..	1·76	1·4	2·4

In ordinary soot the proportion of carbon is also very considerable, and in a very fine state of division; in which form, when exposed to the atmosphere, Davy ascertained that it slowly combines with oxygen—hence one source of its fertilizing powers. According to the analysis of Mr. Solly, it contains, in 1,000 parts (*Johnson's Gardener's Almanac*, vol. i., p. 46):—

Combustible matter........	671	parts.
Salts of ammonia..........	126	,,
Salts of potash and soda....	24	,,
Oxide of iron	50	,,
Silica....................	65	,,
Alumina	31	,,
Sulphate of lime (gypsum)..	31	,,
Carbonate of magnesia	2	,,

In whichever direction, therefore, we analyze the carbon of commerce in its impure state, it seems to present itself, even in its impurities, full of promise of profitable results to the farmer. The peat charcoal of Ireland, which is now, thanks to the energy and ability of Mr. Jasper Rogers, finding its way into the London market, appears to offer a supply to the farmer of the most extensive kind, and at a reasonable rate. A section of an Irish peat bog is given at page 335 of this volume, with much other interesting matter, relating to the cultivation and uses of bog-earth. On former occasions I have in the pages of this work endeavoured to explain the beneficial action of charcoal as a fertilizer when mixed with decomposing substances; I will in this little essay conclude with a few remarks founded on other chemical investigations, not only with regard to such mixtures, but to the all important consideration of preparing the ashes so as to retain the largest proportion of charcoal. This is a difference long since remarked; for, as I had occasion to observe in another work, the distinction between charring peat, and burnit to an ash, was pointed out 250 years since, by one of the earliest of the English agricultural writers; and considering the limited chemical knowledge of his days, he did not, as far, at least, as the presence and operation of the two salts (sulphate of lime and phosphate of lime) of peat ashes are concerned, arrive at a very wide approach to the truth in his explanation of the cause of their fertilising effects. "Ashes," says Worlidge, who wrote in 1607 (*Mysterie of Husbandrie*, 72,) "contain in them very much of a rich and fertile salt; the wood ashes are the best, and very useful. Turf and peat ashes must needs be very rich, being much after the same manner as the burning of land."

Worlidge, however, was far from being the first who noticed the use of charcoal and wood ashes. Cato recommends the burning of the twigs and branches of trees, and spreading them on the land. This appears to have been an ancient practice in Lombardy, for in 1570 Conradus Neresbachius, in his treatise on "Husbandrie," translated by Googe, tells us in page 20, "in Lombardie they like so well the use of ashes, as they esteem it farre above any doung." From the days of Worlidge down to the end of the seventeenth century hardly an agricultural writer appeared, who did not to some extent or other advocate the use of charcoal as a dressing for land.

In April, 1783, Arthur Young commenced a series of experiments, not only with charcoal, but with sulphuric acid, and a variety of other substances, as manures. The experimental researches of this celebrated agriculturist were much too commonly conducted on so small a scale, as materially to detract from their value; but still, notwithstanding this drawback to their practical use, the very numerous trials dispersed throughout the early volumes of his "Annals of Agriculture," abound with proofs of the sagacious reasoning and love of truth which distinguished Arthur Young. The trials with charcoal are given in the "Annals," (vol. 1, p. 139.) It is needless to closely follow these garden-pot experiments; the conclusions, however, observed Young (p. 149), were that, "charcoal contains something that assists vegetation, for a time, considerably. To what, then, is the benefit owing? Are we to consider charcoal as a body not differing from wood-ashes? This trial, combined with the results of others, will not allow such a conclusion, for I have found those ashes to act in proportion to the goodness of the soil—to do little good on poor land; but we find the effect of charcoal considerable for a time." Again, he adds (p. 153), "charcoal alone has done good in one instance from first to last." Young adds (p. 162), with his usual love of careful detail and of truth, when speaking of one of his series of experimental pots:—"A carpenter letting a piece of timber fall on the pots, while putting up a bench, broke some, and tumbled the rest over; here, therefore, ends this trial." He seemed, indeed, ever to feel, as he remarked on another occasion (*ibid*, p. 188), that "the man who wants this sort of candour is fit only for voluntary ignorance."

The chemical operation of charcoal, when used as a manure, either in its simple state or when mixed with decomposing manures, in the way to which we have attended, is not generally understood. That the carbon of the charcoal operates so beneficially upon plants, amongst other modes by a gradual combination with oxygen, hardly admits of a doubt. Charcoal, too, absorbs both the ammonia of decomposing animal substances, and the minute portion found in rain water. It also absorbs and stores up, as it were, for the service of vegetation, the gases of putrefaction; by this means purifying and sweetening, as the housewives say, many tainted substances with which it is mixed. Professor J. F. Johnston (*Elem. Ag. Chem.*, p. 142) has referred to some of these; he recognises the good properties of charcoal as "a valuable mixture with liquid manure, night-soil, farm-yard manure, ammoniacal liquor, or other rich applications to the soil." And, as he observes in another place, when speaking of the fertilizing portions of farm-yard drainage (*Trans. High. Soc.*, 1846, p. 190), "The only substance at present known, by which the separation of all the valuable ingredients from liquid manure can be fully effected, is animal charcoal. A sufficient supply of this substance, when intimately mixed with the liquid manure, will take up nearly the whole of the saline and colouring matters it holds in solution, will carry down the substances it holds in suspension, and will leave the water nearly pure and colourless. The refuse of the prussiate of potash manufactories will have this effect, and what remains when ivory-black is digested in spirit of salt (muriatic acid) will do still better; but this kind of charcoal is neither cheap nor abundant, and therefore cannot be recommended to general use. The refuse animal charcoal of our manufactories is now sold for manure at the price of several pounds a ton; either those who sell it, or those who use it, might render it still more valuable, by causing fermenting liquid manure to filter through it before it is applied to the land. But other kinds of charcoal possess this property to a certain extent; wood-charcoal reduced to powder, charred sawdust, and charred peat, are all capable of being used with advantage in extracting the ammoniacal and other salts, which give its value to the liquid of our farm-yards. Experiment has shown that when filtered through a bed of such charcoal, the liquid escapes without colour, and almost without taste, whilst the charred peat or sawdust is converted into fertilizing manure. A great portion of the loss now incurred may be prevented by the use of such kinds of charcoal, and the fertilizing substance may, through their means, be applied to ourcrops at seasons of the year for which in their liquid form they are not suited. It is even capable itself of yielding slow supplies of nourishment to plants; and it is said in many cases, even when unmixed, to be used with advantage as a top dressing. In moist charcoal the seeds of the gardener are found to sprout with remarkable quickness and certainty, but after they have sprouted they do not continue to grow well in charcoal alone. Drilled in with the seed, charcoal powder is said greatly to promote the growth of wheat."

The young farmer, then, will observe that the use charcoal, as a manure, is not only profitable for its own sake, but for the avidity with which it absorbs and slowly emits, for the use of plants, many of the various products of putrefaction. It is therefore a fertilizer in many ways, worthy of his attention. Let him remember that it is not only a cheap, but an enduring manure—one that is often to be made from the materials afforded by his own farm, and almost always procurable with a very little outlay of capital.

ON THE PROPER QUANTITY OF SEED TO BE APPLIED TO THE LAND.

BY M. M. M.

It is impossible to consider the question of the quantity of seed to be applied, as a general rule, to the land of this country as definitively settled. There are still those who affirm that, as an universal standard, one bushel per acre is by far the best seeding; and who contend not a little for the great economy of the plan, and claim for it both increased production and saving of outlay. And, therefore, there is no reason which can weigh effectually against these gentlemen, if these facts of theirs will bear the test of experience on any large district of country.

It is extraordinary, it would seem, that the wheat plant, which has been cultivated for so many centuries, and in all of them looked upon as the great staff of life, should be so little understood in its habits and peculiarities as to require the very first principles of its cultivation to be investigated at this remote period of the world's history. Little as we know of ancient modes of cultivation, we have the highest authority for believing that formerly its productiveness far exceeded what it now generally yields; and if the produce of "some an hundred-fold, some sixty, and some thirty," refers to single grains, and not to the bulk, there can be no doubt that at a much more ancient period seed was sown and produced "in the same year an hundred-fold;"* and this refers not to any particular grains, but to the whole of his seed sown. Nor can the fact, that the whole Egyptian population were sustained for fourteen years with the production of seven, besides considerable supplies to adjacent countries, and seed-corn for the eighth, fail to convince us that the power of production was far beyond our present returns for the seed sown.

It must, however, be confessed that until we can know the precise amount of seed sown in those early times we cannot fairly estimate the productiveness of the crop; for, assuming a crop to be thirty bushels per acre, and the seedings to be in each case one bushel and three bushels, the one will yield only ten-fold, while the other will yield thirty-fold.

If, however, it can be made out satisfactorily that a small quantity of seed will serve the same productive purpose as a large one, it is manifest that there will be a great saving to the community.

There can be no doubt but the quantity must necessarily vary with the nature of the soil. Thus in ordinary cases we shall find two bushels per acre a very prevalent seeding in a strong clay district, while two and a-half to three bushels will be equally prevalent where gravel, or dry limestone, or chalk soils, predominate; and the one class affirms that a smaller seeding, and the other that a greater, will be attended with invariably unfavourable results. Between these differing practitioners the belligerent small-seeder comes and sweeps away the disputant, by holding out *one* bushel as a proper quantity for all!

In the seventeenth century, Platt says—"Four hundred grains of wheat weigh three-quarters of an ounce, which is about five hundred and thirty-three grains to an ounce; and so one hundred and sixty perches, which is an acre, must have four hundred and eighty ounces, that is 30lbs., which is, in measure, half a bushel and two pints to an acre. If this half-bushel be set upon an acre of good ground, though it increase but as a hundred to one, which is often allowed, then there will be eleven quarters on that acre on which that half bushel was sowed. It appeareth clear that there is 80lbs. in 200lbs. saved in seed-corn by setting with instruments more than than there is by the common way, *i. e.*, random or broadcast."

Again, in 1732, the author of the "Practical Husbandman" says—"Seedsmen generally allow two bushels, or two bushels and a-half, of wheat on an acre, according to the rankness or poverty of the ground. This we say is the method of sowing, and the allowance of seed-wheat to an acre of ground if sown by broadcast. And allowance is made for what lies above ground, and is picked up by pigeons and birds; but if the farmer would drill in his wheat by a plough made for the purpose, *one bushel will be sufficient*, it being a truth, even beyond peradventure, that wheat is generally, especially on good land, sown too thick, of which there was a remarkable instance happened some years ago at Farringdon, in Berkshire, where a farmer's corn had the misfortune, as he thought, to miss; on which he had ploughed it up had not a neighbouring gentleman dissuaded him from it; and, though it appeared to him as if half of his corn was lost, yet at harvest he found a much finer crop than he had ever had on that spot before."

Jethro Tull was a great advocate of thin seeding, and a century later Arthur Young gave, in his "Farmer's Tour," the results of comparative experiments on the different quantities of seed; and his results were decidedly opposed to thick sowing, though the advocates of the extremely thin-sowing process would scarcely take it up as favourable to their theory, the smallest quantity he experimented upon being two bushels per acre.

	Bushs.		Bushs.		Bushs.
When the seed was	$3\frac{1}{2}$	and	$3\frac{1}{4}$	the produce was	21
Ditto	3	—	$2\frac{3}{4}$	ditto	22
Ditto	$2\frac{1}{2}$	—	$2\frac{1}{4}$	ditto	23
Ditto	2			ditto	24

So far, however, they will use it as approximating to the quantity they recommend, and will argue from this that if he had further reduced his quantity he would have had still greater increase of produce.

Mr. Hewett Davis, of Spring Park Farm, seems to be the person in the present century who has revived the question and called attention to the advantages, on a national scale, of sowing corn thinly. He placed the question before the public in his "Injury and Waste of Corn," &c., by showing that at that period what the importations of corn amounted to, and demonstrated that 15,745,267 quarters was the quantity of corn of home growth annually consumed; and, assuming the quantity of produce to average twenty bushels per acre, and the quantity of seed to be two bushels and a half, it was clear that seventeen and a half bushels per acre was all that went for food. And, therefore, the average quantity produced he makes out to be 17,713,425 quarters; and that 7,085,370 acres have to be sown to produce it. To sow these acres at the quantity of seed given above, a quantity of not less than 2,214,178 quarters will be required; and if one bushel only be substituted for

* Genesis, chap. xxvi., v. 12.

it, there would at once be a saving of food of not less than 1,328,507 quarters. And this, Mr. Davis showed, was more than the average of the importations up to the year 1841 (when his pamphlet was written), or, at least, than the average of the fourteen years previous. He also further showed the saving per acre to amount to some 14s. to 16s. per acre on the land under corn; and it was not surprising that these astounding facts should produce an impression. A great many trials were made and recorded; and, scattered as they are over many pages, we shall endeavour to review and form a rationale of the whole as far as we are able; and in doing so we will first *adduce the evidence in favour of thin sowing*, then the *evidence against it*, and lastly, from the whole, endeavour to deduce such *practical facts* as may be fairly sustained by the experiments, and by these only. The first experiment we shall allude to in the *evidence for thin sowing* is that of D. Barclay, Esq., M.P. He sowed quantities varying from one to two and a-half bushels; and, though the result was various, it may be said to be, on the whole, in favour of thin sowing. His mode of sowing was as follows:

1st, 1 bushel drilled 12 inches apart.
2nd, 1 bushel dibbled 12 inches apart.
3rd, 1 bushel and 3 pecks dibbled 9 inches apart.
4th, 2½ bushels drilled 9 inches apart.
5th, 2½ bushels broadcast.

The result as to production of corn was as follows:—

No. 1	produced	25	bushels per acre.
2	,,	31	do.
3	,,	37	do.
4	,,	37	do.
5	,,	40	do.

Then as regards straw, the produce was—

No. 1	produced	51	trusses.
2	,,	63	do.
3	,,	64	do.
4	,,	70	do.
5	,,	84	do.

Now, though the increase of one and a half bushels of seed added some six bushels per acre, an increase of three pecks produces the same additional quantity; and the broad-cast (two and a half bushels) is claimed at once by the thin seeders, inasmuch as they assert that fully one-half of the seed will be consumed by birds and vermin.

George Lane Fox, Esq., at the Wetherby Farmers' Club, gave the result of an experiment he made with wheat dibbled, two acres, at the rate of three pecks per acre; and he tried side by side with it other two acres, with three bushels per acre. The result was, the corn which was drilled thick was laid by the winds and rain, while the whole of that which was dibbled came up strong, and was never moved. He produced a single grain which had matured 141 ears. Mr. Mechi, of Tiptree Hall, is one of the most determined of the thin seeding advocates; and as we prefer his experiments themselves far better than all his theory, we will give the results, omitting those parts which are immaterial to the present enquiry. We will give the numbers of the fields, as the most intelligible mode for reference at a subsequent period:—

No. 1	2½	pecks dibbled,	at six inches.
2 ..	4	,, ,,	at eleven inches.
3 ..	4	,, ,,	
4 ..	4	,, ,,	
5 ..	4 & 5	,,	
6 ..	8	,, drilled.	
7 ..	9	,, drilled.	

The produce was as follows:—

No. 1	30½	bushels per acre.
2 ..	40	do.
3 ..	38½	do.
4 ..	35	do.
5 ..	48	do.
6 ..	34½	do.
7 ..	32	do.

Now these results are neither satisfactory nor very instructive. It is quite true that the 4 and 5 pecks produce by far the most corn per acre; but the soil was so different, that no criterion could possibly be taken from this circumstance; and the remainder of the facts are by no means so striking as to convince any person of the beneficial effects of thin seeding; for though the highest amount of produce is doubtless obtained by thin seeding, in most of the cases, in themselves, yet, when the trials are in the same field, and strictly comparative, they do not show any great and marked difference. Thus in one field,

4 pecks produced 35 bushels per acre; and
8 ,, 34½ do.

Here was, however, a clear gaining of the seed; the half bushel per acre is not an advantage worth the trouble of calculation, and might be merely the result of accidental difference in the field. But in another field, there is the somewhat significant fact of

2½ pecks per acre producing 30½ bushels.
9 ,, ,, 32 do.

Mr. Heathcote also made experiments, and he is quoted on the side of the thin seeders. The following is the result of various trials he made in 1845, and certainly they present anomalies enough to induce a second trial:—

9	pecks produced	46	bushels per acre.
9	,,	36	do.
7	,,	32	do.
6	,,	35	do.
5	,,	30	do.
4	,,	36	do.
3	,,	34	do.

The weight per bushel is an indication, however, that the sample on the thin-sown land must have been very inferior. It was as follows :—

On the 9 pecks,		$65\frac{1}{2}$ lbs. per bushel.	
9	,,	63	do.
7	,,	63	do.
6	,,	$62\frac{1}{2}$	do.
5	,,	62	do.
4	,,	62	do.
3	,,	$61\frac{1}{2}$	do.

Mr. Heathcote's experiments are, on the whole, somewhat in favour of the thin-sowing system; for although, in one instance, nine pecks of seed produced ten bushels more than any other quantity, it also produced that quantity more than another instance of the same quantity of seed; and four pecks of seed produced more corn than any other quantity, except nine pecks.

Mr. Heathcote's second experiment was more satisfactory, but more in favour of the thin-seeding theory. Without encumbering this paper with the whole details, the general results are as follow :—

		bush.	pks.	
6 pecks per acre produced		35	2	per acre.
5 ditto	,,	37	2	do.
4 ditto	,,	41	0	do.

The weights again showed the same peculiarity as in the previous instance. Thus the

6 pecks	weighed	55 lbs. per bushel.	
5	do.	55	do.
4	do.	52	do.

Here is a very marked and decided increase by thin sowing. When there is a difference of as much as $5\frac{1}{2}$ bushels per acre between 4 pecks and 6, and when there was a somewhat regular gradation between each reduction of one peck of seed per acre, it is certainly in favour of the smaller quantity.

Mr. Dean, of Tottenham, communicated the result of some experiments with which he had been furnished, and the results were as follow :—

		Qrs.	bsh.	pk.	
8 pecks of seed produced		2	2	3	per acre.
7 do.	,,	2	2	1	
6 do.	,,	2	0	2	

The quantities here are so slightly different, that, though as such they make somewhat against thin seeding, they are open to the objection that the variations in the soil alone might make the difference; and the thin seeders would object to the quantity in the first instance being too large, and that, though there was a descending gradation as to quantity, it was very slight.

Mr. James Eames sowed a field with wheat, containing seven acres three roods, and planted one and a half bushels per acre on the whole field, except six lands in the centre, containing two roods, thirteen perches. This was drilled at the rate of one bushel per acre. The thin drilled produced somewhat over 40 bushels per acre, and the thicker drilled exactly 40 bushels. The same gentleman tried the experiment three years in succession. The years were as follow; and the general results each year are, more or less, favourable to the thin-sowing practice. They were as follow :—

1844. Dry season. Equal.
1845. Wet and cold. Thin sown, 2 bushels more.
1846. Thin sown produced rather more.

We cannot build much, however, upon these experiments. It is a trial of thin sowing against thin, and not thin against moderate; and the centre of the field often produces more grain than the hedge sides, and especially the headlands.

Before concluding our remarks on Mr. Davis's favourite scheme, we cannot help doing him the justice of naming the quantity of seed he sows for various crops; and we append, also, his season of sowing, for there are some peculiarities of the thin-sowing practice, which its advocates say are necessary to make it answer their expectations; to these we shall allude at the end of this evidence for thin sowing, and also mention some facts as to Mr. Davis's practice, which came out at a meeting of the Maidstone Farmers' Club. His quantities of seed are :—

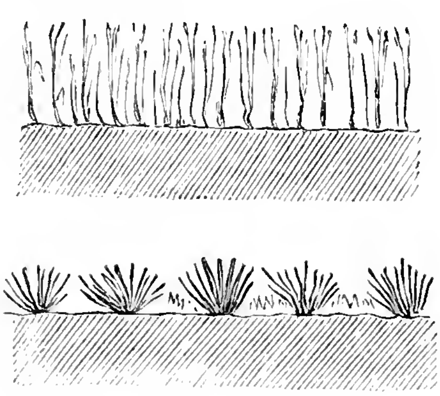
Rye, $1\frac{1}{2}$ bushels, August and September.
Winter barley, 2 bushels, September.
Tares, $1\frac{1}{2}$ bushels, August, September, October.
Mangel wurzel, 6 lbs., April.
Swedes, 1 quart, May.
Turnips, 1 quart, July.
Cabbages, 1 every three feet, June.
Oats, 6 pecks, January, February, March.
Barley, 5 pecks, January, February, March, April.
Wheat, 3 pecks, September, October.
Peas, 9 pecks, December, January, February.
Beans, 9 pecks, September, October.

A deputation from the Maidstone Farmers' Club visited Mr. Davis, and they made some curious observations, which elucidate the natural history of thin seeding. One fact was, that a sample of Mr. D.'s crop of barley, consisting of ten ears, was compared with an excellent neighbour's crop, from which ten ears were also selected; and the one from his neighbour produced 245 grains, while Mr. Davis's produced 318 grains. A specimen of thick sown oats was selected, and compared with an ear of Mr. Davis's thin sown, and the latter had 195 grains in it, while the other had 190 only.

This fact seems, therefore, to be fairly admitted on all hands, that a larger ear and a stronger straw are universally the result of thin sowing, and there are seldom with it any lodged crops. But we think that all the experiments are quite unanimous, that the weight of the grain is most certainly deficient.

Another admitted fact is, that the thin sown requires earlier sowing, and will be found later ripe than that which is sown more thickly; and also that the free use of the hoe is quite indispensable, when the quantity of seed is small.

Doubtless, the result claimed by Mr. Mechi, of advantage from thin sowing in the subsequent seed crop, may be well founded, because the roots of the wheat plant will be further apart in the one case than the other, and greater side space will be allowed for the clover plants. The seeds on wheat land are often defective, partly from the impossibility of its being so well covered when sown, and partly from the soil in which it is deposited being the extreme surface soil, out of which the winter rains have washed the fertilising matter. Still the large development of clover will weaken the plant. But the greater extent of area for the clover plants which is allowed by the thin-seeding system, will, it seems, to a certain extent at least, compensate for this deficiency. To make this clear, the accompanying sketch will fully show the difference beween a thick and a thin sown field.



Evidence against thin sowing.—It is quite surprising how much may be said on both sides of a question; and it is often a truism, that whenever a new plan is adopted for trial, a piece of land usually the best and most likely is selected, ostensibly for the purpose of giving a fair trial, but which often tends to make the results appear more favourable than they are in reality.

Amongst the experimenters whose trials have not answered the expectations held out by the advocates for thin seeding, are those of Colonel Rushbrooke, which never had the publicity which the care and attention they appear to have been tried with deserve; they exhibit the greatest amount of fairness and accuracy. First he tried—

		Bushels.
8 pecks dibbled, 6 in. by 4 in.,	produced	45
8 pecks drilled, 6 in. apart	,,	45
8 do. do. ,,	,,	$47\frac{1}{2}$
Average produce		46

He next tried six pecks, as follows:—

		Bushels.
$6\frac{1}{2}$ pecks, dibbled, 6 in. by 4 in.,	produced	45
6 pecks, drilled, 6 in. apart	,,	45
Average		45

He then tried four pecks, or one bushel, as follows:—

		Bushels.
4 pecks, dibbled, 9 in. by 6 in.,	produced	40
4 pecks, drilled, 9 in. apart	,,	40
Average		40

Carrying out the principle, he reduced the seed to two pecks, sown by drill, at nine inches apart, and here the produce fell to 35 bushels per acre.

The quantity of straw was also nearly in the same proportion. Thus:

	Tons.	cwt.	lbs.
On the 8 pecks it averaged	1	0	3
On the 6 pecks	1	0	84
On the 4 pecks	0	19	0
On the 2 pecks it was ..	0	17	6

Thus the reduction in the amount of straw was nearly as great as that of corn, and established that it is not safe, even with the mild and genial climate of Suffolk, to reduce the seed below eight pecks per acre. How far the maximum would have held good, if the quantity had been increased to nine, or even ten pecks per acre, we are not at liberty to surmise, though it is desirable that comparative experiments to this extent should be submitted to a fair tribunal.

Mr. Thompson's experiments, detailed at the Shrewsbury meeting of the Royal Agricultural Society, were of a character to do immense harm to the thin sowing theory, especially as he tried the dibbling process, against the old discarded broadcast, and subjected the whole to a most careful and searching scrutiny. Before harvest he pulled up one row of each kind, 35 yards in length, and found—

The broadcast gave 938 roots, and 1740 stems.
The dibbled gave 150 roots, and 1185 stems.

Thus, while the broadcast corn had not quite two stems each, the dibbled had nearly eight stems to each root.

Of the dibbled stems, 100 heads weighed $10\frac{3}{4}$ oz.
The broadcast ,, ,, $7\frac{3}{4}$

These had grains as follows:—

Broadcast	2003
Dibbled	3781

But the produce *per acre* was quite unfavourable to the thin seeding—

	Bshls.	pks.
The broadcast, 8 pecks per acre, gave	45	2
The dibbled, 4 pecks ,, ,,	28	3

The same gentleman, though he had tried the experiment for two years before, tried also other experiments this year, which were not given in his paper at Shrewsbury. He tried between 5 and 6 pecks per acre dibbled, and drilled 10 pecks per acre. The result was :

		Bshls.	pks.	
Dibbled produced	..	37	3	per acre.
Drilled	..	48	3	do.

In order further to test the few plants, as compared with the many, he hoed out one-half of the corn after it had come up, on a part of the drilled land, so as to leave the produce of, say 5 pecks per acre, and the produce of this piece was 40 bushels per acre.

The difference in the weight per bushel here, as in the previous experiment, was greatly in favour of the thick sown, as against the thin; the former being 64½ lbs. per bushel, and the latter only 62 lbs., a difference as great as 20 lbs. per quarter!

The same gentleman also calculated the produce of the drilled corn at £19 13s. 3d., and the dibbled at £13 7s. 6½d., showing a difference of six guineas per acre.

Mr. Milburn gives, in his prize essay on the different modes of sowing wheat, the following facts, which also tell hard against the thin sowers. Twenty-five perches of land were sown as follows :

No. 1. Drilled, 10 pecks.
2. Drilled, 9 pecks.
3. Pressed and broadcast, 10 pecks.
4. Ribbed and broadcast, 10 pecks.
5. Dibbled, 4 pecks.

The produce was collected into lots of ten sheaves each, and the result was, in sheaves—

1. Drilled	..	..	180 sheaves.
2. Drilled	..	..	140
3. Pressed	..	..	190
4. Ribbed	..	..	170
5. Dibbled	..	..	160

The yield of each, in corn, was thus given—

			Bush.	pk.	qrt.
No. 1. Drilled	..	..	5	1	1
2. Drilled	..	..	5	1	3
3. Pressed	..	..	5	3	3
4. Ribbed	..	..	5	0	3
5. Dibbled	..	..	3	0	1

Thus it will be seen. that while the average of the 9 and 10 pecks per acre amounted to 5 bushels 1 peck and 4 quarts, the 4 peck produced only 3 bushels and 1 quart. The samples were not, it seems to us, weighed, but were valued by two competent millers, who were unacquainted with the object of the writer in submitting them; and they gave a valuation, on the thick sown, of an average of six shillings and ten pence. They both agreed in fixing the thin sown only at five shillings and sixpence. The produce of straw did not give the progression of increase or diminution in weight in the ratio of the corn. It was—

No. 1. Drilled	..	..	828 lbs.
2. Drilled	..	..	686
3. Pressed	..	..	720
4. Ribbed	..	..	799
5. Dibbled	..	..	855

The reason, however, of the small quantity of seed producing so large a weight of straw, was attributable to the great bulk and height of the clover in that corn beyond what it was in the rest of the field; and though it was not separated, there can be no doubt but if it had been separated from the whole, there would have been much the least weight of straw in the dibbled portion.

It may also be observed that the sheaves were ten short of an average in the dibbled corn; and as a general rule, there was the most corn where there was the greatest quantity of seed. As regards the price, the difference of seventeen per cent. between the ten pecks of corn and the four pecks, is to be attributed to the coarseness as well as lightness of the grain.

Hitherto the experiments have been confined to the thin seeding of wheat alone; but the experiments of Mr. Watson, of Esperston, are full of instruction as to other grain. Mr. Davis, indeed, admits that barley should have five pecks, while wheat had three, and admits of six pecks for oats, per acre, as the proper seeding. His first experiment, however, was made with wheat. He happened to hear of a clergyman who dibbled 22 grains of wheat at six inches apart, and had produced at the rate of 40 quarters per imperial acre.* We imagine he had transplanted out afterwards, or we cannot imagine the production possible.

He accordingly dibbled one part and drilled another part of the same field; he does not give the relative quantity, but we assume the quantities to be about eight pecks to four per acre. At harvest time the gross weight of the entire produce, corn and straw, was—

Drilled, per acre	..	402 stones, of 24 lbs.	
Dibbled ..	..	414	ditto.

showing an excess of twelve stones per acre in favour of the dibbled corn. But in the sack the produce was reversed, and it stood—

Drilled ..	..	17 bushels per acre.	
Dibbled ..	..	11	ditto.

The discrepancy is referrible to the same cause as many of the above instances; the seeds had grown so much more luxuriantly in the dibbled than in the drilled portion, that the difference was equally explained. The smallness of the general produce may be explained by the fact, that the land was 800 feet above the level of the sea. Anxious to give a fair trial to the spring crops, on which the

* In his garden?

severity of the climate might have less influence, he dibbled half a bushel and a quartern of barley to the acre, against his usual seeding of four bushels. On the dibbled land the gross produce was 328 stones, of 24 lbs. to the stone; broadcast, 288 stones.

The difference in gross weight was, as in many of the preceding experiments, owing simply to the seeds which the dibbled corn contained; but the result in corn tells a different tale. It was—

On the dibbled land ..	22 bushels per acre.	
On the broadcast	29	ditto.

It may, however, be objected, with some degree of fairness, that while the advocates of thin sowing recommend a great reduction of seed, they do not, in any case that we have observed, advise so small a seeding of barley, because there is not time—nor is there adaptation in the grain, to tiller out in the same degree, as an autumnal crop. But the reply to this is, that Colonel Croft, of Stillington, near York, dibbled some barley in his garden, as an experiment, which showed the amazing number of 160 heads from one root.*

On the other hand, it may be questioned if the quantity in the other trial pieces is not as far too much in the extreme of thick seeding, as this trial was in that of thin. Still, the truth is probably to be found in the happy medium, which men often forget to adopt.

Practical deductions from these experiments.—It is a truism, almost amounting to an axiom, that it is quite unsafe to adopt any practice in farming from the results of one set of experiments; and so completely do season, soil, climate, and other peculiarities affect crops, that it is quite unsafe to adopt any theory upon one year's trial. The experiments of Mr. Lawes, it may be remembered, exhibited so great a difference in three years on the same land, where he grew wheat in succession, as to prove this point most completely. He grew, it may be recollected, the first year 16 bushels per acre, the second year 23 bushels per acre, and the last 17 bushels per acre—all unmanured. Well says the "Gardeners' and Farmers' Journal" on this fact—"Had it happened that any particular process had been applied in 1845, which had not in 1844, there would have appeared a clear gain of seven bushels per acre by it, though in reality there was no such thing. We would beg to call the attention of some of our thin-sowing theorists to this fact, and call upon them for a repetition of experiments, however satisfactory." How much soever this advice may be necessary to the theorists themselves, it is quite unnecessary to the public, who have abundant reason to be satisfied with the following principles, which are substantially proved by the trials in detail.

1. That a considerable portion of the thin-sown and dibbled seeds never germinate. One reason the dibblers urge against thick sowing, as they call it, is, that a considerable portion of the seed is destroyed by birds and vermin; but the constant complaints Mr. Mechi and others are making of wireworm, seem to indicate that their process does not altogether free them from such visitations; and having so much less seed to lose, they have no alternative, but adopt the *transplanting* system in spring, as an auxiliary to the dibbling one in autumn. All the experiments show that, for some reason or other, a large per-centage of the grains never germinate.

2. The spaces between the plant in its early stage, and before the diagonal filling up of the cavities indicated in our little sketch has taken place, are so apt to be filled up by intermediate plants, that they much tend to interfere with the development of the grain. Weeds in unsown land, and clover in land sown with seeds, grow so rapidly, and fill up the interstices so fast, that in the one case the clover is encouraged to outgrow itself, and expend its vital powers in the first season, while the weeds are only kept down by much more expense in hoeing, and must grow at periods when the hoe can no longer be used.

3. That though the tillering power of the grain may at harvest time overcome the spaces between each grain, still it is an effort of the plant unsuited to its full productiveness; and hence the dibbled or thin-sown samples are generally coarse, as in Mr. Milburn's experiments, when it was valued at so much less, and in Mr. Thompson's, when his dibbled corn had $5\frac{1}{2}$ per cent. of offal corn, while his pressed had only $3\frac{1}{2}$ per cent. Where a fine sample, productive of flour, is required, the system is decidedly unfavourable.

4. That all admit the thin sown ripens the latest. Because the plant has to make such effort to fill up the interstices, its powers are expended in that process rather than in maturing the grain. A late harvest is so synonymous with a bad harvest, that the thin seeders endeavour to avoid the dilemma, by urging that "thin sowing should be early sowing;" forgetting the loss of having the attention diverted, after harvest, so soon to seed time, when the stubbles are to be cleared and prepared for turnips.

5. That few of the experiments in any locality show any *great* increase of produce, while the most of them show results unfavourable to the thin-sowing theory.

6. That though the climate of the south of England appears to be more favourable to thin sowing

* Milburn's Prize Essay, p. 11.

than the north, still Colonel Rushbrooke's experiments in Suffolk show a decided injury by decreasing the seed below eight pecks; and all the northern experimenters are decidedly unfavourable.

7. That though thin sowing may answer when theoretically tried in gardens, it is not adapted to the ordinary soils of our cultivated farms throughout the country.

And 8. That a medium quantity of seed, say eight or ten pecks per acre, or in extraordinary cases eleven pecks, is by far the safest quantity of seed; and it is unsafe rashly and extensively to change any practice in a locality, where it has answered for any length of time.

Sowerby, Thirsk, Yorkshire,
October 16, 1849.

A FEW REMARKS ON THE PRESENCE OF A PARASITIC FUNGUS ON THE GRASSES, HITHERTO ONLY CONSIDERED OF IMPORTANCE WHEN OBSERVED ON RYE; PARTICULARLY IN REFERENCE TO ITS PRODUCING ABORTION IN COWS.

BY D. P. MACLEAN, SURGEON.

There is a diseased state of the rye, commonly called "spurred rye," and sometimes "ergot," observed chiefly in damp seasons and in poor or marshy situations.

In form it somewhat resembles the spur on a cock's leg; it is a firm, compact, and almost horn-like substance, white or grey within, and of a dark peat brown or nearly black colour, with a tinge of violet without. It issues from between the glumes, and occupies the place of the grain; or it is, according to some writers a prolongation of the grain, grooved and furrowed, and elongated in some cases to the extent of an inch or more.

There have been many contradictory opinions concerning the origin of this most mysterious of all diseases attacking grain. Some have presumed that it comes from the puncture of insects, in the same way as the gall-nut is produced on the oak; but of such an origin there is no proof, but rather the contrary, for we find no marks of such perforation, and in all instances of adventitious growth produced by insects we have evidence either of their puncture or presence.

Others have ascribed it to a defective fecundation, but equally without proof. Mr. Francis Bauer seems to have regarded it as being merely a morbid swelling of the ear, neither connected with an insect nor a fungus. De Candolle, a high authority on vegetable physiology, and who has particularly investigated the subject, maintains that it is a parasitical fungus, to which he gives the name of "sclerotium clavus."

If it was merely a morbid swelling of the ear as supposed by Bauer, we should find the ear in distinct stages of transition from sound to the fully developed disease. Such we never see; for even where the ergot is found small and young, it is as complete an ergot as when fully grown, and as distinctly a different product from the young seed as the full grown is to the ripe grain. Indeed, there can be little doubt but that De Candolle has decided truly as to its being a parasitic fungus; the fact of its being most prevalent in a damp season (which is well known to encourage the growth of fungi generally), its rapid growth, as shown in its acquiring four, five, or six times the size of healthy grain ere the field is ripe, and its great liability to decay and the inroads of insects (other striking peculiarities of fungi as a class), all tend to corroborate his views.

Dr. Wiggers, another writer on the subject, confirms the opinion of De Candolle. Whatever its origin, it has properties which are quite peculiar; and differing, as it does, entirely in appearance from the grain it grows on, so it does also in qualities and composition; so much so, that instead of being nutritive like grain, it is a dangerous poison, producing many of the symptoms of poisonous mushrooms. Chemists have also detected in it a principle resembling "fungia," the poisonous principle of mushrooms.

When an infusion of the ergot is injected into the veins of animals it produces paralysis and coma, emaciation, depression of the whole nervous powers, with loss of sight and diminished animal heat. When administered internally it produces spasm or cramp in the abdominal muscles, colic, a tendency to dry gangrene in the extremities, and expulsive pains in the gravid uterus.

On many parts of the continent the peasantry use rye bread as their staple food for many months of the year; and in such districts, after a wet summer a disease often shows itself, in which the toes, fingers, and in some cases even the feet and hands become dead and drop off; and on investigation this has been found to be produced by the quantity of this poison combined with the bread. And from the same cause also, miscarriages amongst child-bearing women are frequent in these districts. Traill, in his "Outlines of Medical Jurisprudence," mentions, regarding this parasite, "the tendency of this substance to produce dry gangrene is generally admitted by German and French writers;" and again, "its peculiar action in promoting the expulsive efforts of the gravid uterus seems to be established."

It has been long known on the continent as a blight and as a poison; and both abroad and in this country it is known to medical men as a drug of great power in various preparations: it is used to restore the action of the uterus in tedious labours, in some other female disorders to check hemorrhage and diarrhœa, and as a local application to check bleeding from wounds.

Hitherto, both by agriculturists and scientific men, this growth has only been considered of moment as existing in rye, as "ergot of rye." The object of this paper then is to draw the attention of farmers and others to the fact of its presence on other plants, to inform them of its importance as a likely cause of disease and calf-casting amongst their cattle, and to give a few hints as to the means of avoiding the evil.

My attention was lately drawn to the appearance of this parasite on rye-grass, and on pursuing the subject I was surprised to find it exceedingly prevalent, so much so as to excite in my mind a conviction of its great importance. The more I have sought, the more general I have found the disease; and I am now obliged to state my belief that all grasses are liable to it, having seen it on rye-grass and on all the more common pasture grasses likewise.

In several of these it appears as frequent as on rye itself; in rye-grass it is exceedingly abundant.

From the parasite bearing a size proportionate to that of the seed it usurps the place of, so as to be largest in rye, less so in rye-grass (but still large), and so smaller in the other grasses in nearly the same ratio with the size of their seed, it becomes of serious consideration in rye-grass, when we recollect the great quantity of that grass grown, and the large size of the fungus on it.

The characters of the ergot on rye are exactly similar to that existing on rye-grass, so that the same description will serve to detect. In the other grasses it is mostly shorter, of a lighter shade, and is more concealed by the glumes or chaffy coverings of the seeds. I may also mention here that in all the grasses, and in rye also, the ergot if dry, when put to the flame of a candle, burns with a bright flame, and a rather strong and a very disagreeable odour.

The potency of the ergot as a cause of disease and calf-casting must be proportionate with its abundance in the hay or pastures. It is sufficient for me, having now drawn attention to its existence, to point to its probable effects, and after the history of its poisonous properties and medical uses in the earlier portion of this paper, that may be done in a few words.

When we know that it causes death of fingers, toes, &c. in men, is it not likely to be the cause of those supposed epizooties in which the cattle have gangrene of the lungs, rot in the hoofs, or disease of the mouth, stomach, and intestines, one, two, or all of these together? Nay, is it not more natural to ascribe such to this palpable and evident poison than to suppose some more subtle agency, which at best is doing little better than proclaiming our own ignorance. We know by direct experiments on the lower animals that it produces emaciation, coldness, &c., in a single dose. May not small quantities taken daily with the food produce murrain or other epizooties?

These questions I leave to practical agriculturists and veterinarians to answer after observation has been made; but let them not hurriedly come to a conclusion. Its action on calving cows, brood mares, &c. must be very strong, from its peculiar power over the uterus and abdominal muscle, acting rapidly in large but no less certainly in small quantities if often repeated. In fact, I believe the eating of the diseased grass to be a frequent cause of cows picking calf. There have been several reasons hitherto assigned for this increasing evil, such as "in breeding," high keep, sympathy, &c.; but all these seem insufficient to explain many of the cases of abortion that occur. This ergot, I think, is the only direct cause to which it can be attributed, and appears to me to explain what has puzzled both farmer and veterinarian.

Having only very recently commenced these researches I am not in a position to illustrate this by either experiments or cases; but one cow, a few days ago, in this neighbourhood, picked calf about a month before her time. She had been grazed upon a pasture where the ergot was present, and as the field was rather bare she would be the more likely to eat the dead grass stalks on which the parasite was found.

There is yet another question arising which can only be answered after long observation and experience, that is, the effect of this poison on the milk, as to its quantity and quality, and also the period at which the cow may run dry when affected by it.

Now before entering on the last part of my subject, our means of protection against the disease, it may be well to state at what period of the growth of the plant the parasite is found. I believe that shortly after the setting or impregnation of the flower, as indicated by the dropping or withering of the feathery-like stamens, the germ or young seed, instead of increasing, becomes wasted by a sporule, (as the seeds of fungus plants are called), of the ergot fastening on it, the same as mould on cheese or mildew on the leaves of plants; so that we have now, in the place of the seed ripening, the gradual growth of this fungus. It will be observed that the above is carrying out the theory of De Candolle as to its fungoid origin, and that it is, as he has named it, "sclerotium clavus."

Our means of prevention are, I am afraid, very limited; steeps may have some effect on it, but a very slight one. It seems the wisest way to obviate the evil as much as possible; and I think the safest plan is to cut the hay very soon after flowering, when the fungus must be in a comparatively undeveloped state, and consequently harmless. If the field is to be grazed, the only way is to put the cattle on early; or if ripe, before putting the beasts on to make a careful inspection of the whole field for the disease, and, if present, to top the pasture with the scythe, so as to cut the ripened stems, and leave only the herbage for the cattle to graze.

I grant that objections may be urged against the early cutting of hay, that it will yield a light crop; but if quality will make amends, I believe the advantage will be in favour of the early method; for by letting the seed ripen, all the sweet juices that were before in the stem become transferred to the seed; and as greater part of that is shed before eating, so a proportionate amount of nourishment is lost, which would by early cutting have been saved, because still in the straw, and in at least as nutritious a form. When in the stem and blade it is a sweet sap, containing along with different salts a little grape sugar and mucilaginous matter; but the seed contains almost nothing but farina, which is supposed to be less easily assimilated. Besides the greater palatableness of the hay, there will be a proportionately heavier fog or aftermath, both from the earlier cutting giving it, the earlier summer weather, and from the more vigorous growth of the grass in consequence of the roots not having been exhausted in maturing the seed of the first cutting.

In fact, instead of having two unequal cuttings, or sometimes only one, there will be two equal crops; or to illustrate it by figures, I will suppose that a field according to the late plan yields two cuttings, the first valued as 4, and the second as 2, they will make six as a whole; according to the early cutting method it would yield two cuttings also, but instead of the first cutting valuing as 4 it would only be as 3, and the second cutting instead of valuing as 2 would be as 3, making a total of six, as in the first instance.

I will only add two other hints. Firstly, never let the cattle feed on the road sides in going to or from the pastures, as there the ripened and fully developed fungus is most likely to be; and the chance of eating of it there might render the farmer's care of no avail. Secondly, keep the grass well cut about the corners of the fields and under the hedge-rows. In concluding this paper I am well aware that I have treated some part of the subject very superficially, in my attempt to render it intelligible to all readers.

The whole is too brief for the importance of the matter, yet I feel anxious to make it known, that others, with better opportunities, may further investigate it.

Burton, Westmoreland, October 1st 1849.

REMARKS ON STATISTICS RELATING TO AGRICULTURE,

SHEWING THE EVILS RESULTING FROM PRESENT DEFICIENCY, AND SUGGESTING MEANS BY WHICH COMPLETE AND ACCURATE INFORMATION ON A SUBJECT OF SUCH GREAT NATIONAL IMPORTANCE MAY IN FUTURE BE EASILY OBTAINED.

BY JOHN EWART, LAND SURVEYOR, ETC., NEWCASTLE-UPON-TYNE.

It cannot but excite astonishment, that in Britain—a country unrivalled in the civilization and wealth of her population—with the exception of such as are subject to fiscal regulations, nothing, in any way worthy the character of accuracy, is known respecting the amount of industrial production. All information relating to matters not subject to charge for public revenue, however necessary in arriving at correct conclusions as to just legislation, or however important in regulating the transactions of individual enterprize, has hitherto—the middle of the nineteenth century of the Christian era—been a subject unworthy the attention of the government! For the only information which we possess on many subjects of the greatest importance in social economy, we are alone indebted to the industry of individuals; and such being generally conclusions drawn from insufficient or erroneous premises, and too frequently amounting only to mere conjecture. In the statistics of no branch of social economy are we so deficiently informed as in those relating to agriculture. For neither has the aggregate quantity of land in cultivation, nor the proportion employed in the production of any article of food, ever been attempted to be ascertained; and so great is the discrepancy of opinion of those best informed on the subject, that the acreable quantity of the different kinds of grain produced within the limits of a county, much less of the United Kingdom at large, is impossible to be estimated beyond a most vague approximation to the truth.

A first essential to a complete knowledge of social economy is a correct enumeration and classification of the occupations of the people; as without which it is impossible to comprehend and accommodate the difference of interests, which, more or less, must of necessity exist in every civilized population of any considerable number. So far as it relates merely to the number of the population, the decennial census of this country has, from the commencement of the present century, been as accurate as it well can be; but in the classification of the occupations of the people it completely fails in furnishing the means of forming a correct estimate of the proportion of the population affected in their interests by any of the various industrial avocations. This remark, as will be perceived from what is about to follow, in no case applies with greater force than to the proportion of the people engaged in the principal and accessorial employments required in the cultivation of the soil.

In discussing the present topic it is not intended to dispute that the whole of the farmers, and their servants and labourers in husbandry operations, are included in the census as "*employed in agriculture;*" but it is objected, however, that a considerable portion of the population, who although not actually employed in any operation of husbandry, according to the general acceptation of the term, yet being almost as closely connected with and as much depending upon agriculture in their avocations as either the farmer or the labourer in husbandry, should be enumerated as to occupation in the census, as they have always hitherto been, with a portion of the population in no wise accessory even to the cultivation of the soil. The portion of the population referred to as being so closely connected in their interests with agriculture are the tradesmen and artizans in the small inland towns and villages. The sole dependence of such for trade or employment being on their neighbours engaged in the cultivation of the soil, their interest cannot be considered otherwise than completely identified with those of the agriculturist. As an illustration of such view of the subject, the case of the country jobbing-smith may be taken: and in advancing such example, those acquainted with rural affairs need scarcely be reminded that every twenty pairs of horses employed in agriculture will furnish employment for a smith throughout the year, in shoeing the horses and keeping the implements worked by that number of labouring cattle in proper order and repair; and that it is not uncommon, on extensive tillage farms, for a smith to be a permanently hired servant of the farmer. Besides the smith there are many other tradesmen, whose craft, although perhaps not so obviously indispensable, is nevertheless necessary to advantageous cultivation of the soil; and numerous shop-keepers in the rural districts, whose trade wholly consists in supplying the requirements of those employed in the actual cultivation of the soil. These tradesmen and dealers, comprising a considerable portion of the population of Britain, if not classed as "*engaged in agriculture,*" ought, in any classification of occupations having accuracy in view, to be enumerated distinctly from tradesmen depending for employment or custom on the community more generally, and from the workmen and artizans employed in large manufactories, the products of whose industry may be, and for the most part are, sent to a distant home or foreign market. The interests of the two distinctions of tradesmen mentioned are in different directions—those of the one being dependent on agriculture, and those of the other on commerce; and whatever dissimilitude may exist in the interests of these leading sections of industrial vocation, the same will obtain in the two distinctions of the population referred to.

On reflecting on the imperfect classification of the occupations of the people above pointed out, we naturally arrive at the conclusion that a fallacious estimate of the proportions of the population engaged in occupations of discrepant interests has tended, in a considerable degree, to promote the changes which have of late years taken place in our commercial policy; the result of which, although as yet not fully developed, is producing serious disadvantage in every direction, and to every industrial interest of the nation, both in the United Kingdom and the colonies. It behoves government—the guardians of the public prosperity, to prevent, in future, errors similar to those that have taken place, which may easily be accomplished by a more perfect classification of the occupations in addition to the enumeration of the population.

Having remarked on the deficiency of almost the only statistics, except what relates to revenue, with which the public are furnished by government, the more immediate topic announced as the subject of the present dissertation next comes under consideration.

The observation in respect to agriculture of a writer of unquestionable wisdom is applied with remarkable justness:—"Let it be remembered, then, that agriculture is the immediate source of human provision; that trade conduces to the production of provision only as it promotes agriculture; that the whole system of commerce, vast and various as it is, hath no other public importance than its subserviency to this end."* Providing food being the first necessary occupation of man, a doubt cannot enter a sane mind, that agriculture—by which not only the first necessaries, but also the comforts of life are produced—is, of all others, the most important occupation that can engage the attention and energy of man: and on affording the subject the slighest consideration the foremost reflection arising in the mind is, that how much soever commerce and manufactures may aggrandize a nation or contribute to the enjoyment of human existence, still such pursuits must ever be of secondary import to agriculture in every country in which the fruits of the soil are capable of being produced. So plain is the truth of the position just advanced, that to attempt to enforce conviction by any argument would be as ridiculous as it would be idle, as where any doubt of the fact can exist must be in complete aberrance of mental perception.

Notwithstanding the obvious importance of agriculture, yet, as has hereinbefore been remarked, the statistics relating to that avocation amount to nothing beyond the conjectures of private individuals, in which great discrepancies exist in the statements according to the difference of views and political bias of those who have treated of the subject. Such state of the matter gave ample opportunity to writers and lecturers during the agitation of the repeal of the duties on the import of foreign corn and other agricultural produce to put forth any statement, true or false, relating to the resources of the country to supply the demand of food for the present and future population, that might appear best to promote their views, and of which such authors and spouters to the utmost availed themselves; whilst the same want of correct information prevented the refutation of error at that time promulgated by every means and in every direction. The effect of the statements put forth during the period from 1841 to 1846, and the conclusions deduced therefrom, has been a belief, very generally entertained, *of a necessity of an importation from abroad of articles of food, arising from an incapability of producing a sufficiency at home to meet the consumption by the population; and of a dependence on a foreign supply of food being in no way prejudicial to the national interests.* The truth of such doctrine in political economy we will in the next place proceed to examine; in doing which we will treat of the two members, into which the proposition is divided, separately.

As to the first portion of the above-mentioned position, it is perfectly true that a portion of the food of the population of Britain is, and will be, so long as the peculiar circumstances of the country continues, required to be imported from abroad; but certainly such necessity does not arise from any incapability of production at home. Every person informed on agricultural matters must be aware that the agricultural production of the country is very far short of what the soil is capable of yielding to improvement in cultivation. To what extent the fertility of the soil may be increased by well-directed labour, aided by the application of science to the art of agriculture, it is impossible even to conjecture; but we are taught by experience, to some extent, the effect of improved cultivation in increasing the returns from the soil; and when we reflect on the general state of agriculture at present, in comparison with that of other arts and of manufactures in this country, and with the improvements of which agriculture itself is susceptible, we may certainly conclude, that food for the population of this country, with a similar rate of increase in future to that which has taken place during the present century, may easily be produced at home for many years to come. The anomalism in the necessity of foreign supply, whilst the capability of producing articles of food at home in full sufficiency to meet the requirements of the population exists, may very easily be reconciled on a consideration of the peculiar circumstances of this country. The true cause of a deficient production of food in this country to meet the requirements of the population is the impossibility of exporting, at a remunerating price, any surplus production beyond consumption at home, arising from the following circumstances, viz.—the high rent of land compared with that in any other part of the world; the heavy burdens in tithe and taxation, with which the occupation of land is charged; and the high price of labour, arising from the physical requirements and acquired habits of the people rendering their living more expensive than in any other part of the world; the elements in the cost of production amounting to probably double that in many countries from which the deficiency of our production is obtained.

(To be concluded in our next.)

* Paley.

THE AGRICULTURE OF THE UNITED STATES.

Having, in several previous numbers of the Farmer's Magazine, briefly described the Agriculture of the principal European countries, we now gladly avail ourselves of Mackay's "Western World," * to lay before our readers the account, furnished by that author, of the Agriculture of the United States.

In the broadest sense of the term the agricultural produce of America comprises wheat, Indian corn, rice, barley, rye, oats, cotton, tobacco, potatoes, turnips, flax, hemp, sugar, indigo, fruit, and grasses of all kinds; to these may be added live stock, which are also, to all intents and purposes, an agricultural product. The different products here enumerated are by no means indiscriminately indigenous to the whole country. They may be grouped into five great classes—as pasturage, wheat, and other bread stuffs, tobacco, rice and cotton, and sugar; and the country divided into five great regions, corresponding to this classification, each region being more particularly adapted than the others for a particular class of productions: we have thus the pasturage region, the wheat region, then the tobacco, cotton, and sugar regions.

It is in the New England States that we find pasturage carried on to the greatest extent in America; not but that there are other districts in the United States, particularly west of the Mississippi, eminently adapted for it; but that the greater part of New England is, in an agricultural point of view, adapted for little else. The soil is generally light and rocky, and although wheat is raised to a considerable extent along the borders of the streams, and in some of the valleys, such as that of the Connecticut, on the whole the growth of bread-stuffs is but scanty in New England. Live stock, however, is raised in great abundance; the horses and horned cattle of New England being reckoned the best in the country: numerous flocks of sheep also find pasture on the hills; and swine are bred to a very great extent, although not so much so as in Ohio, Kentucky, and Tenessee. It was the presence of capital and good water power, together with the absence of any very great demand for agricultural labour in New England, that constituted it the chief seat of American manufacture.

The region particularly adapted for the produce of wheat, and other bread-stuffs, is by far the largest of the five, comprehending fully one-half of the entire area of the Union; within it are included the states of New York, Pennsylvania, New Jersey, Delaware, Maryland, Ohio, Kentucky, Virginia, Tenessee, Indiana, Illinois, Missouri, Ioway, and Wisconsin.* The wheat-growing region is thus comprehended within about 10 deg. of latitude; the line, beyond which it will not grow, to the north, being as low down as latitude 45°, whilst south of latitude 35° it is not profitable to raise it; but beween these two parallels it can be raised with little labour and in abundance, from the Atlantic to the eastern limit of the desert which separates the broad belt of fertile land, immediately west of the Mississippi, from the Rocky Mountains. But, although wheat may be profitably raised, with a few trivial exceptions, throughout the whole of this vast area, it does not follow that it is the product best adapted, in all cases, for its soil and climate. In almost every portion of New York, Pennsylvania, Delaware, Ohio, Indiana, Illinois, Wisconsin, throughout most of Ioway, in northern Missouri, and in a part of Maryland and Virginia, it may be cultivated with more profit than any other species of produce. But, in portions of Missouri, Ioway, and Virginia, and throughout almost the whole of Kentucky and Tenessee, except where tobacco is raised, Indian corn is the product cultivated to most advantage. In the two last-mentioned States particularly, as well as in Ohio to a very great extent, this grain is raised not only for human food, but to feed swine upon, which are slaughtered in myriads at particular seasons, salted and exported either to the distant markets of the Union, or to the still more distant marts of the foreign world. Barley and rye flourish well, throughout the most of this region; but oats, although pretty extensively produced, very rapidly degenerate—the seed in most parts requiring to be renewed after a few crops have been got from American soil. If the demand, both at home and abroad, for wheat were much greater than it is, it would be much more exclusively produced than it now is, throughout the wheat-growing regions *par excellence*; but, as it is, even in the best wheat-growing states, immense quantities of Indian corn and other grains

* Bentley, London, 1849.

* We would recommend the reader to trace these districts on a map; but some idea may be formed of their extent when he is informed that they contain 600,000 square miles, or five times the extent of Great Britain and Ireland.

are produced, and live stock consequently reared in considerable abundance.

In regard to quantity produced, the wheat-growing states range as follow:— Ohio coming first, as raising the largest amount; Pennsylvania next, New York third, and Virginia fourth: Tenessee bears the palm for the quantity of Indian corn produced. Nor must it be forgotten that this important grain is produced in large quantities far to the south of the line within which wheat is raised to any extent. The two Carolinas, Georgia, Florida, Alabama, Mississippi, and Lousiana, produce it at least in sufficient quantity to supply the negro population with food, as well as the white, with a product which figures largely in their cereal consumption. The best American wheat is grown in Virginia, in the Jenesse valley, in western New York, and in Ohio. Great quantities of it are ground into flour before being exported. The chief manufacture of flour in the United States, for this purpose, being carried on at Rochester, near the mouth of the Jenesse, and at Richmond, in Virginia. The Virginia flour is chiefly exported to the Brazilian market, being better calculated for a tropical voyage than that of Ohio and New York.

There is not a state of the United States in which tobacco may not be, and has not been, produced. It can be, and has also been produced in western Canada. But the tract in which the bulk of this produce is raised stretches from the 34th northward to the 40th parallel of latitude; five-sixths of it, thus lying within the limits already assigned to the grain-growing regions. The far greater proportion of the tobacco raised within this tract is cultivated south of the 37th parallel; the culture of this plant being thus chiefly confined to three degrees of latitude, two of which are also within the grain-growing regions. Virginia produces the greatest quantity, her capital (Richmond) being the principal tobacco mart of the country; Kentucky follows Virginia in point of quantity; after which come Tenessee, Maryland, South Carolina, Missouri, and even Ohio.

The great bulk of the cotton-growing regions lies to the south of the 34th parallel, stretching from the Atlantic to beyond the Mississippi, with an average width of about 4 degrees of latitude, the tract being comprehended between the line last mentioned and the Gulf of Mexico.

In the Carolinas and Georgia rice is produced to a great extent from the low marshy grounds near the coast, as also in the coast districts of Florida, Alabama, Mississippi, and Louisiana. Rice has now become a leading article of export from the south.

The cultivation of the sugar-cane, and the manufacture of sugar, in the United States, is chiefly, if not exclusively, confined to the state of Louisiana. The entire yield of this article in 1844 was computed at upwards of 126,000,000 pounds, of which upwards of 97,000,000 were produced in Louisiana alone.

What an almost inexhaustible source of wealth is there to the Republic in this variety of climate, and this vast extent of fertile surface! With a few exceptions, such as the rocky tracts of New England, and the light sandy plains of New Jersey, the whole area of the country, from the lakes to the gulf, and from the Atlantic to far beyond the Mississippi, is highly productive. Even the salt marshes on the sea-shore are capable of being turned to the most profitable account. In many districts of an upland character the soil, after having been used for some time, requires to be manured, as it does in Europe, to renovate it; but in others, particularly in the case of the bottom-lands on the great rivers, and of valleys well irrigated, and where the soil is rich and deep no manure is required. In innumerable instances has it been worked for years in the valley of the Mississippi, and on both sides of the lakes, producing every year more abundant crops, as the soil was more thoroughly worked without the aid of manure.

There is no question but the richest soil in the United States is to be found in the Mississippi valley; there it is not, as in so many other cases, a thin covering over the clay, the sand, the gravel, the chalk, or the rock; but the deposits of ages, effected by the constant operation of mighty agencies. In some cases the rich black mould is found as much as one hundred feet deep, and when turned up is as light and free as the driven snow. The pedestrian as he walks over it can, in most cases, sink his cane to the very head in it: nor is it any wonder when we consider that the vast desert which intervenes between the Mississippi and the Rocky Mountains has been gradually despoiled, that this rich deposit should be made in the lower portions of the valley.

Nothing can better serve to convey to the reader's mind an adequate idea of the exuberance of the Mississippi valley, than the ease with which, the little expense at which, and the abundance in which, wheat can be produced in its upper and grain-growing section. Throughout its entire length and breadth Indian corn seems to be almost a spontaneous production: the difficulty, seemingly, being not to produce it, but to prevent it from growing in too great abundance. The farmer in the valley is remunerated if he gets 10 cents, or about 6d. sterling, per bushel for it on his farm. For want of a great domestic and foreign demand, a great portion of the enormous quantity annually raised rots upon the ground. Wheat of course requires more attention, and more outlay to produce it; but it is astonishing how little labour and cost it requires to draw exuberant crops from the rich prairie land. The following estimate of the cost of raising wheat for the first time from prairie land, I procured from a gentleman in Washington, himself a practical farmer in the west, and, at the time, a member of congress for the western constituency:—

	Dol.	Ct.
"To ploughing an acre of sod	2	0
Seed........................	1	0
Sowing seed	1	0
Harvesting	1	25
Thrashing	1	75
Total..	7	0"

Here then we have 7 dollars, or about 29s. 2d. sterling, covering the whole expense of producing an acre of wheat in portions of the valley. This is the cost at which the prairie can be cultivated for the first time. In subsequent years it is diminished, as, after the sod is once turned up, the land can be ploughed for one dollar an acre: this reduces the aggregate cost to 25s. per acre; but it may be supposed that, as the husbandry is rude, the yield will not be very abundant. The average yield of good prairie land, when properly tilled, is above 35 bushels per acre; but, as it is generally farmed, it yields an average of 30 bushels : this gives the cost of production very nearly 1s. per bushel the first year, and at 10d. in subsequent years. The American is somewhat smaller than the English bushel; but, making ample allowance for this difference, 10*s. sterling may be assumed as the cost of producing a quarter of wheat* in most portions of the Mississippi valley, when the land is prairie land. Of course, when it is forest land the cost of clearing will enhance that of production. It therefore follows that all that the prairie farmer can get over 10s. sterling per quarter for his wheat on his farm is clear profit to him: compare this with 84s., 63s., and 56s., as the successively assumed remunerating prices in this country. I say upon his farm; for before the wheat, from these remote districts in America, reaches an available market, its value is so enhanced by commissions and transportation dues as to give the Mississippi farmer but little advantage on the sea board over his competitors on the American and Canadian sides of the lakes, or of the grain-growing regions east of the Alleganies. My chief object in here alluding to the ease and little cost at which wheat can in prairie land be simply produced, without calculating its constantly augmenting value, as it is borne for hundreds, and perhaps thousands of miles to market, is to show the poor and industrious man in this country, at how little cost, of either labour or money, he could secure a competence in these exuberant though distant regions. Settled upon prairie land, he is an independent man from the moment that the first year's crop is gathered in, as he is when settled upon wheat land in any part of America, although in other places greater labour and greater outlay are required to produce a crop. Prairie land is obtainable for a variety of prices, from the government price of 5s. 2½d. per acre, to £6 5s. in the very best locations.

Doubts have been thrown, in some quarters of this country, upon the ability of America to supply our deficiencies in case of scarcity; and these doubts have been grounded upon the comparatively small surplus of wheat which, for two or three years back, when there was such a foreign demand, America had to spare; but were there a large and steady foreign demand, America, without adding to her present number of agriculturists, could produce double the quantity of wheat which she now produces. Make it more profitable to the American farmer to grow wheat than Indian corn, and much of the surface which is now devoted to the produce of the one would be applied to that of the other grain. There is not at present a sufficient demand, either for home or foreign, to tax all the energies of the agriculturists; and this, to a great extent, accounts for the yet backward state, in most instances, of American husbandry. To produce all that is needed for home consumption, and surplus sufficient to meet but a limited foreign demand, has never called for a careful and scientific treatment of the surface actually under cultivation; but notwithstanding the want of stimulus in this respect, agriculture has in some places reached a high degree of perfection in America. This is not generally obvious to the mere traveller by railway and steamer. The districts first settled were such as adjoined the old highways, and no one has seen American husbandry in its more perfect development, who has not travelled along the great national road in Maryland, through the valley of Virginia, through the centre of Pennsylvania, and along the old highway between Albany and Buffalo, in New York.

The above plain and unvarnished account of the capabilities of the United States, as a corn-producing country, is suggestive of anything but encouragement to the English farmer. Wheat can be grown for 10s. per quarter; and now that our markets are open to the Americans we are much deceived in our estimate of their energy and skill if they cannot bring it from the most remote portion of the Mississippi valley, and dispose of it in Liverpool for something less than

40s., or, perhaps, even 30s. per quarter. Without any wish to give greater discouragement to our farmers, we would yet recommend them to pause and study this brief account of the capabilities of the United States; and more especially we would recommend them not to forget who it was that placed them in competition with "soil 100 feet deep."

GARDEN LABELS.

The mechanical inventions of the present age are neither few nor of trivial importance. People have indeed become so accustomed to discoveries and contrivances as to feel a sort of vaccuum on the least cessation of improvements, or considerable annoyance it they are not enabled to avail themselves of recent introductions. There is something in all this very natural; we might almost say very desirable, as it bespeaks a tendency to rise from, or shake off, the clumsiness and awkwardness of ruder times. In the ordinary operations of gardening for instance, we prefer to have things done in a cleanly, orderly, and expeditious manner. Beside the primitive method of planting by making holes in the earth with the fingers, the practice of the dibble and spade becomes an elegant and agreeable accomplishment. The man who is cleanly at his work is always a better workman than he who is slovenly; and though the common axiom is that a bad workman seldom gets a good tool, it is not the less true that a good workman has never much preference for a bad one. Nor is this principle circumscribed by any considerations of mere utility; for we find that if two objects, possessing equal capabilities, are presented for our selection, the chances are that we prefer that which is the more elegant or ornamental.

We have been led into these reflections from having lately received several communications requesting information as to the best and neatest garden labels; and although we do not pretend to know all the various forms which are adopted in different places, we shall shortly enter on the consideration of a few from which we think a very good selection may be made. We may just observe here—keeping in view the facts above alluded to—that though our list contains one or two which it would perhaps be difficult to supersede, we should nevertheless be happy to hear from such of our readers who may be able to suggest improvements in these or other implements used in gardening.

Fig. 24 represents what is called "Murray's tally," having been first designed by Mr. Murray, of the Glasgow Botanic Garden, and in reference to which that gentleman makes the following observations in a communication published in the third volume of the *Gardeners' Magazine:*

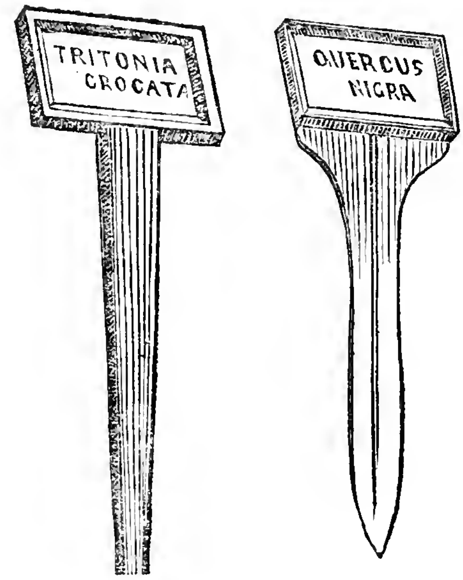


Fig. 24. Fig. 25.

"In my opinion, it will obviate many of the inconveniences attendant upon such as I have hitherto seen used in botanic gardens. It consists of a cast-metal standard, with a long, square head, in the front of which is a hollow box, into which the ticket, with the name written thereon, is put; then a pane of glass is cut to the proper size, and fitted-in over the name with putty, like the pane of a window. The ticket on which the name or number is written may be of wood, tin, or stone-ware. I prefer the wood, as easily written on by a carpenter's black-lead pencil, and also because it is not liable to rust. The dimensions of this tally will always depend upon the choice and objects of those who wish to use it. The expense per hundred of the size sent is, when completed for use, about 23s., not, however, including the value of men's time in writing and glazing, &c., as this can be done at such seasons as their time is of the least value."

The "galvanized cast-iron label" (fig. 25) is, perhaps, an improvement on Mr. Murray's tally, from which, as may be observed, it differs in several particulars. It was designed by Mr. Fortune, formerly of the Botanic Garden, Chelsea; and we are indebted to Mr. Moore, the present curator of that establishment, for the following observations respecting it:

"The label receives on the face of the tablet-part two coats of white paint. On this, and therefore *on the label*, the name is painted in black. When dry, this has a coat of varnish. Afterwards, the name is glazed over; a piece of stout (16 oz.) glass is cut to drop into the part where the name is painted, and this is puttied-in as in ordinary window-glazing, the putty being painted of a lead-colour, the same tint as the label itself. I have every reason to think them durable, and therefore cheap. Nothing breaks them but carelessness; and so long as they remain whole, there seems no limit to their duration. They stand at an angle which makes them easily read; and the name stands upright, facing you—not sideways, as in many forms of label. Being galvanized, they do not corrode at all."

These labels cost about 7½d. each when finished, and are both elegant and convenient. Our drawing being made merely from memory, after having seen them at the Chelsea Garden, it may perhaps be defective in some minute, but at the same time unimportant details. We may, however, observe that the standard or stem is eleven inches long, having a projecting rib down the middle on both sides; while the breadth of the tablet or case is three inches and a-half, outside measure, the depth being about one inch and five-eighths, and the thickness five-eighths of an inch. These measurements differ very slightly in fig. 24; and we think this, as well as the degree of inclination of the top part, may be very properly left to be determined by individual tastes and requirements.

Though these two may be considered as decidedly the best tallies yet invented for general purposes, there are several others not unworthy of attention.

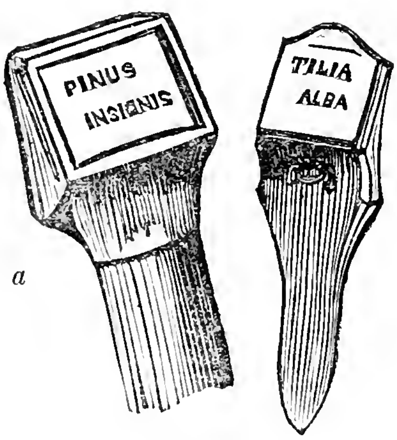


Fig. 26. Fig. 27.

Fig. 26 is somewhat similar in design to those already mentioned, but instead of being cast-iron the top part is made of earthenware, being open or hollow, so as to fit on to a round stick of any length, at *a*. The name may be either written on the interior face or on a card; the card, and glass that covers it, are introduced through a narrow slit at one side, and finally glazed in, so as to prevent rain from entering. We cannot at present say what the cost of these heads may be; nor do we think they possess much to recommend them in point of neatness and durability. The bulk which they necessarily assume, to permit of an interior cavity large enough to admit a stout stick, renders them somewhat clumsy; while the part of the frame near the slit is very liable to get broken.

Fig. 27 represents another earthenware design by Messrs Bourne, of the Derbyshire Potteries. This forms a very neat label, being about eight inches long and concave at the back. The name is written on a slightly raised white ground, and then "burnt in," so as perfectly to resist the action of the atmosphere. Prepared and finished in this manner they cost about a shilling each; but the price varies according to the size and amount of writing required. These are made to fit on to a stick.

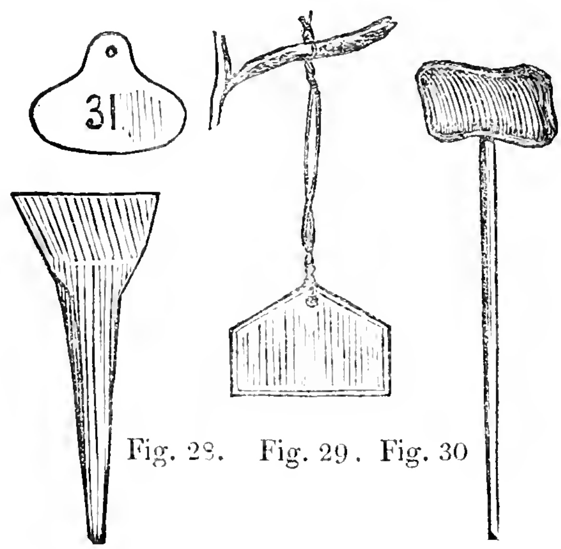


Fig. 28. Fig. 29. Fig. 30

Fig. 28 is a very simple and economical design: being merely a piece of zinc bent in the form represented, then painted, written on, and varnished. It is, however, very liable to be affected by a moist atmosphere, so as to lose the paint.

Fig. 29 represents a light, neat, and durable *hanging* label, made of earthenware. It may be of any size, and is well adapted for attaching to climbers or other plants trained against a wall, where the plants on the borders would prevent labels of a different description from being seen.

Fig. 30 shows "the enamelled label," a very neat design, the plate being firmly fixed or embedded in a metal case.

Fig. 31 shows simply a piece of zinc, which, being painted, may be used for either names or numbers.

With the exception of those shown by fig. 24 and fig. 25, which may be seen at the Botanic Gardens, Chelsea, and the Horticultural Society's gardens, Chiswick, all these are used more or less in the gardens of the Royal Botanic Society in Regent's Park.—Gardeners' and Farmers' Journal.

THE FUNGOID THEORY OF CHOLERA.

Of the various hypotheses by which naturalists and physicians have sought to explain the phenomena of epidemics, not one, perhaps, comes recommended by a stronger body of plausible analogies than the newly revived fungoid theory;—a theory to which Linnæus,* years ago, gave the sanction of his eminent support; which has more recently been maintained and extended in an able treatise by Dr. Holland;* and which, within the last few weeks, has acquired still further consistence and probability from the remarkable discovery of Messrs. Brittan and Swayne.

Minute cellular bodies, of a fungoid character, have, it is affirmed, been detected by means of a powerful microscope, on the one hand, in the evacuations of cholera patients, and, on the other hand, in the air and water of infected districts; while persons and places free from the disease have also been found uninfested with the parasitic zoophytes. Small in the tainted atmosphere, larger in the cholera vomit, largest of all in the cholera dejections,—and in these latter still increasing in size and number with the progress of the malady,—these minute lœmodic† bodies are said to vary from 10,000th to the 500th of an inch in diameter. Their form is doubtful; some, under the microscope, look like spheres surrounded with a light ring; others have a cup-like aspect; but both appearances (as explained in the note below) are occasioned probably by the existence of a dark central point, included within a light circumference. They are said, however, to become less regular in shape and more complex in structure as their size increases; the largest specimens presenting several coalescent cells, which again frequently contain within their cavity a number of still smaller corpuscules—the germs of an infinitesimal pollulation. Their discoverers, with a laudable reserve, confine themselves to the attempt to establish the uniform existence of these bodies in choleraic discharges, and their equally uniform absence from the fluid evacuations of typhus and other diseases; refraining for the present to speculate upon the nature of their connexion with the malady they attend, and relying on further research to determine whether they be its *cause* or only its *characteristic*. Dr. W. Budd, however, stealing a march, in this respect, on the original observers, and indulging in bolder because less responsible speculations on the results of a discovery not his own, unhesitatingly ascribes to the agency of these lœmodic bodies the first development and subsequent propagation of cholera. He says that he has detected them, during the prevalence of the epidemic, in the water of the Surrey Canal, in that drunk at Stapleton workhouse, and in that used in Lovegrove-street. According to him, however, they do not originate out of the body, but are true entozoa, having their peculiar nidus in the human intestine, on which they act as an irritant poison. Their germs, escaping by excretion from the first sufferers, find, either in air or water, or in human food, the vehicle of their dissemination. Of the myriads thus cast loose, the majority, he thinks, perish by decay; comparatively few are inhaled or swallowed by men, but these few multiply so rapidly that each successive victim of the disease produces sporules enough to infect the whole human race. His practical inference is, that cholera should be combated from this time forth by the systematic destruction of all newly-generated lœmodic germs as fast as they emanate from the diseased; and for this purpose he would receive the evacuations in suitable chemical solutions, such as that of the chloride of zinc. As for the impalpable spores that have already found their way into wells and rivers, they

* The attention of these writers, as well as of the naturalist Kircher, and of other still earlier advocates of the zoophytic origin of disease, was rather turned to animalcular or infusorial, than to strictly cryptogamic forms of life. But the vegetable and animal kingdoms of nature have their obscure beginning in the infinitesimal monads, of habits and characters so ambiguous that they cannot with certainty be referred to either of the two great kingdoms, but seem like neutral links connecting both. The arguments in favour of the infusorial theory—of the pestilential *acari* of Linnæus, of the morbiferous animalcular *nebulæ* of Reaumur, of the phthisis-causing *vibriones* of Donné, of the purulent *filaria* of Gruithausen, and of the scrofulaic entozoa of Ehrenberg, are in great measure available in support of the cryptogamic hypothesis, to which Burnett, Lindley, and other eminent botanists have given their direct and specific adhesion.

† From λοιμοδικος, in Latin *lœmodes*—of, or belonging to, pestilence. We employ this term in preference to the epithet "annular," adopted by Messrs. Brittan and Swayne, for the cells are pronounced to be spheroidal by some of the best microscopic observers, who attribute their apparent annularity to an optical illusion, caused by their circumference being lighter than their central part. The principles of scientific nomenclature forbid the use of a term implying the positive affirmation of that which is in reality problematic, and justify, we think, the substitution of a name in which no such premature assumption is involved.

may be destroyed by boiling or distillation of the water before use; while, for the disinfection of the air, we must perforce rely on the spontaneous evanescence of the lœmodic germs themselves. Tainted food and clothing, he thinks, should be purified by fumigation, or destroyed by fire; and, by diligent attention to these rules, he believes that we may hope, if not absolutely to exterminate cholera, at least greatly to abate its ravages.

Reserving for subsequent appreciation several of the facts and inferences here advanced, we propose here to examine, in the first place, how far the general character and habits of the fungoid zoophytes appear to favour the views of Messrs. Brittan and Swayne, and the less guarded speculations of their follower, Dr. William Budd.

The fungi, and the allied tribes, haunt, like the cholera, close, damp, dark localities. In the various forms of mildew, must, and mould, they grow on refuse matters, muck and offal, which they rapidly decompose and assimilate. They also attack, in the form of blight and smut, vegetable organisms which disease or debility, the result of imperfect nutrition, has unfitted for their purpose; all such they speedily deprive of life. Their functions are implied in their name, which is derived from *funus* and *ago*, to remove the dead, or from *fungor*, to execute. They are, indeed, the appointed executioners and the nimble scavengers of nature, clearing away whatever, by degeneration during life, or by decay after death, tends to disturb the general equilibrium. They travel unseen on every wind; they are invisible house-to-house inspectors, penetrating every nook and crany in search of refuse. Linnæus called them the Wanderers (Nomades). Equally prolific and evanescent, they multiply to countless legions whenever there is work for them to do, and they dwindle again to units when no longer wanted. By this alternate expansion and collapse, their force, individually insignificant, collectively immense, is constantly adapted to the varying requirements of nature. A single cell begets 10,000,000 germs, which rise like subtle smoke into the air. Myriads perish on the wing, yielding up as pure gas to the air the atoms stolen from disease or rottenness. Here and there some floating sporule lights on muck, or is absorbed by a sickly plant, and straightway breeds fresh swarms. They resemble Milton's infernal spirits, which, dilating, "thronged the spacious hall," and anon, at signal given, "reduced to smallest forms their shapes immense." Their tribes are numberless; and to each species is assigned its own peculiar task, some vegetable race to decimate, some particular sort of refuse to repress. Thus the dust blight (æcidium) infests the gooseberry, and never, like the tuft blight (puccinia), attacks the sickly rose. The noisome canker brand (uredo fœtida) only infests wheat; and the death-mould (rhizoctonia), a strange subterranean epidemic, which spreads under ground from root to root, and can only be arrested by deeply-cut trenches, confines its fatal contagion to the cultivated saffron. Acidulous refuse is attacked by bead mould (monilia); alkaline, by grapelet mould (botrytis). By its size and mode of growth each kind of fungus is adapted to its special task. Some of the parasitic brands are infinitesimally minute, permeating the sap-vessels along with the water they imbibe. There are other species (as, for example, the frog cheese, or bovista) which expand, with incredible rapidity, to eight or nine feet girth. Of their disintegrating power some notion may be formed from the fact, that by sheer growing force a single fungus has been known to raise a pavingstone of 83 lb. weight. The recorded ravages of the dry-rot fungi best illustrate the prodigious power of these invisible armies, and the astonishing celerity of their operations. The Queen Charlotte, a first-rate ship, which took several hundred workmen seven years to build, was overrun by the little merulia within 20 months after she was finished. The Rodney, launched in 1809, had scarcely put to sea when her damp, sappy timber, was found to be penetrated with leathery fungi, so that all her fastenings loosened, and it became necessary to bring her quickly home; and of the same fungoid pestilence the Dublin, launched in 1812, perished in 1813. The infectious nature of these fungoid growths is but too well established. Fee proved it experimentally, by supplying healthy plants with water in which fungus-branded leaves had been infused, the result being that in a few months the leaves of the plants so watered were covered with the same brand (uredo rubigo). Nor are the ravages of these invisible poisoners confined to the lower kingdoms of nature. Insects, when debilitated by darkness and confinement, have been shown, by the experiments of Ardouin, to become liable to their attacks. Nay, more; in Italy, a fungoid epidemic, called *La Muscadine*, often spreads among the silkworms, and destroys them by millions. Soon after sickening of this distemper, the caterpillars are observed to stiffen and quickly die. The dead body snaps easily with a brittle fracture like that of a rotten twig. Its cavity is found to be completely filled with a parasitic fungus called the Botrytis Bassiania, of which the germs appear as a white efflorescence on the surface of the caterpillar. If some healthy silkworms be confined under a bell glass along with one or more diseased or dead ones, they soon catch the infection, and in their turn sicken and perish. If a crysalid be pricked with a needle on which a little of the fungoid matter has been taken, it becomes inoculated with the malady, and speedily dies. Thus, with the parasitic fungi all the phenomena of infection, contagion, and inoculation may be artificially reproduced in plants and insects.

Nor in them alone. Man himself, when he neglects to fulfil the normal conditions of his physical existence, is liable to the retributive invasion of parasitic zoophytes, fungoid and infusorial, each tribe of which finds, in some morbid secretion of his body, or in the degenerate substance of some particular organ, its special nidus. Some of these entozoa, for example, infest the voluntary muscles; some people the kidneys, the brain, the blood-vessels; some burrow in the substance of the heart itself; some enter, by an unknown gate, into the closely-shut chamber of the eyeball, and swim in its enspliered waters—to them a boundless ocean. Of his fungoid assailants, none pull down the bodily tenement with swifter or more excruciating ravages than the parasitic spacelia, which are introduced into his organism in the substance of degenerate grain. These inflict a terrible disease called the dry gangrene, which has at several periods been epidemic in certain parts of France; especially in Sologne—a tract of poor, wet, clayey land, lying between the rivers Loire and Cher. This horrible malady begins with a sense of nausea and faintness; followed by vomiting, and a tingling numbness of the extremities; which soon begin to wither, becoming dry as touchwood, emaciated like the limbs of Egyptian mummies, and black and hard as if they had been charred. In this state they drop off at the joints; the toes separating in the milder cases; the feet, in severer attacks, falling at the ankle joints—the legs at the knees—and even the thighs at the hips; as in a case recorded by M. Noel, in 1710, in which, strange to say, the mutilated sufferer survived. This frightful disease was first described by Dodard in 1676; since which time it has, according to Ozanam, been ten times epidemic; destroying, as M. Duhamel reported in 1748, 19 out of 20 of the persons infected. It is remarkable that while some persons are peculiarly susceptible to the influence of this baneful fungus, others are impregnable to its effects, and eat the infected grain with impunity. It is equally remarkable that while in some years the spurred grain is more than usually poisonous, in others it is wholly inert; a circumstance attributed by Sevillé to the diffluence of the poisonous principle, when rain falls heavily at a certain period of the development of the fungus. Sporadic (*i. e.* scattered) cases of this appalling malady have also occurred in England. One such happened at Wallisham, near Bury St. Edmunds, in 1762, and was recorded by a physician named Wollaston in the Philosophical Transactions of the same year. The victims were a labourer, his wife, and five children, who were induced by its low price to buy a bushel weekly of wheat diseased with a parasitic fungoid growth, of which they made bad bread and worse puddings, and persisted in eating them for several months, when they were all attacked with dry gangrene.*

Analogous to this disorder is the Raphonia of Sweden and Germany, a malady attended with dreadful convulsions, delirium, and excruciating cramps, of which an account by Rothman will be found in the 6th volume of the *Amœnitates Academicæ.* A fungoid infection of the cheaper bread-stuffs is also supposed to have caused the new distemper which in 1831 attacked great nnmbers of the population in the poor and crowded quarters of Paris. The first symptoms of this strange disorder, called by Andral "Acrodynia," was a peculiar and often poignant pain in the hands and feet; which subsequently grew numb, blistered, blackened, and at last threw off the cuticle, often entire, like a sock or glove. This epidemic, though rarely fatal, inflicted dreadful suffering; and, by incapacitating its indigent victims for the toil on which they depended for support, occasioned severe distress. In America diseased maize, overrun with parasitic fungi, produces extraordinary disturbances in the bodies of men and animals. It intoxicates apes and parrots, dogs and deer. Fowls fed on it lay eggs without shells. When swine eat it their bristles fall off and their hind legs waste and weaken. The hair also falls from mules thus fed, and their hoofs swell. In man it occasions baldness and loosening of the teeth; but no gangrene nor convulsions. A similar deprivation occurrin in wheat is suspected to have caused the sweating sickness which ravaged England in the 16th cen-

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* The condition of this miserable family at the time when the report was sent to the Royal Society is thus described by Dr. Wollaston:—

"Mary, the mother, aged 40.—Right foot off at the ancle; left leg mortified, a mere bone, but not off.

"Elizabeth, aged 13.—Both legs off, below the knees.

"Sarah, aged 10.—One foot off at the ankle.

"Robert, aged 8.—Both legs off below the knees.

"Edward, aged 4.—Both feet off at the ankles.

"An infant, aged four months.—Dead.

"The father was not attacked till about a fortnight after his wife and children, and in a slighter degree. In him the pain was confined to two fingers of his right hand, which turned blackish, and withered. Another labouring man of the same parish, who had eaten of this bread, suffered from numbness in both his hands for above a month. They were constantly cold, and his finger-ends peeled; one thumb, he says, still remains without any sensation."

tury; for, though this epidemic was so severe that the very birds, as Schiller records, fell dead from off the trees with small abscesses under their wings, yet the inhabitants of Wales and Scotland, who did not at this period eat wheaten bread, escaped infection.

A sudden and immense development of minute zoophytes, fungoid and infusorial, has been a frequent concomitant of epidemic pestilence; and this circumstance points in a similar direction with the facts recorded above. At such periods the ground has been seen to redden, as if the earth were sweating blood; the rain has fallen in drops of the same sinister hue; and the ponds and tanks resembled pools of gore. These alarming appearances are due to microscopic zoophytes, called "Lepraria kermesina," or bloody rain; "Palmella cruenta," or gory dew; and Protococcus," or red snow. Some of these, doubtless it was, which turned the waters of Egypt to blood, and constituted the first of the seven recorded plagues. In 1673 the Nile reddened in this way, and remained bloodlike and putrid from July to December. During the last invasion of epidemic cholera, Dr. Burnet found Palmella cruenta in abundance, purpling the ground near Oxford, as if red wine or blood had been poured out. The red snow floats in impalpable clouds through the air till its sporules, weightened by moisture, or attracted by electric disturbance, suddenly descend to the earth, which they sometimes do in such abundance as to cover tracts of ground many square miles in extent. Such a crimson fall happened in 1803 at Tolmezzo, in the Frioul; and again in 1808 in all the country about Cadore, Belluno, and Feltri, and on the mountains of the Tyrol. Sometimes the pluvial waters are blackened, and the sun is obscured, by clouds of darklier tinted zoophytes. Such, doubtless, overshadowed the land of Egypt with that cloud of "darkness that may be felt," which was the precursor of the severer plagues that subsequently fell on man and beast. Such a rain fell, inkblack and fetid, in Carlow last May, covering an area of 400 square miles, and coinciding very remarkably with a fresh outbreak of cholera.

Such, rapidly enumerated, are the principal facts in the history of the fungoid tribes, and of the allied microscopic zoophytes, making in favour of the view that the newly discovered lœmodic bodies are not merely the concomitants, but the generating cause of cholera. Let us next take a cursory review of the facts and arguments tending to an opposite conclusion.

In the first place, it is obvious to remark that the mystery of epidemic causation is only removed one step by the hypothetic recognition of the pestiferous power ascribed to the lœmodic bodies. If they cause cholera, how are they themselves caused? What brought them suddenly into existence some half a century since? Where had their germs lain hidden during the centuries of human existence that had previously elapsed? No problem, indeed, has more perplexed philosophers than that presented by the generation of the various entozoa. How is the guinea-worm developed that infests the inhabitants of the Torrid Zone? the ascaris, that afflicts the Abyssinians? the furia infernalis, that torments the Laplanders? What cause produces the tœnia solium, which infests three-fourths of the inhabitants of Cairo, torments our troops at the Cape, and has spread from Egypt to Germany, Holland, England, and France? How were engendered the hydatids and flukeworms which Dr. Jenner produced experimentally in rabbits, by feeding them exclusively on succulent food? Broussais, in speculating on this subject, declares an irritated mucous membrane the indispensable nidus of the entozoa, which Dr. Budd, on the other hand, assumes to be the cause of the irritation; so that we have here two concomitant phenomena, each in its turn set up as the indispensable antecedent of the other. Into such vicious circles are we constantly led, when, instead of being content modestly to investigate the fixed relations of phenomena (whether relations of invariable succession, or of generic similitude), we strive to penetrate to their generating causes, to their hidden essence, and to their intimate *modus operandi*.

In the next place, it is but fair to notice that Liebig and his school regard the dry gangrene, and other analogous epidemics, as resulting not from the fungi which infest the degenerate corn, but from a fermenting condition of the food itself, of which condition the fungi are but the symptoms. Many recorded facts tend to favour this view. It will be sufficient here to cite one which occurred at Hammersmith about 16 years ago. In this case the wife of the beadle of Hammersmith and her son, after eating of some musty bread, were seized with vomiting and purging, accompanied with violent and painful spasms. The loaf, on examination, was found to be sprinkled with minute fungi, some black, some green, some of a yellowish hue; and to these the poisonous quality of the bread was at first attributed. As, however, the bread itself was soft, inelastic, and so tough that it could be drawn into long strings, with an unpleasant smell and taste, a question arose whether the infection had really been produced by the bread itself, or by the parasites which it nourished. To determine this, portions of the fungi were separately collected, and of these five grains were swallowed by a person aged 22. Another ate a small bit of the bread scraped free from fungi. The former escaped, but the latter suffered with cholicky pains and diarrhœa. Dough suffered to become mouldy and then baked produced similar effects, though the mould was carefully removed; but the mould itself was eaten separately with perfect impunity.

Coming next to the lœmodic corpuscules themselves, and to the direct evidence tending against the assumption that they cause cholera, we meet with several very important facts. In the Drummond-street cholera hospital 280 cholera corpses were submitted to *post mortem* examination by persons who, for six hours together, had their hands necessarily imbrued in the choleraic secretions, swarming doubtless with lœmodic bodies, some of which, in the case of the less cleanly attendants, would probably find their way, by contact, to the food; yet none of those thus engaged took the disease. The same remark applies to the Sunpers employed in the cholera hospital at Calcutta to cleanse the close-stools and vomiting-pans of the diseased. Though often, in the discharge of their duty, covered with the matters ejected, they none of them, as Mr. Twining, the assistant-surgeon of the hospital, has recorded, became infected with the disease. Still more to the point is the experience of Dr. Jännichen, of Dresden, and of MM. Foy, Pinel, and Verat, of Paris; who actually swallowed portions of the matters ejected, without either of them taking the distemper.

Nor, again, do we find that cholera travels by preference *down* the stream of rivers, as it should do if it were communicated by the lœmodic bodies through the sewers, or otherwise, into the water-courses. On the contrary, the cholera, in its progress to Europe, *ascended* the streams of the Ganges and the Jumna, of the Tigris and the Euphrates, of the Danube and the Volga. It also very commonly travelled against the wind, a course which could hardly be held by floating fungus clouds; to which if it be replied that in such cases it was carried by the intercourse of men, it is obvious to rejoin—How in that case does it happen that, in spite of human intercourse, it paused two years on the western verge of Hindostan; and, during six years more, smouldered on the borders of the Caspian Sea, before advancing into Europe?

On the whole, it appears, from a fair comparison of such facts as we have hitherto been able to collect, that the fungoid theory, like every other which has been proposed for the explanation of this mysterious epidemic, though it embraces many of the phenomena in question, fails to include them all; and, though it is supported by a strong body of plausible analogies, is opposed by a weight of adverse evidence of nearly equal cogency. On a subject which imperatively calls for extended experimental investigation it would not be desirable, even if it were possible, to express, at present, a more positive opinion. But, whatever may be the fate of the hypothesis, the experiments of which it must become the subject cannot fail to issue in the beneficial extension of our knowledge—indeed, the very criterion of the scientific value of an hypothesis consists in its greater or less susceptibility of being experimentally confuted or confirmed. We shall, therefore, await with interest the further light which experiment may throw on this momentous question; than which none greater, none more pregnant of possible benefit to our race, ever occupied the attention of mankind. Meanwhile it is important to observe, that whichever way the balance of probabilities may ultimately incline, not one of our sanitary measures can, in any case, be stultified—not one of them but will, on the contrary, find a further justification, in the event of the establishment of the fungoid theory. For the fungi are, as we have observed, the agents employed by nature to maintain in harmonious equilibrium the organic and inorganic kingdom—the Scavengers to remove what is filthy—the Executioners to destroy what is weak. Like the 72 avengers of the Egyptian mythology, their swarms invisibly pursue and punish the disturbers of nature's harmony, and the infringers of nature's law. In this respect, at least, the fungi are cognate with cholera. FILTH and DEBILITY are the chosen prey of both Destroyers, whatever may be their secret relation. Wherever stagnant elements darkly putrefy and breed—wherever pent-up ordures seethe and steam—wherever dead flesh, festering underground, taints and debilitates the flesh of living man—there we may look for devastating Parasites, and there also for retributive Disease.—Times.

RULES IN RAISING POULTRY.

1. All young chickens, ducks, and turkeys should be kept under cover, out of the weather, during rainy seasons.

3. Twice or thrice a week, pepper, shalots, chives, or garlic should be mixed up with their food.

3. A small lump of assafœtida should be placed in the pan in which their water is given them to drink.

4. Whenever they manifest disease, by the drooping of the wings, or any other outward sign of ill-health, a little assafœtida broken into small lumps, should be mixed with their food.

5. Chickens which are kept from the dunghill while young seldom have the gapes; therefore it should be the object of those who have the charge of them so to confine the hens as to preclude their young from the range of barn or stable yards.

6. Should any of the chickens have the gapes mix up small portions of assafœtida, rhubarb, and pepper, in fresh butter, and give each chicken as much of the mixture as will lie upon one-half the bowl of a small teaspoon.

7. For the pip the following treatment is judicious:—Take off the indurated covering on the point of the tongue, and give twice a day, for two or three days, a piece of garlic the size of a pea. If garlic cannot be obtained, onion, shallot, or chives will answer; but if neither of these be convenient two grains of black pepper to be given in fresh butter will answer.

8. For the snuffles, the same remedies as for the gapes will be found highly curative; but in addition to them, it will be necessary to melt a little assafœtida in fresh butter, and rub the chicken about the nostrils, taking care to clean them out.

9. Grown up ducks are sometimes taken off rapidly by convulsions; in such cases, four drops of rhubarb and four grains of cayenne pepper, mixed in fresh butter, should be administered. Last year we lost several by this disease, and this year the same symptoms manifested themselves among them; but we arrested the malady without losing a single duck, by a dose of the above medicine to such as were ill. One of the ducks was at the time paralyzed, but was thus saved.—Canterbury Journal.

ROTATION OF CROPS.

We are constantly experiencing either the revival of old theories, or a modification of those which have at one time or other engaged public attention; and as men seldom gain wisdom by the experience of others, things in themselves plausible are adopted over and over again, and yet they seem not a whit the more cautious for seeing the fingers of their neighbours burnt by their fancies. We would not speak one word of disrespect for those who try new and unusual practices for the sake of experiment and observation; nor do we disapprove of the proper testing of modifications of partially understood systems. All we speak of is the fact, and all we caution our readers against is, the extensive adoption of schemes which have not had the test of *repeated* experiment; for unless they will bear that test they are clearly not to be depended upon, with the many modifications to which all out-door operations are subjected. Climate, and soil, and season, will all operate and act differently too at different periods; so that due allowance must be made for these in any experiment we may make, how satisfactory soever the result may appear to us to be. Mr. Lawes, it will be remembered, had, in three years, on land *unmanured*, the following varying results:—

1844.—16 bushels per acre.
1845.—23 ditto
1846.—17 ditto

Now, had it happened that any particular process had been applied in 1845 which had not in 1844, there would have appeared a clear gain of seven bushels per acre by it, though in reality there was no such thing. We would beg to call the attention of some of our thin—sowing theorists to this fact, and call upon them for repetition of experiments, however satisfactory.

These observations are induced by a writer in an American periodical,* reviving the notion of doing away with rotations of crops, and growing wheat year after year in succession, for an indefinite period. Instead of alternating grass seeds with wheat, he would "select the ground, and *of course keep it*, free from all seeds of grass and weeds, burning the stubble off each year immediately after harvest. . . . and sow again to wheat. It needs only a heavy cultivator to prepare the ground for a succeeding crop." He goes further when he thus repeats his advice in the following terms:—"Keep the ground selected for the purpose free from all grass and weeds, and as often as the stubble is burned off clean from all parts of the field [I would here recommend, were it not for the very high price asked for them, a harvester (? machine) that would only clip the heads of the wheat], so often a remunerating crop of wheat can be raised, if it is ten years in succession, and at least every second year without the use of the plough." And so isolated and independent would he make it, and so completely would he banish rotations, that not "a seed of timothy grass, red top, or blue grass, should be allowed to vegetate on a plot of ground designed for wheat."

Our readers will remember that a very intelligent and scientific gentleman, Mr. Henry Briggs, of Overton, near Wakefield, and secretary to the Wakefield Farmers' Club, tried the plan of growing wheat on the same ground year after year in succession, by merely supplying to the land the elements chemistry determined to be removed from the soil by a wheat crop. A certain measure of success, we believe, attended his operations; but we at present forget whether he abandoned the practice because he found the yield of produce to fail, or whether he found it impossible to keep the soil sufficiently clean; at any rate, we believe the

* "The Prairie Farmer" for September, p. 284.

one or the other reason prevented his carrying out the plan beyond a certain number of years. And there is reason in this. We may supply every particle of salts and of materials the crop may remove; but we can no more restore these either in the same degree of fixation, nor so exactly diffused or concentrated, so pure or diluted, as the plant finds them naturally in the soil, nor provide any apparatus for giving them off just in the proportion and at the periods required by the plants; and, therefore, the scales of the chemist cannot always accurately prescribe for the exigencies of the growing crop.

We need only mention that a short time ago Liebig discovered that there was in all soils far more ammonia than the wheat, or any other cultivated crop, required; and yet there are scarcely any kinds of soil whatever, where the addition of ammonia will not greatly increase the produce. And why? Because it is not either chemically or mechanically available for the wants of the plant; nor can the whole be assimilated, any more than an animal can thrive on just as much food as the waste of the body requires; there is much to be taken in along with it, because all is never made use of by the organism. And this is the reason why so many recipes, good in themselves, are found to fail even when compounded with all the care of the chemist, and all the knowledge he possesses brought to bear upon the subject. Professor Liebig's prescriptions, as well as those of Professor Johnston's, have most certainly failed their anticipations, and we think it is on the ground alone that we have mentioned.

Another fearful impediment—the greatest we believe—is that of the growth of weeds. There is a mystery which Theology only can unravel as to their persevering assertion of their rights — a domination they too soon and too often acquire when the hand is at all slackened, or the energies allowed to be arrested; and with all our mechanical improvements we do not see how, on the majority of the soils of this country, there is any possibility of keeping clear of weeds. With all the efforts which a scarifier can make for the short and busy period between harvest and seed-time, we should fear that in the main it would be quite impracticable. When we reflect that the wheat plant between seed-time and harvest is in general some ten months, or at least nine in the ground, it is manifest that there is not, in our climate at least, time to thoroughly clean the land of weeds for a number of years in succession.

Nor will the burning of the straw alone be sufficient to compensate for the removal of the *corn*, nor aid sufficiently in the destruction of the weeds. It is evident that by allowing all the straw to remain upon the land and burning it, the idea of an instantaneous fallow is at least implied; but apart from the impossibility of dispensing with so much litter, there are practical difficulties at every step. Well may the writer urge the words we have put in italics, that a necessary part of his system is that the land should be kept free from weeds—no easy matter after his *ninth* crop of wheat in succession!—Gardeners' and Farmers' Journal.

NORTHAMPTON AGRICULTURAL BOOK CLUB.

At a recent meeting of this society, the subject discussed was "The Formation of Animals."

Mr. Watts, being asked to introduce the subject, said the notice he had given was more with a view to gain information than from anything he could impart. Before entering upon the subject, he would observe that repletion was not so desirable a thing to begin with as some might think, either in vegetation or animals. The principle of sowing seed on a better soil should be carried out for improved production. It was generally and justly agreed that a good constitution was the first consideration. The information wanted was—What were the constituents? and how were they supported? how did they combine and operate? and how were they deranged or impaired, often to the injury, if not to the annihilation of the whole? The notice given was to consider the vital, the energetic and locomotive principles of the animal. 1st. The nerve, the blood, and the glands. 2nd. The active and passive state at different seasons, and the quietude after castration. 3rd. How they influenced the frame, and how the frame indicated their influence. The present disease of cattle surely deserved attention. When it was under the consideration of the club some years past, it was thought that an irritation of the system, followed by a sudden depression, was generally the forerunner, if not the cause, of the disorder. If a remedy was to be found, where were they to look for it but from the most practical men and immediately interested parties? If the subject was worthy the attention of members of the club, he hoped to get the information he so much needed.

Mr. Barford thought the subject proposed by Mr. Watts for discussion was of vast importance to the agricultural community, and, however inefficient he might be to grapple with it, he should be happy to contribute such information as he might have obtained during 50 years' close attention to and study of the subject. Although the subject was introduced under three heads, he thought, after all, it might be resolved into one, viz., the conformation of the animal; yet he would, in compliance with the view of Mr. Watts, consider it under the heads proposed. First, the reproductive properties. By that term was meant the propagating or breeding, and retaining their flocks and herds from generation to generation. Now it was well known that he differed from his brother breeders on some very important points, and that a great majority of them were opposed to the principle he practised. It must, therefore, be evident that he had an up-hill game to play. Nevertheless, as he had stood his ground for fifty years upon his principle, he felt assured that the day was not far distant when it would be better received and better understood. Being a renting farmer, his object had been to produce such animals as would pay his rent best, and which would afford the most food to man at the least expense. In order to do this, they must have in their animals a good constitution, and that form which gave it. When they had obtained that form, the only way they could retain it was by breeding in-and-in, and avoiding the use of artificial feeding in their breeding stock. Here he would remark that breeding and feeding must be considered as separate and distinct practices. It was of little consequence to futurity as regarded feeding animals how they were fed, if intended to be slaughtered; but not so with respect to their breeding animals. About forty-four years ago he read Cline's Treatise on the form of animals, and he read it until he thought he understood it. He then adopted his principles, and ever since had acted steadily up to them. In his management he had not permitted promiscuous intercourse, but had had due regard to pairing and selecting the males and females; not forgetting that, in order to obtain the form desirable, two animals were necessary in the production; nor had he left all improvement to depend upon the male, when he knew that the female was, at least, of equal importance with the male, and that she should be formed in such a manner as not only to give fecundity, but also to facilitate parturition. When he had arrived at that form, he had not injured or jeopardised it by pampering it with artificial food, thereby obstructing the powers of propagation, but had regularly kept them upon natural herbage. On this important point he believed agriculturists, as a body, were more ignorant than of any other science connected with rural economy. In cultivating their land they did set out upon some principle, if not a scientific one, and had some idea how they should finish; but it was not so in breeding their animals. Their animals were bred as their legislators made the laws—only as a matter of expediency, without any regard to the future. He wished Mr. Watts had given them a standard or criterion to breed to, and let them have a foundation before they lay on a superstructure. He would ask what were their animals but machines to convert vegetable into animal matter as food for man? How much more easily some did that than others. The mechanic knew that a machine made on principle would do its work more easily than one on no principle. A steam engine, Gardner's turnip cutter, or their neighbour Cooch's winnowing machine, were instances; and might not their animals be bred on a principle, and one that gave improvement? In Northampton fair they might see some two or three thousand beast and sheep, and perhaps not one good one, or any two alike. How was that? Did dame Nature do that? No, all her ways were truth. The answer was plain: they wanted principle in breeding. If he were asked, "What, then, is your standard?" his answer would be, that which was given to man by his Maker. In all nature there was no crossing either in the animal or vegetable kingdom. Let him not be misunderstood. He did not condemn judicious crossing when evils had crept into their flocks and herds, perhaps by departing from the laws of nature; but having obtained what they wanted, he maintained in-and-in breeding was the only way to retain it, and by his own practice he had proved that it was not of necessity the cause of degeneracy. In a game shop, they would see hares and partridges formed all so nearly alike that they could not form any idea as to the locality they came from. Was it so with their different breeds of cattle and flocks of sheep? The Down was not formed like the Gloucester, nor either of them like the Welsh. Now he affirmed that there could be but one form right, and that, whether it was under a black, white, or red skin, whether the animal was large or small, the good ones of every breed would be in their main points alike. Suppose a man had obtained what he thought desirable in his flock, he could not expect to retain it, if he followed the practice so fashionable in modern times, of pampering young breeding stock until their constitutions were irretrievably injured before they propagated. If they did propagate, they very often transmitted disease to their offspring; if they used a high-fed male, and he proved a stock getter, the fœtus would not be perfected unless the female during gestation was supported and kept up to the same pitch of unnatural condition as when that fœtus was produced. Few breeders perhaps were aware of that. Never should they use a male with a view to improvement that had been artificially raised, nor desire a larger animal than the natural herbage of their farms would mature, for they might be assured that size had little to do with profit. It was not what an animal made, so much as what it cost making. He would next observe, with much deference, that their Agricultural Societies, especially their national one, were doing, perhaps unconsciously, more to destroy their best breeds than to improve them, by giving high prizes to pampered males. No one would take a bad animal one or two hundred miles to compete; and if he took a good one, and won a high premium, the country was not benefited, for his propagating powers had been, if not destroyed, materially injured. Giving premiums to cross breeds was still more absurd. He would next say a few words on the second head of the subject, viz., the locomotive properties. It must be evident that they were of vital importance to all animals who had to search after and collect their food. An easy movement was given by a certain conformation. When an animal had a well-formed chest, oblique shoulders, his head up, hips spread and legs under him, he moved much easier than one with a porpoised form, upright shoulders, straight neck and back, and legs behind him. He then proceeded to the energetic properties. Energy in every animal was dependent on the form of the head and the development of the brain, from which vitality was communicated to every part of the body through the nerves. An animal with a well-formed head would be less timid and have stronger nerves than one with a narrow or contracted head, and would, consequently, be more docile; while the one with a contracted skull would be frightened at every thing it saw and heard, and, of course, could not thrive so well. He would next remark on the error of preferring dark or blue-faced sheep in their long-woolled flocks. Almost all their best breeds of cattle and sheep had white faces and noses. Where did they see so much energy as in the Welsh sheep? In them there was a good lesson for them, if farmers would read it. Introduce them into the midland counties, and breed from them for one or two years, and they would increase to nearly double their weight; but take a Lincoln or a Gloucester on the Welsh mountains, and they would dwindle to almost nothing. The quality in all animals of being in so great a degree dependent on the circumstances of keeping, climate, &c., as to their size, ought not to be lost sight of by any one in selecting stock for a farm. All those things ought to be taken into consideration, and a person on poor land could not be expected to have so large an animal as one on good land. He must artificialise it if he did. His observations had been based not so much upon theory as upon practical knowledge and facts, and one fact was worth a thousand theories. They should bear in mind that they lived from the past to the present, and from the present to the future. He knew how he produced his present flock; what they once were, and what they were then, and from past practice he knew how to retain them. He did not preach what he could not practise, and he should be happy to show any gentleman who was sceptical of this 400 sheep bred in-and-in for fifty years, possessing as great hardihood of constitution and uniformity of character as perhaps any flock in the kingdom. He would conclude by saying that what he advocated and contended for was, that they ought to reduce breeding more to a science. That man who had made two blades of grass grow where only one grew before was said to be a benefactor to his conntry, and should not he who, by science, produced animals so formed that they would convert a given quantity of vegetable food into two pounds of meat where only one was made before, deserve a like commendation?

Mr. Gray, as the subject was a very interesting one, and their meeting but thinly attended, proposed that the subject be re-discussed at their meeting, October 27th.—Carried unanimously.

HARVESTING MACHINES.

The *Prairie Farmer* states, that without the use of machinery in gathering the grain in that section, the harvests of the two past years would have gone to some extent ungathered. It adds that the use of those machines will be much increased the present season, and offers the following estimate :—McCormick's Reaper has been now sold in the West for three seasons extensively, and somewhat before that. The sales amount, say to the following figures: For the year 1847 to 500, the year 1848 to 800, and 1849 to 1,500—equal to 2,800 in all. Other reapers of various patterns have been put in use, say to the number of 100. Of Esterly's Harvester the whole number in use this harvest may reach 180. Each reaper will save as claimed, with the horses attached to it, the labour of four-and-a half men. Each harvester, it is claimed, with the horses employed, will save the labour of twenty men. Our 2,900 reapers will then stand in the place of 13,050 men; and our 180 harvesters will displace 3,600 in addition, or 16,650 labourers. In this estimate we count the day's work of the reaper at 12 acres, and of a harvester at 16 acres, each being run with four horses—the latter attended by four men.

GLEANINGS IN AGRICULTURE.

(*Continued from* p. 315.)

21, *Festuca loliacea* (spiked Fescue Grass.)—This grass will be found, though not universally, in most rich soils, both of the uplands and meadows. In habit of growth and bulk it much resembles the Festuca pratensis No. 5, but produces little seed, the flowers generally proving abortive, which renders its cultivation inconvenient. However, in some pastures it constitutes the principal herbage; as, for instance, in many parts of Milton Abbey Park. In rich meadows it is also abundant, for which it is a very good grass. According to Sinclair, at the time of flowering the produce from a rich brown loam was 16,335 lbs. per acre. The lattermath produce was 3,403 per acre. The proportional value which the grass at the time the seed is ripe bears to that at the time of flowering is as 13 to 12, and the grass of the latter-math stands in proportion to that at the time of flowering as 12 to 5, and to that at the time the seed is ripe as 13 to 5. Native of Britain. Perennial. In flower in *June*.

22, *Bromus mollis* (soft Brome Grass.)—Although the genus Bromus is considered by some writers to be troublesome weeds to the agriculturists (as all plants are when out of their proper place), nevertheless some of them possess qualities, under proper cultivation, to recommend them to the notice of the farmer. Our present subject is amongst the first that peeps through the shades of winter, continuing for some time to afford food for our cattle till the other grasses make their appearance. It is a pasture grass everywhere, and in some localities constitutes a large portion of the hay crop. Being an early grass, and an annual, it sooner arrives at maturity than most others; therefore, to reap the advantage of it, it should be sown by itself, or with clover, and cut early. We have no grass that varies more by cultivation, or assumes such different appearances as this subject, many of which by some writers have been considered as distinct species. It has also been asserted that its seeds produce giddiness in the human species and quadrupeds, and is fatal to *poultry*. We have frequently eaten of the seeds, and have experienced no giddiness; and we only in the early part of this year saw a flock of geese in a small orchard devouring them (the seeds) with impunity, and they are still alive. Sinclair says that geese are remarkably fond of the seeds of this grass, and if they have access to an orchard or meadow where it is growing, will touch nothing else. For feeding geese this grass might be most advantageously cultivated, even if it was of no other value. In cultivated, that is tillage lands, it is justly considered a weed. It being an annual it is readily destroyed by pulling it up by the roots while in flower, and burning it; but the common practice is simply to cut off the flowering stems or stalks—a plan worse than useless, as the plant only sends up the more. According to Sinclair, at the time of flowering the produce of a sandy loam was 10,890 lbs. per acre.

23, *Poa angustifolia* (narrow-leaved Meadow-grass.)—This grass is a variety of Poa pratensis, but in an agricultural point of view it differs much from P. pratensis, in being much superior and better adapted for permanent pastures. It is an early grass, being in flower in May. Native of Britain. According to Sinclair's experiments, at the time of flowering, the produce from a brown loam was 18,376lbs. per acre—the produce of the lattermath 12,251lbs. per acre. The proportionate value in which this grass, at the time the seed is ripe, exceeds that at the time of flowering is as 21 to 20. The culms of this grass is used in the manufacture of the finest straw-plait for bonnets.

24, *Nardus stricta* (heath Mat-grass.)—This simple and elegant heath-loving grass exists not useless in the great scale of vegetable economy. Goats, horses, and sheep eat it in healthy and mountainous districts, where the more nutritive grasses will not grow. It often lends its aid to give solidity to turfy bogs by the matted base of the numerous leaves and straws which rest upon and are not buried in the soil; no doubt designed by nature as one of her agents, in conjunction with Carex, Scripus, Juncus, &c., to render the situations in which they delight in, in process of time firm and useful land. According to the experiments of Sinclair—"At the time of flowering the produce from a heath loam is 6,806lbs. per acre; the lattermath produce of this grass is small. The nutritive matter offers no reason for the dislike manifested by animals for the grass, as its composition is much the same as that of Aira flexuosa, which is eaten with relish by sheep; the only difference is in the proportion of sugar, the Aira flexuosa having more, and less of mucilage, than the Nardus stricta." Flowers in July, and the seeds are ripe in August.

25, *Phalaris Canariensis* (Canary-grass.)—This grass has been naturalised and cultivated in England, from the days of Queen Elizabeth, for its seeds only (as far as we are aware), which are so much esteemed as food for our smaller cage-birds, particularly the finch tribe (Fringillidæ). The tyranny of the bigoted Philip of Spain, and the persecutions of his evil agent, the Duke of Elva, expelled from their native country many industrious inhabitants of the low countries, who sought an asylum under the government of this Kingdom, introduced with them the arts of horticulture and the esculent vegetables at that day little known in England; and by them was first cultivated the Phalaris Canariensis. The county of Kent was chosen by the Netherlanders as the most favourable soil for their employment, where to this day the Canary grass is cultivated. The herbage is of but little value, and the plant cannot be recommended for cultivation but for its seeds, which meet with a demand in the neighbourhood of towns, &c. Sinclair considers it a great impoverisher of the soil. At the time of flowering the produce from a rich clayey loam on a tenacious subsoil was 54,450 lbs. per acre. Native of the Canary Isles; now naturalized to England, France, Spain, and New Zealand. An annual.

26, *Panicum viride* (green Panic-grass.)—This species of grass is of little value to the agriculturist, as far as is yet known. What it might become, under proper cultivation, we cannot take upon ourselves to assert. It flowers in July, and the seed is ripe about the second week in August; and it will continue to flower till frost prevent it. Great similarity exists between this grass and the Panicum verticillatum, one of the most rare of our British grasses, but found chiefly in cultivated fields. The leaves are broadish, rough on both sides, and minutely serrated on their edges; straw smooth, excepting on the upper part, which is rough, with minute spines, pointing upwards. Nature seems to have strongly armed and defended these Panic grasses from the attack of insects, promoting the increase and continuation of the species for purposes which are not obvious to the comprehension of man. According to Sinclair's experiments on the green panic-grass, at the time the seed is ripe, produce from a rich siliceous soil incumbent on clay was 5,415 lbs. per acre.

27. *Cynodon dactylon* (creeping dog's-tooth grass).—This grass is not of the smallest apparent value in an agricultural sense; yet we cannot refrain from giving the following account from Sinclair:—"A. B. Lambert, Esq., in the Transactions of the Linnæan Society, Vol. VI., first pointed out the identity of the *panicum dactylon* with the doob grass of the Hindoos. The seeds of this highly-celebrated grass in India were communicated to the Duke of Bedford, from the East Indies, by the Marquis of Hastings. The seeds were sown in the experimental grass garden at Woburn Abbey, where they vegetated readily, and produced plants which flowered the second year from seed. These perfected seed in the month of October, and the plants raised from this seed the following spring differed in no respect from the Indian seed. A portion of the seed was sown in the hothouse, and the plants cultivated there, in order to ascertain the effect of climate on the habits of the grass. Exposed in the grass garden, and cultivated by the side of the English species, the habit of the Indian plants differed from the former in the shortness of the leaves, which grew nearly flat on the ground, and were of a reddish brown colour instead of the slight glaucous green tint of the native English plant. The foreign plants flower freely every season, but the native ones of this species of grass very seldom; for during fifteen years the native plants have twice only produced flowers. In the hothouse the Indian plants proved of a habit exactly the same as the native plants in the open ground, having the leaves equally as long as those of the latter, of their glaucous colour, and not producing any flowering culms. This last fact is a very remarkable one, as connected with the long-continued effects of different climates on the same species of plant. In the hothouse more soluble or nutritive matter, and also more vegetable or woody fibre, were afforded by this grass than was afforded by the plants of it cultivated out of doors in the grass garden.

"*Experiments.*—At the time of flowering, the produce of the native plant from a sandy loam, with manure, was 31,308lbs. per acre.

"The doob-grass, or plants raised from Indian seed, at the time of flowering, from a sandy loam in the grass-garden, afforded 2,722 lbs. per acre.

"This grass, cultivated in an artificial, tropical climate in the hothouse, contained a superior quantity of nutritious matter to that cultivated in the open air, in the proportion nearly of 39 to 31; and the woody fibre afforded by the grass of the plants cultivated in the hothouse exceeded the woody fibre contained in the grass of the plants cultivated in the open air, in the proportion of 4 to 3.

"In the East Indies the doob-grass grows luxuriantly, and is highly valued as food for horses, &c.; in this climate, however, it scarcely begins to vegetate till the month of June, and the above details show that its produce and nutritive powers here are not sufficiently great to hold out any hope that its valuable properties in the East Indies can be made available in the climate and soil of Britain."

Sir William Jones observes—"That every law-book, and almost every poem in Sanscrit, contains frequent allusions to the holiness of this plant, and in the fourth *Vedo* we have the following address to it, at the close of a terrible incantation:—'Thee, O Darbha, the learned proclaim a divinity, not subject to age or death! thee they call the armour of India, the preserver of regions, the destroyer of enemies—a gem that gives increase to the fields. At the time when the ocean resounded, when the clouds murmured and lightnings flashed, then was Darbha produced pure as a drop of fine gold.' Again—'May Durva, which rose from the water of life—which has a hundred roots and a hundred stems—efface a hundred of my sins, and prolong my existence on earth for a hundred years.'"

Milton Abbey, Sept. 29.

(*To be continued.*)

NEW SCYTHES.—A trial has been made at Genlis (France) of a reaping-machine used in the north of France, under the various names of Belgian scythe, *sape*, *piquet*, &c. It is of the same form as the scythe-blade, though a little smaller and more curved, and is fixed with a strap to a very short handle. The reaper makes use of it with his right hand by an easy movement, causing little fatigue. He has in his left hand a hook fixed to the end of a small handle of very light wood, with which he holds the wheat while giving the cut with the *sape*. This instrument, worked in the above manner by a young man, 22 years of age, appeared to all the farmers and intelligent labourers present to furnish great advantages over the sickle and rake-scythe. It cuts as close to the ground as may be desired, does not shake the ears, and consequently does not cause the grain to fall out. The reaper does not want (as is the case in using the rake-scythe) an assistant to follow him to pick up what is left behind; his hook performs that office with the greatest facility, and much better; it allows nothing to fall, and collects the corn into bundles of the required size with surprising regularity. It offers, in the most evident manner, a saving of hands, strength, fatigue, time, and acts better than the ordinary implements used. In corn beaten down, especially, labourers at present spend much time and labour, and much of the produce is lost; whilst the use of this instrument offers the greatest advantages, as it works with just the same precision as though the corn were standing. The reapers in the Franche-Comte, who are the ordinary harvest labourers, were quite astonished at the action of this instrument, and we doubt not but that next year a great number of farmers will adopt the system, which is a boon to both master and servant. Those persons who are desirous of seeing this new scythe used will be gladly afforded that opportunity on application at Genlis; it will be put into operation in their presence, and the manner of working it (which may be learned in a few minutes) will be explained to them.—Brussels Herald.

THE USE AND VALUE OF NIGHT SOIL.

That man gets his bones from the rocks and his muscles from the atmosphere is beyond all doubt. The iron in his blood and the lime in his teeth were originally in the soil. But these could not be in his body unless they had previously formed part of his food. And yet we can neither live on air nor on stones. We cannot grow fat upon lime, and iron is positively indigestible in our stomachs. It is by means of the vegetable creation alone that we are enabled to convert the mineral into flesh and blood. The only apparent use of herbs and plants is to change the inorganic earth, air, and water into organic substances fitted for the nutrition of animals. The little lichen, which by means of the oxalic acid that it secretes, decomposes the rocks to which it clings, and fits their lime for "assimilation" with higher organisms, is, as it were, but the primitive bone-maker of the world. By what subtle transmutation inorganic nature is changed into organic, and dead inert matter quickened with life, is far beyond us even to conjecture. Suffice it that an express apparatus is required for the process —a special mechanism to convert the "*crust* of the earth," as it is called, into food for man and beast.

Now, in nature everything moves in a circle—perpetually changing, and yet ever returning to the point whence it started. Our bodies are continually decomposing and recomposing—indeed, the very process of breathing is but one of decomposition. As animals live on vegetables, even so is the refuse of the animal the vegetable's food. The carbonic acid which comes from our lungs, and which is poison for us to inhale, is not only the vital air of plants, but positively their nutriment. With the same wondrous economy that marks all Creation, it has been ordained that what is unfitted for the support of the superior organism is of all substances the best adapted to give strength and vigour to the inferior. That which we excrete as pollution to our system, they secrete as nourishment to theirs. Plants are not only Nature's scavengers, but nature's purifiers. They remove the filth from the earth, as well as disinfect the atmosphere, and fit it to be breathed by a higher order of beings. Without the vegetable creation the animal could neither have been nor be. Plants not only fitted the earth originally for the residence of man and the brute, but to this day they continue to render it habitable to us. For this end their nature has been made the very antithesis of ours. The process by which we live is the process by which they are destroyed. That which supports respiration in us produces putrefaction in them. What our lungs throw off, their lungs absorb—what our bodies reject, their roots imbibe.

Hence, in order that the balance of waste and supply should be maintained—that the principal of universal compensation should be kept up, and that what is rejected by us should go to the sustenance of plants—nature has given us several instinctive motives to remove our refuse from us. She has not only constituted that which we egest the most loathsome of all things to our senses and imagination, but she has rendered its effluvium highly pernicious to our health—sulphuretted hydrogen being at once the most deleterious and the most offensive of all gases. Consequently, as in other cases where the great law of self-preservation needs to be enforced by special sanctions, nature has made it not only advantageous to us to remove our night-soil to the fields, but positively detrimental to our health, and disgusting to our senses, to keep it in the neighbourhood of our houses.

In every well-regulated State, therefore, an effective and rapid means for carrying off the ordure of the people to a locality where it may be fruitful instead of destructive becomes a most important consideration. Both the health and the wealth of the nation depend upon it. If to make two blades of wheat grow where one grew before is to confer a benefit upon the world, surely to remove that which will enable us at once to do this, and to purify the very air which we breathe, as well as the water which we drink, must be a still greater boon to society. It is, in fact, to give the community not only a double amount of food, but a double amount of health to enjoy it. We are now beginning to understand this. Up to the present time we have only thought of removing our refuse—the idea of using it never entered our minds. It was not until science taught us the dependence of one order of creation upon another, that we began to see that what appeared worse than worthless to us was nature's capital—*wealth set aside for future production.* In our eagerness to get rid of the pollution, we had literally not looked beyond our noses: hence our only care was to carry off the nuisance from the immediate vicinity of our own residences. It was no matter to us what became of it so long as it did not taint the atmosphere around us. This the very instincts of our nature had made objectionable to us: so we laid down just as many drains and sewers as would carry our night soil to the nearest stream—and thus, instead of poisoning the air that we breathed, we poisoned the water that we drank. Then, as the town extended—for cities, like mosaic work, are put together piecemeal—street being dovetailed to street, as county to county in our children's geographical puzzles—each new row of houses tailed on its drains to those of its neighbours, without any inquiry being made as to whether they were on the same level or not. The consequence of this is, that the sewers in many parts of our metropolis are subject to an ebb and flood like their central stream—so that the pollution which they remove at low-water, they regularly bring back at high-water, to the very doors of the houses whence they carried it.

But, thanks to organic chemistry, we are beginning to wake up. Science has taught us that an improved and comprehensive system of drainage is a question that concerns not only our health, but—what is a far more important consideration with us—our breeches pockets. What we in our ignorance had mistaken for refuse of the vilest kind, we have now learned to regard as being, with reference to its fertilizing virtues, "a precious ore, running in rich veins beneath the surface of our streets"—whereas, if allowed to reek and seethe in cesspools, within scent of our very hearths, or to pollute the water that we use to quench our thirst and cook our food, it becomes, like all wealth badly applied, converted into poison"—as Romeo says, of gold, to the Apothecary—

"Doing more murders in this loathsome world
Than those poor compounds that thou mayst not sell."

According to the average of the returns from 1841 to 1846, we are paying two millions every year for guano, bone-dust, and other foreign fertilizers of our soil. In 1845, we employed no fewer than 683 ships to bring home 220,000 tons of animal manure from Ichaboe alone; and yet we are every day emptying into the Thames 115,000 tons of a substance which has been proved to be possessed of even greater fertilising powers. With 200 tons of the sewage that we are wont to regard as refuse, applied to the irrigation of one acre of meadow land, seven crops, we are told, have been produced in the year—each of them worth from six to seven pounds; so that, considering the produce to have been doubled by these means, we have an increase of upwards of £20 per acre per annum effected by the application of that refuse to the surface of our fields. This return is at the rate of £10 for every 100 tons of sewage; and, since the total amount of refuse discharged into the Thames from the sewers of the metropolis is, in round numbers, forty millions of tons per annum, it follows that, according to such an estimate, we are positively wasting four millions of money every year—or, rather, *it costs us that amount to poison the waters about us.* Or, granting that the fertilizing power of the metropolitan refuse is—as it is said to be—as great for arable as for parture lands, then, for every 200 tons of manure that we now cast away, we might have an increase of at least twenty bushels of corn per acre. Consequently, the entire forty million tons of sewage, if applied to fatten the land instead of to poison the water, would, at such a rate of increase, swell our produce to the extent of four million bushels of wheat per annum. Calculating then that each of these bushels would yield sixteen quarten loaves, it would follow that we flung into the Thames no less than two hundred and forty-six million pounds of bread every year; or, still worse, by pouring into the river that which, if spread upon our fields, would enable thousands to live, we convert the element of life and health into the germs of disease and death—changing into slow but certain poison that which, in the subtle transmutation of organic nature, would become acres of life-sustaining grain.—Morning Chronicle.

INCUMBENT'S FIXTURES.

Observing that you are frequently asked by your correspondents for information on these matters, I send you the following copy of case and opinion relating to a disputed title to fixtures, from the *Guardian* of Sept. 12th. As it relates to garden matters it may prove useful to some of your readers.—*J. M'Intosh.*—"On the death of the Rev. A. B., late Vicar of ——, the Rev. C. D. was presented to that benefice, and has been duly instituted and inducted thereto. The late incumbent erected in the vicarage gardens, but entirely detached from the dwelling house, and having no resting on or communication therewith, a green-house, a heathery, a hot-house, and other buildings of a like description. The representatives of the late A. B., and the present incumbent, have agreed that the mode in which these buildings are constructed with regard to their annexation to the freehold, shall be detailed by their respective surveyors, copies of their several reports accompanying this case. The representative of the late incumbent does not claim any right to remove the walls or foundations, and is ready, if required, to restore the surface to its former state at his own cost. The present incumbent, however, claims the glass and wood-work, pipes and slabs, as annexed to and forming part of the freehold. Both parties have mutually agreed to abide by your decision as to the law of the case in the event of your being able to express a confident opinion on this statement of facts on the legal rights of the parties as to all or any of the matters in dispute; but in case further information is required on any point before giving your opinion, such information shall be supplied. You are requested to advise separately as to the legal right, on the part of the representatives of the late incumbent, to remove the glass and wood-work in—1st, the greenhouse; 2nd, the hothouse; 3rd, the heathery; lastly, the pipes and slabs, or any, or each of them." Opinion.—"I have felt very great doubt about this case, and, from the perplexed and unsettled state of the law which is applicable to such questions, it is almost impossible to form a confident or satisfactory opinion; but, upon the whole, I am inclined to think that the representatives of the late incumbent are not entitled to remove either the glass, or the woodwork, or the pipes, or slabs, from the greenhouse, the hothouse, or the heathery. The case is one which must be governed by the rules respecting fixtures which prevail between the representatives of an ordinary tenant for life, and the remainderman or reversioner, for the fact of these buildings being parcel of an ecclesiastical benefice seems to me to make no material difference. Now, the general rule undoubtedly is, that things which are attached to the soil are parcel of the freehold; and though there are certain exceptions to this rule in respect of fixtures set up for the purpose of trade, or for ornament, or domestic convenience, yet this latter class is far less numerous than the former, and in each of them less favour is shown to the claim of an executor of a tenant for life against the successor to the estate than to that of a tenant against his landlord. In the case of Lawton *v.* Salmon (1 H. Bla., 260), Lord Mansfield speaks as if the relaxation in favour of carrying away matters of ornament or convenience existed only as between landlord and tenant; and Lord Ellenborough, in the case of Elwes *v.* Mawe (3 East, 38), appears to have had the same impression. In a late case also (Winn *v.* Ingleby, 5 B. and A., 625), it was said by the Court of King's Bench that certain articles, such as set pots, ovens, and ranges, set up by the owner of a house, would go to the heir and not to the executor. And in another case (that of Colegian *v.* Dens Santor, 2 B. and C., c. 76), in which there was a question whether stoves, closets, shelves, brewing vessels, lock, blinds, &c., passed to the purchaser of a house, the Court said that some of the articles, viz., the stoves, coppers, mash tubs, water tubs, and blinds, might be removable as between landlord and tenant, but would belong to the heir and not to the executor, and were, as between those persons, parcel of the freehold; and so, on a still more recent occasion, it was said by Mr. Justice Bayley that stoves, grates, and cupboards, were part of the freehold, and though they might be moved by a tenant during his term, yet they would go not to the executor, but to the heir (Rex *v.* St. Dunstan's, 4 B. and C., 686). According to these authorities, therefore, the Courts seem to consider that the old rule of law has received only a very partial relaxation in the case of heir and executor, and I can find nothing which justifies me in saying that of a remainderman and the executor of a tenant for life would be regarded with much more indulgence. The only cases in which a contrary doctrine occurs were cases of fixtures erected for the purpose of trade, and it seems to be scarcely consistent with the more recent course of decisions. With regard to the fixtures in the present case, I very much doubt whether they would be removable even as between landlord and tenant, for it would be difficult to bring them within either of the classes of exception to the general rule. They certainly are not erections for trade purposes, and they can scarcely be considered things of ornament or domestic convenience; they are rather in the nature of permanent improvements of the property—erections designed for peculiar kinds of cultivation—for making the garden more useful and more productive; they range themselves more properly in the class of buildings for agricultural purposes, which in the case of Elwes *v.* Mawe, were held to be not removable by a tenant. In the case of Buckland *v.* Butterfield, as reported 4 B., Moore, 440, a pinery erected in a garden was adjudged to be of this nature, as well as a conservatory, which was the principal subject of consideration, and which, from its immediate connection with a dwelling-house, was far less proper to be removed. In that case, also, a reference was made to a previous decision, in which it had been held that glasses and frames resting on brick-work in a nursery ground were not removable. Lord Kenyon, indeed, suggested, in the case of Penton *v.* Robart (2 East, 88), that greenhouses and hothouses erected by gardeners and nurserymen during their tenancies for the purpose of their business might be removed afterwards; but Lord Kenyon's opinion upon this subject was subsequently disapproved by Lord Ellenborough, in the case of Elwes *v.* Mawe, and by Lord Chief Justice Dallas in the latter case of Buckland *v.* Butterfield. If, then, the removal of such erections as these would be very questionable at least, if not prohibited, in the case of an ordinary tenant, much less could it be allowed to the executors of a tenant for life, more especially as it must be admitted that the Courts have of late been inclined to adhere to the general rule, rather than to the particular exceptions. In the recent case of West *v.* Blakeley (2 Man. and Gan., 729), the question related to a greenhouse, which was built of wood on a frame fixed on a plank of wood called a plate, and this plate was laid upon mortar placed in the indents of one of three dwarf walls erected for the front and sides of the greenhouse, the back being formed by an old wall; no holes were made in any part of the walls, the greenhouse being built with a view to removal. The question immediately before the Court was, whether this greenhouse was a 'building' or an improvement within the meaning of the covenant in a lease, and it was held to be so; but two of the judges expressly declared their opinion that it was also a 'fixture' which the tenant could not have removed. In the absence, therefore, of any decision authorizing the removal of fixtures of this description between parties like the present, and with so many cases before me which point the other way, I feel myself bound to decide against the representatives of the late incumbent. With respect to the wood work and the slabs, which appear to be either actually embedded in the walls or cemented to them by mortar, I can scarcely suggest a doubt. The moveable sashes and the pipes present a more difficult question. But if the main portions of these buildings cannot be taken away, it is not very easy to see how these appendages, which are necessary to their use, and cannot when severed be regarded as distinct or complete chattels, can properly be removed. The sashes are as much parcel of these buildings as the windows of an ordinary house; and the pipes, though perhaps more questionable, seem to be connected with the boiler, and to belong to it as part of the apparatus. Now that such appendages cannot be severed appears to be tolerably clear from the late decision of the House of Lords, in the case of Fisher *v.* Dixon (12 Cla. and Fin., 312), in which the owner of certain land had affixed to his freehold, not for the purpose of trade, but for the beneficial enjoyment of his property, certain machinery, which, on his death, was claimed by his executor, and then Lord Cottenham said, "that with the exception of one case (the authority of which he entirely repudiated), there is a uniform course of decisions wherein the matter has been discussed in favour of the right of the heir. It is hardly necessary to say that we must hold that all that belongs to that machinery, although more or less capable of being used in a detached state from it, still if it belongs to the machinery and belongs to the *corpus*, the article, whatever it may be, must necessarily follow the same principle, and remain attached to the freehold." And in this judgment Lord Brougham and Lord Campbell concurred. For these reasons I am of opinion that all the fixtures in question in this case must be left entire for the present incumbent.—Edward Badeley, Temple, December 7th, 1848."—The Gardeners' and Farmers' Journal.

TASK-WORK IN ENGLAND.

BY W. BURNESS, LONDON.

A very large amount of all kinds of farm-work in England is performed by contract—so much money for so much work performed; a system which recommends itself to every one acquainted with mankind and labour. In the generality of provinces it is termed "task-work," but in some "piece-work," in others "grit-work," and in a few instances only, by its proper name, "contract-work." In this article we shall abide by the common phraseology of task-work.

A servant, if labouring under the impression that he is performing more work than he ought, not only labours reluctantly, but experiences the effects of exertion more severely upon his physical system than were he actually performing a larger amount of it in a different spirit. The task-man who makes 2s. a day will not be more fatigued at night than the day-labourer who makes only 1s. 8d., the expense of labour in both cases being equal, and in the majority of instances not so much. The reason of this lies partly in the mechanical position of the labourer's body, and partly in the state of his mind.

In practice, it is generally calculated that if a labourer be able to fill 20 cart-loads of manure per day while working at his ordinary rate, if he be paid *one penny per load* he will increase his exertions so as to fill from 24 to 26 of equal size, and be able to continue at this increased rate without increase of fatigue. At every other species of work let upon task, the same rule holds good.

Although the above is the usual calculation of farmers, and although servants view the case in the same light, yet there is generally a much greater actual difference than is here stated; for servants upon day-work very seldom perform the quantity allotted to them according to the acknowledged standard; so that task-work is much cheaper to the farmer than day-work in the majority of cases, and, indeed, more profitable also to servants.

The advantage and harmonious working of the task-system depend in a great measure upon the practical knowledge and uprightness of the master. Where the farmer is qualified to estimate the value of the work irrespective of an opinion from the labourer, and where the terms are specifically settled previous to its commencement, there is no danger to be apprehended from consequences. But it too frequently occurs that masters have only two rates of wages—one which they allow for day-work, and the other for task-work. Such men, too, are not unfrequently the greatest advocates for the task-system, and in every instance adopt it. If they think their labourers deserving, they pay them the task-work rate of wages; but if otherwise, they award them the smallest of the two figures. The following example will illustrate the consequences of such a system as this:—

A certain nobleman had a bailiff who was raised to the stewardship. After his promotion, his bailiff was what some modern landlords would call a "*useful man*," but whom others, with more propriety perhaps, would call a "*whip-the-wind;*" and he himself continued to fix the price of labour. We observed some of his labourers one day no more than task-work-like in their movements, and, on riding past, took the liberty of inquiring how much they received for the job, suspecting that matters were very different from what they really were. On learning the amount, we intimated our apprehensions that they would fall somewhat short of the ordinary rate of day-wages. They replied, that they "*always received day-wages at bad jobs of the kind.*"

On another occasion, we took the same liberty with the same workmen, but found matters now standing very differently. On this occasion they were allowed *too much money;* and when we hinted that they were not exerting themselves so as to make something of the job, they only smiled to one another, and bluntly remarked, that although they did so they would not receive more than 2s. per day, and probably spoil the next job into the bargain.

The proper way is to proceed upon definite principles—to communicate these to the labourer, and to make him familiar with them. We found that it gave great satisfaction to our labourers to explain to them how we ascertained the value of their work, and fixed the price. It was a practical subject which came home to every one of them, and which the most obtuse was quick enough to comprehend. Tell a labouring man, or rather take his spade from him, and show him that you pay a certain price per cubic yard on certain never-failing conditions, and he will not forget your lesson, nor prove himself ungrateful for it. Parties, it is true, are liable to err in the reduction of principles to practice; but mistakes of this kind will be viewed only as venial offences, in cases where there is no departure from the principle. Errors of this kind, in place of depreciating the one party in the estimation of the other, will tend rather to enhance the worth of both. If unforeseen circumstances occur, so as to render the execution of a job more difficult than was contemplated, the labourer will exert himself to the uttermost of his abilities to make wages, stimulated by a confidence that if the opposite had been the case, no advantage would be taken of his gain when the next job of the same kind might be let to him.

Almost every species of work is capable of measurement sufficiently accurate to protect the interest of both parties; and those jobs which can only be measured with difficulty, are generally let by the "lump," or so much for finishing the job. Persons thoroughly versant with farm-work, though not perhaps with task-work, will, on a moment's reflection, be able to approximate very closely to a correct valuation of a job, allowing a man to make a given amount of wages daily. The following account of the prices paid by us, and some others, will convey a general idea of the system, and the expense of labour connected with English agriculture in one of the midland counties, Huntingdonshire, supposing the labourer to make 2s. per day, exclusive of harvest.

Draining.—Drains may be divided into three classes: 1st, rivers; 2nd, ditches; and, 3rd, drains, properly so called.

1. *Rivers.*—The straightening of rivers, cutting of new courses, and forming embankments, is generally done by the cubic yard, at various prices, according to the depth and breadth of the cut or embankment, and the quality of the materials excavated. The principal amount of excavation connected with river-work requires wheeling, the additional expense of which is not so great as inexperienced workmen are apt at first sight to apprehend.

One man wheeling upon level planking, and removing the excavated earth to the distance of from 15 to 20 yards, will keep two men filling to the depth of 3 feet, provided the earth dig freely, and without picking, as is generally the case along rivers in this country. The expense of this may be from 2d. to 3d. per cubic yard, according as the earth is light or heavy. A proportional increase of expense will be incurred for every additional 15 or 20 yards the earth has to be removed, requiring an additional wheeler.

Level planking at works of this kind, however, is the exception; and, accordingly, more wheelers than here stated will be required on the inclined plank, and a greater price allowed for the yard in proportion to the angle of inclination. Not only has the earth to be wheeled from the bottom of the cut to the level of the meadow, after it exceeds three feet in depth, but has also, for the most part, to be raised to the additional height of an embankment. The expense of filling, however, remains the same so long as the soil does not alter, and hence forms an index to the whole, which can easily be estimated upon the spot by any practical man, when once the details of the work are before him.

Where picking is required, the additional expense may be calculated in the same manner as in the case of wheeling, unless where the earth abounds in slaty stones which retard the process of filling, and thus create an addional expense of perhaps from 1d. to 2d. per cubic yard. Rock may be removed at various prices, from 4d. to 1s. per ton according to quality.

When the embankment is small, or not exceeding 3 feet high, and not opposed to a rapid stream, and where wheeling is not required, 2d. per cubic yard may execute the work. When opposed to the influence of tides or strong currents, and where the earth has consequently to be firmly rammed and securely turfed, it may cost from 3d. to 4d. For large embankments that require wheeling, the expense will be regulated by the number of wheelers required for every two fillers, as formerly noticed: in some cases it may be better to have only one filler, the wheelers going from 30 to 40 yards. Extensive work of this kind invariably falls under the inspection of regular engineers and general contractors; and to furnish particulars as to expense, properly, would require details of which our limits in this article will not admit. Small embankments under 3 feet high, along rivulets and brooks, are perhaps as often contracted for by the lineal yard, pole, or chain, as by the cubic, especially where arrangements are entered into between landlords and tenants for the execution of the work; but in all cases of this kind the solid contents always form the principle to regulate the expense of lineal measurements.

2. *Ditches.*—The expense of opening ditches is very various, according to dimensions, and the character of the soil also. They are almost invariably contracted for by the lineal yard, pole, or chain, which enables the workmen, many of whom know nothing yet of cubic measurement, to ascertain what they are daily or weekly making.

Workmen for the most part are acquainted with the nature of the soils in the district where they reside, but it frequently happens that they are called upon to open ditches of a size vastly different from any they have previously excavated. In all cases of this kind, as well as where the workmen were beginners, the practice of the country, so far as we have seen, is for the workmen to take a few days' trial before fixing the price. This, however, is an extremely objectionable plan, more especially in the case of beginners, who must always lay their account for "an apprentice fee," according to the maxim of the workmen. The comparative success of the system, generally speaking, and from time immemorial in this country, is no doubt to be attributed to the unsuspecting honesty of parties, coupled with the prevailing inability of either to calculate the difference of expense from the difference of the cubical contents of any given length, as a rod, or chain. But even in the case where the workmen are governed by the measure of a day's labour, reference is always had to the quantity of materials excavated from any given extent, and the amount of labour this will require; so that the most judicious plan for both master and workman is, to calculate beforehand the number of cubic yards in a rod or chain, and then fix the price according to the dimension of the ditch, and the character of the soil through which it has to be opened; and this, it may also be mentioned, is the only method by which we can communicate an idea of the expense of works of this kind.

In contracting for the cutting of a ditch, therefore, the workman has four things to keep in view,—*first,* the hardness of the soil, and the ease and difficulty with which he can lift a spadeful; *second,* the distance he has to throw it, and the consequent size of a spadeful; *third,* the number of spadefuls in a cubic yard, lineal yard, rod, or chain, or the quantity he can execute in one day for a given sum, or 2s.; and *fourth,* the quality of the workmanship, or the amount of labour required to finish it off agreeably to any specific plan.

1. In the first case, the amount of labour will depend principally upon two considerations. The one of these is, whether the earth requires picking or not; and the other, its adhesive character. *First,* the expense, when picking is required, will be regulated by the number of spades to every pick, and the difficulty with which the materials can be picked and thrown out. Large stones are not such an opposing obstacle as small slaty ones to either pick or spade. We have paid from 4d. to 6d. per ton for the former when thrown aside—a good bargain to ourselves, and a sufficient remuneration to the workmen for their additional trouble; but small slate-shaped fragments are invariably a dead loss to both parties. *Second,* clays often adhere to the spade with such tenacity, that it is necessary for the workman to keep a vessel with water beside him, n which to dip his spade; and, even with the spade thus moistened, the spadeful sometimes returns to the bottom of the cut with it, where it can only be removed by the foot. Such impediments as this may increase the expense from one-fourth to one-half.

2. In the second case, it is necessary to attend to depths and distances. The breadth may be such as to require wheeling, the depth such as to require scaffolding, and the accumulation of the excavated materials may be on both banks, or the whole may be thrown to one side.

3. In the third case, the cubical contents being known, the principal point for consideration is the amount of wages. We have said 2s., and, in ordinary cases, this being the current task-wages, is all that can be reasonably expected; but in particular cases, both in ditching and river work, something extra is necessary, owing to the heavy and sometimes dirty character of the work. This is usually allowed.

4. In cases where the ditch is small, or within certain dimensions, the depth and accummulation of earth, if thrown to both sides, is immaterial, comparatively speaking, to the workmen; but then, in cases of this kind, an additional amount of labour is incurred in dressing the sides and maintaining them at a proper angle, and this, where there is stony ground or tenacious clays, is frequently considerable.

When the earth excavated from new ditches, again, has ultimately to be removed to fill up the courses of old ones, all that is generally required is to throw it so far as to prevent the possibility of its sliding back into the cut. It frequently happens, however, that it must remain as an embankment to prevent overflowing; and in that case it has to be turned up and left in a certain form, according to agreement, for the purpose of being sown with grass-seeds. Sometimes, again, the whole of the top spit is thrown to one side, for the purpose of growing a hedge, and the bottom thrown to the other. All these points increase the amount of labour, and consequently of expense.

The actual expense of cutting a ditch of a given size may be had from the following three examples, in all of which we shall suppose the soil, in the language of the ditcher, "*a workable clay,*" neither adhering to the spade nor requiring picking, and the wages 2s. per day.

In the *first* instance, suppose the dimensions of the ditch to be 4 feet wide at top, 1 foot wide at bottom, and 4 feet in depth; in the *second,* 6 feet wide at top, 2 feet wide at bottom, and also 4 feet deep; and in the *third,* 6 feet wide at top, 1 foot wide at bottom, and 5 feet deep: the excavated earth in each case to be thrown to both sides without trimming. The number of cubic yards in a chain would be, in round numbers, 24, 39, and 44, respectively.

In the first and second examples, the depth is the same, and the difference of the sides and breadth so immaterial to the workmen, that both can be executed at the same expense, or at about one penny per cubic yard. In the last example, however, the depth is so increased that *the additional five yards cannot be executed for five-pence,* but will cost double price, to twopence per cubic yard. The expense per chain, therefore, of each of these examples may be stated at 2s. to 2s. 3d., and 4s., respectively.

On some light alluvial and mossy soils, a man may excavate from 30 to 50 cubic yards per day; while on some other stony and stubborn soils, 12 to 15 may be the utmost he can attain.

3. *Drains properly so called.*—These are generally measured by the lineal chain; and the expense, as in the cutting of rivers and ditches, will depend upon the quality of the soil and the depth to which they are placed. On clayey soils, such as the Oxford of Huntingdonshire, where picking is seldom required, the expense per imperial chain for opening, putting in pipes, and covering, supposing the depth to be 40 inches, may run from 1s. 6d. to 1s. 8d. In soils of a different description, which require picking, the cost may be from 2s. to 2s. 6d. per chain. In many soils of this latter quality the drains are frequently filled with broken stones. The additional expense which this will incur may be estimated on an average at about 1s. 2d. per chain, including quarrying—or collecting, breaking, and filling into the drain, but exclusive of horsework and horseman's wages. The expense in this case, including digging, would be 3s. 2d. to 3s. 8d. per chain.

The acreable expense of draining will of course depend upon the distance between the drains, other things being the same. If we take the distances at 15, 18, and 24 feet, the depth at 40 inches, the six prices above stated, and the cost of the average size of pipes 10s. per 1000, then the following three examples will give a general idea of the expense per acre:—

EXAMPLE 1.

Distance 15 feet from drain to drain, giving about 44 chains of draining per acre—	£	s.	d.	Total cost per statute acre. £	s.	d.
No. 1. To cutting, piping, and covering 44 chains, at 1s. 6d. per chain	3	6	0			
.. 2904 pipes, at 10s. per 1000	1	9	0			
				4	15	0
No. 2. To cutting, piping, and covering 44 chains, at 1s. 8d.	3	13	4			
Pipes, (as before)	1	9	0			
				5	2	4
No. 3. To cutting, piping, and covering 44 chains, at 2s. 0d.	4	8	0			
Pipes, &c.	1	9	0			
				5	17	0
No. 4. To cutting, piping, and covering 44 chains, at 2s. 6d.	5	10	0			
Pipes, &c.	1	9	0			
				6	19	0
No. 5. To cutting, filling with stones, &c. 44 chains, at 3s. 2d.				6	19	4
No. 6. To ditto, 44 chains, at 3s. 8d.				8	1	4

EXAMPLE 2.

Distance 18 feet, giving about 36 chains per acre—	£	s.	d.	£	s.	d.
No. 1. To cutting, piping, and covering 36 chains, at 1s. 6d.	2	14	0			
.. 2376 pipes, at 10s. per 1000	1	3	9			
				3	17	9
No. 2. To cutting, piping, and covering 36 chains, at 1s. 8d.	3	0	0			
Pipes, (as before)	1	3	9			
				4	3	9
No. 3. To cutting, piping, and covering 36 chains, at 2s. 0d.	3	12	0			
Pipes, &c.	1	3	9			
				4	15	9
No. 4. To cutting, piping, and covering 36 chains, at 2s. 6d.	4	10	0			
Pipes, &c.	1	3	9			
				5	13	9
No. 5. To cutting, breaking, filling with stones, &c., 36 chains, at 3s. 2d.				5	14	0
No. 6. To ditto, 36 chains, at 3s. 8d.				6	12	0

EXAMPLE 3.

Distance 24 feet, giving about 27½ chains per acre—	£	s.	d.	£	s.	d.
No. 1. To cutting, piping, and covering 27½ chains, at 1s. 6d.	2	1	3			
.. 1815 pipes, at 10s. per 1000	0	18	0			
				2	19	3
No. 2. To cutting, piping, and covering 27½ chains, at 1s. 8d.	2	5	10			
Pipes, (as before)	0	18	0			
				3	3	10
No. 3. To cutting, piping, and covering 27½ chains, at 2s.	2	15	0			
Pipes, &c.	0	18	0			
				3	13	0
No. 4. To cutting, piping, and covering 27½ chains, at 2s. 6d.	3	8	9			
Pipes, &c.	0	18	0			
				4	6	9
No. 5. To cutting 27½ chain drains, filling with stones, &c., at 3s. 2d.				4	7	1
No. 6. To ditto, 27½ chains, at 3s. 8d.				5	0	10

For any other distance between the drains, the variable expense may be ascertained from the above tubular account, by doubling the price for half the distance; and for double the distance from drain to drain, by taking half the price. Thus, 12 feet distant from drain to drain would be double the expense of No. 1, Example 3, = £5 18s. 6d.; and 30 feet distance, one half the cost of No. 1, Example 1, = £2 7s. 6d. per acre. The expense of draining at 21 feet distant from drain to drain, will be half the difference between the second and third examples added to the third.

When the dimensions of the drain are different from those above stated, the expense will of course differ also. On clay soils of the same quality, drains may be placed to the depth of 4 feet for about 6d. per chain more money. On stony soils, a proportionally greater increase of price than the ratio between the depths and prices in the above examples, according to the hardness of the soil, will be required. When the depth is only 32 inches, the chain may be cut for about 4d. to 5d. less money; and on stony soils a proportionally greater deduction of price.

4. *Cleaning or scouring of ditches* is generally done by the chain, and at various prices according to their size and the state they are in. This is a species of work much more difficult to estimate than the making of new ditches. The maxim here adopted by farmers is to leave the workmen upon the safe side; for experience has satisfactorily demonstrated, that the opposite plan has an infallible tendency ultimately to increase the expense of labour. Practical farmers, who can handle the spade, and who have cleaned ditches themselves, can approximate so closely to the mark as not to suffer injury, and yet leave the labourer with the lucky half of the bargain. Where the common ditches along hedgerows, &c., have been cleaned out regularly every year, the price which was given was one penny per chain, the breadth of the bottom being equal to that of the workman's spade or shovel, and proportionally a greater price for a greater breadth of bottom.

Levelling.—The filling up of old ponds and ditches is almost invariably done by the task, the former by "lumps," and the latter by the chain; so much for filling an old pond, and so much per chain for filling an old ditch. In estimating works of this kind our plan has always been to fix, in the first place, the price per cubic yard according to the quality of the materials; in the second, to approximate as closely as possible to the cubical contents by taking the mean breadth, depth, and length of the old banks; and lastly to settle the price per lump or chain, in order to have no words on the subject afterwards, and to enable the workmen to know what they were doing daily.

In the absence of roots or stones, ponds may be filled in for one penny per cubic yard; and where wheeling and picking is required, the additional expense may be estimated as formerly noticed in river work. Ditches, from being narrower, can be filled in for less money, the earth digging freely. It is seldom, however, that old ditches are without hedges in this country, and these often so overgrown as rather to resemble a forest than a fence, and hence the expense of stubbing them is scarcely any criterion by which to go. Ordinary hedges may be stubbed and the ditches filled up, a spit having first been taken out of the bottom, and a pipe put in for about 3s. to 4s. per chain. Where trees are growing in the hedge-row so much per tree is allowed for stubbing it in addition, according to its size.

Excavated earth from rivers, ponds, ditches, &c., for the most part require removal. Where the courses of rivers or ditches are changed, the earth from new ones is required to fill up and level the old. This is effected either by wheeling or carting, but generally by the latter, when the workmen are paid for filling by the load. The expense of manual labour in this case principally depends upon the quality of the materials. A horse is able to draw a certain weight of earth, without reference to the cubical contents of the load, and therefore the strength of the team and the character of the roads are points for consideration. With good roads and ordinary farm-horses a load of clay may contain from 15 to 18 cubic feet, of alluvial soil from 24 to 27, and of peaty from 30 to 40. The usual price per load is one penny. A proportional increase is sometimes allowed to the horseman for emptying; thus, if a horseman and his two carts keep two men filling, the price will be 1½d. for filling, emptying, and levelling. Where picking is required, the increase of expense may be calculated in the same manner.

Paring and Burning.—This old-school system of getting rid of a vast amount of vegetable matter by burning it in the open air, and hence turning it to bad account, although fast getting into disrepute, is still practised to a considerable extent in many districts in England. With the common breast-plough the expense of paring, burning, and spreading the ashes runs from 30s. to 50s. per acre. When pared by horse-work the turf is generally thicker and more difficult to burn, and consequently, unless the weather is very fine, the operations may sometimes cost nearly as much as for manual labour, including the wages of the horseman, as if it had been performed by the breast-plough. The cost of burning and spreading the ashes in this case may be stated at from 15s. to 25s. per acre.

Another practice similar to the above is the digging up and collecting the banks of headlands, old borders, and everything of the kind into large heaps and then burning them. The labourer is either paid by the load or the cubic yard of ashes.

The general plan is the former, and the average price may be about 6d. per load. Sometimes the subsoil is dug up and burned, and may cost from 6d. to 1s. per load, according to the qualities of the materials. Peat-ashes cost more money, and may be stated at 2d. per bushel. or from 2s. to 2s. 6d. per cart-load.

Spade Husbandry or Culture.—1. *Forking.*—In modern times the spade and digging-fork are likely to supersede the plough. In many counties of England, forking the stubble-lands for the ensuing fallow-crops has been introduced, and from the success which has attended the practice, it bids fair to become universal at no distant period. The work is contracted for by the perch or acre, and the expense will depend upon the depth, natural quality of the soil, and the season of operation also. Some sandy and very loose soils may, perhaps, be more easily dug during the latter part of spring and early in autumn than during winter, but clayey soils, on the contrary, in the vast majority of cases, will be the reverse.

2. *Digging.*—Digging wheat-stubble during winter to the depth of 12 inches may cost from 26s. 8d. to 60s. per acre. Digging the same over again in spring, preparatory to manuring for turnips, &c., should it require it, (which it seldom does if the land has been effectually drained, trenched, or subsoiled, and put into proper order,) will cost from 13s. 4d. to 26s. 8d. Digging grass and clover lands, as well as lands from which green crops have just been removed, will require higher figures.

3. *Trenching.*—The expense of trenching or digging two spit deep is much more diversified than one spit digging. Our experience of trenching in England has been very limited. The lands which we did trench were of two kinds; the first literally matted with tree roots and old stumps, and the second the same species of soil, but free of any encumbrances of the kind. The price of the former was from 1s. to 2s. 6d. per perch, and the latter 6d., both being 18 inches in depth.

In Scotland and Ireland our experience has been much more extensive. During two years we were in the latter country in the employment of his Grace the Duke of Manchester, we drained and trenched upwards of 60 acres, at an average expense of £10 per acre imperial. The soil was incumbent upon greywacke, and thickly embedded with stones, affording in some places more than sufficient to fill the drains, and in others about one-half. The trenching cost £3 4s. per acre, and the draining £6 16s. The drains were cut 30 to 33 inches in depth, and filled from 12 to 15 inches with stones. The trenching was 18 inches. The expenses of trenching and draining, however, were conjointly united. The fields were trenched in spaces or lots of three lands each. Each lot preceded the other, so that the stones dug up from the one served to drain the other; the workmen in trenching were paid at the rate of about 8d. per chain for the stones they dug up, and the breakers and fillers for collecting them, &c., 6d. or 1s. 2d. per chain for stones altogether, as formerly stated. The collecting and carrying across the stones, and filling them into the drains, after being broken, was done by women.

Manure.—1. *Compost.*—The collecting of materials for compost, and the carting out of the same after being made, is paid for by the load; one penny is allowed for filling in both cases, and a penny for spreading; and, generally, a halfpenny for trimming the compost hill when collecting, and the same for emptying, when putting it upon the field in small heaps.

The mixing, turning, and making of compost is sometimes, a work of greater difficulty to estimate than the cartage of it upon the field afterwards. This arises from the character and diversity of the compound; and hence any idea of a standard price is, in most cases, unattainable. The general plan of the country is to appeal to a trial, when parties cannot be guided by previous experience. After the labourer ascertains how much he can perform in a day, he makes a proposal to his employer, which is either accepted or modified as he thinks the circumstances demand.

When the compost has simply to be turned over, or only mixed with farm-yard manure, the amount of labour is more easily ascertained. We always agreed by the cubic yard, measuring the hill sometimes before it was turned, and sometimes after, according to its quality. When fresh materials are added during the process of turning, it must be measured after the whole is finished; but when otherwise, it is better done before the commencement; for the former we gave a penny per cubic yard, and for the latter from a penny to a halfpenny.

2. *Farm-yard manure.*—The filling of farm-yard manure is invariably paid for by the load, and sometimes the whole amount of manual labour in carting it out from the yards. The expense of filling in the farm-yard is a penny; trimming at the dunghill in the field to the height of 7 feet, and backing one of the horsemen's carts, one halfpenny; and the horseman's hire for carting it out, according to the distance. The following account of carting out manure from a farm-yard during frosty weather will convey an idea of the whole expense of manual labour and mode of procedure.

In this example, the distance between the farmyard and field was such as to require four teams to make a full set, each horseman having two single carts. To man these we found it required five men besides the horsemen, making a total number of nine men at the work. Three of the five men were in the farm-yard filling—two at one cart and one with a horseman at the other—and two at the dunghill, trimming and assisting to empty. The horsemen were thus placed: one in the farm-yard, with his two carts filling; one driving out two loaded carts; one returning with two empty ones; and one at the dunghill emptying—himself, one of his carts, and one of the trimmers the other. Each horseman went six turns at a yoking, twelve at two yokings, making a total of 96 loads daily for the eight carts. The expense of this, according to the prices already stated, would be 18s., or 2¼d. per load for filling, trimming, and carting, exclusive of horse labour.

Sometimes, instead of the manure being trimmed or thrown up loose in the dunghill upon the field as it is carted out, to undergo fermentation, it is carted over and trampled by the horse's feet cart wheels, to prevent fermentation. In cases of this kind one man upon the dunghill will be sufficient, and the total expense per load consequently 2d.

3. *Covering dunghills with earth.*—When manure is carted out as above, it should always be covered with from six to nine inches of earth. This is sometimes done by the lump, sometimes by the rod or chain, and sometimes by the number of lands. Turnip and potato binns are covered in the same manner, and therefore we shall include both under this paragraph. Contracting according to either of these plans is a very indefinite mode of procedure. Dunghills and potato binns are seldom of the same dimensions two years in succession. A cart-load is one thing to cover in the case of a large binn, but a very different thing to cover in that of a small one of perhaps half the size; and the same may be said of a rod or chain. The previous practice we found had been an appeal to trial, and generally the parties were unable to fix the price until Saturday night, when payment was to be made, at which time the whole was entered on the books in the gross, at so much per job, without any reference whatever to measurement. The impropriety of such a system needs no comment. Its injurious effects upon the industrious habits of the workmen are palpable If a farmer wants so many inches of earth put upon a dunghill or potato binn, what can be more simple than to measure it? For instance: if six inches is the depth required, then six square yards make one cubic yard; and if nine inches—only four for clayey soils, where in general three tramps of the foot are required to put the spade into the ground: it will require 2d. per cubic yard to finish the work in a workmanlike manner, and when the ground is more easily dug a proportionally less price.

4. *Turning manure in yards or hills.*—The expense in both cases will depend upon the quality of the manure. If the dung is short, from having already undergone considerable decomposition, it may be executed at about three-farthings per cubic yard; but if otherwise, and the straw comparatively fresh and difficult to separate, a penny will be found small enough. A man will fill a cart, containing 1¼ cubic yards of such dung, with as much freedom as he will turn over one yard when confined to a narrow trench.

5. *Manuring, &c.*—The expense of task-work in the manuring of fallow lands, either for green or corn crops, is almost the same as that stated already in forming the dunghill. A penny per load is allowed for filling as formerly, and the same price for spreading. Along with farm-yard manure, guano, bones, and other artificial substances are largely used. These are generally sown with machines, but sometimes also by the hand, upon the top of a slight manure from the farm-yard. For hand sowing we paid six-pence per acre, the men sowing one drill at a time or cast. When horsemen are paid by the task it is more convenient to agree with them for so much per acre than per load. The following two examples will furnish an idea of the expense of manual labour per acre, for laying down a field in turnips, the work being done by the task; the *first* with mixed, and the *second* with farm-yard manure alone.

1. In this example let the quantity of manure be 12 loads per acre from the farm-yard, and 3 cwt. of guano. The most profitable arrangement in this case, to avoid interruption and change, would be to employ seven men, four boys, and seven horses. Four of the men would act as horsemen, the *first* making drills—the *second* carting out and emptying manure from the dunghill—the *third* covering manure, and the *fourth* with the odd horse taking out guano, sowing seeds, and rolling the sown land with a heavier roller, rolling by the turnip-machine being seldom sufficient properly to compress the soil. The occupation of the other hands would be two men filling dung, four boys spreading, and the other man sowing guano. The horses would accordingly be thus employed,—two pairs drilling, one pair in the dung carts, and the odd horse at sundries.

At the commencement of the operations, it is necessary to give the first plough a yoking in advance, in order afterwards to avoid confusion upon the head-lands with the dung-carts. In distributing the dung from the cart, some farmers take three drills and others five; but the former is the most advantageous number, as it admits of the least possible loss by exposure of the manure to the influence of the atmosphere, and enables the horseman to proceed after he has taken out his end-board and righted his cart upon the upsetter to empty without again having to stop his horse until the load is wholly disposed of in the middle drill of the three. The four boys spreading, follow closely after the dung-carts—one throwing out and three breaking, one in each drill. The third horseman follows hard up, covering with the man sowing guano before him. The fourth concludes the operation by sowing and rolling. The set will easily finish 4 acres daily, giving two five-hour yokings. The expense per acre will therefore stand thus:—

Twice drilling, at 6d. per acre	1	0
Emptying dung, at 6d. „	0	6
Sowing guano, at 6d. „	0	6
Sowing seeds, &c.	0	6
Filling and apreading 12 loads of dung, at 2d.	2	0
Total	4	6

2. In this example let the quantity of farm-yard manure be 18 loads per acre. The only alteration which will be necessary in the strength and arrangement of the set, will be three men filling dung, three carts carrying out, with an additional boy driving the intermediate cart between the dung-hill and the field, and also a man or stronger lad to throw out the manure, along with the other three breaking. The expense per acre will now stand thus:—

Twice drilling, at 6d.	1	0
Emptying dung, at 6d.	0	6
Sowing seeds, at 6d.	0	6
Filling and spreading 18 loads, at 2d.	3	0
Boy driving intermediate cart	0	1½
Total	5	1½

Sowing of seeds.—The sowing of corn and the seeding of the ground may be either performed by manual labour or by horse-work. In the former case, it may be either sown broad-cast by the hand, dibbled by dibbling machines, and drilled or sown broad-cast by barrows. In the latter case, horse-machines are of different kinds; some are constructed for sowing broad-cast, some for drilling, and others for dibbling. The manual labour attending machines of this kind is generally performed by the horseman on day-wages.

Where the work is performed by manual labour it is usually done by the task. For sowing wheat, barley, and oats broadcast, we gave 2d. per acre; and for grass seeds the same price—the sower, however, giving three casts to the land or ridge, instead of only two as with corn. Broad-cast barrows are principally used for sowing grass seeds: and the expense will depend upon the level nature and softness of the ground, coupled with the character of the machine. Drilling barrows are principally used for sowing beans, and are now almost entirely supplanted by horse-machines. Dibbling with the old machines, when boys and women dropped the seed after the dibbler, the expense per acre varied with the distance between the lands, and may be stated at from 5s. to 7s. 6d. for wheat, oats, or barley; and from 3s. 6d. to 4s. for peas and beans. Dibbling machines are now constructed of endless variety, which deposit the seed themselves, and which may, therefore, effect a saving of about one-third of the former price.

Hoeing.—Although hoeing corn crops will never in all probability become the practice in Scotland, we may be permitted to state the price at this place.

1. For hoeing wheat we paid from 2s. 6d. to 4s. per acre? oats, 2s. 6d. to 3s.; and peas 1s. 8d. to 2s. 6d. Beans, when grown upon light and kindly soils, may be hoed for the same money as peas, or from 2s. to 2s. 6d.; but, upon many soils, when they are extensively cultivated, the cost may be considerably higher. On some stiff tenacious clays, the expense of hoeing the first time may cost from 3s. 6d. to 4s.; and, for the second time, from 2s. to 3s.

2. Potatoes, when grown in drills, horse-hoed, and scuffled, may be cleaned between the plants afterwards for about 2s. the acre.

3. Turnips, some farmers continue to sow on the broad-cast system, but the majority have adopted drilling, although on various plans—some drilling on the flat at various distances from 12 to 28 inches between the drills, others raising the drills upon the Scotch system. All these plans affect the amount of labour in hoeing and consequent expense.

When drilled in ridges 28 inches apart, and horse-hoed, the price varies from 2s. 6d. to 5s. per acre, or from a halfpenny to a penny per 100 yards of drill-sowing. For the second hoeing, from one-half to two-thirds of the price of the first may be given as a general rule.

Estimates by the drill will be found more convenient in practice than by the acre; for where there are a number of hoers it seldom happens that the field can be subdivided into lots, partly from the horse-hoeing in front, and partly from the size of the plants. It also saves a great deal of measuring. All that the farmer has to do, where this plan is adopted, is to count the number of his drills in every field, and take a note of them. Each hoer will look after his own number; and where the system of task-work prevails, the length of each field is accurately known by both parties, and the number of acres in it.

Harvest-work. — 1. *Hay-crops.* — The prices which we paid for mowing rye-grass and clover, were from 1s. 8d .to 2s., to 2s. 4d., being on an average 2s. per acre. For meadow-grass from 2s. 6d. to 2s. 9d. For tedding or shaking out meadow-grass from the swathe, 6d. per acre. For filling small loads of hay, whether ryegrass or meadow, 2d. per load of about 10 cwt.

The above prices are exclusive of an allowance of three pints of ale and two of table beer daily for each man. The usual wages which workmen make during hay-harvest are from 2s. 6d. to 3s., exclusive of ale, working extra hours, or from 5 o'clock A.M. to 7 o'clock P.M.

2. *Corn-crops.* — These are either mown or reaped. The principal breadth of wheat, perhaps, is cut down by the reaping-hook and sickle. Oats and barley are invariably mown, unless where the former is cut by Irish reapers.

The reaping of wheat is performed in a very rough and hurried manner, leaving, for the most part, two thirds of the straw upon the ground. We had none reaped in this manner; but the usual price, where the wheat is standing upright, is from 8s. to 10s. per acre, and when the crop is lodged from 10s. to 12s. After harvest the stubble is mown and collected into heaps for about 2s. per acre. It is then either carted home and stacked for litter or burnt upon the field. The former is the general practice. To Irish reapers we gave from 10s. to 12s. per acre for cutting wheat and from 9s. to 10s. for oats, both crops being bulky, lodged, and cut low.

The operation of mowing wheat is performed differently. Sometimes the mowers follow each other in the same manner as in mowing grass, which is termed "mowing out to the standing corn;" sometimes they reverse their position, turn their left hands to the unmown corn, which is termed "mowing up to the standing corn." Sometimes two or more mowers follow each other, with regular sets of gatherers, binders, and rakers, finishing the work as fast as it is mown. For cutting wheat in this manner, the crop being of ordinary bulk, we paid as follows:—Mowing, 2s. 6d.; gathering, 1s. 6d.; binding and shocking, 2s.; raking, 6d. Total, 6s. 6d. For heavier crops and lodged, as high as 9s. Sometimes, again, the mowers go singly, each taking the particular lands the farmer may think proper to allot to him. We gave the same price per acre on this plan as on the other.

When each workman goes singly by himself, as in the last case, he has two advantages, *first*, the employment of his wife and family if married, or a sister if not; and, *second*, the full benefit of the breadth of swathe which he cuts, which is sometimes considerable, for some mowers cut a much narrower swathe than others do.

It has also advantages to the master: *first*, that men require less looking after, each man's work appearing by itself; and *second*, that when corn is much broken down and lodged, less damage is sustained from the mowers' scythes. When four or five scythes are pressing hard upon each other, with scarcely two strokes between them, a false stroke on the part of the foremost is one to all the followers, so that to go forward, if possible, without regard to threshing or handling the crop is almost an excusable step, at least in the eyes of the labourer; but when going singly, the best plan for the one is the quickest for the other, and which is, to take the corn as it lies, whether it be round about or forward.

For mowing, tying, and shocking oats, we gave the same price as for wheat, the crops being more bulky and lodged. Barley is seldom bound up in sheaves and shocked. It is harvested in the same manner as rye-grass, and costs for mowing 2s. to 2s. 6d. per acre. Mowing tares costs about 2s. 6d.; hooking pease, 3s. 6d.; and cutting or pulling beans, from 4s. to 7s. per acre.

The above prices are all stated exclusively of the allowance of ale and beer already noticed. Instead of ale, money equivalent in value is frequently given per acre. We gave, in one case, 1s. 2d. per acre. Sometimes, again, an allowance of malt or money is given for the whole period of harvest, or four weeks, termed the harvest month provincially. In some districts cider is used instead of ale.

The drinking largely of ale and cider is, perhaps, peculiar to the labouring population of England. The allowance made to them during harvest is no doubt well meant, and, to a certain extent, absolutely necessary, but, like all other good things, the boon has been very much abused in numerous instances. Much more importance has been attached to it by both master and servant than sober inquiry will justify. Hard work requires eating as well as drinking, and that of a peculiar quality. Nothing of this kind is allowed elsewhere.

3. *Root-crops.*—The pulling, topping, and tailing of mangold-wurzel and turnips is best done by the drill, the same as in the case of hoeing. The following are the prices we paid, but stated per acre:—Mangold and swedes, 5s.; globes, 3s. 6d. For filling the load of bulbs, one penny. The weight of mangold-wurzel was 26 tons per acre, swedes about 30. A load of the bulbs of the former weighed 17 cwt., one of the latter about the same.

The prices in the foregoing account of task-work are principally taken from the writer's private cash-book. A great many items have been passed over as being of too trivial a character, or only locally applicable.

HARLESTON FARMERS' CLUB.

At a meeting of the Harleston Farmers' Club, held on the 3rd Oct., the subject for discussion was "Planting Wheat—Thick and Thin Sowing."

The introducer remarked that he thought the subject was one that admitted rather a comprehensive construction; and, with regard to planting wheat, he thought it well for the club to take into consideration the breadth of wheat at present sown, and a little to inquire how far it was advisable to attempt to increase the number of acres planted with wheat in this district, which he believed was now generally cultivated upon the four-course shift—that is, wheat once in four years. Now, having been kindly invited by his friend J. J. Mechi to make a visit to Tiptree Farm, in the month of July, he accepted the invitation, and was much pleased at the handsome reception he (with some hundred agriculturists) met with on the occasion. Here they had the opportunity of witnessing the experiment of attempting to grow wheat in each alternate year, and he must say the crop looked exceedingly promising; and on comparing one of the fields with an adjoining one on another property, the contrast was astonishing, when J. J. Mechi remarked that he had expended only one pound per acre for guano and rapecake upon that field, besides the manure made on the farm, and that the remainder of the wheat crop was treated in a similar way. After viewing the crops they were shown the live stock, which appeared to him quite ample for the occupation, independently of the pigs, of which he was informed there were about 220, and that as J. J. Mechi planted all the land in course for corn with wheat, he purchased 1,600 coombs of foreign barley annually to fatten them with, in order to produce a sufficient quantity of manure on the farm to carry out the system. When they had taken a fair survey of the system, as carried out upon the occupation, they were invited to partake of a handsome cold collation, at the conclusion of which J. J. Mechi went a little into an explanation of his system of keeping pigs, remarking that he was availing himself rather largely of the *benefits* arising from *free-trade*, by purchasing foreign barley, which he was able to do at 22s. 6d. per qr.; and as 6d. per pound was admitted to be a fair price for pork under protection, now that corn was reduced twenty-five per cent., it was easy to see, by the rule-of-three, that meat would bear the same reduction, which would be to 4½d. per pound; and as he could obtain 5d. per pound in London for his pork, he would leave it to those present whether he did not see his money again, and a profit besides, independent of the excellent manure arising therefrom. After a few more remarks the company were invited to enter upon a free discussion, and state their opinions openly upon what they had that day witnessed; but as the steam engine stays for no one, the introducer of this question was obliged to leave by train before the meeting separated; he therefore thought the present a suitable opportunity to enter a little upon the merits of the system before the Harleston Farmers' Club, whilst the subject so intimately connected therewith was brought under their notice; and, in so doing, he had made an estimate of the cost of a crop of wheat, grown instead of barley, upon the system adopted at Tiptree Farm. He wished it to be distinctly understood that he intended no personal allusions to J. J. Mechi, but simply to the system, whether practised by him or any one else, and had therefore prepared the following outline from the data furnished by J. J. Mechi in his remarks at the time above mentioned, including other expenses necessarily attending carrying the system into practice. Allowing wheat grown 40 acres, foreign barley purchased 800 quarters.

EXTRA EXPENDITURE.

	£	s.	d.
800 quarters of barley, at 22s. 6d. per qr...	900	0	0
Carriage from railway station	20	0	0
Grinding and waste, 2s. 6d. per qr..........	100	0	0
Mixing and feeding pigs, at 1s. per qr.	40	0	0
Carting manure from the above for wheat ..	25	0	0
Guano and rapecake, per acre £1	40	0	0
Carriage, commission, &c., on sale of pork, at 6d. per st......................	80	0	0
Interest on extra capital employed, £500 at four per cent.	20	0	0
Total..........	£1,225	0	0

EXTRA RECEIPT.

For 3,200 stones (14lbs.) of pork, at 5d. per lb., allowing 4 stones for each quarter of barley so consumed	933	6	8
Balance to be made up by the wheat crop beyond the usual expense of tillage for barley...........................	291	13	4
	£1,225	0	0

From which statement it will appear that the extra expenditure to obtain a crop of wheat of 40 acres, upon the above system, amounts to £291 13s. 4d. more than is received for the meat sold, which is equal to £7 5s. 10d. per acre above the usual cost of obtaining a crop of barley upon the four-course system; and if we estimate the produce of each to be equal, say 9 coombs per acre, there must be a difference of 16s. 2d. per coomb between the price of wheat and barley, in addition to the risk of extra live stock to make up the extra cost, thus showing a clear loss of £1 per quarter upon the wheat so grown at the present price of barley and wheat—the former at 28s. and the latter at 40s. per qr. He then came to the following conclusion: first, that the change of system would involve the importation of four millions of quarters of barley for each million of quarters of wheat so grown; secondly, the displacing one million quarters of good barley, adapted to malting purposes; and lastly, the overloading a now greatly depressed meat market, by the fattening so many pigs. Then, with regard to thick and thin sowing, he would first observe that there appeared to him to be a peculiar property in the Tiptree soil to induce a tillering of the wheat in the spring, which, if well manured, would admit of a thinner seeding than even the best land in this district; yet he believed that J. J. Mechi was a loser by carrying thin seeding too far, for the wheat evidently appeared too thin upon the hills where it was most exposed. Now, with regard to his own practice, he had found no reason to depart from his usual course—that of planting about eight pecks per acre, in rows about 7¾ to 8 inches apart, which distance admitted a current of air between the rows sufficient to strengthen the straw at the time of tillering for the ear. He then read a statement of the results of an accidental double planting of wheat in 1847; which being an unfavourable year for thin planting, resulted in favour of nine pecks planted against seven pecks per acre, of £1 2s. 3d., and in favour of the sixteen pecks planted against seven pecks per acre of £1 4s. 4d., after allowing for the difference in the cost of the seed so planted.

The CHAIRMAN (who is a large and high farmer) remarked that he did not think it possible to grow nine coombs per acre of wheat in each alternate year for any lengthened period, even by going to the expense stated by the introducer of the question; besides, we should then displace one of the most important of our crops, that is, the barley crop, and we now had more meat go to market than we could sell so as to be remunerative.

Several other members expressed an opinion that it was not advantageous to attempt to grow wheat more than once in four years; some of them suggesting that it would even be better to reduce the number of acres under cultivation for wheat by growing it only once in five years, now the price is so unremunerating.

The following resolution was then unanimously adopted:—

RESOLUTION.—"It is the opinion of this meeting that the breadth of wheat planted cannot be increased without incurring an increased loss; and the system, as conducted by J. J. Mechi, of planting wheat in alternate years, is decidedly erroneous. And with regard to the quantity sown in this district, it cannot be safely reduced; but that there is an advantage in an increase of the distance between the rows from six inches apart to eight inches."

WALLS FOR FRUIT-TREES, PROTECTING THE BLOSSOMS, &c.—Your correspondent, G. Dawson, in the *Journal* of Sept. 29, directs the attention of the gardening public to a subject of great importance to every one, from the amateur that has only a single tree to the general cultivator; the loss of a crop being the source of great disappointment, which in our uncertain climate is a thing of no rare occurrence; so, at the close of one of the worst of fruit-seasons, which was caused by a few severe nights in spring, a few remarks on the protection of tender fruit-trees may not be misapplied, it being a subject that has received a considerable share of my attention. I have seen fir-branches applied, and an average crop obtained; but their use is objectionable, as they exclude a certain amount of light, which is one of the prime agents in producing both well-developed blossoms and leaves, the greenness of the leaf depending on the amount of light that strikes it; consequently, branches cause a degree of tenderness which renders them unfit to stand severe changes, such as we often experience. Protection by straw-ropes I consider preferable to branches; but to a certain extent they possess the same disadvantages—namely, the exclusion of light—but, by being placed at a greater distance from the trees, not to such an extent. All fixed protections are objectionable, except coping-boards, it being only on certain occasions they are required; and when not requisite, they are undoubtedly more injurious than serviceable, as they intercept the vivifying actions of light and heat—two valuable agents in our northern climate, where atmospheric changes are so frequent. Means ought to be available for turning them to the best account, which cannot be done by fixed coverings. Coping-boards are valuable appendages to a wall, as they protect the trees from frost, and intercept the radiated heat from the earth and wall, by which means a warmer temperature is supplied to the trees; but they are in general too narrow, and, although they are serviceable for the above points, they are of no service as protectors from cold, cutting winds; consequently, they ought to have rolling shades attached to them, with proper means of securing them at a certain distance from the bottom of the wall. They should be made of either light canvass or strong calico; and, being perfectly under control, they could be used as easily as a common frame-sash when circumstances required them. Their use in protecting the tender blossom from cutting winds and heavy showers would be most serviceable; cold, cutting winds being very injurious. They increase the amount of evaporation to a great extent; and anything that tends to diminish the amount is efficacious. The dew-point has been known to be as low as 30 deg. below the temperature, in spring. The effect of such a degree of dryness, accompanied by wind, is very destructive to vegetation. Walls are not sufficient to meet this evil, as they only attract heat and again radiate it into space: hot walls have not even the desired effect, if not aided by some covering. The injurious effects of wet upon the fertilizing power of the pollen is well known. "Pollen will not produce its impregnating tubes when the air is charged with moisture" (Theory of Horticulture, page 177). And again (page 178): "In wet springs the crops of fruit fail, because the anthers are not sufficiently dried to shrivel and discharge their contents, which remain locked up in the anther-cells till the power of impregnation is lost." So, by protecting them from its evil effects, one of the great obstacles would be overcome. Another advantage of shades would be to protect the trees from the injurious effects of the morning sun, which, after a slight frost, is most direful in its effects.—W. ELLIOT, Chiswick.—The Gardeners' and Farmers' Journal.

THE NEVV AND ADMIRABLE ARTE OF SETTING OF CORNE*.

WITH ALL THE NECESSARIE TOOLES AND OTHER CIRCUMSTANCES BELONGING TO THE SAME: THE PARTICULAR TITLES WHEREOF ARE SET DOWNE IN THE PAGE FOLLOWING.

ADAMS TOOLE REVIVED.

Magnus Deus in minimis.

Imprinted at London by *Peter Short*, dwelling at the *signe of the Starre on Bredstreet hill.*
1601.

THE CONTENTS OF THIS BOOKE.

THE NEW FOUND ARTE OF SETTING OF CORNE.

CHAP. 1.

How this Inuention began.

Heere I maie rather probablie coniecture than certainly determine howe this newe conceit in setting of graine began. Happily some sillie wench hauing a few Cornes of wheate, mixed with some other seed, and being carelesse of the work shee had in hand, might now and then in steed of a Raddish or Carret seede, let fall a wheate Corne into the ground, which after braunching it self into manie eares, and yeelding so great increase, gaue iust occasion of some farther triall. Peraduenture the great and rich fertillitie that doth vsually happen in the setting of beanes and pease, might stirre vp some practising wit or other to make the like experience in wheate and barley. Or who knoweth whether that Enigmatical marriage betweene *Bacchus* and *Ceres* so closely couched in such figuratiue termes by *Iohan. Baptista Porta*, in his *Magia naturalis* in the perclose of his title, *de nouis plantis producendis*, might giue some light vnto this new and late inuention of ours. And lastly I haue beene credibly enformed that this manner of pricking in of Corne, hath by the publike impression of an ancient writer (whose name I cannot yet obtaine) euen in plaine and naked termes been long since discouvered and manifested to the view of each reader. But it shall not greatly skill from whence this profitable deuise had his first beginning (although for the honour of my countrie, I could wish the same were fronted with the name and title of an English Authour) and that as it hath pleased the great God of heauen in his vnspeakeable mercie and loue, and in these times of dearth and penurie, to offer a most plentifull encrease of our best nourishing, Manna vnto vs: so that we may in all duetifull manner, with one heart and voice together, give all thankes, honour, and praise vnto so great and bountifull a benefactor, whose name is glorious in the heauens, and whose mightie power extendeth it selfe ouer the face of the whole earth, *cui laus in sæcula sæculorum. Amen.*

CHAP. 2.

The reason why Corne doth shoote vp into so many eares rather by setting then sowing.

The consideration hereof maie well deserue to be handled in the second place, in my opinion, both *quia turpe est Philosopho quidquam sine ratione proferre*, as *Tully* holdeth: and also for that it is a principall motiue to stirre vp a number of drowsie wittes to the practise hereof; who not as yet finding or conceiting any sensible reason for the same, are rather content with the fly-bitten and lean iades, to liue or starue vpon the bare common, then by seeking out of better pasture, to gather more flesh

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* We have been favoured by our friend Mr. Nesbit with a copy of this work, published in the year 1601, nearly two-hundred and fifty years since, and of which a few *fac simile* copies have been reprinted by Rd. Prosser, Esq., of King's Norton, near Birmingham, a gentleman who takes much interest in agricultural matters, and who displayed much discernment in bringing to light this work, from which it will be seen that some of the "wise saws and modern instances" in agriculture are of ancient date. At this season of the year, when attention is necessarily directed to wheat sowing, and the "thick and thin" question, the dibbling, drilling, and broadcast systems, depth of seed-bed, comparative merits of plough and spade husbandry, will occupy men's minds. Some notion of the schemes of the "agricultural improvers" of 1601, may be useful, and cannot fail to be interesting.—[ED. F. M.]

vpon their backes, and to grow in better liking in the sight of all that shall behold them. Such winter Corne then as is vsully sowne before or about Alhallownetide, in my poor reason, must of necessitie loose a great part of his generatiue vertue, and radicall humiditie, both by the extreme nipping of the colde Northren and Easterly windes, and the bitter frosts and hayle, together with the great aboundonce of the colde raynie showers, which in the Winter season do so plentifully attach and fall vppon the Graine, lying then eyther naked and bare to all weather, or verie slenderly clothed with a poore and thinne garment, not able sufficientlie to defend the inwarde and secrete fire of nature, from such outward and piercing enemies; yea, though it haue taken roote, and gotten some head before this boysterous weather do happen, yet by reason that the roote is shallowe, and hath taken so slender holde in the grounde, eyther the inwarde *Balsamum* is washed awaie with moysture, or nipped with extreme colde, that it cannot possible send forth so manie spyring stalkes and eares as naturallie it would; besides the earth being full of clods, and not sufficientlie broken into a fine moulde with the Plough, the Corne cannot so easilie and plentifullie by this attractiue nature drawe for his owne nourishment such store of that vegetatiue salt from the earth, as it desireth; the vertue and strength whereof is more at large handled in my Booke of husbandrie, printed Anno 1594. and in that learned discourse of M. *Bernard Palissie*, in his Booke intituled, *Des eaux & Fonteines*. But on the other side, when as the cornes of wheate shall lie so deepe within their true and naturall bed, euen their owne mother's belly, the earth being made so hollow and open with the spade, whereby they may also draw sufficient nourishment at their pleasure, then are all these outwarde and iniurious stormes of haile and raine, so sufficientlie defended by this armour of proofe, as that the Corne hauing his true and naturall putrifaction (being not perfourmed without the helpe of a kindly heate) doth afterwards in his due season bring forth that infinite multiplication, whereof we haue had so manie and rich experiments of late, far beyond all the hopes and haruests of all our predecessors.

Chap. 3.

The manner of digging and laying of the arable grounds in this new practise.

When and how to digge, weed, or trench your grounds with the spade, is a matter so triuiall and well knowne already to euerie countrie *Coridon*, as that I hold it not a fit subiect for a Scholers penne, and therefore here I must refer you to those beaten pathes, wherein euery simple Gardener hath walked a long time: onelie the depth of digging, and true laying of the grounde, seemes to be materiall in this our new kind of husbandry. Some in this late practis, by their experience, commende the breaking vp of the grounde a foote and a halfe deepe, and some two foote, and some but one foote; but in my opinion since that, three, or foure, or fiue inches at the most is a sufficient depth for the Corne to lie in, I see no reason but that eight or twelue inches more, is a depth sufficient for the Corne to roote in. This being graunted, then shall you haue this farther benefite ensuing, that at the next Breaking vp and digging of your grounde, you shalle turne vppe such moulde, as hath not spent his strength in the former croppe, the fruite whereof you shall find in the next haruest. And heere I must of necessitie acknowledge that M. *Tauerner* in his Booke of Experiments, concerning Fish and Fruit, being of this yeares date, hath bereaued me of one of my best obseruations in Orchard grounds, the ignorance whereof I holde to be one of the speciall and principall causes that so manie of our English Orchards doe never yeeld fruite answerable to our charge and trauell: the secret whereof is this brieflie. Euery ground hath naturallie an vpper crust of earth, which by the liuelie and viuifying heate of the Sunne, the comfortable nature of the Aire, together with the congelatiue part of the raine (for so M. *Barnard Palissie* termeth it, being the first Author of a fift element) which often falleth vpon the ground, is made more rich and fruitefull than all the residue of the earth besides, which vpper crust in some ground is a foote, in some two, and in some three foote deepe, and in some not aboue halfe a foote. And vnder the same vpper crust is either a hote chalke, a drie sand, a barren grauell, or a colde leane claie or lome, or such like. It is therefore requisite that you set your young trees in such sort, as that the root may runne and spread within that vpper crust; and if you set them deeper, they may happily grow, but neuer bring forth fruit in any plentifull manner: nay, though the earth should consist of one and the selfe same veine, and of one colour and nature in shewe, yet because the Sunne doth not giue his impression nor digestion vnto the earth, but to a certaine depth (which I guesse not much to exceede two foote), you shall finde that all the rest of the mould vnder that depth will be leane and hungrie, not hauing anie strength or fatnes in it. And this is the reason why such earth as hath beene digged out of vaultes and Cellers, not hauing receiued anie life or comfort from the Sunne beames, though of neuer so blacke and rich moulde in outward appearance, if it be spread vpon garden grounds, doth make them vtterly barren and vnfruitfull. That which is heere spoken of Orchard groundes, I would haue all wise and skilfull husband men to applie also to their Corne grounds, that in anie case they neuer digge deeper with the spade, then the strength of the ground will beare, and so by their ignorance discredite a worke and practise of so great expectation. Now concerning the laying of your groundes, eyther in ridges and furrowes, or in a declining leuell, whereby the raine maie haue a sufficient conueyance, after they haue once receiued their due moisture from the cloudes: this resteth in the discretion of the husbandman, who best knoweth the moisture or drynesse of his owne groundes, and accordingly may giue such a current vnto them, as may best fit the seuerall natures of each ground or soyle. And heere I maie not omit that ease and speed in breaking vp of groundes, which some of our late practisers haue found out, by making the first entrance with a deepe cutting plough, and then pursuing the same with the spade, whereby much charge, labour, and expence of time is auoided.

Chap. 4.

The seueral instruments for making the holes for the graine, and couering them.

It is an olde saying, that hands were made before kniues: and I doubt not, but the same may as well be verified in tooles. For to my remembrance, the first man that euer attempted the setting of corne, made the first holes with his finger. But this course being afterwards found to be very long and tedious, an instrument was deuised, hauing many teeth or pinnes, like a rake, with a staffe fastened in the middest of the backside thereof, which being thrust into the ground, did at one instant make twelue or twentie holes more or lesse, according to the number of teeth or pinnes therein. Afterwardes this toole was also disliked, as not making sufficient riddance of ground, and in place thereof a boord of three foote or thereabout in length, and twelue or ten inches in breadth, was thought vpon, hauing diuers holes boared therein, according to such distance as euery particular man best fansied, through each of which holes a wodden dibber or pinne was thrust into the ground, being of the bignesse of one's finger, and of three or foure inches in length, having a shoulder or hole with a crosse pin, to keepe one self same certaintie in the depth of each hole. The last deuise that as yet hath come to my view (but now reiected, because in the drawing out of so many pinnes the holes doe choake) is a boord of the same largenes with the former, driuen full of round pinnes of three or foure inches deepe within the boord, and placed each from other in equall distance by a true proportion, which at one impression maketh so many recepticles for the corne, as there be pinnes in the boord. These boords are directed by a Gardiners line, first strained to some reasonable length, or by the eye, and thereby a straight course is kept in the setting. When each hole hath received a corne, then must you rake ouer the ground to fill vp those holes with earth againe: and during all the time of setting and raking, you must stand or kneele vpon one of your boords, which you must remoue from place to place, as your setting and raking from time to time requires.

Heere for the satisfaction of the simple, I haue thought good also to set downe tne length of your boordes, together with the true boaring of them betweene each hole: and therefore if you haue fiue inches distance, then may you, in a boord of ten inches broad make two rowes of holes, the first and last hole being two inches and a halfe from each other, and if the length thereof be two foote and eleuen inches, then may it well containe two rowes of holes, hauing seuen holes in euery rowe, the first and last hole being distant from each end two inches and a halfe: and when the ends or sides of two such boords so bored, shall bee laid together, they will make a true continuance of one selfe same skantling and distance of fiue inches through all your workes: if you worke vpon foure inches, then leaue at each side and end of your boord two inches: and so in a boord of three foote in length, and one foote in breadth, you shall haue nine holes in each rowe one way, and three holes the other way.

And it is to be remembered that euery two workemen (whereof the one maketh the holes, and the other setteth the grain) must have two boords to work vpon: and yet some be of opinion, that one man may performe both the works.

Chap. 5.

At what depth and distance your corne must be set.

I have beene enformed that the obseruation of three inches deepe, and three inches distance, hath brought forth 30. quarters of wheat vpon one acre of ground, and that foure inches in depth, and foure in distance hath yeelded but twentie quarters: happily the ground or the seede corne might make the difference. Some speake of five inches deepe and fiue in distance, with exceeding great increase: the true finding out of which proportions may easily be obtained by seuerall trials made at seuerall depths and distances together, at one time, and in one selfe same peece of ground. Only heere I must remember you of that which was spoken of before, in the title of digging, chap. 3. that concerning the depth, you must have an especiall care that your seed may lie within the rich crust of the earth, and that his bed wherein he lyeth may also be of the same goodnesse, or else the plough will decredite the spade.

Chap. 6.

Whether it be good to fill the holes with common earth, and to prepare the seed before it be set.

If the ground be a rich and kindly wheate grounde, you shall find a sufficient increase by filling them up with their owne proper mould : for so have the greatest and most vsual trialls beene hitherto made alreadie ; yet some pregnant wits, desirous to exault nature to the highest degree of perfection, haue attempted the filling vp of those holes both with Pigeons dung, sheeps dung, and cow dung, and such like, but with no good successe at all, *quære* if this dung had been first rotted into perfect earth and then bestowed. Neither doe I see any reason in fat and lustie grounds, why any further encrease should bee sought for then hath been found already, for that the earth is not able to carrie a greater burthen then she hath borne of late by these vsual practices which haue been made. But in barren and spent grounds, it were greatly to be wished, that by some artificiall and cheape meanes, a plentifull croppe of corne might be had and obtained. For the better furtherance whereof, I leaue these few conceits to the fauourable consideration of those, whose farmes are greater than mine, and haue had more familiar conference with nature then my selfe, referring them also farther both vnto the literall and secret sence of my booke of Husbandrie before mentioned. And here I thinke it not amisse to cite in the first place that learned and poetical Husbandman, who in his first booke of his Georgicks hath these Hexameters.

Semina vidi equidem multos medicare ferentes
Et nitro prius, & nigra perfundere amurca:
Grandior vt fœtus siliquis fallicibus esset,
*Et quamuis igni exiguo * properata maderent ;*
Vidi læta diu & multo † specata labore
Degenerare tamen : ni vis humana quotannis,
Maxima quæque mana legeret, &c.

Here we see Sal niter and the mother or Lees of oyle commended ; but whether *Virgill* doe mean a steeping or imbibition of the grain in the Lees of oyle, wherein there hath been a solution of Niter, or the corne onely sprinkled ouer with them both in the setting ; it is left to the consideration of the reader. But howsoeuer he intend the same, our countrie doth neither afforde store of Niter, nor yet of Amurca, to performe many (if any) acres therewith ; and though it did, yet it would proue a worke of greater charge and trouble (as I suppose) then would be endured : vnlesse it were in some small practise, and for the triall of a magisterie, or vpon some richer seede then wheat, which in lesse quantity would proue more profitable then any ordinary graine, whereof there are sume fewe of English breede, if I bee not deceiued.

But now let vs leaue *Virgll* to his poeticall vaine, and let vs come to that glorious Neapolitaine *Iohan. Baptista Porta,* who expecteth a generall applause of the whole world, for his last and learned booke of *Magia naturalis* (as in his preface to the reader, by a recapitulation of all his infinite readings, charges, and conferences with the greatest clarkes of his time, he would intimate vnto vs) and washing our eyes first in Eyebright water, let vs see whether we are able to pierce and penetrate into these thicke and foggie clowdes of skill, which he hath in so many close and figuratiue termes (as willing to vaunt of his owne wit, but vnwilling to benefit others) so strangely deliuered vnto vs. I finde in the latter end of his thirde booke, entituled *de nouis plantis producendis,* and ouer the 21. chapter, this superscription.

Quomodo frugis satis amplo fœnore ex satu colligamus, & e vineis vinum.

Whereupon he discourseth in manner following : *Vt luculentam, satisq. exoptatam coronidem huic nostro libro imponeremus, docebimus quomodo frumentacea, & legumina satis amplo fœnore e satu colligamus, & e vineis vinum. Res profecto immensæ vtilitatis, vt ex vno modio plus centuplo proueniat. Sed ne quis, quod centuplum plus accipiet, dixerim, putet velim hunc exactum modiorum numerum ex vno sato collecturum: nam anno, cœlo, solo, & syderibus renuentibus, minor erit collectio, sed non tam minor, quin quintuplo vsitatum non superet ; at his fauentibus, ex vno modio centeni quinquageni reddentur. Sed policitatio hæc nostra aliqvibus paradoxum videbitur, sed si sanæ mentis essent, maximum profectio videri deberet paradoxum, cur ex sato semodio ducentos modios non recipiamus, quum ex sato, & concepto acino, videamus radicem in multiplices & numerosos culmos fructificare, plus minus quindecim, & in spica sexaginta grana contineri? mitto By Zacij Africæ solum Plinij, quod vno grano quadringenta paucis minus germina miserit, misitq. ex eo loco procurator Neroni* CCCXL. *stipulas ex vno grano. Sed causam venemur, vnde id accidere possit. Sunt qui dicant id euenire, quod pars maior iacti frumenti ex volucribus, talpis, vermibus, alijsq. subterraneis animalibus deuoretur. Sed id falsum arguitur, quod ex sato lupini modio non plus minus quindecim recipiuntur, quin lupinum impune iaceat derelictum, abomnibus animalibus sua ingrata amaritudine tutum, & suis in thecis, vaginulisq. plus minus centum grana contineantur. Sunt alij, qui id cœlo ascribant, frigorum, calorumq. iniurijs, vel imbrium frequentijs, vt nunc torpeant gelu urua, nunc siti infestentur, nunc in herbarum*

* Cito coquerentur.
† Probata.

copiam luxurient, nunc macie intabescant; sed hoc falsum congruit argumentum, quod ex maximo cœli fauore, neque ex vno triceni redduntur. Sed ne latius euagemur, dicimus non omnia spicæ & vaginulae grana nasci, nam alia Deus ad escam animalium, alia ad semen destinauit. Sunt in spicis grana, quasi abortus & degeneres fœtus, quæ non fœticant sed desciscunt in vitium. Sunt quae e glumis in spicis emicant habitiora, quae ad propagationem producuntur. Praeterea nec debito tempore feruntur, destituunturq. debito agricolarum opere: vnde si his obuiabimus; omnia ex voto succedent. Semina enim prolixioribus radicibus implexis, longe lateque sub tellure serpentibus, numerosiores culmos depromen, circumundiq. spicis vallatis. Sponsa ergo suo viro ducatur, non ex primis vel vltimis natis sed e medijs, quia imbecillis sunt, ac balneo secreta & vnguetis delibuta & pingui depasta caprarum veterum Vulcano, & Baccho associata cubile molle & optime stratum calefiat; viuifico enim calore in amicam naturam coeunt, & dulcioribus amplexibus stringuntur & haerunt. Sic animata viro semina, non degenerem, sed legitimam prolem donent. Suo faecundo lumine Luna praesit, nam ferax feracem reddit, id restat praemonendum, vxorem Baccho ducendam non capillis destitutam, nam suo decore capite destituto spernitur a vira sponsa, neque haberet, quo noxia purgaruntur, sed solum cincinnis orbetur; sic enim minus compta, plus suo placebit & viro. Which for the better vnderstanding of such as are no Latinists, I haue thought good to translate into our naturall language as followeth.

How by setting and planting of Corne or vines, a great and plentiful increase may be had.

That now at length, according to mine owne desire, I may shut vp this booke of plantes with a most famous and renowned conclusion, I will heere declare how all kind of corne and pulse, together with the vines themselues shall recompence all our labours with great increase. A matter without all question of singular profite, to receiue more then an hundred bushels for one. But least I bee mistaken in this great proportion, I would not haue any man to thinke that I doe heere set downe anie exact number of bushels, from which nature can at no time varie: for if the yeare, the heauens, and the ground itselfe, together with the fatall influence of the starres, doe all conspire together, the number of our bushels will fall short, but neuer so short but that they will by fiue degrees exceede the accustomed yeeld. But if all these concurre and affoord their seuerall fauours, then may we wel expect 150. bushels of one. But this proud promise of ours may happily seem a paradoxe vnto some, vnto whom, if they were of any sound & sharpe iudgement, it should rather seeme a greater paradoxe, why halfe a bushell should not rather giue 200. bushels againe, when as we doe often see, that one corne being set and well rooted, doth stemme vp into diuers stalkes, yea sometimes to the number of fifteen, more or lesse, each eare also containing threescore Cornes within it. I do here omit to speake of Byzatium, that fruitfull gronnde of Africa, whereof *Plinie* maketh mention, where out of one corne foure hundred stalkes did braunch: and the Gouernour of that place did also send to *Nero* 240. stemmes arising from one graine. But let vs seeke out and hunt after the true reason hereof. Some be of opinion, that the cause why the same Fertilitie doeth not happen in our vsual and ordinarie manner of Sowing, is, for that a great part of the seede which is sowne, is deuoured by the foules of the ayre, by Moles, woormes, and other creeping Creatures within the grounde. But this is manifestlie disproued in the sowing of Lupines, whereas seldome we doe reape little more or less than fifteene bushels for one, although the same be so bitter a kinde of pulse, that none of all these deuouring Creatures will once touch it, but lyeth safe within his hose each Codde containing much about an hundred Graines: some attribute the same vnto the Heauens, and the iniuries arising of heate, colde, and continuall showers of rayne, that doe often happen; so as sometimes the groundes are benummed with frostes, and sometimes parched with heat, sometime they make a rich & fertile shew, and sometimes they wither and waxe barren; but all this is easilie conuinced. For that admitting the Heauens do affoord all their fauourable influences at once, yet do we scarce obtaine at anie time thirtie for one. But now to come neerer to our purpose, we do affime that each Corne that is founde within the eare is not apt to growe, for God hath created some of them for the foode of liuing Creatures, and some for seed Corne. There be in euery eare certaine abortiue and bastardly Cornes, which will neuer fructifie, but become vtterly vnprofitable; and in some eares there are Cornes which are more beautifull to behold then the rest, which nature hath ordayned for propagation. Besides all this, the seed it selfe is not alwayes sowne by the Husbandman in his due time, neyther hath it all his due rites and ceremonies perfourmed. So that if wee can meete with all these imperfections and errours, then will all good successe follow, according to our owne heartes desire. For the rootes being large in spreading vnder the grounde, and each embracing other in theyr manifolde wreathinges, will thereby send foorth a greater number of stemmes, besette and garnished with eares on euery side. For the better accomplishment whereof let the Bridegrome make choyse of such a Wife as is of the middle sorte, and not of the first or last borne, because they are of a weaker constitution, let them both goe into a warme bath, and there annoynttng themselues with sweete oyntment, and with the fatte foode of olde Goates, being mixed with *Bacchus* and *Vulcan*; let theyr soft and euen layde bedde bee gently warmed: for by that viuifying heat they will vnite themselves in an amiable manner, and bee knit and ioyned together in most sweete and louing embracementes: and the seede beeing thus quickened by the powerfull heate of the man, will in the ende bring foorth a kindly, and no bastardly issue: Let the Moone bee propitious with her prosperous light, for shee beeing fruitefull, will also make the same to fructifie the better. But yet I must admonishe you of one thing more, that such a VVife is as fitte for God *Bacchus*, must not be balde and without haire, for so wanting the due Ornament of her heade, shee might happilie bee despised of hir Husband, neither should shee haue wherat to purge her owne excrementes, onelie let all curlings and perriwigs bee laide aside, that so being the more retchlesse in hir attire, shee maie seeme more pleasing and acceptable to hir Husband.

And what if all this mystical marriage betweene God *Bacchus* and the Goddess *Ceres* (at the solemnization wherof onelie *Vulcan* and *Luna* were present, as though neyther *Saturn, Iupiter, Mars, Sol, Venus,* nor *Mercury* nor the rest of that Celestiall crewe were neyther woorthie to dyne nor dance at the VVedding:) what, I saie, if all this great mysterie or Magisterie of nature, as *Baptista Porta* woulde haue it to appeare, bee nothing else but a soking of Corne in VVine, or in the newe must thereof, before it bee set? Might not this without the prophaning of Nature, or her sacred Maximes beene safelie and without offence in playne termes deliuered to the publike viewe of the worlde? But let vs examine the particulars of this Parable. The VVife (he sayth) must neither be of the first or last, but taken out of the middest: and heere, because hee shall bee his owne expositor, I referre you to his secrete for enlarging of the Gourde, pag. 137. where he citeth these verses out of *Columella*,

Siue globosi,
Corporis atque vtero nimium quae vasta tumescit
Uentre legas medio, sobolem dabit illa capacem.

And this (saieth *Porta*) is not only to be obserued in this plant, but in all others likewise, for those seedes which are contayned within the middest of the bulke are more perfect themselues, and bring foorth more perfect Plantes than those weake and imperfect ones, which occupie the outermost places, and so the Graine, he saieth, in the middle of the Eare bringeth forth a larger Corne than those which grow in the top or bottome thereof.

Concerning the Bath and oyntment wherein *Vulcan* and *Bacchus* are vsed, I thinke he meaneth some fat temper made with Cow dung or Goates dung, the older the better, moystened with Wine or new must, whereby *Bacchus* is signified, in whome the secrete fire and heate, which hee holdeth, may also resemble *Vulcan*, vnder whose name fire sometime is signified, as in that saying of *Paracelsus, In Vulcano veritas*: and in this compound the goddesse *Ceres* is lapped before she be set into the ground; or else the ground and mixture are after watered with Wine, or else the Corne is first steeped a certaine time in Wine before the Graine is bestowed in the earth; any of these constructions seem probable, and to haue some affinity with his figuratiue tearmes.

Her bed must bee very soft, and delicately made, whereby he doeth manifestlie insinuate the very digging with the Spade, which worketh the moulde into a most fine and subtill bodie: the warming of the bed, and those sweete collinges and clippinges together are intended to be wrought with the moystning heate of *Bacchus*. It seemeth also that he would haue this setting perfourmed in the increase, or towarde the full of the Moone. The Corne hee would haue to bee set together with his chaffe about it, which he termeth the hayre, whereby Nature purgeth the excrement of the head, but not with the beard of the eare, which hath a curled kinde of Graine upon it. Let this satisfie, that I haue aymed at the marke, the pinne being so farre off, and cleane out of sight. But what should we vexe our spirites in beating out the sense of this mysticall Latine, when as without all other circumstance, wee see that one Corne pricked into the grounde bringeth foorth eight hundred Cornes at once, whereas *Porta* speaketh of two hundred onely at the most, euen when Heauen and Earth doe all ioyne hande in hande together to helpe this inuention? And who knoweth whether hee mistake the reason of his owne conceite, for happilie the mellowes of the grounde being opened and broken with the spade, did of it selfe performe the great woonder which he writeth of, and then both *Bacchus* and *Ceres*, and *Luna* may haue Iacke Drums entertainment.

Now if I were also disposed to attire and disguise a plaine secret in his figuratiue Robes, what a deepe and drunken riddle coulde I heere set downe of steeping Barley or wheat in new Ale in cornes (although I hold the wort, so it be of the first tap, to be much better) for this doth seeme to be his owne naturall Bath, whereby it should receyue a multiplying vertue in his owne kind? I feare to prosecute this secret any farther in such Philosophicall termes, least some Nouice in Alcumy should suppose that I doe goe about to vnfolde and disclose the sacred Materials and working of the Philosophers Stone, and yet to speake in good sooth, I durst vndertake to perfourme as much with Ale or Beere as *Bap. Porta* shall do with his Sacke and Sugar, or Claret wine and Limons, let him make his choice.

And because *Uirgil* hath spoken of Niter, I haue thought good also, as a Parallel to the same out of M. *Bar Googe* his Booke of Husbandrie, fol. 33. b. to set downe the steeping of Beanes in the water wherein Salt Peter hath beene dissolued, and wny not other graine and pulse, as wel as Beanes? And thus you haue Rome and Naples answered with Surrey & London, I praie God all maie bring forth one good conclusion for our Commonwealth of England.

But why should we spend these costlie liquors that are fitter for Tauerns and Alehouses, then for rusticall imbibitions? when as with common water and the dung of cattell, especiallie of Oxen, Kine, and Sheepe, or Pigeons dung (whereof more quantitie, with a great deale lesse charge (being not much inferior in effects) maie so easily be had & obtained.) Then heare me with patience, & if I happen to slip, staie me with a friendly hand, & so happilie I maie saue some of you from manie a dangerous fal. There is a great opinion conceited, yea publikely maintained by good Authors in their seuerall bookes about imbibition of corne in some fat and fructifying liquors; but neither the strength of the liquors, the time of imbibition, nor the proportion betweene the liquor & graine, hath as yet bin thoroughly sounded, naie scarcelie touched by anie; which three pointes I holde to bee so materiall, as that without the knowledge of them all in some good measure, nothing else but clamors against the writers, and errors in the practizers are like to ensue.

And first concerning the strength of your liquor vpon your dung, you cannot lightlie erre, so as you let the same rest vpon a sufficient quantitie thereof, until it haue gotten a deep colour, and a strong smel & sauour from his ingredient: as suppose you put two parts water to one third part of dung, suffering the same to infuse foure or fiue dayes, and stirring the same once or twice every day, till it haue gotten out al the hart & strength of the dung, or so much thereof as the water is able to receiue; then after some setling, strain this liquor through some course cloth, & if it wille not run then adde more water vnto it; for heere your speciall care must be that, your liquor do not grow too thick: after al this, let the same repose 12. or 24. houres, and then gently dreine away the cleere from the groundes or feticall residence, and so haue you a liquor sufficiently prepared to steepe your corne in: & for the better performance hereof, you may boare a hole within an inch of the bottome of the vessel, or halfe an inch, according as you shal see ye same to run cleere & not muddy into your receiuing vessel.

And as for the time of imbibition, it is a rule in naturall Philosophie, that euery thing hath his stomacke, which doth neuer leaue drawing & attracting vnto it selfe such matter as is apt for it, vntill it be glutted; and then, as being ouer-charged, it lotheth and spueth out euen that which otherwise it most desireth: as it doth manifestly appear in the stomacke of man, wherein by ouergorging it self a *Nausea* doth presently ensue. This is yet made more manifest in the art of dying, where, if in your blewes and greenes you worke with Indico, or in Stammels, Crimsons, Carnations, or Scarlets, you work with Greine or Kutcheneele, the cloth when it hath receyued his glut of colour, though neuer so often dipped after, will nothing at all exalt itselfe in beautie or richnes of colour; euen so it fareth with Corne, after it hath imbibed so much liquor, as it can well beare and brooke without breaking of the Hull, then is it time to dreyne awaie the VVater: and yet wee see, that Pease, though tney bee steeped till they sprowt a little, that they will growe notwithstanding, I leaue the aduenturing of Wheate and Barly so farre vnto them, that list by often and manifold trial to search for the period of this practise.

Lastly, for the better finding out of a true proportion betweene the corne and your liquor: first, put your Corne in the Vessell, and adde so much of your fat liquor vnto it as will couer the same. And if the corne drinke it up, then adde more liquor thereunto: and the onelie feare in this worke, is least if you ouercharge your Corne with water, that the water wil rather drawe the strength from the Corne, then the Corne drawe strength from the water.

And thus I haue discouered the true vse of all imbibitions: which haue hitherto beene confirmed by some, and condemned by others, each seuerall man reporting according to his owne experience. But the errours may from henceforth bee easilie preuented by a carefull obseruation of these fewe rules alreadie deliuered in as playne and simple a manner (as respecting the generall good, which was the *primum mobile* of this discourse) I could possibly deuise or publish.

Here I thinke it not impertinent to our purpose to set downe seueral meanes for the enriching of ground, the trials whereof, by waie of imbibition, I referre to each mans particular experience.

Sea Kilps and Sea Tangle, and other Sea weeds are founde by experience to enrich both Arable and Pasture grounds exceedinglie. Shreds of Woollen cloth strewed vpon Pasture grounde will bring foorth grasse abundantlie.

The dregs of Beere and Ale applyed to the rootes of Trees, and other smaller Plantes, will make them flourish and prosper mightily, Seeds steeped in brine, proportioned according to Sea water, which consisteth of one part salt, and eigteene or twenty parts water, wil in diuers grounds procure a good increase.

The Soote of Chimnies, both ingendred by Seacoale, as also by Wood and Charcoale in a very small quantity, worketh great effects this way.

There is a salte which the Petermen vpon the refining of their Peter, doe separate from the Peter, this salte (if I bee not deceiued) is the Salte purchased from the Ashes, vpon which the Petermen powre their foggy liquors to cleere them; one worke (vnlesse it be a great one) doth not yeeld much aboue a bushell thereof weekly: this salt, I take to be a true vegetable salt, and therefore exceeding profitable, either to be strewed vpon grounds to be mixed amongst the seed Corne, or for inbibition.

Shauings of horne, upon mine owne experience, I must of necessity commende, by the meanes whereof, I obtayned a most flourishing garden at Bishops hal, in a most barren and vnfruitfull plot of grounde, which none of my Predecessors could euer grace or beautifie either with knots or flowers.

I haue had the like experence with singular good successe by strewing the waste sope ashes vppon a border of Sommer Barley, whereof three eares would haue counterpeized any fine that euer came to my sight: you may see a plentifull discourse of these sope ashes in my booke of husbandry.

Some commend greatly the watering of Grounde presently after it is sowne, with an artificial Brine, consisting of an eyghteenth or twentieth part of salt: this is performed by a hogshead or some other such like vessel drawn upon a sled, hauing one of the heads boared full of small hoales like a watering pot.

The residence or grounds of the Oad fat, serue also to enrich ground with.

Malt dust may heere also challenge his place: for foure or fiue quarters thereof are sufficient for an acre of ground.

The Hulles which are diuided from the Oates, in making of Oatmeale, either in theyr owne present nature, or being burnt to ashes, make an excellent substance for enriching of ground. Fearne either rotted to dung by a mixture of earth amongst it, or consumed with fire into ashes, maketh a singular soile to lay vpon barren and hungry grounds.

VVhen the Iron stone or Oare is burnt, those fyne Ashes that are sifted from the same, do prooue a most excellent substance for the enriching of wette Meadows, or Marishe Groundes, especiallie such as are rushie, flaggie, or sedgie, and will bring the same to a fyne sweete Grasse: you shall finde the Grounde euery yeare better than other, with a manifest and apparent difference betweene that parcelle of your Grounde which you haue enriched therewith, and all the rest of the same Fielde, both by the glorious greene colour which it carrieth, and also by the delight of the cattell continuallie feeding thereon, and refusing the other till that be spent. There is plentie of this matter to be had in Sussex, Essex, VVales, and such other Shires wherein there hath beene anie long continuance of Iron works, and those hilles which consist of this matter are worth the breaking vppe, though they be auncient and haue lien long vncouered; but the best and hartiest, is that which hath beene kept alwaies couered and defended from the rayne; this kind of soyle is also good for Wheate ground, and three loades thereof are a sufficient proportion for one acre: and if you intend the same for grasse, you must spreade it vpon the ground about Alhallowntide. The light of this secret I receyued from a Yorkeshire Gentleman, a man both of great gifts and great possessions, who assured me of three yeares tryall made by himselfe with very good successe, whose opinion is, that three loades thereof will enrich one acre of ground for seauen yeares at the least.

Sal Armoniake being a volatile salt, first incorporated and rotted in Common earth, is thought to bee a rich mould to plant or set in (*quaere* of steeping Graine in water, hauing a true proportion thereof first dissolued in it (but he that can prooue so fortunate as to find out the true Sal Armoniake of mettall, shall be able with small quantitie to worke great woonders in this kinde.

Dogges and Cattes, and other beasts, and generally all Carrion buried vnder the rootes of Trees, in a due time will make them flourish and bring forth fruit in great abundance.

Here I cannot omit a strange secret deliuered by a Gentlemon of good woorth vnto mee, euen before this work was fulle perfected, which I haue reserued for the conclusion of this Title. He assured mee of a Gentleman, at this present dwelling in Cornewall, who being very industrious, and searching into the workes of Nature, would needes attempt the sowing of Wheate in his Arable groundes, beeing of such kind, Nature and quality, as was meerely repugnant and unfit for that Grain, as the experience of the greatest part of the Countrie round about him did manifestly declare. And this he performed onely by infusing his Seed Corne foure and twenty houres in a strong liquor, that had descended from his muckheape into a receptacle of bricke: but he neuer infused his Corne (as I am informed) till the liquor had beene of two yeares date, and he alwaies dried his corne before he sowed it: *quaere* if in lesse time and without drying, the same effects will not follow.

Chap. 7.

How to make choice of your seed corne.

Svch corne as is rubbed betweene ones hands out of the middle of the eare, the vpper and neather part thereof being first diuded, I hold (with *Bap. Porta*) to be the most fruitfull seed of al the rest, and that the hand, though it be a more laboursome worke, doth perfourme this better than the flail, which maketh no diuision of the grain, & yet bruiseth a great part thereof by the violence of the stroke. But if your threshed wheat content you, then is it best eyther to pick each Corne by itself, and so to diuide the good from the bad (which is a fit worke for Children, and may the rather bee endured, for that so small a proportion of seede will serue to set an acre, viz. 12. pintes thereof, if each graine be at five inches distance, as some haue observed) or else to powre your corne into a Tubbe of water, stirring it vppe and downe, whereby the best and heauiest Cornes will sinke to the bottome, and the lightest graine will fleete and flote in the toppe, which may easily bee seuered. I know no other meanes seruing for the choyce of your seed Corne, sauing those which are so vsuall and common, as that they deserue no place amongst newe inuentions, and therefore I do here aduisedly omit to touch or name them.

Chap. 8.

The difference of yeeld betweene the plough and the spade, with some new addition to the Plough.

He that reapeth foure quarters of Wheat out of one Acre by his Plough, dooth holde himselfe well contented, as with a rich Croppe, which is eight at the least for one. I know the greatest number do scarcely attaine seuen for one, and many but six for one: but if he haue ten or twelue for one, then hee acknowledgeth himselfe to haue receyued an extraordinary fauour and blessing from the Heauens: yet (because both happily, and by credible report it is come to my handes :) I will here set downe one rare experiment perfourmed this last yeare with the Plough, wherein no doubt the Actor did stryue euen in the strength of his wit and spirit to make the best imitation which he could of the Spade. The ground hauing a Naturall declining or descent by his owne scituation, was first crosse ploughed with a very deepe cutting Plough, and then ploughed ouer the thirde time with a shallow plough, that made very close and narrow furrowes ; then was the Seede sowne by a skilfull Sower, and then harrowed ouer ; and by this newe practise the owner obtayned 15. quarters, (I dare not say 20.) vppon each Acre which he sowed. I do not cite this strange & admirable experiment, eyther to ouerthrow the whole frame of my former worke, by vndermining the foundation thereof, or to hinder the labours of so many thousands of poore and distressed people, which by digging and setting are like to be profitablie employed in this land by means of the spade (whose Estates with all Christian commiseration I doe pittie, and am willing to relieue) but professing all the good I can, and by all the means that I maie, to aduaunce the common good of the whole Realme, and knowing that if this newe practise of digging by good successe thereof do happen to become generall in and ouer the whole Land, notwithstanding the Realme be populous, & surcharged with infinite numbers of poore Men, VVomen, and Children, and maymed Souldiers, that yet there will scarcelie be founde workmen enough for the tenth acre of land: I say, for the better increase of all such groundes where the Plough must of necessitie be vsed, I was bolde to insert this inuention, to supplie the defect of Labourers, which otherwise of necessitie would ensue. And yet if I maie beleeue those infinite reports, which are nowe with open trumpet sounded into each mans eare, in commendation of the spade, there wil be no comparison between the plough & it, though all men would ioine all their wits together for the better furtherance therof; out of many of which reports, I wil only remember these few.

A Iustice of Peace & Quorum of my acquaintance, dwelling in Essex, and desirous to make a triall of that woonderfull experience, so commended at the Court of Requests barre by a Counseller, who had seene the same the Sommer before, would needs set a parcell of grounde with his owne handes, as soone as hee came from michaelmasse terme last to his house: in April the same began to shew very greene and full of blade, and in haruest time each Corne brought foorth at the least 27. eares, some 30. and some 32. with forty graines in each eare, whose proportion is at the least a thousande for one. For the truth of which report, I dare gage my credit, I know the gentleman to be so temperat and wel aduised of his speech.

I do heare of another gentleman dwelling in Surrey, who hath reaped 16. bushels out of one pint of wheat which he set, and that some cornes brought forth 40. and some 48. eares hauing 66. 68. and 72. cornes in each eare. I could name the gent. dwelling, & place of the trial, but this which I speake I dare warrant to be true, having good ground of credit for the same.

In Northamptonshire there grew barly this last summer, amongst the which there was found some rootes hauing 120. eares vpon one root, with 30. graines at the least in each eare.

I haue also heard by sundry reports of 20. 30. and 32. qurters of Wheate vpon an acre, & of 15. quarters of barly vpon an acre; yea there haue beene some which haue reported, that they haue had 15. quarters of wheat vpó one acre by this manner of setting, the ground being spent and out of hart by often plowing before.

And if I should report all the seuerall trials that haue beene made by seuerall persons, as well of the Nobility as others, within these two last yeares, I should both weary myselfe with recording, and you with reading such infinit numbers of practises as I coulde produce, *sed ex his reliqua.*

I wil here either borrow leaue, or commend without leaue, a new, light, and portable Pumpe, beeing of late graced with her Maiesties most fauorable priuiledge, which I am bold to publish, together with this artificial husbádry, because I know no better means to giue a publike notice thereof vnto all my Country men then by this pamphlet, which taking the wings of fame vnto it, is like to disperse both it selfe and his companion abroad in a most speedy and sodayne manner through al this little Iland. This pumpe is of woode, moueable from place to place by one mans labour: it is kept with very small charge in good reparations: it is cheape, and deliuereth great store of water in a little tyme by his double stroke to a reasonable height; it occupieth small roome; it serueth to empty Cellers and ponds; it is very necessary for all Merchants Ships, and other ships of VVarre, whereby all superfluous water may be safely conueied out at the neather Port-holes in a great leake happening by fight, or otherwise. But the most generall vse thereof (as I take it) will be for all those stately houses and buildings which border vpon the riuer of Thames, or any other riuer, whereby they may receiue sufficient store of water to serue all their offices and gardens belonging to the same. You may heare farther of the Authour of this Inuention by the Printer hereof.

H. Plat Esquire.

REPORT OF EXPERIMENTS IN DEEP PLOUGHING.

BY MR. SINCLAIR SUTHERLAND, DALMORE FARM, ROSS-SHIRE.

[Premium, the Gold Medal.]

In the autumn of 1844, the reporter being strongly impressed with the advantages of deep cultivation on land naturally dry, or that had been thoroughly dried by drainage, resolved to subject a field of 45 imperial acres, on which green crops were to be grown the following season, to the operation: but as the reporter had not himself tested the matter, and as he did not know that ever it had been tested, on a soil and subsoil similar to this field, it was thought imprudent to order new ploughs. However, five common ploughs were sent to the smithy; three of these were made fit for casting a larger furrow than was previously required of them, and the other two had the mould-boards *drawn in.* The strongest of the *wide-set* ploughs was put to work with three horses, reaching a depth of 10 inches. The other ploughs wrought in pairs, the wide-set ploughs going first, turning a furrow of 6 inches deep, followed by the close-set ploughs, which penetrated a farther depth of 6 inches. In this way the field was ploughed in the autumn of 1844.

The field had never before been ploughed to a greater depth than 7 inches, and consequently the subsoil was found in every place *very hard.* The land had previously been wrought in a regular rotation, and was in good condition—yielding fair, but not large crops—always failing with continued dry weather; indeed, as turnip, barley, and grass land, this was its only fault. It contains little or no *alumina,* consequently has not power to retain sufficient moisture for the nourishment of plants, when rain is long withheld.

In the spring of 1845, 6 imperial acres were sown with beans, in drills 26 inches apart—a liberal dressing of rich manure, as well as a sprinkling of guano, having been applied. The result was straw five feet long, and 35 quarters of most excellent quality of beans.

Sixteen acres were planted with potatoes of different varieties, in drills 28 inches apart, a good allowance of manure having been afforded. The produce was not measured, but in almost every instance the crop was very satisfactory.

In due season the remaining 22 acres were prepared for Swedish turnip. The land being thoroughly cleaned, about 20 tons of manure from feeding stock, and 2 cwt. of guano, were applied to the imperial acre. The result was 24 tons per acre on the average, exclusive of tops or tails.

These results were so entirely satisfactory, that the benefit on such soil of deep cultivation could not be doubted. To obtain almost 6 quarters per imperial acre of beans, from land that until now no one ever thought of trying beans upon, and a greatly increased return of potatoes and of turnips, being at least a sixth in each case, were positive proofs of the benefits arising from deep cultivation, at least as far as green crops were concerned. It now remained to be seen what the succeeding corn crop would be.

It may be necessary to describe in detail the management of the land after the crops were removed.

In March, 1846, the whole field was ploughed 7 inches deep, and in the following month sown with common barley. The produce was on the average 6 quarters to the imperial acre, of first-rate quality of grain, being at least 1 quarter per acre more than ever the same land grew before in one season, with proportionate increase of straw.

As there was now a certainty of the profitableness of deep cultivation on this farm, trench-ploughs were ordered of the Messrs. Scouler & Co.; and your reporter resolved to conduct comparative experiments, and to report the results.

It will be proper to describe the nature of the land now about to be acted upon—and every remark which applies to it, applies with equal truth to the land already reported; indeed, both are equal divisions of exactly the same sheet of land, each division being 45 acres.

The land lies about half-a-mile from the sea, and from 40 to 50 feet above its level—is of a sandy loam, with, in every place, an abundant admixture of stones,—the subsoil being sand, or sandy gravel.

The soil over about 30 acres is from 12 to 18 inches deep; 10 acres not exceeding 9 inches, and the remaining 5 acres not more than 6 inches deep—these last consisting of the highest points of the field. The entire field is naturally perfectly dry; indeed, water is never seen on its surface, except with a sudden thaw after hard frost.

In the autumn of 1846, 6 acres were marked off in the most equal part of the field, in *three* divisions. Two acres were, with 2 horses, ploughed to the usual depth of 7 inches. The other 4 acres were trench-ploughed, with 4 horses, to the depth of 14 inches. The soil below the usually cultivated depth was very solid, parting from the bottom *as if torn asunder;* but there was no pan.

In the spring of 1847 this piece of land was well harrowed, and the weeds which were brought to the surface were carefully hand-picked; and later in the season the land was cross-ploughed, well harrowed, and thoroughly cleaned. Two acres of the 4 which were trench-ploughed, had 30 bolls of lime, of 40 gallons to the boll, applied in a hot powdery state, and immediately afterwards harrowed in.

This piece of land being intended for Swedish turnips, drills were opened 28 inches wide, and 20 tons of most excellent manure, from stock fed largely on artificial food, as well as farm produce, applied, along with 2 cwt. of Peruvian guano, to the imperial acre. The manure was immediately spread, and covered by the plough, followed by the sowing-machine, depositing about 2½ lb. of seed, of Skirving's purple top, to the acre. This was on the 2nd and 3rd of June.

The weather being exceedingly favourable, the plants very soon made their appearance, and finer braird was never seen, there not being on any part a foot of a blank. The braird on the 2 acres to which lime had been applied, and which were not sown until the afternoon of the 3rd, was out before that of the deep-ploughed land sown the same *morning*, and also before that of the shallow-ploughed land sown the *previous day*. This no doubt arose from the lime disengaging gases from the manures and soil, which warmed the latter, and afforded early nourishment to the *embryo* plant.

Early in July, the 6 acres were hoed 10 inches apart, and after that period the crop on the limed land did not show greater luxuriance than the crop on the deep-ploughed land, to which no lime had been applied; both, however, were more bulky than that of the shallow-ploughed land, and this continued throughout. In due season a second hoeing was given, and in the autumn the whole were drilled up, to preserve them from the winter's frost.

On the 1st of April, 1848, the crop was cast out by the ploughs, an imperial acre of each of the three differently treated portions being measured and staked off. The tops and tails being removed from the bulbs, the latter were filled into the carts, and the entire quantity weighed in loads on a steelyard, with the following results:—

Treatment.	Produce per imperial acre.				Excess produce per imperial acre.			
	Tons.	cwt.	qrs.	lb.	Tons.	cwt.	qrs.	lb.
Trench-ploughed and limed	27	18	2	0	6	6	1	7
Trench-ploughed	26	6	0	14	4	13	3	21
Shallow-ploughed	21	12	0	21				

The land was harrowed quite level, the *shaws* being left on the surface to be ploughed in as a manure; which, on soil of this description, very deficient in vegetable matter, is found good practice.

The six acres were ploughed 7 inches deep, and on the 1st of May were sown by the same hand, with 3 bushels and 1 peck of common barley to the imperial acre,—the land being immediately *thoroughly harrowed* and *rolled.*

The braird came away freely, looking remarkably healthy, and equal all over the three portions; and up to the time of cutting there was not any difference observable, except that, when coming to maturity, the crop on the shallow-cultivated land had a *greater lean-over,* showing that it was less able to support the crop than the deeper-cultivated land.

The whole being equally ripe, was cut on the 8th of September; and highly favourable weather succeeding, the corn and straw were in the very best possible condition for leading on the 18th, when the entire quantity grown upon 3 acres—an acre of each kind—was weighed in loads as brought from the field, and at once put into the loft to be thrashed, each differently treated portion being kept distinctly separate.

The object of weighing the crop as brought from the field was to save labour, as it only remained to deduct the *weight* of the dressed barley from the *gross weight,* and the balance, of course, was the weight of the straw and chaff.

On the 20th September the whole was thrashed, dressed, and measured, and the following results obtained—*per imperial acre* :—

TREATMENT.	Produce of Grain.			Produce of Straw.		Weight per bushel.	Excess produce of Grain.			Excess produce of Straw.		Light Barley
	qrs.	bsh.	pks.	sts.	lb.	lb.	qr.	bsh.	pk.	sts.	lb.	pks.
Trench-ploughed and limed	7	0	2	260	0	57½	1	0	0	5	9	2
Trench-ploughed	6	7	2	261	8	57½	0	7	0	7	3	2
Ploughed	6	0	2	254	5	57½		—			—	2

The reporter is decidedly of opinion that had the season been hot and dry, instead of, as it was, cool and moist, there would have been a greater difference in favour of the trench-ploughed land; this is asserted from the experience of former years, in which both green and corn crops withstood continued drought after deep ploughing, when formerly, with dry weather, a failure was inevitable.

The expense of trench-ploughing old cultivated land may be set down at a halt more than common ploughing; where there are many large stones interrupting the progress of the plough, and also a hard subsoil, the expense will be *more* than a half. Let no man think of trench-ploughing his land without giving his horses plenty of the best food.

The horses are yoked two and two abreast, the foremost two drawing by a strong chain from the muzzle of the plough. A boy accompanies each plough, attending the front horses, managing them at the turnings, and placing a *mark* wherever a large stone is found, for the purpose of the latter being taken out by the men who follow, so that there may be no future interruption to deep cultivation.

The writer's experience only refers to trench-ploughing before green crop; and the land in spring *is always harrowed* before cross-ploughing. This serves two good purposes; the weeds which may be brought to the surface are removed, and the horses have a *firmer footing* for cross-ploughing.

The rotation practised on this farm is the seven-course, viz.:—1. Beans, tares, potatoes, and swedes. 2. Wheat or barley. 3. Turnip, partly eaten off. 4. Barley, with grass seeds. 5. Hay, or pasture. 6. Pasture, 7. Oats. So that the land will continue to be trench-ploughed *twice* every seven years.

The practical conclusions to be drawn from these experiments are—

First,—That deep ploughing increases the produce of both green and grain crops: and this the reporter states not only from what these experiments point to, but from having grown green crops, after trench-ploughing, on 180 acres, and grain crops on 135 acres of land, with uniform success.

Second,—That trench-ploughing tends to *firm* or *consolidate* light land. This is stated from the fact, that on walking across the stubble-field the writer felt the shallow-ploughed land more loose than the trench-ploughed land; and this is also supported by the fact already stated, viz., that the crop on the shallow-ploughed land had a greater lean-over than the other, while the quantity of grain was less; showing that, however forced, it is impossible on weak light land to grow very large crops without deep cultivation, as the mechanical texture of the surface cannot support beyond a certain quantity.

Third,—Deep ploughing will always require to be *well harrowedol ed,* as it is only by these means that a *uniform compactness* can be attained.

By uniform compactness the writer would be understood to mean, that the soil to the depth of fourteen inches—or whatever more the cultivated depth may be—should be equally firm; *not* that there should be a few inches of continually turned weak soil on the surface of a solid undersoil, which the roots of the ordinarily cultivated crops cannot penetrate. It may also be proper to mention that parts of fields which on this farm were destroyed by over-liming, so that the oat-plant almost entirely disappeared in consequence of the well-known over-porousness which heavy liming produces on light soil, has been *completely cured* by trench-ploughing and a liberal dressing of manure, followed by plentiful harrowing and rolling.*—Journal of Agriculture.

CHEMISTRY AND VEGETABLE FOOD.

It is the object of chemical research not merely to explain known facts, but to remove misapprehensions and correct erroneous opinions. The recent determinations of the proportion of nitrogen contained in wheat have served both these purposes. Thus it was long asserted and believed, that the wheat of warm climates always contained more nitrogen, and was consequently more nutritive and of higher money value, than the wheat of our more temperate countries. But later researches have corrected this hasty deduction; and have placed our home wheat in its proper position, economical and nutritive, as compared with the wheat of India, of Southern Australia, or of the Black Sea.

Again, the British miller usually requires a portion of foreign wheat to mingle with our native grain, both to make it grind more easily, and to satisfy the baker with a flour which will stand much water. The pastrycook and the macaroni maker also demand of him a flour which will make a peculiarly adhesive dough. These several qualities were supposed to be inherent only in wheat which abounded, in an uncommon degree, in gluten, and which was produced under specially favourable conditions of soil and climate. Modern chemistry has the merit of gradually removing these misapprehensions, and of directing us to the true causes of all such differences.

So in regard to the superior amount of muscle-forming matter supposed to exist in wheat in comparison with other kinds of native grain, such as the oat. Experience had long taught the Scotch that oats, such as they grow in their climate, are a most nutritious food; but the habits of the more influential English, and the ridicule of a prejudiced lexicographer, were beginning to make them ashamed of their national diet. Chemistry has here stepped in, and by her analysis of both has proved not only that the oat is richer in muscle-forming matter than the grain of wheat, but that oatmeal is, in all respects, a better form of nourishment than the finest wheaten flour.

But, what is more, chemistry has brought us acquainted with the value of parts of the grain formerly considered almost as waste. The husk or bran of wheat, for example, though given at times to pigs, to millers' horses, and other cattle, was usually thought to possess but little nutritive virtue in itself. Analysis, however, has shown it to be actually richer in muscular matter than the white interior of the grain. Thus the cause of its answering so well as food for cattle is explained; and it is shown that its use in bread (whole-meal bread) must be no less nutritive than economical.

The true value of other kinds of food is also established by these inquiries. Cabbage is a crop which, up to the present time, has not been a general favourite in this country, either in the stall or for the table, except during early spring and summer. In North Germany and Scandinavia, however, it appears to have been long esteemed; and various modes of storing it for winter use have been very generally practised. But the cabbage is one of the plants which has been chemically examined, in consequence of the failure of the potato, with the view of introducing it into general use: And the result of the examination is both interesting and unexpected. When dried so as to bring it into a state in which it can be compared with our other kinds of food (wheat, oats, beans, &c.), it is found to be richer in muscular matter than any other crop we grow. Wheat contains only about 12 per cent., and beans 25 per cent.; but dried cab-

* In the *Journal of Agriculture*, for October, 1848, p. 531, Professor Johnston recommends shallow ploughing as a mode of curing the extreme openness which over-limed light land acquires. Professor Johnston—as an author who has done much for the cause of agriculture—has no greater admirer that the reporter; but the latter cannot agree with the learned professor in this; and having found the shallow system to fail, and the deep system to succeed, the reporter would suggest —to those who are unfortunate enough to have over-limed light land—*a trial* of deep, and also of shallow cultivation, and let the results be made known to the Society.

bage contains from 30 to 40 per cent. of the so-called protein compounds. According to our present views, therefore, it is pre-eminently nourishing. Hence, if it can but be made generally agreeable to the palate, and easy of digestion, it is likely to prove the best and easiest cultivated substitute for the potato. And no doubt the Irish kolcannon (cabbage and potatoes beat together) derives part of its reputation from the great muscle-sustaining power of the cabbage—a property in which the potato is most deficient.

Further, it is of interest—of national importance, we may say—that an acre of ordinary land will, according to the above result, produce a greater weight of this special kind of nourishment in the form of cabbage than in the form of any other crop. Thus, twenty tons of cabbage—and good land will produce, in good hands, forty tons of drum-head cabbage on an imperial acre—contain fifteen hundred pounds of muscular matter; while twenty-five bushels of beans contain only four hundred pounds; as many of wheat only two hundred, twelve tons of potatoes only five hundred and fifty, and even thirty tons of turnips only a thousand pounds. The preference which some farmers have long given to this crop, as food for their stock and their milk-cows, is accounted for by these facts; while, of course, they powerfully recommend its more general cultivation as food for man.

We may add, while speaking of cabbage, that it is known to be so exhausting to many soils, that wheat will scarcely grow after an abundant crop of it. It springs up indeed, but yields little straw, and early runs to a puny ear containing little grain. But the same analysis, which shows the value of the cabbage crop, shows also what it takes from the soil, and explains therefore the kind of exhaustion produced by it, by what special applications this exhaustion is to be repaired, and how repaired at the least cost.

Again: In many parts of our island furze or gorse grows up an unheeded weed, and luxuriates in favourable spots without being applied to any useful purpose. In other districts, however, it is already an object of valuable though easy culture, and large breadths of it are grown for the feeding of stock, and yield profitable returns. Chemical researches show its nutritive property to be very great. Of muscle-building materials it contains, when dry, as much as thirty per cent., and is therefore in this respect superior to beans, and inferior only to the cabbage. Under these circumstances we can no longer doubt the conclusions at which some experimental feeders had previously arrived, nor the advantage which might be obtained from the more extensive cultivation of gorse on many poor and hitherto almost neglected soils.

The history of the Tussac grass is familiar to most persons. A native of the Falkland Islands, where it grows in large tufts or tussacs, from which it derives it name, it is described as fattening in an extraordinary manner the stock, and especially the horses, which graze upon it. Some of the seeds which have been lately imported into this country having vegetated, the grown-up plants have been analyzed; and it was found, "that the proportion of muscle-forming ingredients in the dried grass is as great as in the best samples of wheat, oats, or barley, and therefore that the grass is of a very nutritious character." Thus its alleged feeding qualities are confirmed; and we may look forward to seeing it, on further trial, domesticated in Great Britain.

The money value of the above investigations is obvious enough, and we do not dwell upon them. But the same branch of chemical inquiry deals with questions of a larger and higher kind.—Edinburgh Review.

GROWTH OF FLAX IN SOMERSET AND DORSET.

Sir,—In reply to your question respecting the lessened growth of flax in the counties of Somerset and Dorset, I have, from the best source I could apply to, been enabled to state the lessened growth is estimated at fully one-third, whilst the consumption of flax is much the same. Amongst the causes may be mentioned the prohibition of many of the landlords against growing it, and its being a troublesome crop and requiring more attention than can be given to it by occupiers of large farms. The growth, from these causes, was much confined to parties who rented land for the purpose, with small capitals, but who understood it, and had time either to do good part of the work or see it done: these were possessed of but little capital, and have been driven out of the occupation in these parts by the manufacturing of dowlais, for which the growth of flax was peculiarly fitted, by cheaper cotton goods, superior as to appearance, but not as to durability, being manufactured in Scotland; whilst for making sail-cloths, &c., they could not compete with that grown under better advantages. As to the lowness of wages in Ireland and abroad, when corn is low there is an increase of the growth of flax, and the contrary when it is high. This has made the supply irregular, and has obliged the manufacturers to seek a better-regulated supply from abroad, where the quality has of late years much improved; and they are enabled to select larger quantities of similar qualities necessary for their various wants. It is not unlikely that the low price of wheat and lowered wages (6s. to 7s. per week) may encourage an increased growth; and necessity may make farmers, where they can, willing to submit to the unpleasant drudgery of the cultivation. It is estimated that there have been upwards of forty thousand tons of flax grown in the north of Ireland this year.—*Street, near Glastonbury, Oct.* 5.
—Mark Lane Express.

DRAINING TABLE.

Showing the Number of imperial Roods, Yards, or Feet, and the Number of Pipes or Tiles of the undernoted Lengths required in Draining one imperial Acre, at the Distances stated; also, the Number of Pipes or Tiles required for any Number of Roods, Yards, or Feet, irrespective of Distance betwixt the Drains, such as the Number of Pipes or Tiles for a given Length of Main-drains.

BY EDWARD POND, AUTHOR OF THE "FARMERS' CASH BOOK," &C.

(The fractional parts of Pipes or Tiles calculated as whole).

DISTANCE BETWIXT DRAINS.		NUMBER OF ROODS, YARDS, OR FEET OF DRAINING, IN ONE IMPERIAL ACRE.			No. of 13-inch Pipes or Tiles.	No. of 14-inch Pipes or Tiles.	No. of 15-inch Pipes or Tiles.	No. of 16-inch Pipes or Tiles.	No. of Pipes or Tiles, Average Length $14\frac{1}{2}$ inches.
In Yards.	In Feet.	Roods.	Yards.	Feet.					
5	15	166	968	2904	2681	2490	2324	2178	2404
$5\frac{1}{2}$	$16\frac{1}{2}$	160	880	2640	2437	2263	2112	1980	2185
6	18	$146\frac{2}{3}$	$806\frac{2}{3}$	2420	2234	2075	1936	1815	2003
7	21	$125\frac{5}{7}$	$691\frac{3}{7}$	$2074\frac{2}{7}$	1915	1778	1660	1556	1717
8	24	110	605	1815	1676	1556	1452	1362	1503
9	27	$97\frac{7}{9}$	$537\frac{7}{9}$	$1613\frac{1}{3}$	1490	1383	1291	1210	1336
10	30	88	484	1452	1341	1245	1162	1089	1202
11	33	80	440	1320	1219	1132	1056	990	1093
12	36	$73\frac{1}{3}$	$403\frac{1}{3}$	1210	1117	1038	968	908	1002
13	39	$67\frac{9}{13}$	$372\frac{4}{13}$	$1116\frac{12}{13}$	1032	958	894	838	925
14	42	$62\frac{6}{7}$	$345\frac{5}{7}$	$1037\frac{1}{7}$	958	889	830	778	859
15	45	$58\frac{2}{3}$	$322\frac{2}{3}$	968	894	830	775	726	802
16	48	55	$302\frac{1}{2}$	$907\frac{1}{2}$	838	778	726	681	752
17	51	$51\frac{13}{17}$	$284\frac{12}{17}$	$854\frac{2}{17}$	789	733	684	641	707
18	54	$48\frac{8}{9}$	$268\frac{8}{9}$	$806\frac{2}{3}$	745	692	646	605	668
19	57	$46\frac{6}{19}$	$254\frac{14}{19}$	$764\frac{4}{19}$	706	656	612	574	633
20	60	44	242	726	671	623	581	545	601

NOTE.—In calculating the number of Pipes or Tiles required for a certain number of acres, beyond the number which the table would show, an additional number should be added for breakage, according to the mode of transit, and the nature of the roads over which they are to be conveyed. For instance, 10 acres drained with $14\frac{1}{2}$ inch Pipes or Tiles, at 15 feet apart, would require 24,040, to which add, if they were first carted from the Tile work to a Railway Truck, and thence a long distance over bad roads, say 6 per cent. for breakage, which would make the total number 25,483. What the rate per cent. for breakage should be is, however, only an approximation at best, and must depend upon the mode of transit, local circumstances, care, and the description and quality of the Pipes or Tiles.

THE FUTURE PROBABLE PRICE OF CORN.

The future probable price of corn being a most important question to the farmer, we subjoin the following statement of opinion of the Editor of the *Bankers' Circular* on the subject, as given in that publication on Friday, Oct. 5.

"When new elements have entered into the question which never before February 1849 could be found in it, the task is a difficult, and it may by some persons be thought a dangerous one, to attempt to foretel anything concerning the future range of prices. We have endeavoured to reflect on the case in all lights, we have deliberated on it maturely, and therefore we venture to submit our conclusions, expressed in as precise terms as would be proper. From the foregoing review of circumstances affecting the important matter we deduce :—

"1. That the class of small farmers, especially in the south and west of England, have in general become so poor as to be unable to pay rent, rates, and taxes without severe distress; and that consequently they will be compelled to carry whatever is most saleable to market for immediate sale.

"2. That the pressure of this necessity, acting together with a panic among farmers of less exhausted means, will cause an unusual quantity of grain (that being the thing of most ready sale) to be forced on the markets during the months immediately succeeding harvest.

"3. Consequently that in those months the lowest prices will be marked; and they may be expected to be lower than the average price of the year of consumption from September 1849 to September 1850.

"4. That the average price of wheat, for a given period of four or six months, may be expected to range between 38s. and 43s. the quarter; and in no case do we expect the average six weeks' return under the Corn-law to show a lower average than 38s. the quarter, at least for any continuous period of three or four weeks.

"5. That the average price of wheat for the whole year of consumption will show a higher range than we have here assumed for the more limited period.

"6. That the average price of fair malting barley may be expected to range between 25s. and 28s. the quarter as the malting season advances. There is a considerable stock of old malt on hand, and some unusual quantity, though not a large one, of old barley.

"When reflecting on the gloom and depression of these times which so deeply affect the value of all the products of agriculture, we feel by no means confident that we have not allowed too much for the operation of that cause, and consequently estimated the future range of the prices of wheat too low. We are persuaded that an elevation beyond that range may fairly be reckoned on for the period coming after the four first months of the year of consumption. Efforts will be made in Parliament to put spirits into the 'agricultural mind;' measures may be adopted by Parliament affecting prices. On the whole, we feel that intercourse with the farmers in many parts of England, and impressions made by them respecting their perplexities and hopeless prospects, may have made too strong an impression on our judgment in the important affair of price. All political proceedings and unknown parliamentary measures affecting prices are of course out of the question in all such estimates."

PNEUMONIA;

OR INFLAMMATION OF THE LUNGS, ALIAS CONSUMPTION.

This is a fearful scourge when once it appears in a yard of bullocks. It not only destroys all hopes of profit from feeding, but makes sad inroads into "principal;" and will, if not remedied, deter many from "winter grazing." One thing is pretty evident, that medicine is of little use. Examination after death shows the lungs to be the organs chiefly affected. They are gorged with black blood, and generally have abscesses filled with pus. In our country villages, bleeding is the rock on which the practitioner rests his hopes of safety; on this the farmer depends; this is their sheet anchor, right or wrong. The worst of it is, so few are cured by it, even when aided by medicine.

Seeing then how little can be done towards *curing* the disease, is it not more necessary to try any and every means to *prevent* it?

Many a farmer will ask—"How are we to prevent a disorder that we do not know the cause of?" I answer, partly, by attending more to the wants of the cattle in the summer.

They are well housed and fed in winter. Every possible care is taken then. They are at that season fed, watered, and watched regularly; and why? Because you see that they then require all the pains you bestow "to make them go-a-head;" that swedes and hay, corn, linseed and oil-cake, without great attention, regularity, and efficient shelter, will not suffice. But why bestow so much care in the winter, and little or none in the summer? *Art* is to do everything for them in the winter months, when they are consuming expensive food; but in the spring and summer, be the winds ever so easterly, dry, and piercing—the sun hot and trying—the rains heavy and frequent—the grass rank, long, and sour—the dews copious and chilling—the fogs as thick and impenetrable as if imported from London—they are then turned out to graze, and entrusted to dame Nature's care night and day. A young friend of mine lost eighteen or twenty fine bullocks last year, between Michaelmas and Christmas. The disease was said to be pneumonia. Bled and physicked they all were, but die they would. The loss was great, and enough to make a man try to find a preventive for another season.

Unhappily, he has already had three fatal cases. I went with him to see the animals. There they were in "the marshes." Upwards of seventy fine fresh-looking three-year-old steers. The feed was long enough, but terribly full of the rag-wort and marsh marigold.

I looked for water, and lo! "what a falling off was there!" The ditches were almost dry; the little liquid left was full of life and mud, and all unfit to drink. Again, there was no shelter, for "the marshes" grow few sheds, and not many more bushes or trees. I recommended a good watering to be made, the bottom well covered with clay or marl, and a supply of wholesome liquid made sure. I suggested a shed or two to be erected, the rag-wort to be mown twice during the summer just before flowering, and the land to be well salted, horse-raking off the rubbish.

To my mind, it is no marvel that "disease of the lungs," or consumption, should prevail in many of the yards of our winter graziers; the seeds of the distemper being so ably sown during the spring and summer, when the cattle are driven from fair to fair to find a purchaser. They are often heated by over driving, to make up for delays on the road, in order to be in time. On an exposed market site they stand for hours without food or water. Faint with travel, fevered with thirst, goaded by drovers, and half maddened by their dogs, they are, happily for the original owners, bought, driven home late, and turned into a pasture where, perchance, there is a flush of feed, and a scarcity of water fit to drink. If they want to slake their thirst, the first filthy town pit they come to is just the thing. The more highly colovred the better; there is then some strength in it, for drovers generally have but little faith in clean water: thus they get a taste for dirty drink, and thus disease is drunk up in their daily draught, and destruction made sure.

I was visiting a farming friend during the hot weather of last spring, when a report came from the yard that three or four of the winter fed bullocks were ill. They were frothing at the mouth, and restless. The eyes indicated great irritability of the stomach, which was confirmed by loss of appetite, hanging of the ears, &c. A farrier was sent for; "*drinks*," *of course*, were given, (there seems to be no cure for anything without them), and other measures taken; but the distemper attacked all in the yard.

I asked the general habits of feeding, and was shown their place for watering. This was a pit dug out at the edge of the farm-yard, and for its supply of liquid, depended on the voluntary contributions of the clouds, the drainage of the yard, &c. This, that was of itself an "unwholesome fixture," was the place of refreshing for the cattle. A few hurdles and stakes, by way of trial, were put down, the stock kept away, and driven to clean water, "the drinks" were discontinued, and the animals recovered. David's question to his brother, Eliab, "Is there not a cause?" will come to my mind when I hear of "stock doing badly," of lamentable losses in stables of good horses, bullock sheds, and sheep folds. In seven cases out of ten, *there is "a cause,"* and one that may be remedied. A "spirit of enquiry," a searching out the apparently hidden mysteries of farm stock management must be fostered. There is far two much laid to "luck." The very term is offensive to a well regulated mind. Good-luck, with cropping and stock feeding, is the fruit of patience, attention to small things as well as great, and the exercise of a right judgment; whilst bad-luck is but the return for ignorance, bigotry, and idleness.

Watering places for cattle in the field should be well cleaned out twice a-year, the bottom made good with chalk or stones, and a supply of clean fluid secured at any cost. In a pint of liquid taken from a pond, always used for stock, I found 17 different kinds of aquatic insects, and the most terrific looking larva. Any of them in a glass of even clean water, offered to a farmer to drink, would have perfected his inbred hydrophobia.

But these small deer are daily swallowed by farmyard stock, in a fluid having all the colour of porter, and the effluvia and virtues of "liquid manure." Ought such things to be? Answer it, you gentlemen interested in Cattle Insurance Companies, and all you enterprising agriculturists who have embarked large sums of money in farming stock.

Clean out your pits of pestilence: remove the unwholesome fluid from their reach; give the animals, winter and summer, good water; and their more certain well-doing will reward you. If your men persist in using it, remove the hinds, and replace them with a set not quite so bigoted to dirty ways. Better change all your men than lose one beast worth twenty pounds, and risk the lives of others. A more rigid attention to these daily matters relating to stock will prevent "a winter of discontent" setting in, and freezing the energies of farmers. They have already a thousand-and-one evils to fight against to try their tempers and pockets, and to keep "the good time coming" away; let them see that none of the "trials" proceed from want of forethought, and that the last straws that break the back, if laid on, be not placed there by themselves.—West Norfolk.

ELEMENTARY GEOLOGY.

By John Morris, Esq., F.G.S.

HISTORY OF THE SCIENCE.

Probably, among the various subjects connected with natural science which have engaged the attention of mankind, none have been so fertile in crude theories and vague generalizations as that regarding the ancient natural history of the earth. Nor is this a matter of surprise when we consider how small a portion of the earth was known to the ancients, and that the earlier writers, instead of accumulating facts and making an appeal to nature by observation and experiment, indulged the easier method of fanciful speculation, to account both for the formation of the globe and a different order of things which they imagined had existed in the primæval history of our planet. Still, however, amongst their speculations (ingenious as many of them were), we may occasionally detect glimpses of inquiry in the right direction, more especially in proportion as the existing natural phenomena arrested the attention of the inquirer. Among the Greek philosophers, the writings of Herodotus, Pythagoras, Aristotle, and Strabo, plainly indicate that they had observed with care the various natural operations which tended more or less to modify the aspect of our continents, and account for their origin. Thus the addition of land by the influence of river action in filling up the bed of the sea, as the Nile is alluded to by Herodotus; the separation of islands from the mainland by the action of earthquakes—the power of volcanic action—the wearing away of the land by ordinary agencies—the transporting power of rivers and seas, is mentioned by Pythagoras; the occurrence of shells belonging to the sea at great distances from the shore and considerably above its level—the relative changes of land and water—the formation of new islands—the elevation of land—earthquake and volcanic action—and various other physical phenomena in modifying the configuration of the surface, were not unnoticed by Strabo, who ingeniously speculated on the causes which had produced them. It is not, however, the intention in this elementary notice to give any detailed history of the opinions of the many successive writers who have occupied themselves with this subject, although a cursory glance at some of the principal may not be altogether uninteresting.* That the various arguments used by different authors, were dependant not only upon their more or less acquaintance with the facts to be explained, but also the direction of their previous studies and even the country from whence they originated—some directing their inquiries to the structure and arrangement of the various rock masses, others to the fossil organic bodies found in them.

From 1500 to 1700 different views were advocated, respecting the true nature of fossil organic bodies, *i. e.*, the remains of the various animals and plants imbedded in the earth's crust; some considering them merely the sportings of nature, *lusus naturæ*, generated by the plastic powers of nature causing them to assume certain definite forms, as that of shells, corals,† &c. although Frascataro (1517) contested they were really the remains of the animals themselves. These views, borne out by the opinions of Colonna (1666), Scilla (1670), Agricola) 1546), and Steno (1699), did not prevent them from attributing their occurrence to the universal deluge, although Steno adverted to their proving the alternate changes of the sea level, as well as their partly marking the ages of the beds containing them.

Among the followers of the diluvial hypothesis in this country may be mentioned—Burnett (1689) Woodward (1702), Whiston (1725), and Cattcott.

In the works of Plot (1677), Lister (1678), and Ray (1692), we find fossil-shells alluded to as occurring in different parts of the world, but not with a view of accounting for them by a similar cause.

Among the general speculations, that of Leibnitz must not be overlooked, more especially as it contains the germ of certain physical points in geology advocated at the present day, as the elevation of mountain chains, &c. Leibnitz considered, from a state of fluidity, the earth's crust underwent a degree of cooling and contraction, by which the older rocks were first formed, the subsequent agency of water producing and depositing the sedimentary strata.

Of the general speculations, although of considerably later date to those of Leibnitz, may be mentioned those of Werner and Hutton at the close of the last century; the former attributed all the rock masses of which the crust of our globe is composed, to the universal agency of water, by which even the crystalline rocks had been formed from previous solution, and the sedimentary strata deposited. Hutton, on the other hand, called in the agency of fire as producing many of the observed phenomena; and inferred that the oldest rocks were derived from the ruin and destruction of previously existing ones, the detribes or materials of which, more or less com-

* Full information respecting the various writers will be found in the following works:—

Conybeare, W. D.; "Report on the Progress of Geology"—British Association Reports, vol. I.

Fitton, W. H.; "On the Progress of Geology in England"—London and Edinburgh Philosophical Journal, 1832-3

Phillips, J.; "Geology," in Penny Cyclopædia.

Ramsay A. C.; "Passages in the History of Geology"—1848-49.

Lyall, Chs.; "Principles of Geology" 7 Edit. 1848.

† The two following passages, from the writings of Lister and Plot, may be cited as advocating this opinion. Dr. Lister says:—

"We will easily believe that all along the shores of the Mediterranean sea, there may be all manner of sea-shells found promiscuously imbedded in rocks or earth, and at a good distance too from the sea: but for our English inland quarries, I am apt to think there is no such matter as petrifying of shells in the business, but that these cockle-like stones are everywhere as they are at present *Lapides sui generis*, and never were any part of an animal. It is most certain that our English quarry shells have no parts of a different texture from the rock in question whence they were taken; that is, that there is no such thing as *shell* in these resemblances of shells, and that they never were any part of an animal."

Dr. Plot states that—

"The great question now so much controverted in the world is, whether the stones we find in the form of shell-fish be *Lapides sui generis*, naturally produced by some extraordinary plastic virtue latent in the earth in quarries where they are found, or whether they rather owe their form and figure to the shells of the fishes they represent." Dr. Plot strongly advocated the former opinion.

minuted were carried by streams and other agencies into the ocean, there forming various stratified masses, which by the power of heat became consolidated, and were subsequently upheaved and fractured by the protrusion of the more crystalline rocks, as granite, &c.; these latter being produced of igneous fusion. Important as the generalizations of Hutton were, the germ of similar ideas may be traced in "An Essay on the Antiquity of the World," published by Dr. Toulmin in 1775.

Passing in review those writers in whose works can be traced the first attempts towards a succession of the various strata, or their division into different groups, a mere notice will suffice for Lister and Woodward; but in a paper on the portion of the Somersetshire Coal-field by Strachey (1719) are noticed the order and composition of the coal series, their inclined position, the faults which affected them, and, lastly, the horizontal position of the superior beds of red marl and lias overlying the inclined strata. Lehman (1756), however, first distinctly noticed the three-fold division of rocks—the primary coeval with the globe, the secondary of more recent origin, and a third class due to partial or local revolutions. Mitchell (1760) in a paper "On the cause and phenomena of Earthquakes," gives a tolerably clear account of the arrangement of the strata in this country, pointing out that they were not casually thrown together, but uniformly and regularly stratified, alluding also to their inclined position in high and mountainous countries. Whitehurst* (1786) offers some clear notions on the stratification of Derbyshire, mentioning also the effects and situation of the loadstone of that county. That he possessed more than speculative views may be inferred from the following remark, that his work might "establish such a system of subterraneous geography as may in time become subservient to the purposes of human life, by leading to the discovery of those things which are concealed from our observation in the lower regions of the earth."

The labours of Fuchsel materially increased the classification of Lehman: but the great generalizations of Werner, in defining the different groups of the principle classes of rocks—in pointing out their mineral character, the order of succession among them, and that their relative place is never departed from, were the most important doctrines advocated in geological science on the continent at the close of the last century.

In England the true doctrine of successive and regular stratification was fully developed by Mr. W. Smith, who ascertained, whilst following his professional career in different parts of the country, that the strata of this island had a general inclination towards the east as well as an invariable order of succession; he also adverted to their containing peculiar groups of organic forms by which a stratum could be identified, even if the common mineral character was changed. For some years Mr. Smith quietly pursued his researches, and in 1799 he published "The order of the strata in the vicinity of Bath," and in 1801 proposed to publish a geological map of England and Wales. but which, from various causes, did not appear until 1815. Long prior to this period Mr. Smith had freely communicated the results of his discoveries, and thus widely diffused a knowledge of his general principles to his friends and others desirous of being acquainted with them. With the labours of Smith we have arrived at a period when geology may be ranked in the catalogue of inductive science: and, however important may have been the researches of the many zealous and active cultivators of this science during the present century, they have but enriched, enlarged, and consolidated that fabric, the superstructure of which was laid by the untiring zeal and energy as well as unaided genius of one individual, W. Smith. Nor ought it to be forgotten that their co-operation has unfolded to us broad and extensive views in the great scheme of creation, by which the wisdom and beneficence of the Deity is manifested in all the arrangements of nature and the practical utility of which, as bearing upon our interests and happiness, ought to be duly appreciated by all classes of society, and not the least by those engaged in the pursuit of agriculture.

* An enquiry into the original state and formation of the earth.

PEAT-CHARCOAL AS A DEODORIZER OF MANURE.

Subjoined will be found reports of the meetings held at the Mechanics' Institute, Southampton Buildings, Chancery Lane, on Monday, October 8, and Monday, October 15, in consequence of the challenge given through this paper to Mr. Jasper Rogers, to prove, by public demonstration, that night-soil intermixed with peatcharcoal would be immediately deodorized and converted into an apparently dry mass capable of being manipulated and transported by any conveyance. We shall leave the report to speak for itself as to detail; but we feel bound to say a few words on the subject.

The challenge to accomplish this operation originated with ourselves. We had inserted several communications from Mr. Rogers on the subject, and so many considerations arose out of his statements—so many advantages to the country, which at first glance may possibly be not perceptible, but which *must* accrue—that we determined, so far as in us lay, to set the main question—that of converting night-soil into an inoffensive manure, capable of being transported by any conveyance, and of being used with the drill—*at rest, if we possibly could.* In fact we doubted, for men's own children are usually deemed prodigies; but we must now admit our doubts were unfounded. The demonstration on Monday night establishes to the utmost Mr. Rogers's statements; nothing could have been more complete and almost immediate than the effect produced—all odour seems to cease *immediately* on intimate intermixture, which apparently involves the necessity of an intermixing mill; but at the same time it is evident that admixture by any process, if intimate, accomplishes the end; and we can scarcely now say what may be the result to the agricultural community by the use of a manure containing such elements as are set forth, and which we all know do exist in the compound of *night-soil and peat-charcoal.*

Mr. Rogers gave another demonstration of the properties, &c., of peat-charcoal, with a description of his plan for the collection of the whole excretory matter of London, and its conversion into a manure, on Monday, October 15. We waited that exposition with some anxiety, because we believed it to be a most difficult question. To deal with the monster nuisance of London is a *mighty* work: we have to combat with a giant whose power has risen to such a height that it can alone be overcome by the act and power of the multitude. Individual exertion will be naught—householders cannot help themselves—because, no matter what individuals may do, it cannot save them from the general evil.

If an individual adopt the most simple proposition of saving the excretory matter of his establishment, which it is evident he can, and thus purify his own premises, it does him no good, because all around is impure and filled with poison. He may do his individual duty, but the mass will not—either from thoughtlessness or carelessness. The measure must be a public one; we must be obliged to *keep ourselves* from evil; the law must enforce public cleanliness for public safety's sake, and one man must not be permitted to drive from his door that which may give disease, perhaps death, to his neighbour, it must be removed from all alike.

When we gave our *challenge* to Mr. Rogers, we said—if he proved his statements he would deserve the thanks and honour of his fellow-men. We now say he has won them fairly; and we cannot but add that the independent and manly course taken to prove his proposition, which must have entailed upon him many and heavy expenses, and which he apparently still adds to—for he gives free admission to his lectures, and bears all costs—evinces a disinterestedness which we rarely meet with, and which highly deserves public approbation and reward.—Mark Lane Express.

IRISH PEAT CHARCOAL AND EXCRETORY MATTER.

On Monday, October 1, a very unusual meeting of a highly interesting character took place at the Mechanics' Institute, Southampton Buildings. There were present an assemblage of above 600 persons, composed of many of the leading medical and scientific characters of London, and several foreigners of distinction, who appeared to be much interested in the proceedings. Amongst those present we observed, a number of the Poor-law Guardians of London and the Country; the Treasurer, Secretary, and several of the Members of the London Botanical Society; the Secretary of the King's College Hospital; Dr. Alfred King; Dr. Walker; Dr. Malan; several Members of the Sewers Commission; Professor Wildsmith; Professor Way; Captain Horne (Life Guards); Sir Augustus Hillary, Bart.; O'Gorman Mahon, Esq.; Dr. Bird; General M'Leod; General Briggs; Colonel M'Donald; Wm. Shaw, Esq., Strand; Wm. S. Langbourne, Esq.; Wm. P. Andrew, Esq.; Dr. Ayres; Dr. Graham; Dr. Lancaster; Rev. R. I. Beadon; Rev. G. H. Stoddart; Paul Shordiche, Esq.; H. A. Harrison, Esq. (Commissioner of the Board of Exchequer); the Proprietor of the *Mining Journal;* Dr. Reid; Dr. Russell; several Civil Engineers; and many others of note: in fact, we have seldom attended a meeting composed of so many scientific men.

The meeting was held in consequence of "*a challenge*" given by this Paper to Mr. JASPER ROGERS, C.E., who had proposed on several occasions, by letters, &c., published therein, to solve at the same time one of the great social and pecuniary difficulties of Ireland and the great sanitary question now agitated in the metropolis. The primary object of the meeting was to test, by actual experiment, the valuable deodorising properties of peat charcoal, when applied to and intermixed with night soil, the matter of sewers, &c.; and its peculiar character may be inferred from the fact that a chairman was selected haphazard from the body of the meeting; that eight judges were chosen, according to "Crowner's 'quest law," *de circumstantibus,* all being perfect strangers to one another, and all ultimately concurred in bearing testimony to the value and importance of the experiments which they were called upon to witness, and by which the deleterious and appalling effects, in crowded cities, of decomposed animal and vegetable matter might be averted and made subservient to the reproduction of food for man.

The proceedings were opened by an address from Mr. WM. SHAW, who stated that he had been mainly instrumental in calling the meeting together. Having been formerly practically connected with agriculture, and latterly devoted to agricultural literature, and seeing how much had been done by their neighbours on the continent in the use of night soil for the improvement of agriculture, his attention had been directed to that point, more especially to some means by which so valuable a manure as human excretiæ could be saved. In London it was not only entirely thrown away, but actually so disposed of as to poison and infect the air we breathed, although it was well known to be a most valuable fertiliser, but could not be dealt with on account of its offensiveness. Mr. Rogers having directed his attention to the subject of the deodorising powers of peat charcoal, and frequently published statements in the *Mark Lane Express* upon the subject, which, *if not true*, would lead many astray, while, if true, would be productive of incalculable good to the agricultural interest as well as towns, he had *challenged Mr. Rogers to the proof*, because he felt that no doubt should be permitted to rest upon the subject. It was fact, or it was not; and a question of such paramount importance should not be permitted to exist a moment if possible to be ascertained. Although some delay had taken place, he presumed, in making preparation, Mr. Rogers had accepted the challenge, and he (Mr. Shaw) was bound to say that in doing so, Mr. R. had offered to him, unasked, the privilege of naming the time and *place*, and *judges* of the test. In accordance therewith he had appointed the present to be the "*time and place*;" and all that was necessary to *prove* or *disprove* the question was the appointment of *judges*. Now, he conceived the most straight-forward and honest way would be that the *chairman* and *judges* should be taken indiscriminately from the meeting (Hear, hear). "Let whoever is the centre man of the first row be chairman (cheers), and let the meeting send on the platform eight judges (Hear, hear). He begged to disclaim having private or personal interest in view—he wished the trial to be made in the most public manner, because it was a great public question; let the meeting select its own chairman, and pronounce its opinion upon the result."

At the suggestion of Mr. Shaw, a gentleman was then called from the body of the meeting to act as chairman, and from a number who presented themselves on the platform for that purpose, eight were chosen to watch the proceedings, and act as judges. One part of night-soil, and two parts of peat charcoal, were then passed through a mill of simple construction, in which they were thoroughly mixed, the result being a dry blackish powder, not unlike the peat charcoal in appearance, and giving out a faint ammoniacal smell, which almost instantly passed off, leaving the poudrette inodorous and capable of being handled and carried about without any inconvenience. There was a small loss in weight, the product something more than 17lb. for 18lb. put into the mill; but the remainder appeared to be the quantity resting in the mill.

The operation having been repeated, the same results followed, and within a few minutes the whole quantity intermixed was carried off by the audience, who came forward from all parts of the theatre to take it in *handfulls*. This fact was striking; a few minutes before, all *noses* were turned away from the tin buckets in which the night-soil was brought (closely covered up); a few minutes after, it was taken up in *handfulls*, put into slight paper bags, which Mr. Rogers had provided (of course knowing the result to be attained), which were carried off, "stowed away" possibly in the same pocket with the pocket-handkerchief, but which in fact could not be affected by it. The *material* was an object of such great demand that it was at length carefully collected from the floor, and *pocketed*.

Each bag exhibited the following amusing announcement, printed on either side:—

IRISH PEAT CHARCOAL
AND
ENGLISH EXCRETIÆ,
Intermixed in the presence of the Meeting at the
MECHANICS' INSTITUTE, LONDON,
Held on the 1st October, 1849;
ACCORDING TO THE PATENTS OF
MR. JASPER W. ROGERS, C.E.,
IN ANSWER TO
THE CHALLENGE OF
"THE MARK-LANE EXPRESS."

"NON OLET."

COMPONENTS OF IRISH PEAT CHARCOAL AND ENGLISH EXCRETIÆ.

PEAT CHARCOAL.	EXCRETIÆ.
Carbon	Phosphate of Ammonia
Hydrogen	Phosphate of Lime
Nytrogen	Phosphate of Magnesia
Oxygen	Phosphate of Soda
Sand and Clay	Phosphate of Iron
Oxide of Iron	Chloride of Sodium and Alkaline Sulphate
Phosphoric Acid	
Silicate of Potash	Sulphate of Lime
Chloride of Sodium	Sulphate of Soda
Carbonate of Lime	Sulphate of Potassa
Sulphate of Lime,	Hydrochlorate of Ammonia
&c.	Lactate of Ammonia
	Free Lactic Acid
Possessing as a whole, the power of absorbing, deodorizing, and retaining for the uses of vegetation, the components of Human Excretiæ.	*Urea*
	Uric Acid
	Animal Matter
	Mucus
	Earthy Phosphates, &c., &c.

Vide:
BERZILIUS,
BOUSINGAULT,
LIEBIG,
LYON PLAYFAIR,
CUTHBERT JOHNSON,
&c., &c.

"UNITY IS STRENGTH."

The CHAIRMAN, after the experiments had concluded, called upon the judges to give their opinions *seriatim*, for the satisfaction of the meeting.

Dr. ALFRED KING said the results of the process appeared to him extremely satisfactory. The product had at first a slight ammoniacal smell, and no doubt some ammonia and other gases were given off. It had completely answered the object in view, and for his part he had been very much surprised and pleased at the result, and was of opinion that a most glorious discovery had been made. He was also highly impressed with the honest and straightforward conduct of Mr. Rogers in submitting the process to the investigation of perfect strangers. He had come forward as a judge with a very sceptical feeling; but that had been completely changed, and he had no doubt on his mind that the advantage to the public would be equal to the merit of the discovery. He again repeated, Mr. Rogers had won general good feeling by the straightforward course he had pursued (Hear, hear).

Mr. Lyon, secretary to the King's College Hospital, the second judge, said he also was of opinion that the experiment had been perfectly successful. It was the intention of Dr. Guy to have been present, but in consequence of the opening of the session he was unable to attend. He was glad to find that there had been no chairman provided beforehand, and no packed committee. He knew nothing of any of the parties, and had offered himself as a judge from the belief that, as acting in an official capacity, his testimony would be some guarantee of the fairness and impartiality of the experiments, to which he bore the strongest testimony.

Mr. Griffiths, surgeon, of No. 1, Bloomsbury-place, had great pleasure in joining in the approval of his fellow judges. He thought the application of charcoal to cesspools would be a very important benefit, as he had witnessed in the course of his house-to-house visitation many cases in which the removal of the night-soil were likely to be productive of more evil and danger than allowing it to remain. By mixing the charcoal with it all danger would be obviated, and he trusted the matter would be taken up by public bodies in the metropolis. In his numerous official visits to cases of cholera in the metropolis, with scarcely an exception, he had traced the disease as emanating from some of the filthy exhalations which were allowed to pollute the air.

Mr. J. E. Yarrow, civil engineer, of 18, Adam-street, and Cheshire, said he attended there as the representative of a large body of agriculturists of the county of Cheshire, who had requested him to investigate and report upon the various deodorising agents now being put forward in the metropolis; and he expressed himself perfectly satisfied with the result. As a practical man, he believed that the charcoal might be applied with the greatest benefit to the towns in which large quantities of night-soil were collected; and he should be fully prepared, after what he had witnessed, to give the principle which Mr. Rogers has so fully established his best support (Hear).

Mr. Nisbett, the next judge who came forward, said he was only an accountant, and could not be supposed to know much of the nature of the experiments. He had been requested by his brother, Dr. Nisbett, superintendent and manager of the county lunatic asylum of Nottinghamshire, to accompany him to the meeting, his brother having been deputed by the magistrates of that county to report upon the plan. He took a handful of the *charcoal* out of the bucket, and also a handful of the *mixture*; he put each into a small paper bag, and on smelling both he could not perceive any difference. He did not feel himself competent to say whether the granulate particles were charcoal, but he could not perceive any difference between it and that which came from the machine. If the pecuniary part of the process were found to answer as well as the chemical, Mr. Rogers would have conferred a very great boon upon society (Hear, hear).

Dr. Walker, M.A., of Maidstone College, said the result had entirely answered his expectations; and, indeed, gone beyond them. It was true there was a slight smell of ammonia, but it appeared to go off very soon. He had attended more with an agricultural view than any other, in order to ascertain whether it would come within the range of farmers, so as to be made available by them without any considerable expense or costly machinery. If that were so, it would be of very great value, especially in the county of Kent, where the most expensive manures were employed.

Mr. Swinburne, a barrister, said he would premise that he was averse to the principle, having a plan of his own; but did not hesitate to say that, as a deodorizer, the charcoal was perfectly efficacious. He had tested the matter privately, and was satisfied that it was one of the most complete deodorizers they possessed. He should probably have the honour of submitting an antagonistic plan, and therefore his testimony must be considered the more impartial.

Mr. Garrett, one of the commissioners of the parish of St. James, and one of the committee of the sanitary board, entirely agreed with the gentlemen who had preceded him. He thought it would be most desirable if the charcoal could be introduced into cesspools in the metropolis. He was not so favourable to machines, as they could not be so generally adopted; but the fact of deodorization could not be doubted (Hear).

Mr. Nisbett, an analytical chemist, was the last of the judges. He said it was known to chemists for a long period that charcoal was a powerful deodorizer; but much credit was due to Mr. Rogers for bringing the fact in a practical way before the public. As an agricultural chemist, he was very much interested in the subject; and in the present case he thought the result was highly satisfactory. If the pecuniary calculations were such as would enable the process to be carried on with advantage, the peat charcoal of the bogs of Ireland was likely to produce very valuable and important benefits in the heart of the metropolis.

The Chairman, in addressing the meeting, said: You have now heard the opinions of the judges appointed, in which I most cordially agree. I was myself doubtful, but I am no longer so; and I must say I consider Mr. Shaw has been beaten in the battle (No, no)—that is, I mean that Mr. Rogers has established his point (Hear).

Mr. Shaw was loudly called for, and said he would not presume to offer any opinion after the very able and satisfactory ones the meeting had heard. He was gratified to find that his challenge had been productive of such satisfactory results. He only trusted that Mr. Rogers's calculations might be borne out practically; and then, indeed, they would be enabled to say that they had achieved a great victory. He was very happy that he had *been beaten;* for he was satisfied that the value of a manure so composed as that presented could not be too highly estimated. He believed few things could effect greater benefit than such a manure.

Mr. Rogers was then called for, and on presenting himself was received with loud cheers, which lasted for some minutes. He thanked the meeting sincerely for the approbation bestowed, but under existing circumstances would not tresspass on their time more than to say a few words. As regards cost of the material, peat charcoal may be had from the bogs of Ireland, and will be sold in London by the Irish Amelioration Society, at all events at £2 10s. a ton, giving fair, nay handsome, profits to the proprietors; and he was happy to say he could vouch for all parties connected with that society, that it was their anxious wish to reduce the cost as much as possible, in order that it might be used to do away with the evils of the *horrid* sewers and cesspools of all large cities, and employ the people of Ireland. But what were cesspools compared to sewers! The former was the better of the two. Cesspools were, perhaps, 10, 15, or 20 feet deep, with a surface of only 3 or 4 feet square. The atmosphere acted only on the upper surface, whilst if that mass of 20 feet in depth were driven into a sewer, and from thence through miles of sewers, it would contaminate miles and miles of the city, giving out its pestilence to every place around as it went along, in place of yielding its evil at one spot alone. The noxious gases given out from cesspools were at least one thousand fold *less* than when the matter was driven into sewers. He had no hesitation in saying that, so long as the present system continued of sending excretory matter into the sewers, thus diffusing deleterious vapours from street to street throughout the town, London would never be free from disease (Hear, hear). He was happy to say that if, in place of attempting to remove the contents of cesspools during warm weather, the surface was covered with 2 or 3 inches of peat charcoal, he could vouch that no odour could arise. This was not a theory. Above a year since he had been asked to try the experiment on a cesspool belonging to an eminent firm in Gray's Inn, not a thousand yards from where he stood. On examination he found it was so offensive that the windows of the back offices could not be kept open at times. He made the experiment, covered the surface with 2 or 3 inches in depth of charcoal, the result being that within a quarter of an hour all odour had subsided. The *cause* of the fact was immediately after debated by the parties present, and one of the firm alluded to, *who stood over the openings of the privy for at least half an hour!* thus proving that no odour whatever existed. This occurred last year, and about a month since he was informed it was still unchanged (Hear). Mr, Rogers having answered several questions relating to the fertilizing properties of *animalized charcoal*, concluded by offering his thanks to the meeting and to Mr. Shaw, for the fair and upright manner in which the tests had been made; and to the chairman and judges, to whom he was a stranger, for the highly proper and honourable course they had adopted in thoroughly investigating facts which interested every member of the community. Mr. Rogers retired amidst much applause. When thanks had been voted to the chairman and judges, the meeting was formally dissolved; but a very interesting discussion afterwards arose upon the subject of the plans proposed by Mr. Rogers for effecting "sanitary reform" in London through means of peat charcoal; and a wish was generally expressed that he should hold another meeting, for the purpose of making the public aware of his plans for that purpose and the presumed results.

On Monday, Oct. 15, a second meeting on this most important subject was held at the Mechanics' Institute, Southampton-buildings, Chancery-lane. The present much exceeded the former attendance: above 800 persons were present. The members of the different scientific bodies mustered strongly; medical men in abundance, who seemed to take great interest in the proposition; poor-law guardians, evidently on the "*qui vive*" as to what could be best *made* of the paupers; engineers "*ad infinitum;*" and though last, *not least*, a considerable attendance of agriculturists and florists. But we have not done: here and there appeared in a quiet corner, or under the shade of a lamp, a "bonnet," *with a veil* closely drawn over it, but which could not conceal the interest *within*, on a subject which, perhaps, after all, more immediately affects the *woman* than the *man*. *She* feels and suffers under the *evils of home*. *He* spends his day abroad, from place to place, and therefore escapes. In fact, this meeting was composed of those who appeared, one and all, to feel that a question of paramount interest was to be discussed, and therefore assembled to have it fairly done.

After 8 o'clock, the time named, some impatience was expressed by the assembly, when Mr. Jasper Rogers came on the platform, and was received with applause. He stated that at the last meeting, so truly equitable a course had been adopted, namely, choosing chairman and judges from the meeting, that he could not follow a better example, and he hoped the same chairman who acted on the former night, would, if present, occupy the chair to-night. Might he ask was he present? No answer having been given, Mr. Rogers then said as he was not present, perhaps the gentleman *who challenged* him, *Mr. Shaw*, would be good enough to preside. The meeting having loudly called for Mr. Shaw, who subsequently came on the platform—

Mr. Shaw said he should have preferred the chairman being selected from the body of the meeting, because it would have satisfied the parties present that there was no attempt to conduct the business in any other than the most impartial manner; but inasmuch as they had been pleased to request him to fill the office, he would not shrink from the duty imposed upon him. The question which would come before them was one which all who were interested in it were desirous of placing upon its own solid merits alone, and whether it had any merits or not they would leave the public to determine. Upon the former occasion of meeting, the simple question was, whether or not peat charcoal was a perfect and immediate deodoriser; and after establishing the fact that it had that quality, it would now be for Mr. Rogers to show whether or not he could make it practically useful (Hear, hear).

Mr. Rogers then presented himself, and addressed the meeting as follows:—In praying attention to what I am now about to place before you, I do so with great diffidence. I feel that to an assembly composed of so many men of science, I can scarely hope to bring forth aught that may be considered really new; but the fact that so many have done me the honour of being present to hear what I have most humbly to promulgate, gives me hope that although there is "really nothing new under the sun," I shall have the gratification of offering for the use of my fellow-beings the application of old principles to new purposes; and I shall hope to show that the combination of two substances—both deemed to be the meanest of nature's productions—will give effects, to prove, if proof be wanted, that nothing which nature produces is mean, if used for its purpose. The excretory matter of England and the bogs of Ireland have each been deemed pestilent and worse than useless; but, in reality, both are essentials to the luxuriance of vegetation. What does the mere observance of nature teach us? This—that plants luxuriate abundantly in nature's wilds. Why? Autumn blasts the flower, then the fruit, and then the leaf, which fall and rest, mayhap, in near proximity to the root that gave them birth. The flower withers, the fruit and leaf decay, earth goes back to earth again, and new plants rise, to worship nature. Such is nature's most beautiful operation. What is man's? Man takes to himself all the products of the earth. He consumes all, it may be said, that the earth yields. The inferior animal eats and draws from the soil elements which are essential to be returned, in part at least to give the food again; but man consumes the animal! The plant draws from the earth its nutriment, and man consumes the plant. He luxuriates in all that animal and vegetable life can produce; and then, ungrateful as he is, forgetful now and always of the source from whence he draws his sustenance—takes all, and gives back nought. (Hear, hear.) I am wrong; I said man, but it is only the Englishman! The Chinaman, whom in our self-complacency we despise, does not forget his obligation to the earth. All goes back again, and vegetation flourishes luxuriantly. Our neighbours of the Continent repay their debt to nature, and therefore inundate our markets with their grain. We alone, the mightiest of the earth, forget the earth, yet periodically call on Providence to succour us. We pray for food, while the means to secure it abundantly is left to rot and fester, till it kills, not feeds us (Hear). Who can doubt that the horrors of cholera have been increased and nurtured by our sewers. Through them all that should be given to the earth is rendered to the waters, and our rivers are thus made cesspools (Hear). I fear to theorize on so fearful a subject; but may we not with advantage inquire, is cholera an atmospheric influence, bred and wafted to us from some vast space of decaying vegetable matter, yielding continuously an atmosphere of life—imperceptible to the eye—but which feeds and fattens amongst the haunts of men, upon the esults of man's own slothfulness? Is it the offspring of n ?—an animalcule, perhaps, which wends its way over the filth of India, where millions of beings unceasingly give out to the atmosphere what never should be left exposed to it. Luxuriating on its horrid food, it reaches mighty England at last, to prove to her she is filthy midst her magnificence — weak and powerless midst her greatness (Hear, hear). But I need not theorize. It is generally admitted that cholera is propagated by the effluvium from decomposing matter in the sewers of cities; and the question is, how can that monster evil be checked? I believe it can, by simply following the laws of nature—rendering back continuously to the land the elements drawn from it, which are the food of plants, but destructive to mankind. But it will be asked, how can this be done in such a place as London, where millions are congregated together? How can the matter be removed without contaminating the atmosphere of the town, and how used without that contamination being extended to the country? My answer is, *it can be done by intermixing it with peat charcoal!* At the last meeting here I had the satisfaction of proving that the intermixture of peat charcoal and excretiæ perfectly deodorised the fœtid matter, and rendered it apparently dry and fit for transport by any conveyance. Now, although that has been accomplished to the full satisfaction, I believe, of all present, it is only right that the properties of peat charcoal should be fully understood. It is the groundwork of all the plans I shall have the honour of describing; it should, therefore be perfectly clear that the peat charcoal deodorizer is a fertilizer also, which many other deodorizers are not. I must, therefore, pray your kind indulgence in permitting me to dwell a little on the facts relating to this very singular production. Early in the year 1845 I first brought the question of the value of peat charcoal as a fertilizer of the soil under public consideration, in a report then published, which had been previously made by me to the Relief Commissioners of Ireland, on the subject of the bog lands of that country; and let me premise that what I speak of is *peat charcoal*, not *peat ash*, which has long been known and used, and is totally different from charcoal. My investigation of the question was induced by experiments which had been made at the Botanical Gardens at Munich, in 1844, by wood charcoal applied there to aloes, pelargoniums, &c. Seeing the effect produced by wood charcoal, it immediately occurred to me that if peat charcoal possessed a fertilizing power, a mine of wealth (to use an Irishism) lay up on the surface of the country. I tried my experiments, and one and all were successful. The fact, however, was then not only doubted, but actually laughed at by many, and I had the honour of being refused the gold medal offered by a public body in Ireland, for an essay on the treatment of the potato disease (although offered a silver one, which I declined), because, as I have been informed, I had set forth that carbon given to the roots of plants would invigorate them. This was then deemed a fallacy, but I am happy to say, any one may now allege the same without being laughed at. At that period, a popular chemist had set it down "that all plants depended upon the atmosphere for the carbon they contained," but the leading chemical writer of the present day says very differently. Brande states, in 6th edition, published

1848, that "although the accumulation of decaying matter which chemists term *humus* performs an important part in vegetable nutrition, it is not by its direct absorption and assimilation, but by its influence as a source of carbonic acid, which is partly taken up by the juices of the root, and partly evolved into the atmosphere; so that plants, independent of their leaves, can thus receive carbonic acid." Thus Brande proves what I then promulgated, namely, that peat charcoal acted upon by the soil and atmosphere yields carbonic acid to the plant, *for peat charcoal performs the same part exactly as humus.* I then stated what I do now, that the fertilizing power of peat charcoal can scarcely be over-estimated. It acts upon all that the soil produces, *I except nothing:* and, to use the words of Dr. Lindley in reply to a correspondent (although the learned doctor was at first a doubter), "*Use it for your onions, but it is good for everything.*" (Hear, hear.) My own experiments have proved its value beyond a question, but I shall give you a few particulars of those made by two gentlemen of large landed property in Ireland, who, immediately after my first publication on the subject, entered into correspondence with me, and closely followed out my proposition —Henry Newton, Esq., Mount Leaster, county Carlow, and James Russell, Esq., Dunlivey House, county Donegal—and I beg to say that both were strangers to me until my publications came before them. Mr. Russell commenced his experiments in 1846. He tried it with all the usual farm produce except wheat, with uniform success, and as a top-dressing for grass land he had fully borne out all I had stated in that respect; but his trial on a field of four acres with potatoes in 1847 was very remarkable. They were planted in ridges, or, as termed here, "lazy beds;" one-half the field manured with farm-yard manure, the other with peat charcoal only, about a handful thrown on each seed. The result was more than a double crop from the charcoal; and he informed me that he was himself so astonished at the fact, that he requested Lord Donegal to see and vouch it. At my suggestion he planted oats the next year on the whole field without any further manure, and he assured me the increase on that portion manured with charcoal was nearly in the same ratio as the potatoes. Now, what is the cause? Simply this. The charcoal lay on the the land throughout the winter. Every shower of rain that came brought it ammonia and common salt in abundance. This continued for the winter months, and when spring came every grain was rich in nutriment, while it held moisture besides, to give it to the seed at once, and stimulate it into growth. Mr. Newton was most anxious to tell you these facts himself, but he arrived in London too late for our last meeting. He brought potatoes, of which I will tell you the history. In February last he planted a large field in drills, manured as usual, not then having charcoal; but in April he got some, and, before the potatoes being earthed, he top-dressed a few yards at the foot of all the drills as far as he had charcoal. He authorises me to state that the result was not only very nearly a double crop, but that there was not a taint in one of them, while all the rest of the field was more or less diseased (Hear, hear). I regret extremely that he was unable to wait for the present meeting; but he also authorises me to say he has now a crop of Swede turnips that cannot be exceeded, to use his own expression. Yet they were not sown till June. No rain came for a month after; all the crops in his neighbourhood failed, and his were only manured with peat charcoal. In short, he has fully proved its value for all plants; like me, he excepts nothing. But I must tell you his reply to my enquiry as to his experience of its value for grass land. He said "Nothing can exceed it; and there is little or no labour in using it. My friend Fenwick swears by it, and he declares he will write his name on the best grass in the country with *black* charcoal, and it will be the *greenest* part of the field in ten days" (Hear, hear, and laughter). Having fully satisfied myself of the value of peat charcoal as a manure individually, my next question was, does it contain the property of correcting putrescence, which chemists have long known to exist in animal charcoal? I was aware from experiments I had made several years since in the purification of water in large quantities for manufacturing purposes, that many descriptions of wood charcoal—for instance, all hard woods — did not possess that property at all; but I was at length happy in the discovery of proofs that peat charcoal specially prepared was gifted with it to the highest degree; but it is right I should say all peat charcoal has not the same effect; and this I wish to be perfectly understood. The quality and preparation greatly affect results. From the moment, however, of my first discovery, I was impressed with the idea that if it were possible to make the pestilential bogs of Ireland (as they have been called) yield a material to neutralise the really pestilential sewers of London, such an amalgamation would not only by the union produce wealth to both countries, but that that union would also produce, through self-interest alone, the real and lasting union which Providence must have intended, and which would be the greatest blessing that ever fell upon both. (Loud cheers). In this happy anticipation I have incessantly laboured for nearly five years, midst derision at the commencement, doubts and difficulties of all kinds midway, jealousies and attempts to overthrow my hopes and my proposition at the end. But I stand now, for the second time, before an assembly openly convened to test the reality of what I have promulgated. And I believe, in my heart, that if England takes from the bogs of Ireland the means to give purity to the towns of England, Ireland will be blessed with food and contentment, and England with increased wealth and happiness. (Cheers.) At our last meeting I proved to you that the amalgamation of peat charcoal and excretiæ produces an inoffensive mass, capable of being packed in bags, and transported by any conveyance. I would now pray attention to what that compound contains. I do not hesitate to say it is richer in fertilising powers than any other manure that can be produced. The components of peat charcoal are carbon, hydrogen, nitrogen, oxygen, sand and clay, oxide of iron, phosphoric acid, silicate of potash, chloride of sodium, carbonate of lime, sulphate of lime, &c., possessing, as a whole, the power of absorbing, deodorising, and retaining for the uses of vegetation, the components of human excretiæ, &c., phosphate of ammonia, phosphate of lime, phosphate of magnesia, phosphate of soda, phosphate of iron, chloride of sodium and alkaline sulphate, sulphate of lime, sulphate of soda, sulphate of potassa, hydrochlorate of ammonia, lactate of ammonia, free lactic acid, urea, uric acid, animal matter, mucus, earthy phosphates, &c. Is it possible to conceive anything richer in the essentials for vegetation ? In fact, it may be said there is nothing wanting. And recollect, that whilst it originally contains all you have heard, peat charcoal has, as before stated, the extraordinary power of drawing to it, so long as it rests in the land, all the ammonia, salts, &c., which every shower of rain brings down, still enriching itself more and more; and, according as it gives out its elements of nutrition to the plant, it becomes the vehicle to receive a new supply from the atmosphere. It is, in fact, at all times a reservoir of both manure and moisture combined. It will take up above 80 per cent. of water, and above 90 volumes of those volatile gases which are the food of plants. The intermixture may be well called artificial humus. But I believe we are all ignorant of what the real and manifold properties of peat charcoal are. Peat, in its natural state, is known to possess the extraordinary power of preventing the decomposition of animal substances. Human bodies have been found undecomposed which have been submerged for years. It contains spermaceti—whether naturally, or by deposit of animal matter, produced from itself by insect life, and given back to it in death, or otherwise, is unessential for the present. But, above all, it holds an abundance of humine or ulmine, which, it is well known, is essential to vegetation, and posseses extraordinary powers in attracting or fixing ammonia. None of these properties exist in wood except a slight portion of humine in elm. In the original properties, perhaps, rest the singular virtues of peat charcoal ; for I do not hesitate to state that its powers are for many purposes infinitely beyond all other charcoals, and only belong to itself. We have been in the habit of assuming that all charcoals contained identical components, but I believe this is an error ; in fact, I have so proved, and the proof is within the reach of all. Charcoal of lignum vitæ, teak, and other hard woods, has no deodorizing power, neither has the charcoal of coals ; and it has long been known that the charcoal of hard woods has no decoloring property : hence why animal charcoal has been used for such purposes. Still, it has been assumed that charcoal, in a general sense, had not only these properties, but that it has been known to be a general deodorizer. I shall only say, that if any one knew that peat charcoal had the property of deodorizing nightsoil in the manner that I have brought forward and proved, he has, I conceive, a great deal to answer for in not having brought it before the public. Peat charcoal, it cannot be doubted, possesses properties belonging to itself alone, and perhaps there are few subjects so well worthy of the deep research of chemistry. If I but succeed in enlisting the attention of the many men of science present, I shall be happy to be only the humble *finger-post* to the path (cheers). But what does peat charcoal present besides, for public good ? Its extraordinary capability of absorbing sulphuretted hydrogen and other gases inimical to animal existence, gives it the power of relieving us from the fearful evil that the inhabitants of cities now suffer. By its use, excretory matter may be constantly kept from the sewers, in place of being daily disseminated through miles of streets, giving out those gases which were formerly held sealed up in cesspools. The evil produced may be a thousandfold beyond that which cesspools formerly permitted, because for every square foot of surface exposed to atmospheric influence in a cesspool, the distribution thereof, by means of a stream in a sewer, say one inch in depth, will give the contents of 12 cubic feet to be acted upon; thus 1728 inches of surface will generate gases destructive of human life, in place of 144. Do not think I advocate cesspools ; far from it, for they are a disgrace to civilization ; but I hesitate not a moment to say, they breed disease in a manifold degree less than sewers. No city can be healthy so long as the present system of sewers continues. The proof is simple—in London itself 140 of its people die for every 100 that die in the surrounding counties. I shall now beg leave to point out the plans I suggest for the sanitary reform of London, which are similar to what I submitted to the sanitary commission two years since, and which are now before the metropolitan commissioners of sewers. I do not present them as fully matured, but as the principle upon which I am satisfied the whole excretory matters of towns may be saved, and converted into a most profitable manure. Modifications will possibly suggest themselves hereafter, but the principle has been already proved.

Mr. Rogers then developed his plan for the sanitary reform of large cities, which he illustrated by reference to numerous diagrams. In the first place, he proposed the construction for every house of a tank about 2 feet 6 inches square, and capable of holding 18 or 19 cwt. of matter. By this arrangement, supposing it to be universally carried out in London, only 218 waggons and double that number of men and horses would be required periodically to remove the tanks and replace them again. In fact the same staff which now carried away the ashes from dwelling-houses might remove the contents of the tanks : and the adoption of this plan would give a return to every house of £5 or £10 a year. It had been asked, however, if one tank might not be constructed for the reception of the excretory matter from a number of houses ; and it might. Let a chamber be made under the street, 30 feet by 20, with two tanks 28 feet by 6 feet, and they would be amply sufficient for receiving all the matter from 500 houses in 24 hours, and also to contain enough peat charcoal at the bottom to allow of the filtration of the liquid, and the retention of the solid matter. Workmen employed 12 hours every day might get rid of all the matter deposited in 24 hours ; and, in doing so, not the least odour could, under any circumstances, arise. In his estimate he had allowed from £10 to £15 a house for accomplishing this ; but such tanks as the latter would cost, say £800 ; and the only additional charge would be the earthenware pipes, of comparatively little expense. In that way £5 per house would be more than ample. And if he was not wrong in what he had that night shown, every house would net £5 to £10 per annum—if what he proposed was honestly carried out. The disagreeable and noxious effluvia which were generated at cab-stands and other places in the streets of London might also be completely destroyed. And with regard to intramural interments, if the management of any churchyard in the metropolis were entrusted to him, he would undertake that in the course of one day after carrying into effect the plan he proposed, no odour whatever should arise from it. Upon the surface of the ground he would place some three or four inches of granulated prepared charcoal, which would arrest the gases and prevent them from passing through; and this he would cover with a small quantity of macadamized stones (Hear, hear). Any person had the power in his own hands of testing for himself that peat charcoal would absorb all gases that arose from decomposing matter; but there was another purpose for which it was also highly valuable, viz., the filtration of water. They had only to cause the water which they desired to purify to pass up—not down—through a layer of charcoal, and then through a sponge, and it would flow out as pure as spring water (cheers).

Sir Charles Aldis, Dr. Grosse, and Mr. Cuthill (florist), of Camberwell, having been appointed judges, experiments were proceeded with to show the deodorizing properties of the peat charcoal. The machine was put in motion by manual power, and in an incredibly short space of time a quantity of excretory matter, mixed with charcoal, had passed through it in the form of a dry black powder, the volatile gases which it originally possessed being entirely neutralized, and the substance itself rendered completely odourless.

Sir CHARLES ALDIS then reported that the judges were of opinion that the experiments had been fairly and properly made, and that they were most successful (cheers).

Mr. CUTHILL said he had carefully examined the machine before the experiments were made, for the purpose of ascertaining that they were conducted fairly; and he must say that he considered it a most marvellous discovery (Hear, hear).

Doctor GROSSE said he could not say too much for what he had witnessed; and that he did not doubt that, because England was first in all other things, she would soon be first in agriculture (cheers).

Mr. BLANCH (surgeon), after expressing his approbation of the experiments, and his concurrence in the statements made by Mr. Rogers respecting the value of peat charcoal as a deodoriser, said that the only drawback he saw in that gentleman's plan was that the sewers would carry away the liquid excretia. Thus a considerable portion of the existing evil would remain, though it was possible to preserve the liquid as well as the solid manure.

The CHAIRMAN then read a resolution to be proposed by the Judges.

Mr. SWINBURN stated that, before any resolution was put, he wished to point out that he had an antagonistic plan. He considered that the *two excrements* should be separated and kept asunder, for which Mr. Rogers's plan did not provide (laughter). But, as he could not deny the deodorizing property of charcoal, he could not object to the resolution which it was proposed to put.

Sir CHARLES ALDIS said he had great pleasure in proposing the resolution he held in his hand, by desire of his fellow-judges. Mr. Rogers deserved the highest praise. The sentiments he had expressed did him honour, for they could not be doubted. He had conferred a great good on society. What could be more simple than his plans? and at all events, if the authorities would not remove the cesspools, surely they ought to *smother them with charcoal*. He could not express too strongly his approbation (Hear, hear).

The resolution was as follows:—

"We, the undersigned, having been appointed by the Meeting held here this evening, to watch the experiments made by Mr. Jasper W. Rogers, explanatory of his views for carrying out his plan for the Sanitary Reform of London and other large cities, by the application of Peat Charcoal, do certify as follows:—

"That the experiments have been fairly and openly performed, and that the results have justified the predictions and sustained the facts advanced by Mr. Rogers in his Lecture.

(Signed by)

"Sir CHARLES ALDIS, Surgeon, Old Burlington-street, St. James's.
JAMES CUTHILL, Florist, Camberwell.
Dr. THEODORE GROSSE, Stoke Newington."

The CHAIRMAN then rose. It became his duty to read a resolution which had been placed in his hand, in order *to ascertain if it were the feeling of the meeting.* He then read the resolution, and said—"All who are of opinion that this resolution shall pass, will express that opinion in the usual way." A forest of hands immediately appeared, while no dissenting hand was presented. The following resolution was also unanimously passed, with enthusiastic cheers:—

"Resolved unanimously,—That the cordial thanks of this meeting be given to Mr. Jasper W. Rogers, for his instructive and important lecture on the plan as proposed by him for the sanitary reform of London and other large cities, by the aid of peat charcoal; and that we deem his proposition worthy of the very serious attention of the inhabitants of this great city, as a lucrative method of freeing themselves from the serious evils under which they have been and still are suffering, in consequence of the present defective system of sewage.

"WM. SHAW, Chairman."

Mr. ROGERS came forward, and was loudly cheered. He said he could not express the obligation he felt; all he would say more on that point was that he would rest neither day nor night until he had carried out those plans which he was satisfied would be of the utmost consequence to the country at large. They would save the poor of Ireland from starvation, and the poor of England from death. Ireland had 3,000,000 acres of bogs, and thousands of poor people ready to give their labour to produce peat charcoal, which might be sold at £2 10s. a ton in England; yielding large profits to those who embarked capital in the manufacture. The peat was from 10 to 50 feet deep, and he could answer for it, that if London took even 2,000,000 tons a-year, there would be enough for the next 6,000 years. (Hear, hear, and laughter.) And what would it do for themselves? Get rid of the horrors they were suffering under, and at the same time give the farmer plentiful crops, at a comparatively trifling cost. (Hear, hear.) He wished the meeting saw what he witnessed yesterday. At the request of the Irish Amelioration Society he visited Windsor, in the hope of purifying the miserable square of buildings where some 17 or 18 persons had died, within a few days, of cholera. Before his arrival (accompanied by Mr. Shoredicke, one of the Directors,) government officers had taken the matter in hand; the Society was, therefore, unable to accomplish its desire. He never saw so fearful a place. A little square of 21 houses, situate at the lowest part of the town, had the sewers from all the houses on the hill above running directly under them, in addition to all their own filth, and at the back ran an open ditch filled with house matter. This ditch communicated with several others, some five or six thousand yards in length, at each side of a public road, and into it had been emptied for years all the filth of the town. Now, all these horrors lay within 500 yards, as the crow flies, of where the Royal standard of England was then floating, and where her Majesty then was (Hear, hear). Unscared she had come there—to her honour be it spoken—but was it not fearful to think that within the very precincts of royalty so dangerous and abominable a nuisance existed? (cheers).

Thanks were then voted to the chairman, who warmly expressed the pleasure he felt at having been instrumental in proving what he had himself doubted; but which if proved, he felt would be a great benefit to agriculture.

The meeting then formally closed, and several left the theatre.

Mr. Rogers, in a few minutes after, came forward and expressed a wish that the meeting would remain until he showed them the intermixture of *equal parts of charcoal and excretia.* Those quantities were then weighed and passed through the mill, and immediately came out perfectly free from odour. In an instant a rush was made for the *precious "morceaux;"* every hand was in the tub, and the whole vanished at once. While passing out, we heard the man who worked the machine saying to Mr. Rogers, "*If you let me put another charge in, I'll get a shilling an ounce for it.*" In sober seriousness, not a grain was left.

NIGHT SOIL AND PEAT CHARCOAL.

The attention of those interested in combining sanitary improvement with improved cultivation, was last week called to some experiments performed by Mr. Jasper Rogers, at the Mechanics' Institute, on the properties of peat charcoal. The result of the experiment was to convince most of those who were present, that peat charcoal is at least a powerful deodorising agent. This subject, however, is one of so much importance, that we are anxious to draw special attention to it, in order that further experiments may be tried, and a larger number of facts placed before the public.

It has long been known to chemists that both animal and vegetable charcoals have a remarkable affinity for the vapour of water and for various gaseous bodies. Although it appears that this absorbing power varies according to the texture of the wood from which the charcoal is made, the denser the wood the greater being the amount of gaseous matter absorbed, yet the following estimate of the quantities of various gases absorbed in 24 hours by charcoal of box-wood, and given by De Saussure, will be found near enough to the truth to assist judgment for all practical purposes.

	Volume.
Hydrogen	1.75
Nitrogen	7.5
Oxygen	9.25
Carbonic oxide	9.42
Olefiant gas	35
Carbonic acid	35
Nitrous oxide	40
Sulphuretted hydrogen	55
Sulphurous acid	65
Muriatic acid	85
Ammoniacal gas	90

It will be seen at a glance, from this table, that a body capable of absorbing such large quantities of carbonic acid, sulphuretted hydrogen, olefiant and ammoniacal gases, must be a powerful deodoriser. This was fully demonstrated in Mr. Rogers's experiments. Two parts by weight of charcoal, with one part by weight of night-soil, were mixed together in a machine made for the purpose, and the result was the production of a compound which gave out little more odour than the charcoal itself.

We shall not stop to inquire here in what form the gases of night-soil are held by the charcoal, so as to prevent their escape; for whether they undergo chemical change, or are held by some physical force, their tendency to diffuse themselves is very small indeed. As a deodoriser, then, there can be little doubt of the power of charcoal; but still if it had no farther value, and the question was between it and some of the various preparations of chlorine, we should unhesitatingly give our preference to the latter.

The process of deodorisation, however, is mostly demanded for substances which have a value as manures. Hence it becomes a matter of first-rate importance that the body used as a deodoriser should not be injurious as a manure. It has been often shown in the pages of the *Gardeners' Chronicle* that many of the chemical re-agents recommended as disinfectants and purifiers of decomposing animal and vegetable matter are not only themselves injurious to vegetation, but frequently arrest those processes which alone can make manures useful. It is then a subject of great interest to ascertain with regard to charcoal, whether in virtue of its own properties, or any it may derive from being mixed with decomposing vegetable and animal matters, it is fitted to act as a manure.

With regard to unmixed charcoal, whether animal or vegetable, there is abundant evidence to prove that it is a valuable manure. It was at one time supposed, and this opinion was held by Sir Humphrey Davy, that charcoal and wood-ashes acted favourably as manures on account of the carbon of the charcoal uniting with the oxygen of the air, and thus forming carbonic acid gas, which was thus directly supplied to the roots of plants. Most chemists maintain, however, that this does not take place whilst the carbon retains the form of charcoal, and we must look for an explanation of the beneficial effects of charcoal to other causes. In the first place, then, it appears that all charcoals contain in them the inorganic constituents of the plant from which they are obtained. Hence they may become a source of supply of some of the inorganic elements required by plants. In the next place charcoal exerts its affinity for gaseous matters without being directly mixed with them. Like clay, chalk, magnesia, humus, and garden mould, it has the power of absorbing moisture, carbonic acid, ammonia, and other substances from the atmosphere, and thus of conveying them directly to the roots of plants. We are not aware that any extended series of experiments has been made on the relative absorbing powers of soils, but we know from Schubler's* experiments that humus possesses the power of absorbing moisture in the highest degree, and humus in its physical character and chemical composition closely resembles charcoal.

Although we have no direct experiments to prove what is the way in which such substances as clay, chalk, and humus act beneficially in soils, yet we know that they are powerful absorbents of water, carbonic acid, and ammonia; and as these are the very constituents which plants most need for food, and as plants flourish best in soils of this kind, we conclude that it is on account of their supplying these elements of the food of plants that such soils are beneficial. This argument leads therefore to the conclusion that charcoal acts as a manure by first absorbing moisture, carbonic acid, and ammonia from the atmosphere, and then yielding them to the plants which it surrounds.

Now, if charcoal is thus adapted to act beneficially alone, there can be little doubt of the advantage to be gained if we can so mix it, before applying it to the soil, as to make it yield at once, not only an additional quantity of the inorganic matters required by plants, which matters it does not itself possess, but also that moisture and those gases which, when applied in its pure state, it must obtain from the atmosphere. This appears to be effected by mixing charcoal with animal excretions in the way proposed by Mr. Rogers. We understand that his compound has been tried as a manure, and we are not surprised to hear very favourable accounts of its success.

The first point upon which any question can be raised is that of expense. The advantages of charcoal, as a manure, may be purchased at too high a price. For the ordinary kinds of charcoal burned in stoves £8 or £9 a ton is given, but this is an absurd price to give for a passive manure, such as charcoal. The project, however, of burning peat in Ireland is represented to afford a prospect of obtaining peat charcoal at much less than this; Mr. Rogers mentions 50s. a ton as a probable sum, to which we presume must be added cartage, freight and sundry other expenses. Provided peat charcoal acts in the same way as other charcoals, that price might put it within the reach of the farmer and gardener as a manure. But this is, as we have formerly observed, exactly what we shall not believe until it is actually in the market at that price.

From the following composition of peat charcoal, as given by Mr. Phillips, we should not infer that its effects would be different from that of other charcoals.

Carbon	79.24	88.42 combustible matter.
Hydrogen	2.20	
Nitrogen	0.54	
Oxygen	6.44	
Land and clay.. ..	2.48	11.58 incombustible matter.
Oxide of iron	1.66	
Phosphoric acid ..	0.34	
Silicate of potash ..	0.98	
Chloride of sodium ..	2.53	
Carbonate of lime ..	1.85	
Sulphate of lime ..	1.44	
Loss	0.30	
	100.00	

We have, however, heard urged against the use of this substance the very serious objection that, from the large quantity of sulphur and iron it contains, a sulphuret is almost certain to be formed, which would inevitably lead to spontaneous com-

* "Agriculturchemie."

bustion. We have been assured that such accidents have occurred, and we venture to solicit information on the point from some of our Irish correspondents. The quantities of sulphates and iron, as recorded in the analysis given by Mr. Phillips, strike us as being too small to give rise to spontaneous combustion.

With regard to any plans for using charcoal as a deodoriser in our towns and cities, or the best time, place, and means of mixing it with the refuse for use, those are points for discussion hereafter, when the article which Mr. Jasper Rogers has brought before the public shall be in the market at a price which will make it worth using—an event about which we are not particularly sanguine.——Gardeners' Chronicle.

ON THE ACTION OF CHARCOAL ON VEGETATION.

BY EDWARD LUCAS.

In a division of a low hot-house in the botanical garden at Munich, a bed was set apart for young tropical plants, but instead of being filled with tan, as is usually the case, it was filled with the powder of charcoal (a material which could be easily procured), the large pieces of charcoal having been previously separated by means of a sieve. The heat was conducted by means of a tube of white iron into a hollow space in this bed, and distributed a gentle warmth, sufficient to have caused tan to enter into a state of fermentation. The plants placed in this bed of charcoal quickly vegetated, and acquired a healthy appearance. Now, as always is the case in such beds, the roots of many of the plants penetrated through the holes in the bottom of the pots, and spread themselves out; but these plants evidently surpassed in vigour and general luxuriance plants grown in the common way, for example, in tan.

Several of them, of which I shall only specify the beautiful Thunbergia alata, and the genus Pereskia, throve quite astonishingly; the blossoms of the former were so rich that all who saw it affirmed they had never before seen such a specimen. It produced, also, a number of seeds without any artificial aid, while in most cases it is necessary to apply the pollen by the hand. The Pereskia grew so vigorously that the P. aculeata produced shoots several ells in length, and the P. grandifolia acquired leaves of a foot in length. These facts, as well as the quick germination of the seeds which had been scattered spontaneously, and the abundant appearance of young Filices, naturally attracted my attention, and I was gradually led to a series of experiments, the results of which may not be uninteresting; for, besides being of practical use in the cultivation of most plants, they demonstrate also several facts of importance to physiology.

The first experiment which naturally suggested itself was, to mix a certain proportion of charcoal with the earth in which different plants grew, and to increase its quantity according as the advantage of the method was perceived. An addition of two-thirds of charcoal, for example, to vegetable mould, appeared to answer excellently for the Gesneria and Gloxinia, and also for the tropical Aroideæ with tuberous roots. The two first soon excited the attention of connoisseurs, by the great beauty of all their parts, and their general appearance. They surpassed very quickly those cultivated in the common way, both in the thickness of their stems, and dark colour of their leaves; their blossoms were beautiful, and their vegetation lasted much longer than usual; so much so, that in the middle of November, when other plants of the same kind were dead, these were quite fresh, and partly in bloom. Aroideæ took root very rapidly, and their leaves surpassed much in size the leaves of those not so treated; the species which are reared as ornamental trees, on account of the beautiful colouring of their leaves—I mean such as the Caladium bicolor, Pictetia, Pœcile, &c.—were particularly remarked for the liveliness of their tints; and it happened here also, that the period of their vegetation was unusually long.

A Cactus, planted in a mixture of charcoal and earth, throve progressively, and attained double its size in the space of a few weeks. The use of the charcoal was very advantageous with several of the Bromeliaceæ and Silenaceæ, with the Citrus and Begonia also, and even with the Palmæ. The same advantage was found in the case of almost all those plants for which sand is used, in order to keep the earth porous; when charcoal was mixed with the soil instead of sand, the vegetation was always rendered stronger and more vigorous.

At the same time that these experiments were performed with mixtures of charcoal with different soils, the charcoal was also used free from any addition, and in this case the best results were obtained. Cuts of plants from different genera took root in it well and quickly. I mention only the Euphorbia fastuosa and fulgens, which took root in ten days; Pandanus utilis, in three weeks; P. amaryllifolius, Chamædorea elatior, in four weeks; Piper nigrum, Begonia, Ficus, Cacropia, Chicocca, Buddleja, Hattea, Phyllanthus, Capparis, Laurus, Stifftia, Jacquinia, Mimosa, Cactus, in from eight to ten days; and several others, amounting to forty species, including Ilex, and many others. Leaves and pieces of leaves, and even dedimenti or petioles, took root and in part budded in pure charcoal. Amongst others we may mention the fioliola of several of the Cycadaceæ as having taken root, as also did parts of the leaves of the Begonia Selsairice, and Tacaranda, Brasiliences, leaves of Euphorbia fastnosa, Oxalis Barrelieri, Ficus, Cyclamen, Polyanthus, Mesembryanthemum; also, pieces of a leaf of the Agave Americana, tufts of Pinus, &c., and all without the aid of a previously-formed bud.

Pure charcoal acts excellently as a means of curing unhealthy plants. A Doryanthus excelsa, for example, which had been drooping for three years, was rendered completely healthy in a very short time by this means. An orange tree, which had the very common disease in which the leaves become yellow, acquired within four weeks its healthy green colour, when the upper surface of the earth was removed from the pot in which it was contained, and a ring of charcoal, of an inch in thickness, strewed in its place around the periphery of the pot. The same was the case with the Gardenia.

I should be led too far, were I to state all the results of the experiments which I have made with charcoal. The object of this paper is merely to show the general effect exercised by this substance on vegetation; but the reader who takes particular interest in this subject, will find more extensive observations in the *Allgemeine Deutsche Garteuzeitung*, of Otto and Dietrich, in Berlin.

The charcoal employed in these experiments was the dust-like powder of charcoal from firs and pines, such as is used in the forges of blacksmiths, and may easily be procured in any quantity. It was found to have most effect when allowed to lie during the winter exposed to the action of the air. In order to ascertain the effects of different kinds of charcoal, experiments were made upon that obtained from the hard woods and peat, and also upon animal charcoal, although I foresaw the probability that none of them would answer so well as that of pine wood, both on account of its porosity and the ease with which it is decomposed. It is superfluous to remark, that in treating plants herein described, they must be plentifully supplied with water, since the air, having such free access, penetrates and dries the roots, so that unless this precaution be taken, the failure of all such experiments is unavoidable.

The action of charcoal consists primarily in its preserving the parts of the plants with which it is in contact—whether they be roots, branches, leaves, or pieces of leaves—unchanged in their vital power for a long space of time, so that the plant obtains time to develop the organs which are necessary for its further support and propagation. There can scarcely be a doubt, also, that the charcoal undergoes decomposition, for after being used five or six years it becomes a coaly earth, and if this is the case, it must yield carbon, or carbonic oxide, abundantly to the plants growing in it, and thus afford the principal substance necessary for the nutrition of vegetables. In what other manner, indeed, could we explain the deep green colour, and great luxuriance of the leaves, and every part of the plants, which can be obtained in no other kind of soil, according to the opinion of men well qualified to judge? It exercises, likewise, a favourable influence, by decomposing and absorbing the matters excreted by the roots, so as to keep the soil free from the putrefying substances which are often the cause of the death of the spongiolæ. Its porosity, as well as the power which it possesses of absorbing water with rapidity, and, after the saturation, of allowing all other water to sink through it, are also causes of its favourable effects. These experiments show what a close affinity the component parts of charcoal have to all plants, for every experiment was crowned with success, although plants belonging to a great many different families were subjected to trial.—Irish Farmers' Gazette.

ON THE SUCCESSION OF CROPS.

In addition to our remarks on the continuous growth of any particular crop on the same piece of ground, we may observe that whether the system of the humic or inorganic theorist is right, or whether the excretory principle of De Candolle be the correct one, it is evident the laws of nature are opposed to the principle. We find naturally, plants, from the oak and the pine to the smallest of the musci, pursuing successions, if not rotations of species, differing in their nature and habits. And this is perfectly natural. We find some races of plants which derive the great bulk of their nourishment from the air; thus, the wheat crop of 25 bushels per acre will carry off some 220lbs. of inorganic matter from the soil, while a potato crop of eight tons will carry off 580lbs.; and as regards the nitrogenous products, the same wheat crop will contain 44½lbs. of nitrogen, while the same crop of potatoes will only produce 67lbs.; but, as regards carbon, the difference is very striking, for the potato crop carries off 1,971lbs., the wheat crop 1,452lbs. And to show the great difference between different rotations, Boussingault shows that a rotation of potatoes, wheat, clover, wheat, oats, produced 16,206lbs. of carbon; and one of potatoes, wheat, clover, wheat and stubble turnips, peas, rye, produced 10,705lbs. of carbon. Thus, the six crops produced nearly 6,000lbs. of carbon less than the five crops; and it is possible to select such rotations to a certain extent as derive a large portion of their constituents from the atmosphere, and hence their utility. But, independently of this, such a succession of crops must be selected as will admit of fair proportions of the land being under the plough, and under the stock; and unless this is systematically arranged there will be nothing but confusion on a farm. One year the horses will have more work than they can do, another too little. This can only be regulated by adopting a system of management, on which an old friend thus writes us :—

"No business can be properly conducted without some system; but in agriculture it must be expansive, so as to allow of considerable variations, without deviating from certain fixed principles. These should be such as to equalize the work, and, as far as practicable, the produce also, by having a regular quantum of fallow or fallow crop, of grain, and of grass seeds, each year. With this view the farm should be put on a regular scale of cultivation, according to some such plan as that below, which the writer adopted for many years, and found very useful. His plan was to have two scales, the first showing what each field was intended to produce, and the last what it did produce. It is very desirable that a farm should be divided into a certain number of equal-sized fields, but where they vary in size and quality they should be coupled as equally as practicable. Ten or fifteen acres is a good size for each field, especially if it be of an oblong form; and an eight-field course of cropping is a very convenient one, admitting of a double four-course, or various deviations, and a moderate interval between two crops of the same kind; but of course the size of the fields, and the system of cultivation, must be regulated by the size, character, and situation of the farm. It will not do in these days of difficulty to bind the judgment of the farmer by stringent and needless ties, but for his own benefit he ought to adopt some flexible system; from want of this, farmers sometimes get sadly out of course. Suppose the farm to contain 120 acres of tillage land, divided into twelve fields of about ten acres each, two or three of them may be classed together, as in the subjoined form, which shows at once the crop of each field and the quantity of fallow in every year.

SCALE OF CULTIVATION FOR 120 ACRES.

	Name of Field.	Acres.	Crop in 1849.	1850.	1851.	1852.
A.	Norfield	10½	Rape 20	Wheat .. 4½*	Red clover.	Wheat .. 4*
	Farfield	9½	Turnips 30	Oats 10	White do., &c.	Ditto .. 5
	Stony close.	10	Do. 20	Barley .. 7	Ditto.	Ditto .. 4½
B.	Sandlands ..	12	Oats 12	Turnips.	Wheat.	
	Midlands ..	9¼	Wheat 7	Mangold wurzel.		
	High field..	8¾	Oats 10½	Tares (green).		
C.	Banks......	7¾	Red clover.			
	Drains......	12¼	White do., &c.			
	East field ..	10	Ditto.			
D.	South close..	9	Beans.			
	Home close.	10½	Tares.			
	Corner close.	10½	Peas.			
	Total	120	Fallowed.. 30 Corn .... 60 Seeds.... 30	Fallowed Corn Seeds	Fallowed Corn Seeds	Fallowed Corn Seeds

The numbers under the * indicate the supposed or ascertained acreable produce in quarters or tons.

Washington says, in his "Agricultural Notes"—"A system closely pursued, although it may not in all its parts be the best that could be devised, is attended with innumerable advantages. The conductor of the business, in this case, can never be under any dilemma in his proceedings. The overseers, and even the labourers, know what is to be done, and what they are capable of doing, in ordinary seasons. The force to be employed may be in due proportion to the work which is to be performed, and a reasonable and tolerably accurate estimate may be made of the products. But when no plan is fixed, when directions flow from day to day, the business becomes a mere chaos, frequently shifting, and sometimes at a stand, for want of knowing what to do, or the manner of doing it. Thus is occasioned a waste of time, which is of more importance than is generally imagined. Nothing can so effectually obviate the evil as an established system, made known to all who are actors in it, that all may be enabled thereby to do their parts to advantage. This gives ease to the principal conductor of the business, and is more satisfactory to the persons who immediately overlook it; less harassing to the labourers, as well as more beneficial to the employer."

Now, although a system must be set down, and adhered to with the most rigid punctuality, yet it must be a system of *change*. The unvarying wheat after wheats proposed by the American writer noticed in our last, or by Mr. H. Briggs, is *not a system*. It is a simple attempt to continue an uniform practice, unbending and unvarying, as long as the land will produce; and then it must be a break-up of the plan, and the cultivator will be utterly at sea.

We cannot help thinking that the system by far the best adapted to profit and to economical management is a rotation of cropping; and the perfection of it, to keep the land "in heart," is to "crop green and crop grey:" and if the land is not in heart, two green crops may be substituted for one grey; and this is better and safer, and often more profitable, than even an alternate change. The following rotations will be found good for restoring poor sandy soils to fertility:

1, Turnips, boned; 2, Barley; 3, Seeds; 4, Turnips.

Or: 1, Turnips, boned; 2, Oats; 3, Seeds; 4, Seeds, broken up at midsummer; 5, Barley.

Or: 1, Turnips; 2, Barley; 3, Seeds; 4, Seeds; 5, Oats.

For barren clays, a somewhat similar system will be found useful, thus:

1, Fallow; 2, Wheat; 3, Seeds; 4, Seeds, broken up; 5, Oats.

Or: 1, Fallow; 2, Wheat; 3, Seeds; 4, Beans; 5, Oats.—Gardeners' and Farmers' Journal.

FULL COMPENSATION FOR TENANTS' IMPROVEMENTS PRACTICABLE AND BENEFICIAL TO THE COMMUNITY.

Letter II.

TO THE TENANT FARMERS OF GREAT BRITAIN AND IRELAND.

Fellow-Countrymen,—The measure of compensation which should be secured to a tenant-farmer for his permanent improvements has occupied the attention of our wisest statesmen and economists. In London a society has been established for the amendment of the law, numbering among its members two ex-Chancellors of England—Lords Brougham and Lyndhurst—besides a distinguished array of Peers and Commoners, eminent lawyers, and public functionaries. This society has applied itself, with a vigour and perseverance worthy of the arduous task it has undertaken, to an investigation and exposure of all the errors and abuses, whether of doctrine or of practice, that are to be found in the administration of the various courts of law and equity, and has had the merit of suggesting many of the remedies which have recently been applied by the legislature to such abuses. The anomalous state of the law with regard to tenants' improvements, even in England, did not fail to attract the notice of this society, and a committee of its members was appointed, "to consider the propriety of amending the law of landlord and tenant, with respect to fixtures and permanent improvements." The report of this committee was published in the *Law Review*, of May, 1848; and it has never been my lot to meet with a public document more clear and concise in its statements, or more thoroughly conversant with the subjects of which it treats. I shall have several opportunities hereafter of referring to this report. In the meantime, I wish to record here its deliverance regarding the matter discussed at the close of my last letter:—

"The 4th question is the most difficult of all, viz., 'On what principle, and at what period, is the amount of compensation to be determined.' There are only two standards applicable for this purpose: first, the increase in value of the land at the end of the tenancy; and, secondly, the prime cost of the works, subject to a proportionate deduction for subsequent enjoyment by the tenant. The first is the one adopted by Mr. S. Crawford's Bill as to most improvements, the second that of the Government Bill and Mr. Pusey's Bill. *Primâ facie*, there is much to be said in favour of the former; it is obviously the just, and the only strictly just, method. The tenant would by it, so far as his acts are concerned, be held bound to restore the land in as good, but in no better, condition than it was in when he took it; and for all increase of value, arising from his acts, he would receive an equivalent in money. But this method is, unfortunately, less easy of application than it is just in principle. In acting on it, the following data would be necessary, in order to come to a conclusion:—1st, the annual value of the land at the commencement of the tenancy, which might, perhaps, be obtained by reference to the rent and the poor-rate assessment; 2ndly, the annual value of the land at the end of the tenancy, which would require a special valuation; 3rdly, the proof of the fact that the improvements were made; 4thly, proof of the extent to which the improvements one, as distinguished from other co-operating circumstances, have affected the value."

Here then is a distinct admission from *the very highest authority*, that the value of the tenant's improvements at the end of his tenancy is the ONLY JUST measure of the compensation which he ought to receive. No doubt there must be some difficulty in determining the exact value of these improvements; but the necessary materials for coming to a just conclusion on this point would be supplied by the four considerations above described. Of these, the first and second present no very serious difficulties. The third, or proof of the making of the improvements, being the very foundation of the tenant's claim, the fullest evidence regarding it would naturally be preserved by the tenant himself. And that it might not rest wholly on oral testimony, a detailed account of the improvements made could easily be prepared, immediately after their termination. This might be attested by some of those who were actively engaged in mahing the improvements, and also by competent and impartial persons, who had had an opportunity of seeing the premises before the improvements commenced, while they were in progress, and after they had been completed. If such a record of his improvements were prepared by the tenant, and a copy of it furnished to the landlord soon after the execution of the works, to enable him to make inquiry and satisfy himself as to its accuracy, it would, if acquiesced in, supply, at any future period, a tolerably safe criterion of the works that had actually been performed, the attesting parties, if alive and accessible, being, of course, liable to a *viva voce* examination as to the truth of any matter which they had certified. When such evidence had not been preserved, it would be necessary to resort to oral testimony, or such other proof as the tenant might be able to produce; and if on any occasion he should fail, for want of sufficient evidence, to obtain that compensation to which he was fairly entitled, he would be in no worse condition than he is in at present. His case would then be the exception, whereas now it is the rule; and the failure of justice would then be owing to the neglect of the party principally concerned, and not to a defect in the law, as at present.

But I do not dread any lack of evidence respecting improvements that have been made, more especially as the fourth question, the most important of all, still remains behind. In order to establish a claim for compensation, it must be shown, not only that the farm is more productive or otherwise more valuable at the end, than at the beginning of the tenancy, but also that this increased value arises from the tenant's improvements. Various other causes might enhance the value of the farm, such as the establishment of a town or harbour, the vicinity of a railway station, the opening of a mine or a manufactory, or improvements effected by the landlord's capital. But, in the absence of any such special cause, the increased value of the farm would naturally be referrible to such improvements as the tenant could show he had accomplished. In regard to the fact of the improvements, the *onus probandi* would necessarily rest upon the tenant; but these being once established, the burthen of proof would be thrown on the landlord to make out any special cause for the whole or a part of the increase of value in the farm, independent of the tenant's improvements. The actual increase in the value of the farm, if any, we have supposed to be made out by a close comparison of its value at the end, with its value at the beginning, of the tenancy. This increase, then, or such portion of it as should be found justly due to the tenant's industry and capital, being measured, in the first instance, by the addition of yearly rent which it would make the farm worth to a solvent tenant, could easily be reduced to a fixed sum, by allowing so many years' purchase for the improvements, according to their nature and their durability. It would be manifestly unjust to place on the same footing, in regard to remuneration, solid lasting improvements, never needing to be repeated, such as reclaiming land from waste, by removing stones, covering bog with clay, or *vice versâ*, and thus creating a fertile arable soil, where the land had previously been unproductive, and other improvements of a less substantial and permanent character, though influencing, perhaps to an equal extent, the letting value of the land. Hence the necessity, not merely of leaving the question of increased value to be determined after the improvements are completed, and their effects distinctly seen, but also of leaving the number of years' purchase to be assigned as compensation in any particular case, to be determined, within certain limits, by the circumstances of that case.

So much for the possibility of ascertaining the real value of improvements at the end of a tenancy. Some difficulties there would be, no doubt, as in every other system of compensation that could be devised; but these could, in most cases, be overcome. And then, by encountering these difficulties, the legislature would be enabled to establish a sound principle, or, to adopt the words of the society for improving the law, "the only strictly just method" of compensation for improvements.

But how, it may be inquired, will this new doctrine of ample compensation for tenants' improvements affect the general interests of society? For so far the question has been discussed as between class and class merely. Are there no public interests at stake depending on the proposed change? Unquestionably the whole community is deeply interested in every measure which promises to increase the supply of food. And if, as it is alleged, the securing of fair compensation to improving tenants would at once give a stimulus to agricultural enterprise, and devolop more fully the resources of the soil, it is manifest that the whole country would be enriched by such a change. In presence of the awful famine, which has not yet ceased to desolate this unfortunate island, we must not undervalue any measure which would increase our home supplies of food. Now it cannot be seriously alleged, by any one, that these countries have attained the utmost limits of fertility. In fact, it must be admitted that agriculture, as a science, is still in its infancy. The discoveries of the philosopher always precede the practical improvements of the workman. And, with regard to agriculture, the discoveries of Liebig and other modern chemists have ushered in a new era in its history. Thus, the structure and composition of every kind of plant can now be accurately analyzed, and so also can the soil be, on which it may be proposed to plant it. And since plants must necessarily derive all their nourishment, save a little air, from the soil on which they grow, it can thus be at once determined what soils are suited for particular crops, and what ingredients must be supplied, by way of manure or otherwise, to render them suitable for the growth of other crops still more profitable. Here, then, in these simple principles of agricultural chemistry, previously unknown or not duly appreciated, lies a granary of knowledge which a century will not exhaust, nor bring into full practical operation. The artificial treatment of soils, so as to adapt them to the most productive rotation of crops, together with the skilful application of thorough-drainage to the ventilation of the land, will afford abundant occupation to the scientific farmer for generations to come.

But how can the tenant-farmer be expected to expend the capital, and try the experiments, and run the risks necessary for developing the resources of the soil, without adequate security for his outlay? If agriculture is to be advanced through his agency, and kept abreast of the other physical sciences, he must be induced to throw his heart into the work, and not merely to adopt in every department of labour all the appliances which ingenuity has devised for increasing produce and abridging toil, but to devise new and untried methods of improvement. We may then expect to find agriculture produce its Arkwrights and Watts, and furnish an ample field for the inventive genius of its votaries. But it is contrary to the principles of human nature for a man to throw himself with all his ardour and energy into any occupation of which he is only to reap a fractional share of the profits. There must be an adequate motive, or stimulus, to draw forth the higher degrees of skill and ingenity, such as are necessary for advancing agriculture to a high degree of perfection. This necessary stimulus, our system of land tenures fails to furnish to the tenant farmer, and even to the proprietor, whose estate is in strict settlement, and who is himself merely tenant for life; and however far the discoveries of agriculture may be pushed by the man of science, and by the practical man, who has an adequate motive to urge him forward, or however richly their industry and enterprise may be rewarded, it is in vain to expect that many of those who have all the hazard and often but a small share of the profit, will follow the example. Indeed, without a complete change of system in this respect, we must be prepared to find agriculture continuing to lag behind all the other arts and sciences, instead of taking its place in the front rank, fully abreast of those manufactures, for which, through the whole world, this country is distinguished.

It becomes, therefore, a question of great public interest, whether it is not desirable to modify those antiquated feudal doctrines which have proved so great a drawback on the improvement of the country; and whether the interests of landlords, as well as of every other class in the community, would not be materially promoted by the introduction of a different system. That the continuance of the present system necessarily retards the progress and improvement of the country must be manifest, if we consider that the introduction of thorough-draining and other permanent improvements, absolutely necessary to draw out the fertility of the soil, would require an outlay of capital vastly greater than the proprietors of the soil, with all their ordinary sources of expense, could devote to that purpose. Were they ever so much inclined to develop to the utmost the resources of the soil, they have not the means at command; and the improvement of vast districts of the country must either be indefinitely postponed, or something like adequate security must be given to those who are prepared to advance and apply the capital required for their amelioration. The only security which they require is an interest in the increased value which they will themselves create by the application of this capital. Is this a security to which they are fairly entitled, without interfering with any just right or privilege of the proprietors of the soil? And if the giving of such security, for a great and immediate service to be rendered to the community, would be found to trench upon the present privileges of the proprietors of the soil, in this case should the interests of the public or of the landlords be allowed to prevail? I must reserve my solution of this knotty point for my next letter, in which I propose to consider the nature of the landlord's vested interest in his land.

Meanwhile, I remain your devoted friend,

S. M. Greer,

Secretary to the Coleraine Tenant-right Association.

Springvale, Coleraine, September 6, 1849.

CALENDAR OF HORTICULTURE.—NOVEMBER.

General Observations.

In lieu of the usual retrospect, I offer, on this 15th evening of October—the eve of the new moon—a few meteorological remarks, which, in this extraordinary season, may be found apposite and premonitory. The lowest averages of temperature with me, by three instruments distributed among the fifteen preceding nights, amount to 42 degrees of Fahrenheit; those of the highest rise in the day 53°.2—the mean of which indicates 47°·6—nearly 2 degrees below the usual average. The immediate neighbourhood of Croydon has been favoured; for the *Gardeners' Chronicle* stated a depression of 6 degrees below the average of the week ending the 13th. Kidney beans, heliotropes, and many dahlias were cut off during the nights of the 9th and 10th; but, with me, I find not one scarlet pelargonium affected. The wind from north east, with a forcible current, has blown for six days, attended with much cold rain, and on the 12th with scuds of hail. Taking into consideration the prevalence of cold easterly winds during the first half of the month, with the prognostic of the autumnal Equinox on the morning of September 23, the gardener ought to be prepared for an early, long, and severe winter. I offer this caution now, as worthy of attention; though, with M. Arago, I believe that we cannot, with any certainly, predict the weather or its changes from hour to hour.

Operations in the Kitchen garden.

1st. *Potatoes.*—Take up the store expeditiously, and at once place them under shelter from frost, as a simple *rime* will decompose the skin and injure the substance. We now begin to *conjecture* the actual condition of the main crops, and therefore again impress the necessity of rigid selection before any tubers be put aside for planting. So long as disease is in the pulp, however slight the taint, each tuber planted in that condition will extend the malady, and perhaps may predispose the soil to encourage it. The haulm everywhere appears to have given way; the diggers raise numbers of infected potatoes, and those which were sound and are already in store afford instances of progressive decay. We cannot trust the crop; but dealers say, that "owing to the great produce there is no deficiency, though there are plenty of diseased tubers."

A paragraph which is in that old and respectable authority, *Mawe's and Abercrombie's Gardener*, affords proof that careful storing was deemed an essential in the last century; thus—"The roots being housed should be from time to time turned and looked over; all such as have any tendency to rottenness or decay should be taken out, for such would infect those that are sound, and the infection would soon spread."

Carrots, beets, some *parsnips* and *Jerusalem artichokes* ought to be taken up, cleaned, and stored in dry sand. A root cellar or store room, cold, dry, but not accessible to frost, is the place wherein to preserve these things. Parsnips are not injured by frost, if left in the ground. Cut off the tops before storing.

2nd. *Celery.*—Take advantage at any time of the dryest weather to fully earth-up the best rows; break up the earth, and place it neatly and regularly on each side of the plants within a few inches of the tops, avoiding the hearts. It is gratifying to observe the regularity and order of the London market garden in all these operations. *Endive* is also to be blanched at this season under pots, or in cold frames darkened by a covering. Gather the leaves, and thus holding them with one hand, pass a shred of bass-matting round them, somewhat above the middle.

Coleworts and *cabbage plants.*—Finish planting-out in the early days of the month most of the strongest seedlings. Thin-out and use for the table some of those moved in September, leaving the rest to stand from one foot to eighteen inches asunder. Hoe and stir the ground between the rows; do the same also by the plants of spinach, provided the surface be dry and open. Weeding, however, must be attended to by hand, if not by tool. In gathering, cut or draw the close-standing plants, so as to leave at least 3 or 4 inches between each; then pull or cut the large outer leaves only; thus others within them will (if the weather be mild and sunny) grow and come on in their proper order. If cold and frosty, spinach should not again be touched till after winter.

Asparagus beds and rows, also artichokes, must be finally regulated. The latter may be thus treated: cut back all the fruit stems, and the yellow discoloured leaves; fork-dig the ground, being careful not to injure the roots and suckers; raise the earth a few inches next the plants, and add a quantity of tree-leaves to the depth of 5 or 6 inches, over which a mere sprinkling of coal-ashes may be given to guard the leaves from the force of wind. This dressing of leaves can be renewed if the frost come on severely. Some use coal-ashes only; but unless the land be naturally a clay, they may render it poor and liable to become droughty. I never knew an artichoke injured by even a "Murphy" frost, if dressed as above; and the leaves produce an excellent "dress" in the spring.

Cardoon.—(*Cynara cardunculus*), allied to the artichoke, approved by many, but seen in few gardens. It has four varieties: 1, the cardoon common; 2, the Spanish; 3, the French or Tours, and 4, the red. We introduce the Spanish, chiefly. "Collect the leaves carefully at this season, and secure them with a hay band, then break the earth well, and lay it up round each plant to a good height."

Peas and *Mazagan beans.*—Sow on a warm border; the beans are pretty certain, but peas are hazardous. Seed is lost by damp, underground vermin, and sharp frost; whereas in boxes, turves, or frames, under glass, time will be gained even a month hence, and seed economised.

3rd. *Sea-kale* ought always to be excited in darkened frames—lined; or, if under pots, surrounded by warm leaves and manure; this should be done in the melon-ground, or some such out-place; the garden becomes littery by the facing, and is thus rendered unsightly.

All the dwarf varieties of rhubarb, Buck's Scarlet, the Elford, Tobolsk, &c., can be excited in pots, placed in the mushroom-house, or in a warm cellar, wherein the colour of some sorts become of the richest crimson and yellow.

Attend at every fitting opportunity to the works of neatness and order. Trench and manure the several plots designed for spring crops. We are not yet instructed in the art of specific manuring adapted to the requirements of individual plants; herein chemistry offers the most certain assistance; but the labour and time required must be very great. Hence, as stable and fold manure must be buried, we cannot err in placing all that is not wanted for warm linings, deep at the bottom of trenches, to be brought to the surface soil in process of time, when it will have acquired the quality of humus.

Hardy Fruit Department.

Plant any or all kinds of fruit-trees and shrubs, either in the orchard, fruit quarters of larger gardens, or against walls and espaliers. I object to standards in any vegetable plots, because all herbs suffer under trees. Prune and finish off the vines, and let them enter into entire torpor so soon as the last clusters are gathered. Leave figs till April, and interlace the branches with spray of the fir-tree. Prune apple and pear dwarfs, also espalier trees, but leave the stone fruits till February. Examine the stores of fruit, to pick out any that is decaying, and to wipe off mould, and excess of moisture. Give plenty of air and light at the time. If dry fern can be obtained, it will—according to Lindley's "*Guide*"—be found the best material on which to lay the picked fruit, and also to cover the store, "as it is perfectly sweet, not liable to contract any unpleasant smell, and keeps much longer than straw."

Forced Fruits.

Cucumbers ought to be growing in the hot-house in pots, or over a tank in a pit heated by hot water. Charred peat or turf, with the mould of decayed couch grass, forms an excellent bed. As a hint, we would suggest that charcoal dust and white sand mixed together constitute the best, sweetest, and indestructible of media for plunging pots over a gentle bottom heat from a warm tank.

Pine plants, in a bed of heath-mould, mixed with carbonised turf, chopped up, would, I think, grow to perfection without pots, and with great advantage to the roots. Always remember that, as the sun descends in its course, and light decreases, heat should correspond. It is thus with every thing, and our artificial treatment ought to conform to natural laws.

Pleasure Grounds and Flower Departments.

Clean the borders, removing dead annuals and every kind of litter; fork the surface lightly in dry weather, and leave it unraked. Little remains to be done beyond planting tulips and bulbs surrounded by siliceous sand. If hyacinths be in pots, plunge them a foot deep in ashes or charcoal dust and sand. Plant shrubs and trees, deciduous or evergreen; but avoid a poshy state of the land, if it be binding or clayey. Sand is always free, and we may take almost any liberty with it, provided it be not dust-dry in hot weather. Grass plots and gravel must always be swept, and now every tuft of grass ought to be removed from the latter while the texture is moist and soft. Fresh gravel should be added in the spring.

The wind changed, and the weather became extremely mild and balmy till the evening of the 20th, when a drizzling rain from W. by S. came on.

Croydon. John Towers.

AGRICULTURAL REPORTS.

GENERAL AGRICULTURAL REPORT FOR OCTOBER.

The weather of this month, though somewhat variable, has been seasonably fine. Out-door farm labours have progressed steadily in all parts of England; so much so, that they may be considered rather more forward than usual at this period of the year. As might be expected, opinions are still divided on the subject of the yield of the present year's crops; some of our correspondents assert that the produce is considerably above an average, others that it is comparatively small, compared with the bulk of straw. In order to arrive at something like the truth, we have caused the most extensive inquiries to be made amongst the principal growers. The result is that we are perfectly satisfied of the total yield being considerably in excess of that of several past years, both as respects quantity and quality.

The next point in connexion with the supply of food is the produce of the potato crop. Although we may be found to differ from many parties, we feel assured that the actual losses from the disease, so prevalent in 1847, have been comparatively trifling—certainly not sufficiently extensive to have any material influence upon the quotations. From France, Holland, and Belgium, we learn that the quantity of potatoes grown this year is large, and of good quality; hence, it is probable that very large supplies will reach us during the next two or three months.

The leading cattle markets, Smithfield especially, have been heavily supplied with stock, the sale for which has ruled dull in the extreme, at drooping prices. The imports from abroad have progressed rapidly, particularly from Denmark and Holland; but those from France and Spain, arising from the low prices here, have been very trifling. Very little improvement has taken place in the general quality of the importations. The quantity of stock at this time in the country as well as abroad is represented as large; and the abundance, together with the low prices of natural and artificial food, have enabled not a few of the large graziers to keep up their full average number of both beasts and sheep. That the principal portion of the stock disposed of since our last has yielded no return to their owners must be obvious to all connected with the land; yet we regret to observe that we see little or no prospect of higher prices this side of Christmas.

Letters from Ireland state that the potato disease has increased to some extent. This information has had but little effect upon the corn trade, which has remained much in the same state of inactivity as on this side of the channel. Very few direct imports of grain have taken place. Indian corn, owing to the large supplies of potatoes offering, has commanded very little attention.

The breadth of land under potato culture this year, in Scotland, has been unusually large. The disease is evidently not so extensive as has been represented. Fine wheats have sold to a fair extent, at full prices. In all other articles of grain only a moderate business has been doing. The quantities of foreign grain at this time in store is represented as small.

The provision markets have been very inactive; but no material change has taken place in value. The imports from America have fallen off to some extent.

A portion of the hop duty has been declared at £45,672 8s. 8d.; included in that amount is Sussex, at £35,250 9s. 6d. As the latter figure is considerably above the previous estimate, it is by no means unlikely that the total duty will exceed £100,000. Holders of hops are, therefore, anxious sellers.

The produce of the turnip crop is unquestionably good. The same remark may be applied to swedes.

REVIEW OF THE CATTLE TRADE DURING THE PAST MONTH.

Notwithstanding the low prices—taking the average of those ruling during the last seven years—at which fat stock has been disposed of in our markets, the imports from abroad have continued seasonably large. This circumstance, combined with the immense numbers of home-fed beasts and sheep in most of our large grazing districts—to which we have before alluded, as proving that no permanent rise in the quotations can be reasonably expected in the present state of things—has had a most depressing influence upon the demand in Smithfield; and the currencies, although there was some firmness in them in the early part of the month, have declined to some extent. It is true that the weather has operated against value, but it cannot be denied that production—including, of course, that of the foreign—is in excess of the consumption. The result is that a great loss has been experienced in almost every transaction; and it is by no means an easy task to ascertain when the downward movement will stop, although the abundance of keep in most parts of England may enable the glaziers to keep back a portion of their stock for the present. That the unrestricted imports of foreign stock are depressing our markets must be evident to all persons, yet we may observe that the importers themselves admit having lost considerable sums by their stock for some time past. To shew the extent of the traffic, we direct attention to the following statement of the imports into London:—

Beasts.	Sheep.	Lambs.	Calves.	Pigs.
		October, 1845.		
1143	1621	—	—	27
		October, 1846.		
4845	8768	—	325	—
		October, 1847.		
5433	17,635	378	1225	433
		October, 1848.		
2962	10,669	239	803	116
		October, 1849.		
5008	16,190	—	565	243

From the above comparison it will be seen that the arrivals at this time—one of the lowest periods, as regards value, on record—have nearly equalled those of the dearest season, viz., 1847. Last year the importations fell off to some extent, as they did not pay; but, in spite of the prevailing low currencies, increased supplies are pretty generally expected. Only 20 oxen have come in from Spain, but about 6,000 head have been landed at the northern outports, mostly from Holland.

The total numbers of stock, including English and foreign, shown in Smithfield have been:—

Beasts	22,477	Head.
Cows	457	
Sheep	146,200	
Calves	1,946	
Pigs	2,085	

COMPARISON OF SUPPLIES.

	Oct., 1847.		Oct., 1848.
Beasts	19,509	..	20,177
Cows	572	..	487
Sheep	126,480	..	114,760
Calves	2,000	..	2,200
Pigs	2,713	..	3,140

The bullock droves have been drawn from the following quarters:—

	Head.
Northern districts	9,000
Eastern, ditto	600
Western and midland, ditto	3,600
Other parts of England	2,000
Scotland	200
Ireland	59

COMPARISON OF PRICES.

	Oct., 1847.	Oct., 1848.	Oct., 1842
	s. d. s. d.	s. d. s. d.	s. d. s. d.
Beef from	4 0 to 4 10	2 4 to 4 0	2 4 to 3 10
Mutton..	3 8 to 5 2	3 4 to 5 0	2 8 to 4 0
Veal....	3 8 to 4 8	3 0 to 4 2	3 0 to 3 6
Pork....	4 0 to 5 2	3 10 to 4 10	3 2 to 4 2

It is calculated that nearly 40,000 carcasses of country-killed meat have been received up to Newgate and Leadenhall markets during the month, and which have sold with difficulty at ruinously low prices.

The various stock fairs have passed off heavily as regards price. The numbers of beasts and sheep brought forward have been large. Several losses have resulted from the prevailing epidemic, especially in Norfolk and Lincolnshire.

LEICESTERSHIRE.

From what has since occurred, we have no reason to change the opinion we expressed in our last report as to the produce of the late harvest. Thrashing has since been very general; and some people are disappointed as to the yield of wheat. This, we believe, only applies to those who farm cold clay land, which no doubt, in many instances, has proved much below an average; but, on the other hand, the produce of the better soils will bring the aggregate yield up to an average of years. Though a large quantity of rain fell in September (4·74 inches), and this was the principal harvest month, still all accounts agree that the corn was secured in good condition. This seeming anomaly may be thus reconciled: the heavy rains fell mostly in the night-time, and from the prevalence of north and easterly winds the evaporation was astonishing, and in a few hours all appearance of rain on the surface of the ground vanished; consequently the corn dried rapidly, and was soon in a fit state for carting. The quality of the wheat is exceedingly good, of great weight, and will yield a large amount of flour to the measure. Barley is a deficient crop, from its failure on strong soils, and we believe is considerably below an average. We do not consider oats and beans average crops, still the latter is far better than last year. The large quantity of rain which fell in the last week of September and the first of the present month so completely saturated the land with water that agricultural operations on all the strong soils were suspended for some time, and this has retarded wheat-seeding for a fortnight. A favourable change occurred in the second week of the present month; the land has become sufficiently dried to admit of being worked, and a large breadth has been put in during the last ten days in very fair order. Should fine weather continue for another fortnight, the great bulk of this grain will be sown, with every prospect of favourable results. The digging of potatoes has been very general of late, and we wish we could say anything encouraging as to their quality. The haulm was extensively blighted in August, and in consequence the tubers are small, as they cease growing when that commences. There is great difference as to their soundness in various crops, but all are more or less affected, and we fear a large proportion will not keep through the winter. It is found very unsafe to camp them, as they require great attention at different times to sort out those which are tainted with the disease. Upon the whole we are willing to hope that the loss will not be so great as in the last year. The turnip crops, both swedes and common, had a very favourable appearance till the heavy rains at the close of the late and the beginning of the present month; but lately we have observed a very remarkable appearance for the worse. The plants, up to the time named, were flourishing and regularly set on the ground: now they are greatly affected by the mildew, and the lower leaves are dying, and present a yellow, and the whole plant a sickly hue. We do not presume to say that this proceeds from any disease akin to that which has destroyed so many potatoes, but we find many of the swedes, on being cleaned and the root being cut off, present the same colour as the diseased tubers of the potato. It is not alone the early-sown which are affected, as we have seen the common turnips, sown upon stubbles, present the same appearance. From this circumstance we believe the root will lose much of its nutriment, and will not afford that nourishment to stock as when in a healthy state; but we hope this disease may be confined to a limited locality. From the heavy rains we had at intervals, our pastures have been good through the summer, and both sheep and beasts have done well where free from disease; but most flocks and herds have been seriously injured from attacks of the epidemic, which affects the feet and mouth. The price of all kinds of stock has undergone a further reduction, and our fairs and markets have been exceedingly dull, and all concerned assume a melancholy tone on this subject. It is not only the grazier or feeder of stock that suffers, but the breeder feels greatly the low price which he is obliged to sell his young things at, which is entirely unremunerating. Sheep made 10s. per head less than last autumn, and beasts from £2 to £3. Fat mutton and beef sells at from 4d. to 5d. per lb.; this, combined with the low price of corn, places the cultivators of the soil in a most embarrassing position. His outgoings are little less than for past years, while his incomings are reduced from 25 to 30 per cent. No wonder that the farmers should be dissatisfied, and cry out to those above them, is there to be no remedy for this state of things? There was a slight rally in the corn market last week, and wheat advanced 2s. per qr.; but it is lost again this. Wheat fetches, in our market, from 38s. to 45s.; barley, 24s. to 28s. per qr. An unusually large quantity of corn has been thrashed since the harvest, and forced into the market from the needy state of the farmers, and great sacrifices are made to obtain a little ready cash. Agricultural distress and the difficulties of farmers are such stale subjects that we are loath to name it, but it comes so home to us that we cannot avoid it. No one heeds any thing about it but those who suffer from its effects, and know that their property is slipping through their fingers much against their will. The question is, how to avoid it. The lowering of farm produce to continental prices, without any corresponding reduction in the expenses attendant upon the cultivation of land, or the value of land itself, is a problem for those to sulve who ought to get their living by farming. None else care one jot about it; the public has no sympathy for the tillers of the soil, and Government will not listen to their complaints. The landlord is satisfied so long as he gets his rent; and, when he can't, the tenant must make room for another with a well-lined purse. Such have till lately been found, but they are now becoming scarce, and men with capital appear shy at taking land just now; and we well know tenants with money still left, who have resolved to keep what they have got, and have given up their farms. They have asked for a reduction of rent, and have been refused; and the landlord does not find applications for his farms a dozen deep, as used to be the case, and his lands have fallen into his own occupation. The competition for land is evidently declining, and farmers begin to think it unfair to pay the same rent for their holdings now as they did before the repeal of the corn laws. They see the folly they have committed in running over one another to take land, and they are convinced, to a certainty, that they must lose by the speculation, and are resolved to act in future with more caution, and acknowledge they have been to blame. They no longer buoy themselves up with the hope of a renewal of duties upon the importation of foreign corn, and consider it the most fallacious fancy that could enter their imaginations; free trade must have a trial, and in the mean time the occupier of land is ruined. When the time arrives that the Government are convinced that free trade measures are ruinous to the country generally, then, but not till then, shall we obtain any restrictions to the importation of foreign produce. We regret not being able to report any material advance in the price of wool; yet, from the present aspect of trade, we are convinced that a further rise will take place before next shear-day. Farmers' lots are worth from 24s. to 26s. per tod, but the demand is not active. We are happy to state that all the framework-knitters are in full employ, and some advance has been obtained in the wages. Our labourers are getting from 10s. to 12s. per week, and there is plenty of work for the whole of them on the land if the occupiers could obtain remunerating prices to employ them. —Oct. 25.

SURREY.

This notice anticipates the close of the month by a few days, for especial reasons, which will shortly be given. The month commenced with much rain, which did not pass away till the change of wind to north, that occurred on the 7th. This condition marred the prospects of what is called the "walnut fair" of Croydon; though its character is quite miscellaneous, and exceedingly annoying to the immediate neighbourhood. There is one feature of interest, however, to the farmer and flockmaster on its first day (Oct. 2); because great numbers of sheep, including lambs, ewes, and wethers, cows and horses are exposed for sale. It is stated that on the late occasion more than 21,000 of store sheep were penned—a number which exceeded that of 1848 by perhaps 8,000. Prices were, on the whole, reduced several shillings. Lambs brought from 16s. to 21s.; broken-mouthed ewes according to quality, from 20s. to 25s.; good ewes, from 25s. to 31s. 6d., or higher; and the best wethers 35s. to 38s. per head. The prices are approximate average quotations; for it is difficult to collect accurate returns, for, even of the numbers which changed hands, many were certainly taken home again by the owners. Whatever may be said of profit and loss so far as the farmer is concerned, there can be no question that, in the chief towns of Surrey, butchers are realising high remuneration; though there are parties, as our Michaelmas contracts evince, by whom the unions can be, and are, supplied with very excellent provisions of all kinds, at rates which could not have been anticipated in the spring of 1847. The poorer classes suffer from the comparatively high price of flour, in proportion to that of wheat; middle men are the gainers while the consumer remains supine. After the first week of the month, we were visited by that penetrating east and north-east wind, which reduced the atmospheric temperature several degrees below its average. A change again occurred on the 16th—the day of the new moon—and since that date the weather has been motley, but always very mild; and though some rain has fallen, on several days, the land has come into good working condition, favourable to the plough, and certainly on every account to the turnip crops, which are much improved. The mid-day heat, with a fair proportion of sun, has exceeded 60°, and that of the nights above 50°. It is particularly incumbent upon us to allude to the "fall of the leaf," which is now in full activity, pre-induced by the two or three sharp frosts of the second week. Every leaf is valuable, as furnishing the most pure and natural vegetable manure; collected in heaps, and stored for composts, the farmer and gardener would be equally benefitted; but left on the grass, the dairy-farmer suffers very seriously. No sooner do the milch cows touch the leaves, than the milk, cream, and butter—the last particularly—acquire a taint which is extremely disagreeable. If left in the lanes and roads, decaying foliage is not only lost to husbandry, but the surfaces are speedily injured by the masses of decaying litter. We write urgently on this subject, which we trust will be deemed of some importance in rural management. Of wheat-sowing more in our next; but we must say, that farmers are frequently too late.—Oct. 27.

SUFFOLK.

The wheat harvest in this locality was general about the 13th August, and the whole secured in most excellent order, scarcely a day to protract it. The yield on the clay lands will be *under* their average, but the light and mixed soils are very much *over*—this and the weight being two pounds per bushel heavier than last year, will bring the crop to a *full average one*. Barley early in the spring promised well, but receiving a check in April from wet and cold weather, it never recovered; so that the yield proves considerably under an average: it was housed in good condition, but the quantity of *really fine malting* will be limited. Beans are a partial crop, but very fine sample, weighing 67 to 68 lbs. per bushel. Peas a very abundant yield, and good quality. Potatoes not diseased, but rise very bad. Turnips are excellent in plant, and promise great weight of feed.—Woodbridge, October 24th.

AGRICULTURAL INTELLIGENCE, FAIRS, &c.

BEDALE FORTNIGHT FAIR, October 23.—We had a large show of fat beasts and sheep, the sale for which was slow, at former rates Calving cows sold rather better. The show of lean stock was large, but very little business was transacted. Beef, 5s. to 5s. 6d. per stone—mutton, 4½d. to 5¼d. per lb.

CARLISLE HEAD HEMPTON FAIR, October 20.—The show was in no way inferior to that on the 26th ult., equal in number, and as good in kind. Prices were as follow: Short-horns, £5 to £9; galloways, £5 to £7; West Highlanders, £5 15s. to £10; Irish, £3 10s. to £6 5s. As is generally the case, this fair was, upon the whole, a dull one, many who exhibited stock never being asked a price. There was a decided falling off in sheep, both in quantity and quality. Two lots of cheviot ewes, however, were good; the rest indifferent throughout. Blackfaced ewes were poor, lambs were few in number, and very little choice. Altogether business was dull. Prices: Cheviot ewes, 15s. to 20s.; Blackfaced ewes, 10s. to 12s.; cheviot lambs, 8s. to 11s. 6d. The show of horses was capital, and amongst the great number exhibited many fine animals were to be seen. In one instance £40 was refused for a colt. For useful horses business was done at a considerable advance upon Burgh Hill prices, but for middling and inferior horses there was little or no inquiry. In fact a good horse will always fetch a good price in any market.

COWLINGE FAIR.—Braintree Market falling on the same day, doubtless shortened the supply and attendance. A somewhat better trade was experienced for keeping sheep and lambs, and most lots found purchasers at about 1s. per head advance upon late depressed rates. Mr. Westrup, of Fordham, exhibited a stand of good two and three-year-old cart colts, the greater portion finding purchasers at from £18 to £25 each, otherwise the horse fair was a very sorry show of very middling cattle, with but little business passing.

COLCHESTER FAIR was well attended by the farmers and graziers of the neighbourhood, but the business done was rather limited. In horses, an average number of sales were effected, besides the changes among the dealers, of whom there was as usual a numerous attendance. The show included a great number of excellent cart colts, a few good hackneys, with an unusual stock of drove ponies. The existing depression and lack of capital rendered the business in cattle very sluggish. There was a large supply of Welsh beasts and some good Scots, but sales could only be accomplished at reduced prices, and the larger proportion left the field unsold. There was also a large exhibition of sheep and lambs, but here also there was a reluctance to buy, and very few pens were cleared.

DEVIZES FAIR.—The number of sheep penned was beyond an average—being upwards of 22,000; and prices in the early part of the day might be quoted quite as good as at Weyhill, with a brisk trade; but towards the close a reduction was obliged to be submitted to. Very few flocks, we believe, were driven away unsold. The supply of cattle was short, and for lean beasts there was a very dull sale at wretchedly low prices. Good beef fetched from 9s. to 10s. a score. Of horses there was a larger number than we have seen for some years.

DALTON FAIR.—Tuesday last. We had a great number of cattle on the show ground, and a fair amount of business was transacted, but prices generally were at a low figure, say from two to three pounds per head under last year.

GAINSBOROUGH FAIR.—There was an abundant supply of cheese both days, but like every other kind of produce it fetched low prices, being from 45s. to 52s. per cwt. There was a full fair of cattle and sheep on Wednesday, but little was sold; there were no buyers at anything like remunerating prices.

GISBURNE FAIR, Oct. 22.—We were well supplied with fat cattle, and there was a large number of butchers, who made a brisk sale, prices a little better than last fair. We had a tolerable quantity of present calvers, which were good to sell at better prices than they have sold at for some time.

HARLING FAIR, Wednesday last.—The show was good, and the company numerous, from the very fine weather. Trade appears improving for lean cattle of good size and age. Some excellent Scotch and shorthorn beasts were sold at good remunerating prices. The quantity of green as well as dry feed compels graziers to buy, although the impression with many is that they will profit nothing by purchasing lean at the present rates. Some large three-year-old beasts fetched £13 to £14 each; moderate shorthorns and Devons at from £11 to £12 ditto; smaller homebreds and Welsh at from £9 to £10 ditto; Irish, £7 to £8 ditto. Cows and heifers were decidedly worth more money by at least £1 per head than at the beginning of last month. Fat beasts were sold at from 5s. 6d. to 6s. per stone of 14lbs. Sheep.—A very fair show of prime Downs, Norfolks, half-breds, with Leicesters, with trade more animated, and prices 1s. per head better for the sellers. Ewes, lambs, and other keeping sheep in good demand; fat ditto less sought after, without any alteration in price. Some fine ewes in lamb made from 34s. to 36s. each; others at from 30s. to 32s. ditto. Lambs readily went at from 18s. up to 25s. each; shearlings at from 28s. to 32s. ditto; tups at from £3 to £4 ditto. Some fine fat wethers (Downs) made 6s. per stone; larger sheep, 5s. 6d. ditto.

HARBOROUGH FAIR.—More than an average number of horses was brought for sale. A large number of good draught horses were sold readily, and buyers were found for good saddle horses, while the "screws" were whipped and spurred for nought. The beast fair was well supplied with all kinds of stock. Fat cows sold at £11 to £14 each, or 4d. to 4½d. per lb. Good dairy cows were rather better sold than they have been for some months past. Of sheep the number penned was 2,174, against 2,239 last year. Tupping ewes, 26s. to 30s.; shear hogs, 26s. to 32s.; lamb hogs, 16s. to 20s. per head. But few sheep were turned out unsold. Of cheese rather more was pitched than for several years past, and prices were lower. Best dairies sold from 50s. to 54s.; other sorts sold according to quality—36s. to 42s. per cwt.

HEREFORD FAIR.—There was a large exhibition of steers and oxen on the preceding day, and some business was done. Prices were about 20 per cent. lower than at the same period last year. A large supply of stock; and a few dealers being present, there was a sale, although at low rates; and on the whole it was a dull fair. Fat cows, of which there were not a great many, went at 4½d., and the very best at 5d. per lb. For steers there were customers, but at the depression already noted. We heard a remark that one dealer had bought 40 steers at £15 a-piece, and that he had only given 4d. a pound for what he bought. An eminent breeder disposed of 12 for £17 each, although he fully expected to receive £18. Lean stock was also dull of sale. Sheep, of which there was a good supply, went at 5d., but four prize wethers realized 6d. per lb. Store sheep low, and pigs also on the decline. In the horse fair there were some good saddle horses and animals for agricultural purposes, and many the very reverse of good. The latter sold at prices varying from £2 10s. to £18, and superior ones of the former description for £24, and up to £26. Hops, &c.—There were about 300 pockets and tods pitched in the old Town-hall on Saturday—a small number, as was to be expected. Upwards of 200 had been weighed and sold. For old hops and the inferior descriptions there was little or no demand. Prices ranged from £5 12s., £6, and up to £7 for choice lots. Good hops might have been purchased on Saturday at 1s. per lb. Of tub butter a considerable quantity was pitched, and at first 9s. 6d., 10s., and 10s. 6d. per stone were asked, but the average in the afternoon may be stated at 8s. to 10s.

KENDAL FORTNIGHTLY FAIR.—Monday last was, as usual, well stocked and well attended, and the usual quantity of cattle, sheep, &c. sold, at late prices. These prices have been unremunerating for the past season; but it is a matter that will in due course correct itself, and assimulate itself to the times, with a fall of rent and a lengthened lease.

LEEDS FORTNIGHT FAIR, Oct. 24.—We have a good supply of beasts and sheep. Although the day was unfavourable, we had a large attendance of buyers. The cattle were in good condition, and nearly all changed hands. Prices for good things were 6s. and 5s. 6d., and as low as 5s. 3d. per stone; the number 420. Sheep and lambs, 3,400; mutton all sold at 5d.; lambs, 4¾d. per lb.

LOCKERBIE MARKET, Oct. 18.—There was a good show of sheep (above 150 lots), numbering, in all, from seven to nine thousand. The most of them were Cheviot draft ewes, partly direct from the hill farms, but mostly ewes kept over year in the lower pastures. There was also a number of small lots of the shot or third lambs. The sale was dull for all sorts, and prices of regular draft ewes were below the September market, and much under Falkirk, quality considered. The low prices of Malham, in Yorkshire, were partly the cause of this. Many of the over-year ewes were in good condition; either fit for Liverpool, or would soon be so with a short turnip-keep. For the latter purpose there was a fair demand, and we heard of a good many lots sold at from 16s. to 20s. For the lambs there was little demand, and a good many of these and of all sorts of sheep went off unsold. Of cattle the show was much larger than on any previous October market, and little short of the September fair, viz., from 1000 to 1200. Though there were a number of dealers from different districts the sale was slow, especially for queys, and a good many unsold. Most of the good lots of stots, however, were sold to the local dealers for Stamford and other English fairs. A lot from Gillenbie gave £10. Another from Fingland, about the same. A good many lots of two-year olds realized £8, but most were sold from £6 to £8. A lot of premium stirks from Eskdale were said to be £6 6s.; on fair ox-stirks, from £4 to £5. Two-year-old queys from £5 to £6 10s., and quey-stirks from £3 to £4. A few mixed cattle were bought for the Edinburgh market, or partly intended for Lothian feeders. Another account says there was fully double the number of both cattle and sheep usually exhibited on any previous October market; in fact, it had all the appearance of one of our September trysts. It is to be regretted, however, for the sake of the farmers, that we are obliged to report anything but favourable accounts as regards sales and prices; still, it may be stated that a very great quantity of stock of all descriptions changed hands. In condescending to quote prices, we may set down best three-year-old Galloways at £10; next best, £9 5s.; two-year old ditto, £8; secondary, £7; stirks, very good, £5 10s., down to £3, according to quality. Draught ewes, of which there was a good number, and for which there was only a middling demand, fetched from 14s. to 18s. 3d.; half-bred lambs, from 11s. to 15s.; Cheviots, from 7s. to 11s., *pallies* excepted; some of which, we believe, only brought from 4s. to 6s.

LEIGHTON BUZZARD FAIR, Oct. 24.—There was a large attendance of dealers, farmers, and graziers. The supply of cattle, the greater part of which were milch and barren cows, was very large, few of which found purchasers, the prices ranging as follows:—Milch cows from £9, £12, £16, the highest price being £18; barren cows were also a dull sale at from £8, £10 to £14. The show of sheep were also large and in good quality. For good ewes, the prices asked were £1 2s. to £1 6s., in one or two instances £1 7s. was obtained, but very reluctantly paid by the purchasers. Tegs were making 18s., 23s. to 25s. each. There was a good show of horses, among which were some very useful cart colts: from £20, £25 to £30 each was asked. The trade was exceedingly dull, and a falling off at least 20 per cent. from the prices that were realized last year. This was the worst fair that has been known for some time past, and the greater portion of the cattle was driven away, and in fact, some were not even asked the price of.

MAIDSTONE FAIR.—There was a large supply of sheep, chiefly Kents, and a great many of them changed hands at prices a shade better than recent quotations. Down wethers sold very dear, at least 2s. or 3s. a head more than they have obtained at other fairs. There was a slow trade for beasts, and not many sold. Cows and calves were in great demand, and good ones sold at good prices. Horses were plentiful, but extremely dear, but many were disposed of at very high prices. At Penenden Heath a great many sales were effected, some at very low prices. Good two and three-year-old runts were disposed of at £4, and it was only those of very superior quality that realized £7 and £8.

NEWTOWN FAIR, Tuesday.—There was a large supply penned for sale, and a considerable number of buyers. Fat sheep sold at from 4d. to 4½d. per lb. For stores there was little demand, and many returned home. The pig fair was not so large as usual. Strong bacon pigs—of which there was but few—sold at a good price. There were a great many stores, which were in brisk demand, at about the same prices as last fair. In the cattle fair on Wednesday there was a very large supply, including a number of bullocks, many of which sold at reduced prices. There were but few cows and calves, also lean stock. There were many useful horses, but the prices were considerably reduced.

PENRITH FORTNIGHTLY FAIR.—There was a very large supply of both sheep and cattle, but selling was slow, and prices down.

SALISBURY FAIR, Tuesday.—There was a large quantity of cheese pitched (between 150 and 160 tons); the trade ruled dull, and at the close of the day not more than 50 or 60 tons had been disposed of. Prices: Skim, 18s. to 22s.; half coward, 34s. to 38s.; North Wilts, 42s. to 48s.; red Somerset, 56s. to 60s. per cwt. There was a large number of hack horses on sale, but very inferior, consisting mostly of the Welsh and Irish breeds. There was not a single cart colt for sale; and the trade doing was of a very trifling character.

STAGSHAW BANK FAIR, Oct. 24.—Cheviot border ewes were in good demand at 14s. to 20s. each. The principal lots were Mr. Elliot's, Cottonshope; Mr. Telfer's, Brudenlaws and Blindburn; Mr. Robson's, East Keilder; and Mr. Stephenson, West Keilder. Half-bred ewes (cheviots and Leicesters), 24s. to 26s.—a small show; black-faced ewes, 10s. to 12s. each; a few lots brought from Falkirk by Messrs. Croser and Lillico. Wedders for feeding purposes in demand, but a poor show. Trade slow for all kinds, buyers wishing to do their business well, and sellers unwilling to give in, but a good clearance was effected. Quality considered, it was as good a market as Wooler.

ST. DENNIS'S FAIR.—There was a tolerably good show, about 2,600. There were several lots of good short-horns, and a considerable portion found purchasers. Good Scots found a ready sale, at rather improving prices, and considerable business was done in Welsh and Irish beasts. Upon the whole, the transactions were quite as numerous as the dealers anticipated. There were but few English cart colts shown, and scarcely any of prime quality. There were several lots of excellent foreign cart colts, rising two-years-old; the prices asked varied from 18*l.* to 22*l.* 10s. each. There were a few excellent cart-horses, which sold at good prices, according to their respective ages. Secondary and inferior descriptions were numerous, and but few sales were effected. In nags very little was done. There were about 7,500 sheep and lambs exhibited, and the majority were sold before the close of the day, at prices quite equal to those obtained at Colchester market on the previous Saturday; and in a few instances, for some pens of very excellent wethers, improved prices were given. The business done altogether may be said to have been upon a par with that of last year.

ULVERSTON FAIR.—Notwithstanding a short supply, little selling took place amongst gelt beasts for tying up to be fed during winter. Those that did change hands were at prices lower than for a considerable time back. Calving cows are apparently scarce, many inquiries being made for them, and the prices for good likely beasts are still kept well up.

WHITBY CHEESE FAIR (Tuesday last), considering the generally depressed state of the markets, was a very excellent one. There was the produce of a great number of superior dairies in the market, all of which were sold at from 40s. to 51s. per cwt., the average price being 44s. The attendance of buyers from York, Leeds, Hull, Scarbro', &c., was exceedingly numerous. The Whitby District Agricultural Society offered a premium of 2 soveraigns for the best dairy of cheeses, which was awarded to Mr. Thomas Duell, of Borrowby; and a premium of 1 sovereign for the second best, was awarded to Mr. William Robinson, of Fryup, both of which were very prime dairies. The judges were—Mr. Bayley, of York, and Mr. Hawson, of Scarbro.'

WINCHESTER FAIR.—On Tuesday the unusually large number of 75,000 sheep were penned. Business commenced briskly, but soon slackened, and many pens were left unsold. Prices ranged, for Southdown ewes forward in lamb, from 28s. to 32s.; two-tooth wethers, from 26s. upwards; lambs, 12s. to 18s. per head. At the Horse Fair, on Wednesday, there were about 170 of a superior quality to those usually exhibited at this fair. For some young Irish horses of a light and useful description from £30 to £40 was asked. It being fat cattle market day, there were a few fat beasts, and about 200 fat sheep. The cows, about 70 in number, were decidedly inferior, and mostly barreners. Of pigs there were about 400, with a brisk sale. In the Cheese Fair the large quantity of 450 tons was pitched, about two-thirds of which was sold, at prices varying, for best old Cheddar, from 68s. to 70s.; new, 60s. to 66s.; middling and thin, 42s. to 50s.; skim, 21s. to 28s.

YORK FORTNIGHT FAIR, Oct. 25.—We had a good supply of fat beasts, which sold at from 4s. 9d. to 5s. per stone, few buyers attending the market. A good show of fat sheep sold at low prices, being from 4½d. to 5d. per lb.; a plentiful supply of lean sheep sold readily, there being plenty of purchasers. Many lean beasts were shown, but they had bad sale.

YARM FAIR.—The new horse fair on the 18th was well attended by the London and local dealers, and superior roadsters, field horses, coach horses and good draught horses met with ready sale. We must, however, regret that the farmers in the neighbourhood do not bring their horses to this fair in as good a condition as might be expected at this season of the year. On the 19th, the show of beasts was not so large as in many previous years. Short-horns, calving cows, and heifers, were sold to advantage, and we had a better market than the farmers expected. Beef sold at from 5s. 6d. to 5s. 9d. per stone. On the 20th there was, as usual, a good supply of rams of superior quality, which met with a good market: there was likewise an excellent show of shearlings, and other fat sheep, which were speedily purchased at 5d. and 5½d. per lb. The show of breeding ewes, sheep for turnips, and Highland wethers was likewise good. The show of cheese was not by any means so large as on previous years. New milk sold at from 40s. to 52s., general price, 44s. per cwt., and old milk at from 25s. to 28s. There was a great demand for cheese, and the quality being good, they met with a much better market then was expected, and more especially when we take into consideration the general price of cheese at fairs held in the neighbourhood within a fortnight previous thereto.

METEOROLOGICAL DIARY—1849.

Barometer.			Thermometer.			Wind and State.		Atmosphere.			
Day.	8 a. m.	10 p.m.	Min.	Max.	10 p.m.	Direction.	Force.	8 a. m.	2 p.m.	10 p.m.	Weather
	in. cts.	in. cts.									
Sep. 21	30.18	30.12	48	62	55	S. East	gentle	cloudy	fine	fine	rain
22	30.08	30.07	51	67	57	Easterly	strong	fine	sun	cloudy	dry
23	29.94	29.90	52	58	55	Easterly	lively	cloudy	cloudy	cloudy	rain
24	29.90	29.84	52	69	56	Var., E. by S.	gentle	fog	fine	fine	dry
25	29.84	29.84	46	69	56	E. by North	gentle	fine	sun	fine	dry
26	29.85	29.80	47	66	56	E.N.E.	gentle	fog	sun	fine	dry
27	29.80	29.70	55	66	61	East	strong	fine	sun	cloudy	dry
28	29.84	29.80	54	68	58	Southerly	gentle	fine	sun	cloudy	rain
29	29.70	29.50	57	62	58	S. West	gentle	cloudy	cloudy	cloudy	rain
30	29.29	29.20	58	58	56	S. West	lively	cloudy	cloudy	cloudy	rain
Oct. 1	29.43	29.60	51	57	52	E.N.E.	calm	cloudy	cloudy	cloudy	rain
2	29.64	29.72	49	53	47	N. East	calm	cloudy	cloudy	cloudy	rain
3	29.57	29.30	45	58	55	S. West	strong	cloudy	cloudy	fine	rain
4	29.09	29.44	45	55	47	W. by N.	gentle	cloudy	cloudy	cloudy	rain
5	20.70	29.70	39	56	46	W. by N., by S.	gentle	fine	sun	cloudy	dry
6	29.73	29.60	43	53	48	S. East	gentle	cloudy	cloudy	cloudy	rain
7	29.30	29.25	46	58	54	Northerly	gentle	cloudy	cloudy	cloudy	rain
8	29.50	29.90	48	54	38	Northerly	lively	cloudy	cloudy	fine	dry
9	30.02	29.97	33	55	40	Ny. to West	gentle	fine	sun	fine	dry
10	29.88	29.74	34	54	40	N. Westerly	calm	fine	sun	fine	dry
11	29.55	29.40	39	50	44	N. East	brisk	cloudy	cloudy	cloudy	dry
12	29.40	29.61	43	54	43	N. East	idem	cloudy	sun	fine	rain
13	29.66	29.86	39	44	40	N. East	idem	cloudy	cloudy	cloudy	profuse
14	29.97	30.04	39	48	42	N. East	idem	cloudy	cloudy	fine	shower
15	30.04	30.05	39	50	40	E. to North	idem	cloudy	sun	fine	dry
16	30.05	29.99	36	56	46	Easterly	gentle	fine	sun	cloudy	dry
17	29.90	30.00	45	62	54	S. West	lively	cloudy	sun	fine	rain
18	30.17	30.17	53	66	56	S. West	gentle	fine	sun	fine	dry
19	30.00	29.90	52	66	58	E. to S.E.	vrygntl	haze	sun	fine	dry
20	29.85	29.90	57	67	57	S. by E., to W.	vrygntl	cloudy	sun	cloudy	sm. rain
21	29.86	29.95	50	58	48	S. Westerly	airy	cloudy	cloudy	fine	showery

ESTIMATED AVERAGES OF OCTOBER.

Barometer.		Thermometer.		
High.	Low.	High.	Low.	Mean.
30.610	28.740	68	27	48.9

REAL AVERAGE TEMPERATURE OF THE PERIOD.

Highest.	Lowest.	Mean.
58.7	46.6	52.65

Weather and Phenomena.

Sept. 21.—Wet over-night, fine. 22. — Fine. 23.—Wet equinox. 24.—Fine, warm. 25.—Same. 26.—Fog till 10, causing trees to drip like rain. 27.—Wind and cirro-stratus clouds. 28.—Fine after rain. 29.—Wet afternoon. 30.—Showers.

Lunations.—Last quarter, 11 h. 24 m., forenoon.

October 1, 2, 3, 4.—Cloudy days, more or less wet. 5.—Fine and sunny. 6, 7, 8.—Overcast, with rain on the 6th and 7th. 9, 10.—Fine and calm. 11.—Commencement of the biting N.E winds; very forcible, yet always lulling about sunset, till 16, when a change occurred, introducing the mild and balmy weather that prevailed till 20th evening, when a little small rain fell. 21.—Smart showers.

Lunations.—Full moon, 2nd day, 5h. 33 m. afternoon; last quarter, 44 m. after midnight of the 8th; new moon, 16th, 5 h. 13 m. afternoon.

Remarks referring to Agriculture.—The weather has been capricious; the first week wet, the second cold, with a fierce North-east wind, and in some places extremely severe frost. In other respects no complaints can be made, as, upon the whole, the land is in a fine and healthy condition. Turnips are much improved, and the clover plant is looking healthy. It is a pity that farmers remain so tardy with their autumnal wheat.

Croydon. J. Towers.

REVIEW OF THE CORN TRADE

DURING THE MONTH OF OCTOBER.

When we last addressed our readers there was some quantity of corn remaining abroad in the backward parts of the kingdom. The weather having, however, during the greater part of October, been very fine, ample opportunities were afforded for securing the grain in the most backward and mountainous districts, and though the quality may in some parts have suffered, we believe that less injury has been done by exposure to wet this season than is commonly the case. All the information which we have been enabled to collect since harvest has been concluded, and thrashing proceeded with, confirms the favourable opinion we previously entertained in regard to the generally auspicious result of this year's harvest. In some few localities there are complaints of the yield of wheat from the straw; these are, however, rather the exception to the rule, and though we do not consider the crop as extraordinary either in reference to quantity or quality, we have very little doubt that in both respects it is fully equal to the produce of good average season. This view is by many deemed too favourable, and we are willing to admit that in some parts of the country the yield of wheat in proportion to the straw is deficient; but we are speaking of the entire crop of the United Kingdom, and not of isolated cases. The weather during spring and part of the summer was certainly not propitious for the growth of wheat; the latter stages of its growth were, however, greatly favoured, and from the commencement till the close of harvest, the work went on with comparatively little interruption. The great bulk of the wheat was, therefore, well got in; there was little loss from high winds or heavy storms; and we again repeat that in our opinion we have secured a good average crop but not more. The weight of the new wheat varies from 58 to 65 lbs., the greater part averaging 62 to 63 lbs. per bushel. The mealing qualities are generally well spoken of by the millers, and taking it as a whole we may consider the result of the harvest satisfactory.

Barley appears to have been less extensively grown than in ordinary years, and the yield to the acre is not particularly large. Hitherto farmers have not thrashed out much of this grain, and its value has been better supported than has the price of wheat. We are inclined to think that Barley will scarcely prove equal to the produce of average years, and that superior malting qualities will rule comparatively high, such being less interfered with by foreign importations than the commoner kinds.

The yield of oats is generally represented to be very good, not only in England, but likewise in Scotland and Ireland; and beans and peas are considerably above the average of favourable seasons.

With the exception of barley (in respect to which we feel some hesitation in speaking positively, owing to so little having hitherto been thrashed as scarcely to afford the means of judging as to the general produce), we consider the result of the harvest, over the whole of the British islands, superior to any secured for some years past. Wheat is not equal to the produce of 1847; but spring corn and pulse of all kinds are far more productive than in that year, and the aggregate amount of home-grown food is decidedly greater.

That the extent of the potato disease was greatly exaggerated in the months of August and September is now certain. In many districts the main or late crop is dug and pitted, and the growers are therefore in a position to speak positively as to the extent of the rot. If the loss had been nearly as great as was at one period predicted would prove the case, all doubt on the subject would ere now have been set at rest. We should have heard complaints from every side: but so far from this having been the case, the accounts have become less alarming in proportion as digging has been proceeded with, and for some weeks past we have scarcely heard a word about the disease. The fact appears to be that the blackened, and in many cases rotten state which the haulm presented in August, gave rise to serious apprehensions. This was perfectly natural, and we feel no surprise that fears should have been entertained for the result of a crop so peculiarly liable to disease. It proves, however, that the tubers have escaped much better than could have been expected, which we attribute mainly to the dry weather during the greater part of September having checked the spread of the disorder. There is, nevertheless, a certain degree of uncertainty in regard to the keeping during the winter, which will unquestionably lead many growers to dispose of their potatoes as fast as possible, and it is therefore by no means improbable that the article may become scarce before the close of the year: an early consumption of so perishable an article as potatoes we regard as by no means objectionable;

they now furnish good wholesome food, and their extensive use must be the means of economising the consumption of other articles less liable to be damaged by keeping.

Considerable difference of opinion is entertained respecting the probable future range of the value of wheat in this country. Those who consider that the yield has been over estimated (and they are not few) reckon with confidence on a material improvement: this notion would probably prove correct if our ports had not been opened to all the world, and we were dependent on our own growers for supplies. One good, or even a large crop, ought not, considering the exhausted state of the stocks of old, to cause so great a depreciation in prices as has taken place. But it is not any superabundance of home-grown food which has occasioned this great fall in the value of agricultural produce. It is the removal of all duties on importations: for many months past the arrivals of grain and pulse into the United Kingdom from foreign countries have averaged over a million of quarters per month; the effect of this was to keep prices low even with so wretchedly deficient a wheat crop as that of last year, and an extensive loss of the potato. We do not say that imports will continue on the same extensive scale, but we are certainly disposed to think that the competition which our farmer will have to encounter will prevent him obtaining anything like remunerating rates for his produce.

The weather has during the greater part of the month been highly auspicious for all kinds of outdoor work, and considerable progress has been made with wheat sowing. The land has worked kindly, and most of the seed has been committed to the soil under favourable circumstances. Farmers have been so busily occupied with the preperation of the land for autumn sowing, the lifting of the potato crop, and other field labours, as to have little leisure for thrashing or bringing corn to market; and as there is still a great deal of work to be attended to, we may calculate on short deliveries for some time. With a falling off in the supplies of home-grown wheat there has been an increased demand, a considerable quantity having been taken for the seeding of the land. Under these circumstances the merchants and millers have experienced some difficulty in securing sufficient for their immediate wants, and the competition thus created between two classes of buyers caused prices to rise about the middle of October 2s. to 3s. per qr. Latterly, however, there have again been symptoms of a reaction, but the changes which have occurred will be referred to more in detail in our remarks on the trade at Mark Lane. Before entering on this part of our subject it will perhaps not be amiss to state that we do not look for any material alteration in quotations of wheat for some time to come—the price for good new red wheat will probably fluctuate between 40s. and 44s. per qr. Whenever it recedes to the lowest of these points buyers will most likely be induced to purchase pretty freely; whilst a rise of a few shillings per qr. above 40s. will probably lead to increased supplies from the growers.

The arrivals of wheat coastwise into London have been small throughout the month, having averaged only about 3,000 qrs. per week. Hitherto we have been without arrivals from Lincolnshire, &c., nearly the whole of the weekly supply having been from Essex and Kent. The few parcels of Lincoln and Cambridgeshire wheat which have come to market have been received per rail, and the probability is that a large proportion of the supplies from the eastern counties will in future reach us that way. The value of wheat has undergone some fluctuation at Mark Lane since the close of September, the tendency having on the whole been upwards. In the commencement of the month the business was very dull, and though the show of samples was small on the 1st inst., only the best qualities realized previous prices, the commoner kinds being quoted 1s. per qr. cheaper. The following week holders began to exhibit more firmness, and the decline was nearly recovered. Subsequently the demand improved, and on the 15th inst. the supply fell short of the quantity required by the millers, which enabled factors to establish an advance of 1s. to 2s. per qr. This improvement was not only supported, but in some cases exceeded between the day last named and the 22nd Oct.; but on the latter occasion the upward movement received a check. This was partly caused by the condition having become effected by the soft damp weather experienced about that period; but making allowance for a difference in quality from this cause, still the turn was decidedly in favour of the buyer. The lowest price at which good runs of red wheat, weighing 62 to 63 lbs. per bushel, were sold at Mark Lane was 41s. to 42s. per qr.; this occurred on the 1st of the month —the same descriptions realized 44s. to 45s. on the 15th, and were sold on the 22nd at 43s. to 44s. per qr., which rates have since been barely obtainable. The quality of the new Lincolnshire and Cambridgeshire wheat which has hitherto appeared has proved rather coarse, but the weight is good, say 61 to 63 lbs. per bush., and those millers who have tried it appear satisfied with its mealing properties. Though not so good in colour, and hardly so heavy as the Essex and Kent wheat, the sales made have been at prices similar to those paid for the best runs from the last named counties. Hardly a sample of old English wheat has been shown at Mark Lane since our last, and at most of the provincial markets the home supply has for some time past consisted almost exclusively of new, from which it may be fairly inferred that the stocks of old have been nearly if not wholly exhausted.

A material falling off has lately taken place in the arrivals of wheat from abroad, and of the 50,000 qrs. received during the month, more than half came to hand previous to the 6th inst. The quantity now on passage from the Baltic cannot be large, and the prevailing opinion is that the receipts from ports lying east of Gibraltar will, for a considerable time to come, be on a moderate scale. In the American markets prices have all along been much too high to admit of consignments being made to this country with a prospect of profit. We have therefore only the near continental ports to look to at present for supplies of old wheat, and neither in France, Belgium, nor Holland are quotations sufficiently low to encourage our merchants to send out orders. Under these circumstances holders of old wheat in granary here have become indifferent about realizing, and the value of the article has gradually crept up. Owing, however, to the millers having imported direct from abroad, business at Mark Lane has not at any period been active. There was more doing, and higher prices were obtained, about the middle of the month than previously or since; but though the inquiry has within the last eight days become very languid, sellers have refused to make any concession. Polish Odessa wheat may now be quoted 35s. to 38s., the commoner sorts of red Baltic, Rhine, Hamburg, or French, 40s. to 42s., and prime qualities 44s. to 46s. per qr.; Rostock, the growth of 1847, and superior Danzig, 48s. to 52s. per qr. The quantity of really good old foreign wheat in granary here is quite insignificant, the principal proportion of the stock consisting of secondary and inferior Black Sea qualities; but we are disposed to think that our large millers are still tolerably well provided, many having imported rather largely in the early part of the autumn.

The top price of town-manufactured flour has not varied since our last. The consumptive demand for flour has throughout the month been active, and the mills have been in full work.

During the first week or two in October we had small arrivals of country flour coastwise, as well as by rail. Within the last fortnight the receipts have increased, and households have been sold on rather easier terms.

The imports of flour from France have also been good the last week or two, and the supply on the whole has been rather more than sufficient for the demand.

Old American flour has not varied in value. Some of the late arrivals are of very inferior quality; good brands have been saleable at about 24s per barrel, at which figure they continue still to be held.

In the early part of the month the market was very scantily supplied with English barley, and though a slight increase has lately taken place, still the arrivals must be considered small.

The maltsters have manifested considerable unwillingness to buy more than needed for immediate use; but the very moderate nature of the supply has compelled them to pay full terms, and quotations have undergone very little change since our last notice; really fine malting samples were then worth 32s. per quarter, and have not at any time been sold below that price. Secondary descriptions have latterly been offered somewhat more freely, and have in partial instances been sold 1s. per quarter lower.

The arrivals of barley from abroad have not been so plentiful as earlier in the season, the unfavourable result of previous consignments having apparently deterred foreign shippers from exporting to Great Britain. The greater part of the supply has consisted of qualities only suitable for grinding, Saale, and other kinds deemed sufficiently good for malting, being as dear on the continent as in our markets. There has been a good steady demand for grinding barley throughout the month, and no change requiring notice has occurred in prices. The light and ill-conditioned parcels have moved off slowly at from 19s. to 21s., whilst the heavier sorts have commanded 22s. to 23s. per quarter. For a small parcel or two of fine Saale barley our maltsters have paid 25s. to 26s. per quarter.

The transactions in malt have been on rather a retail scale; but stocks of old being moderate, and new having come forward sparingly, previous prices have been steadily maintained.

The arrivals of oats from our own coasts and Scotland have not increased; the English which have come to hand have been principally from Lincolnshire and from Kent, and have consisted almost wholly of new of good quality. From Scotland only a few small lots of new have yet appeared, the bulk of the supply from thence having been old. Hitherto the receipts of Irish have been on a moderate scale, but more liberal arrivals from thence may be calculated on. The quality varies materially; a large proportion of the oats as yet received from the sister isle has, however, consisted of good serviceable corn.

From abroad the supplies have fallen off, and are likely to be comparatively short during the winter. The large dealers have throughout the month conducted their operations with much caution, but factors have manifested no disposition to press business, and quotations have scarcely undergone any change. Owing to a gradual decrease in the supplies from abroad, and more moderate arrivals of new Irish than had been calculated on, the firmness of holders has within the last week or two increased rather than diminished, and all good qualities are fully as dear at present as they were at the close of September. Good English feed are worth from 18s. to 21s., Scotch from 21s. to 24s., Irish 18s. to 21s., and foreign 15s. to 20s. per quarter, according to quality.

In the early part of the month rather liberal supplies of new beans were brought forward, and prices consequently gave way about 1s. per quarter; this abatement has since been recovered, and quotations are precisely the same as they were a month ago. Egyptian beans are becoming scarce, and the value of the article has rather tended upwards since our last.

Peas have come to hand rather slowly; the arrivals have nevertheless proved amply sufficient for the demand, and no improvement has taken place in prices. The best white boilers were at one time worth 32s. per quarter; but very good qualities have lately been offered from Kent and Essex at 30s. per quarter.

In the value of maple and grey peas, not the slightest change has occurred. Old foreign white peas have been taken for grinding at from 25s. to 27s. per quarter, according to quality. We have still a fair stock of the latter in granary,

The operations in Indian corn have been of very little importance. The unfavourable reports from Ireland relative to potatoes caused high prices to be asked for floating cargoes in the early part of the month; but the inquiry was at no period active, and comparatively few bargains were closed. Latterly, sellers have become more anxious to realise, and fine qualities of Galatz have been offered at 27s. per quarter, cost, freight, and insurance, without exciting much attention. We have little or no stock of Indian corn here; but at Liverpool a considerable quantity is held, and in Ireland stocks have also accumulated of late.

The general tone of the advices from abroad has been of much the same character during the month as previously. That the grain crops have turned out satisfactory in most of the principal corn-growing countries of Europe, appears to be admitted; but old stocks being everywhere reduced into a very narrow compass, and the growers being generally dissatisfied with the prices current, comparatively little grain has been offered for sale. Prices have consequently been well supported, and by the most recent accounts wheat was too dear to allow of its being shipped to England with a prospect of profit. A good many vessels seem, nevertheless, to have been chartered, from time to time, to load for British ports—probably in execution of previously received orders.

At Dantzig, on the 20th inst., superior high mixed wheat was still held at the old price, 43s. per quarter free on board. Other sorts varied in value from 38s. up to 41s. per quarter, according to quality, weight, and condition.

At the Lower Baltic ports old stocks had, we are informed, been completely exhausted, and so little new wheat had been brought forward by the growers as to prevent much business being done. The purchases made for local consumption had been at 38s. to 39s. per quarter for fine heavy qualities of red. It was, however, expected that when the farmers should have completed out-door work, they would bring forward more liberal supplies, and prices might, it was thought, then recede, so as to allow of good qualities being put free on board at 36s. to 37s. per quarter.

At Hamburgh good red upland wheat, weighing 61½ lbs., was, according to the latest accounts, worth 40s. per quarter free on board; and at Rotterdam an advance of 2s. to 3s. per quarter had been caused by the news of the rise at Mark Lane on the 15th of October. New Rhine wheat, which had at one time been sold at 36s. 6d., had advanced to 39s. per quarter free on board.

From Antwerp the advices are of a similar character, and at several of the French markets prices have also been influenced by the temporary rally which occurred here about the middle of the month.

From America we have letters of recent dates. Notwithstanding a want of export demand, prices of bread stuffs had tended upwards at the principal ports on the sea-board. This had not been caused by any doubt as to the productiveness of the crops, but owing to the smallness of the stocks, and the unwillingness of the farmers in the interior to send forward supplies. Comparatively little wheat or flour had been shipped for British ports, the orders received from hence having been mostly limited too low to allow of their execution.

CURRENCY PER IMPERIAL MEASURE.

	Shillings per Quarter, OLD.		NEW.	
Wheat, Essex and Kent, white	40	to 50	41	to 48
Ditto, fine selected runs	—	—	48	50
Ditto, red	40	44	40	42
Ditto, extra	42	43	43	45
Norfolk, Lincolnshire and Yorkshire..	40	42	—	—
Ditto, white	42	46	—	—
Barley, English, malting and distilling..	—	—	26	28
Ditto, Chevalier.................	—	—	28	32
Ditto, grinding	—	—	23	25
Malt .. Essex, Norfolk and Suffolk	—	—	57	58
Kingston, Ware, and town made....	—	—	57	61
Oats, Essex and Suffolk	—	—	16	18
Lincolnshire and Yorkshire (Polands)	—	—	18	20
Ditto, feed	—	—	15	18
Devon & West Country, feed	—	—	15	17

BEANS, Mazagan	26	28	24	26
Tick	30	32	26	28
Harrow	32	34	28	30
Pigeon, Heligland	34	38	30	32
Windsor	—	—	26	28
Long pod	—	—	26	28
PEAS, non-boilers	—	—	28	29
White, Essex, and Kent, boilers	—	—	29	30
Ditto, fine Suffolk	—	—	30	32
Maple	—	—	28	30
Hog and grey	—	—	27	28
FLOUR, best marks (per sack of 280 lbs.)	—	—	35	40
Norfolk and Suffolk, ex-ship	—	—	30	33
RYE	—	—	23	24

IMPERIAL AVERAGES.

FOR THE LAST SIX WEEKS.

	Wheat.		Barley		Oats.		Rye.		Beans		Peas	
WEEK ENDING:	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Sept. 15, 1849	43	0	27	1	18	6	26	7	30	8	30	1
Sept. 22, 1849	41	9	27	1	17	10	25	11	29	9	30	0
Sept. 29, 1849	42	4	27	4	17	11	25	2	29	5	31	8
Oct. 6, 1849	42	4	27	7	17	5	24	9	29	0	29	5
Oct. 13, 1849	41	4	28	0	17	2	24	5	28	10	31	8
*Oct. 20, 1849	41	1	28	2	17	4	24	9	29	5	30	3
Aggregate average of last six weeks	42	0	27	6	17	9	25	3	29	6	30	6
Comparate average same time last year	51	7	32	3	19	11	32	4	35	9	39	7
DUTIES	1	0	1	0	1	0	1	0	1	0	1	0

PRICES OF SEEDS.

BRITISH SEEDS.

Cloverseed, red 35s. to 40s.; fine, 45s. to 50s.; white, 34s. to 42s.
Cow Grass (nominal) —s. to —s.
Linseed (per qr.).. sowing 54s. to 56s.; crushing 40s. to 42s.
Linseed Cakes (per 1,000 of 3 lbs. each).. £9 0s. to £10 0s.
Trefoil (per cwt.) 14s. to 18s.
Rapeseed, new (per last) £28 to £29
Ditto Cake (per ton) £4 5s. to £4 10s.
Mustard (per bushel) white .. 6s. to 9s.; brown, 8s. to 10s.
Coriander (per cwt.) 16s. to 25s.
Canary (per qr.) new 75s. to 82s.
Turnip, white (per bush.) —s. to —s.; do. Swedish, —s. to —s.
Tares, Winter, per bush. 4s. 6d. to 4s. 9d.
Carraway (per cwt.) 28s. to 29s.; new, 30s. to 34s.
Rye Grass (per qr.) —s. to —s.

FOREIGN SEEDS, &c.

Clover, red (duty 5s. per cwt.) per cwt. (nominally) 30s. to 40s.
Ditto, white (duty 5s. per cwt.) per cwt. „ 24s. to 42s.
Linseed (per qr.) .. Baltic 38s. to 44s.; Odessa, 42s. to 46s.
Linseed Cake (per ton) £6 0s. to £8 0s.
Rape Cake (per ton) £4 5s. to £4 10s.
Coriander (per cwt) —s. to —s.
Hempseed, small, (per qr.) 32s. to 35s., Do. Dutch, 35s. to 36s
Tares, (per qr.) small 24s. to 26s., large 28s. to 33s.

HOP MARKET.

BOROUGH, MONDAY, Oct. 29.

The demand for the finest sorts of hops continues moderately active at fully last week's rates. The inferior descriptions are heavy of sale at barely late quotations. Duty, £80,000. HORTON AND HART.

WORCESTER, Oct. 27.—We had a better supply of new hops at market to-day than last Saturday, being about 500 pockets; of which, with what were left over, 777 pockets have been weighed. The market has been quick, and 2s. to 4s. more money given for best qualities; fine old hops are more in request, at rather more money. Our duty is thought more favourably of to-day; and there are backers of £8,000.

LEWES, Oct. 23.—The hop trade is slow at last week's prices, and it appears but little fluctuation except for the first class of hops, may be looked for.—Duty £82,000.

POTATO MARKET.

SOUTHWARK, WATERSIDE, Oct. 29.

Our market since our last week's report has been supplied quite equal to the demand, particularly from Yorkshire and the continent; a very few choice York Regents made 90s., but we cannot quote the price as general. Those from the continent came to market in very good condition and of good quality, but the weather has been so mild that less money has been obtained for them than our previous quotations. The following are this day's prices:

York Regents	75s. to 85s.	per ton.
Wisbech do.	60s. ,, 70s.	,,
Scotch do.	60s. ,, 70s.	,,
French whites	60s. ,, 70s.	,,
Rhenish do.	50s. ,, 65s.	,,
Belgian do.	50s. ,, 60s.	,,

ENGLISH BUTTER MARKET.

OCTOBER 29.

Our trade is very dull, only the best and freshest parcels are saleable, at barely current rates, while middling and inferior qualities are neglected; as such we must report prices as presenting a downward tendency.

Dorset, fine weekly	90s. to 92s.	per cwt.
Do., stale and middling	64s. ,, 80s.	,,
Devon, new made	80s. ,, 82s.	,,
Fresh	8s. ,, 12s.	per doz. lbs.

BARK.

Per load of 45 cwt.

English, Tree	£14	0	0	to	£15	10	0
Coppice	15	0	0		17	0	0

FLAX.

BELFAST (Friday last.)—Flax: fine, 60s. to 65s.; good, 56s. to 58s.; good middling, 49s. to 52s; middling, 40s. to 45s.; coarse, 34s. to 40s. per cwt.

HIDE AND SKIN MARKETS.

			s.	d.		s.	d.	
Market Hides,	56 to	64lbs.	0	1¼	to	0	1½	per lb.
Do.	64	72lbs.	0	1½		0	1¾	,,
Do.	72	80lbs.	0	1¾		0	2	,,
Do.	80	88lbs.	0	2		0	2¼	,,
Do.	88	96lbs.	0	2½		0	2¾	,,
Do.	96	104lbs.	0	3		0	3¾	,,
Do.	104	112lbs.	0	4		0	0	,,
Calf Skins			3	0		5	6	each.
Lamb Skins			0	0		0	0	,,
Horse Hides			7	6		0	0	,,
Polled Sheep			2	6		3	6	,,
Kents and Half-breds			2	4		2	10	,,
Downs			2	0		2	4	,,

WOOL MARKETS.

BRITISH WOOL.

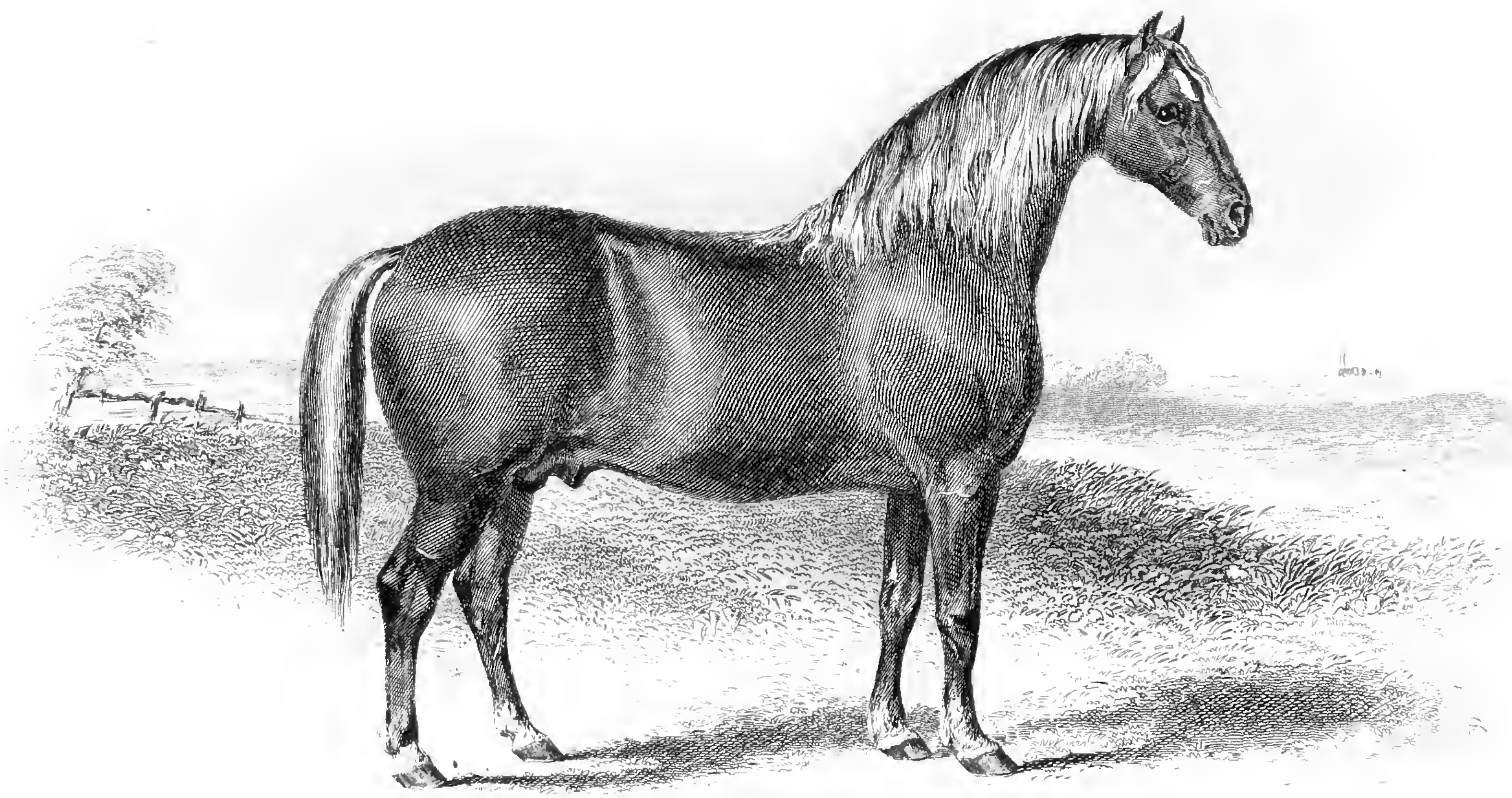
LEEDS, Oct. 26.—We have no change to quote in the markets this week; the demand is without alteration, and prices are stationary.

LIVERPOOL, Oct. 27.

SCOTCH.—If any change, there is rather more inquiry for Laid Highland Wool this week. In white no change. Good crossed and Cheviot are still most in demand at late rates; the inferior kinds are still neglected.

	s.	d.		s.	d.
Laid Highland Wool, per 24lbs.	7	6	to	8	3
White Highland do.	9	6		10	0
Laid Crossed do...unwashed	9	0		11	0
Do. do....washed	10	0		12	9
Laid Cheviot do...unwashed	10	0		13	6
Do. do.. washed	14	0		18	6
White Cheviot do... do.	20	0		22	0

Printed by Joseph Rogerson, 24, Norfolk-street, Strand, London



Lond... ...hed by Joseph Rogerson 24 Norfolk Street Strand 1849

THE FARMER'S MAGAZINE.

DECEMBER, 1849.

No. 6.—Vol. XX.] [Second Series.

PLATE I.

A CART HORSE.

The subject of our first plate "The Royal George," the property of Mr. John Coulson, of Kenninghall, near East Harling, Norfolk, obtained the first prize of Thirty Sovereigns at the Royal Agricultural Society's Show, at Norwich, in July last. This animal stands about sixteen hands three inches high, was bred by Mr. George Drake, of Fersfield Lodge; his sire was the property of John Amas, Esq., of Riching Hall, and was purchased at his auction, by Thomas Thornbill, Esq., of Riddleworth, in whose possession he now is. The dam of "the Royal George" was got by "Boxer," a celebrated horse, the property of John Nunn, Esq., of Rickinhall.

PLATE II.

A SHORT-HORNED BULL.

The subject of our second plate, a Short-horned Bull, the property of Mr. William Todd, of Elphinstone Tower, Tranent, Scotland, obtained the first prize of Forty Sovereigns at the Royal Agricultural Society's Show, at Norwich, in July last.

CHARCOAL AND CARBONISED SUBSTANCES.

BY J. TOWERS, MEMBER R.A.S., H.S. OF LONDON.

It might appear intrusive and superfluous to offer further remarks upon subjects which occupy already so prominent a position; but I hope to prove that, by collecting facts which have come under my own observation, and within the range of personal experience, I may be so fortunate as to give additional impulse to the spirit of inquiry that is now active, and thus to advance the cause of science and of agriculture.

Common Wood-Charcoal claims the first notice. In 1844, I think it was on the 17th of July, I was present at the Council of the Royal Agricultural Society, the late Lord Spencer being in the chair: three or four specimens of turnips were produced by the steward or bailiff of the Earl of Essex—that nobleman himself, if I mistake not, being at the table. These turnips exhibited a great and marked difference in their growth and appearance. One sample was very fine and well developed, perhaps nearly a foot high, of a full rich green; it had been raised from seed sown in drill, the seed well mixed with twelve times its bulk of *common charcoal-dust*. Another and smaller specimen was raised with nine times its bulk of the same dust, and five times its weight of salt.

Since writing the above, I have fortunately discovered the original communication from the Earl, as it stands in vol. v. p. 280 of the Journal. The third specimen (No. 1 of the paper.) was produced from seed without charcoal. I now follow the printed details—(merely remarking, that on returning to Berkshire, I sowed several drills with turnip-seed and charcoal. There was then no dearth of rain, and the plants vegetated and advanced well; but the situation was unfavourable, and I did not add charcoal sufficient to render the experiment decisive):—

"All three put in the same day in drills, on the same ground which had had no manure for three years. The ground at the time (3rd June) was dry as dust; in five days Nos, 2 and 3 came up well. No 3 soon, however, taking the lead. At the end of a fortnight all were slightly watered, but the soil was so dry that No. 1 did not vegetate: 2 and 3, however, grew rapidly. At the end of five weeks we had heavy rains, and in a few days No. 1 at last appeared, and then No. 3 almost grew visibly. The three plants I exhibited to the Council this day (17th July) bore the following proportions to each other:—

"No. 1, Just coming in rough leaf.

"No. 2, Eleven inches long from end of root to head; and

"No. 3, *Twenty* inches long, and big as my finger at the crown of the root, and very vigorous."

I am happy to have met with this official communication, which more than confirms what my great distance from the exhibitor did not permit me to observe. The Earl further adds that he had experimented with carrots to the extent of six acres —the seeds of which, "in spite of the drought, were well up in three weeks." My object in thus adducing by-gone facts is to excite the reader's attention to the *chemical* difference that will be proved to exist between the ordinary charcoals of *wood* and the carbonised peat and other refuse matters that assuredly comprise a great multiplicity of fertilizing elements.

Lucas, of the Munichgardens (see p. 454 of this volume,) employed wood-charcoal in his floral experiments, and with machinery that I have on several occasions ventured to suggest were objectional as being far inferior to our tank-pits, heated by hot water and its vapour. I tried many experiments with charcoal alone, and in combination with leaf and heath mould, very soon after the appearance of Liebig's first book, but could not satisfy myself that the material effected any great improvement in the growth and tinting of leaves or flowers, in the *Gesneræ Gloxinia* and similar plants. Plants also, so treated, were liable to become dry very rapidly.

To whatever quality may be ascribed the fertilizing principle of wood-charcoal, certain it is that, when newly-made, it absorbs given quantities of gases. By the experiments of M. Theodore de Saussure it was proved that after charcoal was again heated to a red-heat, then suffered to cool under mercury, and instantly plunged into a vessel of the gas, on being taken from the mercury, it absorbed—(assuming 1 to represent a single volume of charcoal)—of

Ammoniacal gas	90·
Muriatic gas....	85·
Carbonic acid gas	35·
Oxygen gas	9·25
Hydrogen.........................	1·75
Sulphuretted hydrogen	·55

It is stated also that if wood charcoal remain in contact with valerian, galbanum, balsam of Peru, or musk, it destroys their peculiar odour. This absorbent power appears to depend upon the great porosity of charcoal, which itself is produced by the action of heat. Wood is composed chiefly of the elements carbon, oxygen, hydrogen, with some salts of potassa and lime. When acted upon in iron cylinders, oxygen and hydrogen are expelled, water is formed; also some carbonaceous compounds, among which are pyroligneous, acetic acid, pyroxilic spirit, and tar; the remaining charcoal retains the exact form of the wood employed; it is, however, lighter than water, and full of pores. When thus completely decomposed, it consists chiefly of carbon, with a little silica, and the bases of the salts above alluded to.

Many years ago I discovered a process by which the carbonate of soda (sesqui-carbonate), then just coming into practical use, might be much improved. Crystals of the purest soda were exposed in flat shallow trays, having canvass bottoms, to the vapour of ignited charcoal, conveyed into oblong close leaden vessels through a leaden cylinder. The combustion was effected in iron crucibles, regulated by an air stopper. The gas developed was *pure carbonic acid;* it acted upon the crystals of soda, combined with the neutral salt, and displaced the water of crystallization which drained through the canvass. In the fire crucible the residue of the combustion was very small in bulk and weight, and consisted of the silex, lime, and potassa, which constitute the impurities of common charcoal. From these, and corresponding data, we infer that wood charcoal is very inferior to the carbonized matter of peat, containing vegeto-animal matters, either in respect to depurating, deodorizing, or fertilizing properties, and therefore that the powerful and unanswerable *exposé* by Mr. Rogers, of the advantages to be derived from carbonized peat detailed in pp. 443-452 have not been duly appreciated by the writer of the article on "Night Soil and Peat Charcoal," which commences at page 452 of this volume. In the second column of page 453 there is a table given by Mr. Phillips, wherein we perceive that the carbon in 100 parts of that charcoal is stated to be 79.24, and yet the writer says—"We should infer that the effects would be different from that of other charcoals." So, then, although eleven other elements are tabulated, amounting in the whole to 20.76 parts, to make up the 100, many of them being essential to vegetable growth, we are to take it for granted that peat charcoal, so constituted, would differ little in its effects from common wood charcoal, although the latter consists almost entirely of carbon!

It may, perhaps, be regretted that in the comparative tables of the components of peat charcoal and English excretiæ, placed side by side in second column of page 445, the quantities of each constituent is not registered; thereby more certainty would have been acquired, and the misgivings of many half friends either qualified or removed. However, as quantities must vary, whenever substances liable to perpetual changes are submitted to analysis, we ought to be content for the present with what has been effected and demonstrated. There may be difficulty in arranging the mechanism required to realize the vast objects proposed. Whatever is "the business of all and everybody—" the proverb is somewhat musty. Yet the inference, obvious as it is, leads one to hope that a project absolutely national may be taken up by the nation, and never be permitted to lapse into oblivion. Shame on the country if it be!

ON A POPULAR ERROR AS TO THE FOOD OF PLANTS.

BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

It is a subject of considerable regret that any popular error should tend to impede the progress of good cultivation. This truth has been lately forced, as it were, upon my attention, during the progress of a series of inquiries as to the improved sanatory condition of populous places, and the employment of their sewerage for the purposes of irrigation. The error to which I allude is the distaste sometimes evinced at the suggested employment of sewage as a manure either in the garden, or in the farm, from the erroneous conclusion that the obnoxious matters of sewage enter into the composition of the plants watered with it. Such a belief, however in some degree natural, is of course attended with a corresponding dislike to aid in any efforts to divert such matters from the river or ditch, where they are probably diffusing discomfort and disease. Its extent is, as a natural consequence, often under-rated: its natural importance as a very large means of increasing the supply of food, little indeed generally understood. Previous, then, to any observations upon this error, it may be well if we make a few inquiries as to the real value and extent of these great streams of liquid manure. Such a course of proceeding may be attended with this good result—that it may lead the most careless reader to feel that the question is one of vast importance in irrigation. And, moreover, if it induces such a reader to follow me through details, not always very attractive, it may bring into the camp of sanatory reformers another friend to the good cause; it may aid the labours, it may smooth the path of many a little band, who, as members of a local Board of Health, are labouring to banish disease and misery from around the hearths of their neighbours, and who, at the same time, are anxious to render their now pestilential stagnant house-drainage a source of fertility and general comfort. Let us, then, first very briefly inquire into the real value of such matters, before we proceed with the original object of this paper; and let us base our examination on the labours of the chemical philosopher; for *they* rest on a foundation which is not apt to deceive those accomplished farmers, on whose behalf I have so long had the honour to labour. Of the ordinary contents of a sewer, the urine and the nightsoil form chief fertilizing portions: (and let us, in considering the value of these, remember the vast population, crowed together in our great cities and towns.)

Liebig, the great German chemist observes (*Organic Chemistry*, p. 195)—"In respect to the quantity of nitrogen contained in excrements, 100 parts of the urine of a healthy man are equal to 1300 parts of the fresh dung of a horse, and to 600 parts of those of the cow." Hence it is evident that it would be of much importance to agriculture if none of the human urine were lost. "If we admit that the liquid and solid excrements of man amount on an average to 1½lb. daily (1¼lb. of urine, and ¼lb. of fæces,) and that both taken together contain three per cent. of nitrogen, then in one year they will amount 547lbs. which contain 16.41 lbs. of nitrogen—a quantity sufficient to yield the nitrogen of 800 lbs. of wheat, rye, oats, or of 900 lbs. of barley. 'A thousand pounds of urine,' observes Professor Johnston (*Elem. Agricultural Chem.* p. 158), 'contains 68lbs. of dry fertilizing matter of the richest quality, worth, at the present rate of selling manures in this country, at least 10s. per cwt. As each full grown man voids about 1,000 lbs. of urine in a year, the national waste incurred in this form amounts, at the above valuation, to 6s. per head. And if five tons of farm-yard manure per acre, added year by year, will keep a farm in good heart, four cwt. of the solid matter of urine would probably have an equal effect; or the urine alone, discharged into the rivers by a population of 10,000 persons, would supply manure to a farm of 1,500 acres, yielding a return of 4,500 quarters of corn, or an equivalent produce of three crops." Of another valuable portion of the heterogeneous contents of a sewer, M. Sprengel, when speaking of night-soil, remarks (*Jour. R.A.S. vol.* i. p. 494).—"Although there can be no doubt that this material is one of the strongest manures, it is still in most places managed with less care than any, and in many altogether neglected; yet the greater or less value attached to it in any country is certainly a proof of the degree in which the agriculture of that country is advanced. Where pains are taken with it, husbandry will be found in other respects excellent; where it is little thought of, the art in general will usually be less perfect." It is to the use of this substance, drawn from reservoirs in the towns, that Belgium in a great degree owes her fertility; while in many large cities of Germany it is allowed to drain into the rivers. Since 1,200 lbs. weight of it yearly may be reckoned for each unit of population, it is easy to see, where population is counted by thousands, how important its application must be. The value of the sewage of houses is certainly more generally understood on the Continent than with us. In most of the German towns (*Johnson on the Fertilizers,* p. 107), the householder disposes of the contents of his cesspool for a certain sum of money, besides getting the operation performed gratuitously. By comparing the returns of the different prices paid in those cities for the commodity in question, one year with another, and equallising them by an average price, the inhabitants appear to be benefited to the amount of four francs a head yearly, and the middleman to at least 40 per cent. on the sum he pays to the householder. It is true that these matters in a common sewer are mixed and diluted with a very considerable portion of water; but this is no bar to its use in irrigation (I make the remark more for the use of the general reader than the farmer), since, in the case of water meads, town sewage is found to be abundantly powerful; so much so, indeed, that in the case of the meadows watered by the sewage of Edinburgh, its strength is sometimes deemed too great. Such is the value as a fertilizer, such the extent, of the now wasted sewage of most English towns. Let us now proceed to examine the delusion with regard to its use, to which I wish to direct the attention of my readers. To this, I have not long since had occasion to refer in another place (*Bell's Messenger*); and as I there remarked, the delusion consists in this: it is supposed that when plants are manured with such offensive matters, that these substances enter into and form a portion of, perhaps, the very vegetables we afterwards consume. Now as such an objection, if true, will stand on the very threshold of all our efforts to employ the enormous mass of sewage matters at present worse than wasted, let us again bring the chemist's noble services to our aid, and inquire—first, what is the composition of the contents of the sewers of houses (using the term in its most comprehensive sense); and secondly, let us learn if any portion, and which of them, when applied to plants, is absorbed and assimilated by them. First, then, let us note the composition of the sewage fluid, taking as a fair specimen one of the foulest of the London sewers, analyzed by Mr. T. J. Cooper. This chemist found in a gallon of the liquid portion of the sewage water of the King's Scholar Sewer 85.3 grains of solid matter. This consisted of a large proportion of animal and vegetable matters, besides the following substances:—

	Grains.
Ammonia	3.29
Sulphuric acid	0.62
Phosphate of lime	0,29
Lime	6.05
Chlorine	10.00

With some potassa and soda.

The mechanically suspended matters of a gallon of this sewer matter amounted to 55 grains; of which 21.22 grains were combustible, and consisted of animal matter rich in nitrogen, some vegetable matter, and a quantity of fat, and 33.75 of matter consisting of:—

	Grains.
Phosphate of lime	6.81
Oxide of iron	2.01
Carbonate of lime	1.75
Sulphate of lime	1.53
Earthy matter and sand	21.65

In proceeding with our inquiry, we may disregard the animal and vegetable matters, found in a state of mechanical suspension in sewer fluid, because it is a well-established fact that plants only absorb their food when in the form of a solution. All attempts have failed to induce plants to absorb the finest powder of charcoal, and other solid substances. And moreover we shall presently see that if a saline solution is used, and a plant immersed in it, even then the vegetable refuses to absorb the salts of that solution if foreign to its composition. But to return to the analysis of the fluid. In studying its composition, we might reasonably suspect that if any ingredient with which sewage matters abound was absorbed by the plant watered with it, it would be the salts of ammonia, which are of so highly fertilizing a nature. But we find that salts of ammonia are not assimilated by plants: such salts are decomposed by them, it is true; but if a plant is watered with a weak solution of carbonate of ammonia, for instance, or if ammonia is applied diffused in solid manure, as is the case when farm-yard compost is employed, yet still not any of this salt is found in the composition of the plants thus fertilized. The nitrogen and the hydrogen of which ammonia is composed are assimilated by the plant after decomposition, but ammonia itself is found (if at all) only in very rare instances. If the young farmer doubts this absence of ammonia from plants constantly manured with ammoniacal fertilizers, let him study the composition of the various culinary plants, as analyzed by Dr. Thomas Richardson. Examine, for instance, the two or three first analyses given of these in a copious list (*Gardener's Chronicle*, 1848, p. 4). This chemist found in 100 parts of the—

	Organic Matter.	Ash.	Water.
Asparagus	6.26	0.47	93.27
Onion	11.49	0.46	88.05
Cauliflower	6.81	0.71	92.48

The organic matter of these were composed per cent. of—

	Carbon.	Hydrogen.	Nitrogen.	Oxygen.
Onion	49.02	6.09	1.62	43.27
Cauliflower	46.34	7.03	2.92	43.72

The mineral portion, or ash, of these contained in 100 parts—

	Asparagus.	Onion.	Cauliflower.
Potash	4.83	29.21	33.75
Soda	33.05	9.41	15.92
Lime	3.53	11.43	2.90
Magnesia	2.44	2.44	2.33
Phosphate of iron	2.66	12.00	3.59
Phosphoric acid	14.89	13.62	25.29
Sulphuric acid	3.32	7.53	10.92
Chlorine	6.25	2.46	1.65
Silica	10.83	2.75	1.88
Sand, charcoal	10.66	4.75	1.34
Carbonic acid	0.27	4.33	3.20

I have selected the analyses of these three culinary vegetables, which yielded no traces of ammonia, because they are known to every gardener as "very gross feeders." It is difficult, for instance, to give them liquid organ ic manure in too concentrated a state; they are all highly invigorated by, and grow luxariantly, in the richest nightsoil, with which, in fact, they are constantly manured by the great market gardeners; and how completely do these plants, yet how well, separate or decompose its ammonia, its sulphuretted hydrogen, and other offensive gases, from the other matters of this manure! The chemist searches in vain for them in their juices. This magic power of plants to separate their food from a mass of matters foreign to their composition and their habits, long since attracted the attention of M. Saussure, a celebrated French chemical philosopher. He submitted plants to a variety of trials, all of which proved their power of selecting their food from the soil, and of rejecting those substances which do not naturally form a portion of their chemical composition. He finally subjected some plants to a very severe trial: he entirely immersed their roots in solutions of various salts; even then the plant, without having apparently any alternative but to absorb the salts dissolved in the water—even then it managed, sometimes partially and at others entirely, to absorb only the water, leaving the salt. The detail, as given by Dr. Thomson, is full of matter for the young cultivator's serious and instructive reflection (*System of Chem.* vol. IV, p. 319). M. Saussure dissolved the following salts in water, in such proportions that each solution contained 1-100th part of its weight of the salt:—Muriate of potash, muriate of soda (common salt), nitrate of lime, sulphate of soda (Glauber salts), muriate of ammonia (sal ammoniac), acetate of lime, and sulphate of copper (blue vitriol). In each of these solutions, he put plants of Polygonum persecaria, or of Bidens cannabina, furnished with their roots. The Polygonum grew for five weeks in the solution of muriate of potash, nitrate of lime, muriate of soda, and sulphate of soda, and its roots increased in them as usual. It languished in the solution of sal ammoniac, and the roots made no progress. It died in eight or nine days in the solution of acetate of lime, and in less than three days in the solution of sulphate of copper. When such a number of plants of Polygonum were put into the solutions as to absorb one-half of each in two days, the remaining half was *found to have lost very different proportions of the salt which it had originally contained.* Supposing the portion of salt at first in solution to be 100, the following table exhibits the quantity of each which had disappeared when one-half of the liquid was absorbed—

	Parts.
Muriate of potash	14.7
Muriate of soda	13.0
Nitrate of lime	4.0
Sulphate of soda	14.4
Muriate of ammonia	1.20
Acetate of lime	8.0
Sulphate of copper	47.0

The Bidens absorbed pretty nearly the same proportions, but in general did not vegetate so long as the Polygonum.

When various salts were dissolved at once in the same solution, and plants made to vegetate them, *it was found that different proportions of the salts were absorbed*; so that the plant evinced very clearly, even in this difficult case, its power of separating the water of the solution from its salts. The following table exhibits the results of these trials; supposing, as before, the original weight of each salt to have been 100, each solution contained 1.100th part of its weight of each salt—

		Parts absorbed.
1	Sulphate of soda	11.7
	Muriate of soda	22.0
2	Sulphate of soda	12.0
	Muriate of potash	17.0
3	Nitrate of lime	4.5
	Muriate of ammonia	16.5
4	Acetate of lime	31.0
	Sulphate of copper	34.0
5	Acetate of lime	8.4
	Muriate of potash	17.0
6	Nitrate of lime	17.0
	Sulphate of copper	34.0
7	Sulphate of soda	6.0
	Muriate of soda	10.0
	Acetate of lime	0.0

These experiments succeeded nearly equally with other plants, as the Mentha piperita and Scotch fir. When the roots were cut or removed, the plants absorbed all solutions indiscriminately; on examin- the plants, the salts absorbed were found in them unaltered.

Such researches as these are fraught with instruction and practical usefulness. They will teach even the most fastidious that the sometimes disgusting manures with which our vegetable food is reared seldom, if ever, form a portion of the plants they nourish. Such plants in fact (although then less in size and slower in growth) would have *contained the same constituents had these manures not been applied to them.* It is here that the finger of God seems indeed strikingly apparent; we see that all the emanations of animal life, often so noxious however employed as the food of plants, as in the richest organic manures, are by the marvellous processes of vegetation, decomposed, and returned to us in new forms of beauty, or fragrance, or usefulness. Thus the nitrogen of the most obnoxious ammoniacal gases re-appears as the ever-present constituent of the gluten of wheat-flour. In conclusion (to state the case in other words), all growing plants must abstract from the soil the very same ingredients, whether manured or grown without its aid; the difference being this: the plant, not helped by any fertilizer, will be longer seeking its food, perhaps never obtain it in sufficient quantity to render it, when at maturity, of any sufficient size or value.

We must banish then, from our minds, all those injurious conclusions with regard to such fertilizers entering unaltered into the composition of plants. The portion assigned to the vegetable world is of a different character. Growing plants it will be found, although nurtured by the products of putrefaction, decomposing, purifying, and rendering useful the most abnoxious of such matters, yet never assimilates them in such a form as to be either obnoxious or injurious to those, for whose use they were created, and by whose skill and labour they are produced.

ON THE ECONOMY AND APPLICATION OF LIQUID MANURE.

BY M. M. M.

It is the first duty of a state to take those steps which are most favourable to the production of food for the population. And this is more particularly the case where the bounds of the land are circumscribed, and the population rapidly increasing; because when a people are unsupplied with food, property and life are soon insecure, and the bonds which fasten society together are very soon loosened, and confusion and anarchy will reign.

In our own country the question is one of vital importance. When we reflect that in the beginning of this century the population of England and Wales was under 11 millions, and now it cannot be less than 22 millions—(it was 19½ millions in 1845)—it is evident that we ought to double the means of feeding our population in 50 years. Added to this, much of our land, instead of being what it once was—fresh and fertile—is now cropped and cropped and exhausted, until all our farmers, with one consent, say that their oats and their turnips are not what they once were—and, indeed, how should they be? Year after year, the wheat and the barley, the beans and the oats, are being sold off: and unless something is returned to compensate for it, the land will, and must, get poorer and poorer, and the crops less and less. Nor will the crops alone suffer. The manure will also be year after year in smaller quantities; and thus we may well understand how land becomes worn out and sterile, and crops poor and feeble.

Now, in order to remedy this deficiency, we are in the habit of purchasing extraneous or artificial manures; as well as applying such materials near us as are available for the purpose. Guano and bones are amongst a few of the fertilizers brought from a vast distance. We send our ships to Russia for the latter, and to South America and Western Africa for the former. We have not very correct data as to the entire imports of these; but there certainly were 219,764 tons of guano imported in 1845, and in the preceding year 63,267 tons of oil-cake were imported into Great Britain; and assuming the importation of bones to be only equal to that of guano, we have an aggregate of upwards of 500,000 tons of fertilizers of this kind in one year; which, at not more than £5 per ton, is at once an outlay of £2,500,000 in this description of manure. But it is quite evident that much more might be done in this respect than we find to be practised; and no one who travels with his eyes open, through any given district of country, does not see thousands and tens of thousands of acres capable of growing double, nay, treble their present amount of produce, and where some one or other of these fertilizers could be applied to advantage.

Now, if this at all approaches towards a correct view of the case, it appears quite clear that we might expend some six times the amount stated, with advantage, in artificial manures, or upwards of £15,000,000 per annum in these manures alone. Then there is the cartage and cost of conveyance of these from the ports inland—and other charges which would be very serious; and this, we fear, is a state of things which, in the present state of the capital of the British farmer, he is unable to accomplish.

What, then, must he do? Let us consider what he has to aim at, and we shall see. He wants to produce more beef and mutton, and pork and corn, and at a less cost—or at as little cost as possible. The former are to be fed with green food, and to make him manure; and this is to enable him to grow corn plentifully, and therefore cheaply. Let us take two separate acres of land. The one is growing 15, and the other 40 bushels of corn. There is, perhaps, a difference of £1 per acre in the rent. The labour is more on the 15-bushel land; the manure it requires is more; and when it is done, it is less fit to grow the next crop: and yet the one has 25 bushels more corn to sell than the other. It is quite clear, therefore, that it is the interest of the farmer to grow large crops of green food for his cattle, to be able to sell large quantities of animal food and large quantities of corn; and therefore the farmer must grow more and better plants.

Now plants require food. They can no more live without it than animals. If they have plenty they will be fertile and vigorous; if they have little they will be small and poor and stunted. What do they live upon? All my readers well know that farm-yard manure, well made, supplies them with food; and on this occasion it is not my intention to examine the particular parts of which it is composed, nor to trouble them with hard names. But it is clear that there are some parts of the manure which are of the greatest use, and some parts which are of very little.

If we examine the land which has been well manured, after it has borne a large crop of potatoes or of turnips, we shall find large quantities of black, strawy matter, very like the stuff we put in for the crop, and which is left in the land. The plants have not required this for their growth; and, if we manure another crop of turnips or potatoes with it, we shall find it does them very little good. Now, if we examine this black stuff, and compare it with good manure, we shall find this difference—it has lost its juices: these juices are the very things the crops want. But we will go further. We often see these brown juices trickling down from a farmstead—or we see a manure heap on a road-side, and its drainings washed down a gutter; and I will venture to say that the grass by that ditch side is the richest in the neighbourhood, and the clearings of that ditch are richer than many kinds of manure. Thus it is clear that the parts dissolved out of the manure and washed away—the juices, as we call them—are the very materials which plants require to feed upon. I remember an anecdote of an old lady, who had, many years ago, at her christening, a present made of an ounce of tea. Unaccustomed to so refined an article, she boiled it, poured off the water, and served up the leaves as greens. And yet this is just what the vast mass of our farmers are doing with their manures: they are keeping the leaves, and allowing the tea to trickle away down the ditches.

Consider for a moment. The value of manure depends much on the stock which has made it, and the food they have been fed upon. If there is much straw and few cattle the manure will be poor; if there has been much cattle, well fed, it will be rich. And why? Because the straw bears a small proportion to the dung and urine of the animals. Now we all know that this very dung is easily washed out with water—the urine will trickle away itself; so if we let our manure lie exposed to the rain-water, and take no pains to catch the liquid which runs away, we cannot help losing by far the best part of our manure.

Taking guano as a sample, the following is an analysis of the composition of guano. The relative proportion of the constituents of guano appears to vary slightly. The following analyses have recently been published:—

Urate of ammonia	90
Oxalate of ammonia	106
Oxalate of lime	70
Phosphate of ammonia	60
Phosphate of ammonia and magnesia	26
Sulphate of potash	55
Sulphate of soda	38
Muriate of ammonia	42

Phosphate of lime	143
Sand and clay	47
Organic matter—traces of salts of iron and water	323
	1000

The above is on the authority of Volckel. We therefore beg to give another, which will be sufficient to place before us the general characteristics of our samples of guano; and though the quantities differ, there is a general approximation of quality.

COMPOSITION OF GUANO (SECOND SAMPLE).

Urate of ammonia	32
Oxalate of ammonia	134
Oxalate of lime	164
Phosphate of ammonia	64
Phosphate of ammonia and magnesia	42
Sulphate of potash	42
Sulphate of soda	11
Muriate of ammonia	65
Phosphate of lime	100
Phosphate of soda	53
Alumina	1
Residue (insoluble in acids)	58
Waxy and resinous matters	6
Common salt	1
Organic matter, free ammonia, &c., water	227
	1000

The above is on the authority of Bertels.

We now proceed to give the analysis of various samples of urine from different animals, to show the great similarity of composition with the samples above given.

The composition of the urine of the horse has not been so carefully investigated as some, though it would seem to be more worthy of it than most other kinds. The wonderful effects of this in decomposing straw and in exciting the rapid growth of the Italian grass and some other of the grasses, shows that it possesses properties peculiar to itself. Fourcroy and Vauquelin's analysis is the best we know of, and it is evidently a very imperfect one. It is this—

Urea	0.7
Benzoate of soda	2.4
Carbonate ditto	0.9
Ditto lime	1.1
Muriate of potash	0.9
Water	94.0
	100.0

This gives six per cent. of solid matter, whereas Professor Johnston gives it to be at the minimum six per cent., and at the maximum nearly twelve and a half.

Again, the analysis gives the composition as only 0·7 per cent. of urea; whereas Sprengel, and most other authorities, give the per centage of urea at nearly four per cent. This is a difference so striking, and comparing it with the evidence the one gives of its presence over the other, that it is manifest there must have been some radical error in the analysis of these excellent authorities. It is not for us to suggest how this could have happened, but it occurs to us that the examination had been made after fermentation had taken place, and the urea had changed into carbonate of ammonia, and so passed off in that volatile substance. And we say this without any disrespect. In the comparatively infant state of agricultural chemistry, and of animal chemistry especially, we may expect errors of this kind, as we have to lament that the process whereby the examinations of the ashes of plants were made for the Royal Agricultural Society, were made by a process which dissipated at least one of its component constituents.

Sprengel's analysis of the urine of the cow, so carefully made, exhibits the great value of the application; and the multitude of the component parts shows us, again, how imperfect *must* be the above analysis by Fourcroy and Vauquelin.

Urea, with some colouring matter		4.00
Albumen		0.10
Mucus		0.19
Benzoic acid	Combined with potash, soda, and ammonia.	0.09
Lactic acid		0.51
Carbonic acid		0.25
Ammonia		0.20
Potash		0.66
Soda		0.55
Sulphuric acid	Combined with soda, lime, and magnesia.	0.40
Phosphoric acid		0.07
Chlorine		0.27
Lime		0.06
Magnesia		0.03
Alumina		Trace.
Oxide of iron		Trace.
Ditto manganese		Trace.
Silica		0.03
Water		92.62
		100

The third decimal places are not given, as being practically of little utility, but they make the total as above.

To show the plausibility of our previous hypothesis, we may mention that the same authority examined putrid urine, and the difference in this particular was very striking. Taking the two analyses as regards their ammonia and urea, they stand as follows:—

	Urea.	Ammonia.
Fresh urine	4.00	0.20
Putrid ditto	1.00	0.48

Now this, though it shows what process had gone on, shows also that there had been a considerable loss of the ammonia; for while the urea had diminished as much as three per cent. on the whole mass, the ammonia had increased only .028 per cent. on the same, so that a great quantity had volatilized.

When putrified, however, by the addition of its own bulk of water, there was this remarkable difference, the relative proportions being—

Urea	0.60
Ammonia	1.62

So that the water had taken up a very considerable portion of the ammonia, and prevented an escape of a very considerable quantity.

It is pretty generally admitted that, now that the connection between ammonia and wheat growing is so very complete, and seems so satisfactorily established, that Boussingault, and other authorities, have estimated the value of manures by the quantity of nitrogenous matter which they contain; and as regards wheat-producing this is perhaps no bad criterion, but as respects turnip-growing it is quite evident that it is no indication whatever of fertilization, for unless there is phosphoric acid, and perhaps carbonaceous manure as well, it is quite clear, from experimental facts without any limit, that we need not expect any very abundant crop. Of course it is immaterial whether this remains in the soil or is added by the manures, but it is quite evident the one or the other it must be. This, in fact, at once indicates that the urine of animals, and of the horse in particular, is a most valuable fertilizer if applied rightly and judiciously. Pigs are generally sheltered, and their urine drops into the fold-yard or sheds; but sheep only seldom. These two, as regards urea or ammonia, stand as follows:—

Urine of Sheep in 1000 parts.

Urea...............	12.62
Sal ammonic	3.00

Urine of pigs in 100 parts, 2:73 to 2.97.

Now the solid matter of all these kinds of urine varies, as we have seen, in different animals. Professor Johnston gives it as follows:—

Urine of	horses....	60 to 124	parts in 1000
Ditto	cattle	70 to 120	ditto.
Ditto	pigs	40 to 70	ditto.
Ditto	sheep....	18 to 74	ditto.

And the same authority says that each man voids as much as three pounds in twenty-four hours, and the horse about the same; while the cow voids about forty pounds.

It is, perhaps, hardly necessary to add anything to our previous remarks on the imperfection of the analysis of horse's urine, but we may say thus much at least, that the dry extract of each contains nitrogen as follows:—

Of the cow......	3.8	parts of 1000
Ditto horse	12.5	ditto.

It must be manifest, however, that the urine of animals, though containing nitrogen in various shapes, urea, ammonia, soda, potash, and common salt, is still remarkably destitute of phosphoric acid; it is evident, therefore, that the waste of bone and muscle in this particular does not find its escape by the kidneys. And we have, therefore, to look for it in the other ejectamenta of the animals. It is equally evident, therefore, that urine alone is unsuited to the growth of those crops which require large quantities of phosphoric acid, and its full effects can only be produced where other applications embrace a supply of the phosphates, or where the land has had on it a sufficient supply of the phosphates before. Now to avoid technicalities as much as possible, I will just call attention to the tables above, from which we may see that the constituents of urine and of guano are almost exactly the same—or, in other words, that urine is, in fact, guano and water. Professor Johnston says that the solid substances contained in urine, if applied to the land, would be more fertilizing than guano, which now sells at £10 per ton. If we estimate the urine of each individual, on an average, at only 600lbs., then there is carried into the common sewers of a city of 1000 inhabitants a yearly weight of 600,000lbs. of guano, or 270 tons, which, at £10 per ton, is worth £2,700; which would, no doubt, prove more fertilizing than its own weight of guano, and might be expected to raise an increased produce of not less than 1,000 qrs. of grain. Mr. Gyde, in a paper sent in to the Highland Society of Scotland, says, "that for every 10,000lbs. of the urine of the horse that is allowed to escape, 600lbs. of dry matter of a highly fertilizing character is lost to the farmer; and for every 10,000lbs. of the urine of a cow, the loss is 700 lbs. of dry matter." He also shows that in a farm of 500 acres of land, 400 arable and 100 pasture, with a stock of 50 head of cattle—20 horses and 60 pigs—there would be 45,000lbs. of dry fertilizing matter equal to guano, or upwards of 20 tons; and this, at £10 per ton, would be worth £200 a year, or 8s. per acre on the entire farm. It must be clear, however, that the ordinary drainage of farm yards is by no means exclusively urine; and those persons who manure their ground with the ordinary drainings of their steadings will find that, unless they apply very large quantities per acre, there will be scarcely any good effects produced. Mr. Gyde, in his essay sent in to the Highland and Agricultural Society of Scotland for competition, seems to have in his calculations by far too much confined his estimates and observations to the application of the urine of the animals alone; and as much of this is taken up by the straw, as a matter of course it is perhaps hardly fair to take it as a sample of the waste. Still the general remarks are by far too true; that ignorance in this particular is more remarkably visible than in any process of farming, however neglected. Professor Johnston, while in his capacity of chemist to the Chemistry Association, analyzed generally two specimens of farm-yard drainage. The first specimen was ordinary farm-yard manure washed with cattle urine, and every gallon of this contained 617 grains of solid matter, of which as much as 518 were inorganic solid matter. The proportion of ammonia in the former was 21 grains (omitting fractions). Now, assuming the liquid to weigh 10lbs. per gallon—it might vary a little, but it is not necessary to know its exact weight for the purposes of this calculation—the analysis will stand thus—

Water	999.45	parts 1000
Matter in solution	.55	ditto
	1000.00	

Thus, to supply a quantity equal to 3 cwt. of guano, the enormous quantity of 3,811 gallons must be applied per acre; or 95 journeys must be made with a 40-gallon water-cart, if applied by that apparatus.

The other sample of liquid drainage was, as in the former instance, from Coltness, near Hamilton, and was from cow's dung, washed with rain—we apprehend, cow's litter, as thrown out from the stalls. Here, however, there were only 479 grains of organic and inorganic matter in the whole, and the ammonia amounted only to 9½ grains, so that a very great deterioration both in quantity and quality had taken place in the manure. About one-third less of all the valuable parts of the manure was deficient, and more than one-half of the wheat-producing property—the ammonia. But it is evident that this is a mere approximation to an accurate idea of the quality of the drainage of farm-yards. The time the manure is exposed; the proportion of straw to the cattle; the nature of the food on which these cattle have been fed; the amount of rain which has fallen, and whether from the heavens only, or whether from the roofs; if any or all of the adjoining buildings are spouted, or the contrary—will all operate to change the character and strength of the drainage from the manure. There was in the liquid drainage from manures this striking difference: A gallon of the manure drainage from that watered with urine had as much as 44½ grains of the phosphates; and that washed with rain-water contained 25 grains of the same salts. Thus, two facts are clearly established—first, that the phosphates of the manure are washed out and carried away by the liquid drainage; and second, that this drainage supplies to the soil some ingredients which urine alone—otherwise more valuable—would afford.

It is only necessary to go to such places as Clipstone Park, to see what the application of liquid drainage will effect. By it alone, land not worth originally 4s. 6d. per acre—being heather and whins—is made so rich, that three to six crops of grass can be cut in a season, and where no manure whatever but the liquor is applied; and the land is now worth £11 4s. per acre.

At Edinburgh—where, of course, the liquid drainage is very rich and fertilizing—land formerly let at from £2 to £6 the Scotch acre is let for the enormous sum of £30 to £40 per acre. Of course the produce is of great value so near a large city; but the number of cuttings per annum exceed all credibility. One might imagine that in America, where there is so much virgin soil, and so much fresh for all kinds of crops, they would be careless about their liquid manures; but this is far from the case. Immediately below their outhouses and stables (barns, as they there call them), they have an immense cellar, with trap-doors and grates. Into this all the manure is put as made; and all the liquid of the animals drops, without any admixture of rain-water. This, when full, is emptied, and the contents carted to the field when wanted; and thus they preserve the liquid manure. In Belgium, where they are generally considered so far behind us in farming, the greatest care is taken of the liquid manure. There is scarcely a farmer, however small, who has not in constant use a tank for the reception of his liquid manure; and the way of applying artificial manures (as rape-cake, &c.) is to dissolve it in this very liquid.

In England, it is painful how much this is neglected. First, the manure, as soon as made, is thrown into the open fold-yard, there to receive all the rain from heaven, and all that falls on the unspouted buildings, as I shall show shortly; and this is carefully carried away, by careful drainage of the fold, down the ditches. As this manure accumulates, it is carted out, and often exposed in new surfaces to the action of the rain by a roadside, where it has the washings of another ditch to withstand; and who has not seen the coloured water and rank grass growing on the roadside as a consequence? I may be told, and I know it, that the farmer must ferment his manure, or it cannot be useful; and this I admit. But why must he ferment it? Because fermentation breaks down the strawy matter, and makes it soluble—in other words, reduces it to the state in which it can be washed out by water, so that the plants can make use of it. But do we not see the mass of farmers taking care that the water shall wash this away also, down the ditches, to the robbery of the crops, and the loss of the farmer?

The practical effects of the liquid drainage as a direct application to the land are given over a vast variety of soils and situations, showing that there are solid grounds for the opinion that it is a valuable application.

Arthur Young proved, so long ago as 1787, the value of urine and drainings of the farm-yard; and Mr. Gyde gives the following instance of the successful application of liquid dunghill-drainings to the barley-crop, as a top-dressing:

	Straw. Cwt.	Qrs.	Lbs.		Corn. Bush.
No manure produced....	20	3	6	....	40
Guano (1½ cwt.)........	25	0	0	....	50
Drainings, diluted with water in the proportion of 330 gallons of the former to 670 gallons of the latter............	26	2	0	....	52½

It must hence be quite clear that the drainings of the farm-yard must have been of a quality extremely rich, or so small a proportion could not have produced the effect of 1½ cwt. of guano; for, according to the best of the specimens analyzed above, there could not have been in it more than one-third of a cwt. of good guano. This may, however, be to a certain extent fallacious as a result, because it might possibly so happen that the soil might already possess in sufficiency some principle contained in the guano, and be deficient in some, possessed by the liquid drainage. Mr. McLean, of Braidwood, another of the society's competitors, who applied house and building sewage, and employed it in saturating moss, as well as applied it directly, estimates that there should be applied 2,500 gallons of the liquid to the acre, or something like two-thirds of the quantity theoretically shown by Professor Johnston's analysis. On this basis he made the following experiment: — He applied 40 cart-loads of farm-yard manure to potatoes in 1843, and the result was 5 tons 13 cwt. per acre. 2,500 gallons of what he called urine, but which appears to have been what we stated, house and farm buildings' sewage, produced 6 tons 16 cwt. per acre, or an increase in produce of 1 ton 3 cwt. per acre.

Mr. Wilson, of Eastfield, another of the venerable society's competitors, estimated his increase of hay at from 80 to 100 stones of 22 lbs., or as a medium say 141 stones per acre. On oats he estimates the increase on an acre to be in an equal ratio; and on potatoes he considers the increase to be 2 tons per acre. There are two other competitors whose reports are not sufficiently in detail to admit of any comparative estimate of the results.

Mr. Dickenson, of London, is a remarkable instance of the immense value of the direct application of the liquid—the urine of horses trickling down and dissolving the solid excrements, so far, at least, as to produce astonishing results. Look, for instance, at the crops grown in 1847. Taking it, however, as a favourable season, it still stands—

1st cutting.—		Early in the spring for soiling.
2nd	do.	Hay early in May.
3rd	do.	Hay in June.
4th	do.	Seed in July, or early in August.
5th	do.	For seed in September.
6th	do.	Green for soiling.

Then eaten with sheep.

Average height of each cutting 4 feet.

This direct application to grass, which is allowed to live for two years, will only apply with the same degree of force to the Italian grass, as the liquid is not found to have the same effect on the clovers, but rather adverse. Nor does it produce it on the permanent grasses; and Mr. Dickenson has found it necessary to inoculate the latter with the Italian grass, to answer his purpose.

Instances, however, are not wanting to show that the application of the solid matter of liquid drainage is not without beneficial results, and that the assumption of Professor Johnston and others, as to its being equal to guano, are by no means ill founded. On the authority of Mr. Gyde, the following is the comparative effect of the dry matter of urine after the ammonia had been fixed with sulphuric acid:

On turnips (per acre)—

Undressed produced	12 tons	17 cwt.	per acre
1 cwt. per acre	24 ,,	11 ,,	
Increase	11 tons	14 cwt.	per acre.

It must be clear, however, that the turnips must either have been sown on land previously manured, or comparatively fresh, otherwise nearly 13 tons could not have been produced.

On potatoes (per acre) the whole being manured with 40 cubic yards of dung per acre—

	tons.	cwt.
Produced	12	15
With 1½ cwt. additional of dried urine	14	10
Increase....................	1	15

On wheat (area not given)—

Undressed................	43 qrs.	3 bush.
1½ cwt. of dried urine	51 ,,	1* ,,
Increase.............	7 qrs.	6 bush.

On Oats (area not given)—

Undressed................	44 qrs.	0 bush.
100 lbs. of dried urine......	54 ,,	2 ,,
Increase.............	10 qrs.	2 bush.

* This is given as 18 bush., which must be an error. We have called it 1 bush. M. M. M.

To conclude the facts and experiments connected with the application of liquid drainings *per se*, we may observe that Mr. Hannam found that by the use of 32 gallons of putrid urine, mixed with 2 cwt. of gypsum, or 12 bush. of bones, his turnip crop was increased by 2 tons 7 cwt. 6 stones; while the same quantity of bones and gypsum without the liquid increased the crop only 1 ton 6 cwt. 2 stones. An addition, too, of 100 gallons of flax waste, a dry vegetable absorbent, produced an increase of 5 tons 5 cwt. 2 stones.

From the above facts and principles, it would be very difficult to arrive at any other conclusion than that the drainages of farm-yards are of great value, and ought to be preserved. The evidence is too irresistible to admit of a moment's doubt or hesitation; and if 10,000 failures could be satisfactorily proved against its application, they would indicate mismanagement, misapplication, or some other reason for the failure; but they could never prove that the soluble parts washed out were not only not the best and most fertilizing parts of the manure, but the parts which were not in that state most calculated to afford the sustenance to the plants to which they were applied. At the same time I neither can nor will attempt, however, notwithstanding all I have said, to deny that many persons have made sad mistakes in treating their liquid manure. The methods taken are either to prevent its escape from the manure at all, which is by far the best plan, or to collect and apply it properly after it has escaped from the manure. The system of box-feeding, into which I am not now able to enter, as it would be quite without the scope of this paper, is, I believe, the best way of effecting the former.

In the application of the liquid, notwithstanding all that has been said, I am aware that great disappointments have taken place. The causes of these will form a subsequent paper.

Sowerby, Thirsk, Oct. 10, 1849.

ON THE ERGOT FOUND IN GRASSES, CONSIDERED AS THE EXCITING CAUSE OF ABORTION* AND PLEURO-PNEUMONIA IN COWS.

BY RICHARD J. JONES, WEST BROMPTON.

TO THE EDITOR OF THE FARMER'S MAGAZINE.

Sir,—Having seen an article in your Magazine of last month by Mr. McLean referring the probability of the ergot found in grasses, causing the great prevalence of abortion in cattle, hitherto so long unaccounted for, and so little understood, being a subject which has for some time engrossed my attention, I beg to offer a few remarks on it.

On reading the article in question I was at once struck with the truth and force of the observations therein set forth, and wondered, not at such views being newly brought forward, but that they had not been so long before. That the cause assigned is novel, is no reason why it should not be a rational one, and being a matter of such vital importance to the agricultural interests of the country, deserves the most patient and careful examination. It involves a question of paramount importance, in a pecuniary point of view, to the farmers of Great Britain, whose annual losses, estimated from that source alone, are almost incredible—not to speak of the fatality from pleuro-pneumonia, to which I shall revert in the course of this article.

There must be a cause for such a state of things, and the question naturally arises, Where is it to be found? Many curious speculative theories have been from time to time advocated, which could not stand the test of a practical investigation, and, however ingeniously supported, proved fallacious. It is an extraordinary fact that cows are more subject to abortion than any animal we know of in the ratio of three to one, and were I to give the comparative numbers occurring on some farms I should, I fear, excite a smile of incredulity on the countenances of some of your readers, but there are only too many, I am sorry to say, who from sad experience could bear testimony to its truth; in fact, in some districts there is still a superstition existing of certain farms being unlucky—and unlucky they are—from the frequency of abortions there: they attribute to the effects of supernatural agency what they, as well as many better informed persons, are otherwise unable to comprehend. Mr. Maclean has, however, thrown a new light on the subject, which would rationally account for what has been hitherto so inexplicable. I will now proceed to give you a short history of the ergot, in the hope that the investigation just set on foot may cause those most interested in the matter to pursue it carefully, and will endeavour to point out hereafter such measures as will, I trust, put an end at once and for ever to this evil, which has so long

* When occurring within six weeks after conception it is called "Miscarriage"; between the sixth week and sixth month, "Abortion"; any time after the sixth month and before the usual time, "Premature labour."

been disappointing the fairest hopes and most promising anticipations of the stock owners of Great Britain.

According to M. De Bourget, a French writer, the formation of the ergot is as follows:—"The seed in which it appears first softens, becomes very friable, and undergoes a species of fermentation, exhaling at the same time a very disagreeable smell; their outer surface is now seen to be intersected with many small furrows, moistened by a whitish viscous and saccharine liquor, which reddens turnsole paper. This liquor exudes in greatest quantity from the summit, where it agglutinates together all parts of the inflorescence. At this period the perisperm (or investing sheath of the seed) becomes everywhere destroyed, except towards the summit, where it is the cause of the greater consistence of the ergot. The outer surface, previously white, now becomes brown, and afterwards black, first in the inferior portion and then throughout the rest of the seed; the furrows disappear, the seed elongates, and it soon emerges from its outer covering (the glume) in all its distinctive characters. Thus the formation of the ergot presents two distinct epochs; the first comprising the destruction of the perisperm—the softening and saccharine fermentation of the seed, and the second the period of its assuming its deep colour and morbid enlargement." Ergot, whether of wheat, rye, or grasses, possesses the same peculiar properties, and its use is followed by the same effects. Ergot of rye has been known for a period of 800 years as a medicine possessing deleterious and poisonous qualities, and has been freely used by midwives on the Continent as a promoter of labour pains for over 150 years. M. De Granges, an obstetric practitioner of Lyons, is said to be the first physician who used it, in the year 1777, for the purposes to which it is at present applied. Its use among the faculty in this country is of comparatively recent date, being introduced from America about the year 1807; it was not till about the year 1820 that it came into anything like general use. In large doses it has been found to produce nausea, vomiting, a feeling of intoxication, vertigo, giddiness, and convulsions; and when used for a considerable time mixed with healthy grain, dysentery (as was the case in Brittany, in 1842), madness, epilepsy, spasms, loss of sight, paralysis, total emaciation and loss of nervous power, *gangrene of the lungs* and of the limbs, to which the name of "Ergotism" has been given. These symptoms have been found most prevalent in *the very spots and at the very times where and when we know ergot would flourish most*, viz., *in low, wet, marshy*, or as it is not inaptly termed *"cold ground,"* or in higher and better ground when very hot weather has suddenly supervened on much rain. Its poisonous effects were noticed as early as the year 1096, by Sigebourt De Gremblour. Wendelier Thelius, a German physician, in the year 1596, gave an account of *a gangrenous* epidemic which raged in the kingdom of Hesse, in which the limbs were said to *drop* off, and *abortions were said to be most extraordinarily frequent.* In the years 1648 and 1649 both Saxony and Sweden became ravaged by a similar scourge; and some years after Blois and Montargis, in France, were visited by an epidemic presenting the same characteristics. M. Tessier speaks of a disease of the same kind occurring in 1670 and 1777 at Cologne, on which he made numerous observations and experiments. Since then its baneful influence has been several times observed during successive *wet seasons* in France, where *rye bread is so generally used.* In a cleverly written work called "Blights of the Wheat," there is the following remark:—"There is reason to believe that in several localities in France, where pains have been taken to prevent ergot being sent to the mill with the good rye, the epidemics formerly so prevalent have diminished; indeed, it is said that they have been nearly removed by this judicious care." The various experiments of M. Tessier and others fully establish the fact that all those epidemic appearances were solely to be attributed to the presence of ergot in the food. The true nature of ergot is as yet matter of dispute, each of the several writers on the subject advancing as many different arguments in support of his own opinions; but, to whatever class it belongs, there is only one opinion as to its effects. Its discovery among grasses is by no means new, but the application of it as a reason for abortion in cattle is due to Mr. Maclean, who, in leading inquiry into the right track, will have conferred a great boon on the agriculturists of this country. In the "Journal de Pharmacie," of 1842, we find—"Mr. Hoffman has discovered well formed specimens of ergot on the 'Phalaris canariensis' (or canary grass)—a discovery that leads to the belief that the disease is proper to the entire family of grasses." And again, in "Bigelow's Materia Medica," an American work, "Various specimens of grains *and grasses* are subject to a morbid excrescence on some part of the ear or spike, to which the French name of 'ergot' has been applied. Rye is more frequently affected with this appendage than any other grain, but it has also been discovered on wheat and barley. Different conjectures have been offered relative to the nature of this excrescence, the most probable of which is that of Decandolle, who considered it to be a parasitic vegetable, of the tribe of fungi, and genus Sclerotium."

I myself have frequently found it in the "Phleum pratense" and "Festuca pratense," in addition to which it has been found by the Author of the "Blights of the Wheat" in those grasses, and also in the "dactylis glomerata," the "Lolium perenne," and "Lolium arvense." However, the growth found in wheat is said to be the most powerful of any.

To comparative anatomy and physiology, and to experiments made on animals, we are indebted for some of the most valuable discoveries that have been made in medical science. Carpenter, in his System of Animal Physiology, says—"It is a principle now universally admitted, that the life or vital actions of no one species of animal can be correctly understood, unless compared with those of other tribes, of different conformation." If then the effects of medical agents on the brute creation be taken for the purpose of exemplifying the results likely to be arrived at from their use on the human subject, should not this, on the other hand, lead us to assign to them similar effects on animals to those which we know them to produce on the human species. It is well-known that ergot will produce contraction of the *gravid* uterus in females, to the expulsion of the fœtus, *at any period* from the time of conception. If it produces similar uterine contraction in the cow *during parturition*, why not as well *at any other period of gestation?* To shew that it has been used effectively in veterinary practice, and found to possess the properties ascribed to it, I shall quote one case, out of many, from the Veterinarian of 1845, by Mr. W. Fox Wilkinson.

"A few weeks ago, I was called upon to attend a cow that had been in labour about seven hours. The owner and an old cow-leech had in vain been struggling with her, and at length, weary and "dead beat," gave up the case as hopeless. When I saw her, she was lying down much exhausted; could not get up without very great difficulty—the extremities cold—the vulva much swollen, and of a livid colour. Upon examination, I could with difficulty introduce my fingers into the os uteri, which appeared quite constricted, although only about twenty minutes had elapsed between my being sent for and the previous examination of the owner—the labour pains being completely gone. I immediately administered 3 drachms of *Secale cornutum* (ergot) in half-a-pint of port wine and three pints of hot gruel; ordering fomentations to the inflamed parts. I very frequently examined her, and endeavoured by degrees to overcome the stricture, which eventually gave way, and in sufficient time, previous to the operation of the medicine. Having waited two hours, and no re-appearance of the pains, I gave a drachm and a-half of the ergot in half-a-pint of port wine and gruel as before. In about three quarters of an hour the throes came on, gradually increasing in strength. I passed up my hand, and found it a cross presentation—viz., two legs—a fore and a hind one presenting. I brought the hind leg into the vagina, and made it secure with a noose; then pushing the fœtus forward, as the other hind leg appeared the easiest to take hold of, I drew it into the vagina, again forcing the fœtus forward. I turned it upon its belly, and extracted it. The calf was very large, especially about the fore extremities and head. The placenta I also took away, for fear of another stricture. The pains continued severe, and she was very restless; her breathing was short, and the pulse strong and full. I bled to four quarts, and gave her $1\frac{1}{2}$ oz. tincture of opium, and Epsom salts 6 oz., in some warm gruel. I bedded her well up, and left her comfortable for the night. This case will, I think, along with some that I have read of in your periodical, go a little way to prove the efficacy of the ergot in protracted parturition, when in consequence of want of energy in the uterus, I have never found it fail." Some few have complained of being disappointed by it; but that may readily be explained by the fact, that all new medicines are at first very expensive, and consequently more liable to adulteration, as was the case with ergot, which was frequently adulterated with plaister of Paris casts of the grain, coloured so as to resemble genuine ergot.

Mr. Russell, in his Agriculture, says of abortion:

"Abortion is singularly frequent in particular districts, or on particular farms: it seems to assume an *epidemic form*. This has been accounted for in various ways. Some have imagined it to be contagious; it is destructively propagated among the cows. *But this is probably to be explained on a different principle than that of contagion*."

Mr. Wedge, in his Survey of Cheshire, says:

"Slinking generally happens *in wet seasons, and continues for two or three years together*."

The explanation of which is simple enough: ergot being produced in the grasses during a wet season, is not likely to leave it for two or three; hence the continuance of slinking on such farms as it has once made its appearance on. To quote again from Mr. Russell:

"*The pastures on which the blood or inflammatory fever is most prevalent, are those on which cows oftenest slink their calves.* Whatever can become a source of general excitation and fever, is likely, during pregnancy, to produce inflammation of the womb, or whatever would under other circumstances excite inflammation of almost any other organ has at this time its injurious effects determined to this particular one. There is no farmer who is not aware of the injurious effect of the *course, rank, herbage of low, marshy, and woody* *countries*—in fact, these districts are the CHOSEN RESIDENCES OF ABORTION."

Now, in speaking of pastures on which the blood or inflammatory fever is prevalent, he says: "On those, cows oftenest slink their calves;" and why? Because the ergot which produces only inflammatory fever on an animal when not pregnant, on the gravid uterus immediately excites contraction and expulsion of the fœtus. Can anything bear more directly on the matter at issue than the remarks of this writer, in which he points so distinctly to the very spots on which ergot is now known to flourish most abundantly as "the chosen residence of abortion?" The author of "Blight of the Wheat," from whom I have before quoted, says of the ergot, "It is more than probable that many disorders have been produced by this singular abortion, the origin of which has hitherto remained unsuspected. It is well worthy the farmer's attention, inasmuch as *his cattle may have suffered much from the same cause where he has never even dreamed of its existence.* The author knows at present of certain low meadows, where all the cattle that were turned into them at one time were taken ill: although this fact may not be perfectly decisive, it affords a strong presumption in favour of the idea, that ergot did greatly tend to promote the evils complained of." The number of abortions occurring on particular farms, induced the belief that it was communicated by sympathy from one animal to another. That animals are capable of such feelings as we understand by the word "sympathy," is a matter on which I must venture to dissent from the generally received opinion. Sympathies of such a kind exist only in beings of a highly nervous organization; such, for instance, are hysterical females. Those of more robust constitution rarely experience them, and in savage life they are totally unknown: as are they nearly so in country districts where the females enjoy a pure, bracing atmosphere, and work in the open air. It is in towns alone that we see them in their most severe form. Sympathy may be defined as an *emotion of the mind*, which produces particular actions of the body, independently of the *will*, or even in opposition to it. Animals do not possess, what we understand by the word, "mind," or if so, in a very inferior degree. Mind, with them, is what we understand by the term "instinct." Should we find instances of abortion occurring among human subjects, in a large number, in the same district, I do not think it would be saying correctly that they were communicated through sympathy, but rather through the influences of fear, acting on the nervous system through the medium of the mind. Persons most subject to such nervous fear would be the most predisposed, from peculiar nervous organization (of which that fear is the proof) to abort, even setting aside altogether the exciting cause itself—fear: therefore I cannot allow myself to think that even a single case of abortion has occurred among cows from sympathy. It would, in fact, be assigning to them a higher amount of reasoning power than we know any of the brute creation to possess. We must, then, seek out some other cause. That which could produce one case, may as readily produce a number; and it is not matter of surprise that so many should occur, when the fodder is vitiated by such a quantity of ergot, as it is now pretty nearly proved to contain. When we find such pernicious results arising from its use in the human economy, why be surprised at its effects on cattle? particularly when we recollect that ergot acts on the womb *not specifically*, but through the spinal column and nervous system on the muscular tissues *generally*, but more particularly on the womb, from its highly nervous structure. It is beyond dispute that anything calculated to excite inflammatory action of the system, as the ergot decidedly is, will, if it does not itself produce it directly, render the animal more susceptible to organic affections of the lungs and pleura (or investing membranes of the lungs), and will, by destroying the proper balance of circulation, foster the morbid tendency to such diseases as pleuro-pneumonia.

THE NEW FARM AT BALLINDALLOCH.—A LESSON TO PROPRIETORS.

Twelve months ago, we gave some account of the extensive improvements commenced at Marypark, by the late Sir George M'Pherson Grant, of Ballindalloch, and continued by his son, the present proprietor, distinguished for the liberality and practical soundness of his views as a country gentlemen. We observe that those improvements have now been completed—a valuable farm of two hundred arable acres has been rescued from the waste. Sir John has received the Highland and Agricultural Society's gold medal, and an able and detailed report of the whole appears amongst the transactions of the Society appended to the last quarterly number of the *Journal of Agriculture.*

Marypark is the name now given to the improved portion of an extensive tract of waste land, lying to the east of Ballindalloch Castle, in Strathspey. It is elevated about five hundred feet above the level of the sea; and in 1843, when operations were commenced by the late Sir George, so worthless was the land in its natural state, that an extent of over two hundred acres was considered to be dearly rented at £18 per annum. The soil, though good, was in many places covered deeply with obdurate moss; in most places was overlaid with stones; and so saturated with water, that it was only available for cattle during the summer months. It was a very unpromising subject; but the spirit and enterprise which assailed it have been singularly successful. In June, 1843, the labour was begun, under the superintendence of an able practicable reclaimer, Mr. Dow, who had carried through some valuable improvements in the county of Kincardine. A deep drain was first constructed along the high ground on the north side of the farm, to intercept the water; and the land was then divided into ten fields, which were successively trenched where necessary, and then thoroughly drained, until the whole were brought in. Of the 200 acres, of which the farm consists, 116½ acres were trenched, and thorough-drained, and 80 acres thorough-drained without trenching. The hard land was trenched sixteen inches deep: the sods were cut not larger than one foot square, and were placed at the bottom of the trench with the surface downwards, and all the stones in the trenched soil were carefully turned to the surface. Other parts of the land, however, were mossy; but wherever the soil was found, by probing, within fifteen inches of the surface, those parts also were trenched, four inches of clay being thrown up from the bottom. This labour cost from £6 to £11 per imperial acre, the labourers employed having worked together by contract. The main drains are from six to seven feet in depth, and none were made less than a foot and a half wide at bottom, increasing gradually from the upper to the lower end. Sir John remarks that these dimensions are considered unnecessarily large; but he accounts for the unusual size of the drains by adding that they were found to be convenient receptacles for the large quantities of stones trenched from the ground. The average expense of the main drains was 6s. 6d. per drain. The thorough drains are at least three feet in depth in the hard soil; and wherever moss was encountered, whatever its depth, the drain was sunk at least two-and-a-half feet into the solid ground beneath it, so that in some parts of the mossy ground the thorough drains are ten or eleven feet in depth. The estimated expense of the thorough drains was 3s. 6½d. per chain. The necessary sunk fences cost, between cutting and building, about 1s. per yard, the double dykes from 6d. to 7d. per yard, and the outfall burn running through the farm was substantially causewayed, to prevent any injury from floods. Belts of wood for shelter are being formed on the east and wider sides of the farm; watering places for stock have been formed in every field; a thrashing-machine of the most modern construction has been procured at an expense of £128, and a substantial steading, completed with all the modern improvements, has been erected at an expense of £1,106. The whole improvement has been effected in the most permanent and most efficient manner. Ninety-eight miles five hundred and seventy yards of dykes and drains in all have been constructed—a gigantic improvement! The total expense which falls to be apportioned over the 116½ trenched acres, makes the cost reach the large sum of £28 17s. 9d. per acre, and of the drained land £19 2s. 9d. per acre —on an average, £24 per acre over the whole extent of the farm. The total cost of the new farm thus approaches the large sum of £5,000. Marypark has been divided, as already said, into ten fields, and Sir John appends a separate balance sheet for each field. The first, comprising 19 acres 2 roods and 4 poles, has been in crop since 1844. The expense of its reclamation was £468, and by the end of 1848 the profit of the various crops had reached £517 17s. 4½d., thus leaving a balance of nearly £50 in favour of the proprietor! At the end of 1848, the various crops had reduced the debt against the farm, adding five years of the original rent, to less than £1,900, and the bountiful harvest which has just passed must have gone a long way to redeem this sum. A few more years will elapse, and Sir John may then congratulate himself—and all who desire the prosperity of the Highlands, so much dependent on the spirit of its proprietors, will congratulate him—on the success of a great experiment. Some of the crops raised on the new land have been very large. A portion of one of the fields produced, after turnips, no less than 8⅝ quarters of oats per acre! Another field produced 8 quarters per acre after turnips; and it may be remarked that the first premium for swedes was awarded by the Morayshire Farmers' Club this year to the Marypark crop, and the judges remarked that "they never saw a better crop." How grateful it must be to the proprietor, and to all, to see a wide extent of land now rearing magnificent crops, supporting herds of superior cattle, and adding to the general wealth of the district; and all this where, six or seven years ago, stretched out a wide and watery moss, productive only of weeds, and the starving ground of a few hungry cattle! Sir John concludes his business-like report with the following satisfactory and graceful comments:—

"So satisfied am I with the result, that I have lotted off, and already commenced, from perfect waste, another farm of one hundred acres, immediately adjoining that now completed, with the intention of improving it in the same manner; being persuaded that nothing will contribute more to the augmentation of a proprietor's rent-roll, the amelioration of the circumstances of the people, and the improvement of the climate of the country, than the reclamation of our waste lands by substantial trenching and draining.

"Besides the remunerative return from this improvement, it has already produced, and is daily bringing an indirect benefit of no small amount to the estate of Ballindalloch, and to the district in which it is situated, by the spirit of agricultural enterprise it has engendered among the tenantry, who are now, both large and small, most eagerly employed in adding to the productive powers of their farms; and I hope a son may be pardoned for venturing to affirm, that a more honourable monument could not have been raised to the revered memory of his father than that which Sir George Macpherson Grant has himself erected in this improvement of the beautiful farm of Marypark."

One remark only is necessary in conclusion. The proprietor practically unacquainted with land improvement will infer from Sir John's report the necessity of dealing liberally with an improving tenant. No farmer, large or small, now thinks of improving his lands without a lease; but a lease is not all—it must be conceived in liberal terms; for even where the expenditure is judicious, as in the case of Marypark, five or six years must elapse before the tenant is in a condition to pay rent.—Inverness Courier.

REMARKS ON STATISTICS RELATING TO AGRICULTURE,

SHEWING THE EVILS RESULTING FROM PRESENT DEFICIENCY, AND SUGGESTING MEANS BY WHICH COMPLETE AND ACCURATE INFORMATION ON A SUBJECT OF SUCH GREAT NATIONAL IMPORTANCE MAY IN FUTURE BE EASILY OBTAINED.

BY JOHN EWART, LAND SURVEYOR, ETC., NEWCASTLE-UPON-TYNE.

(Concluded from page 394.)

As to the second member of the position, in the case of an individual, there can be but one answer to the question—how does dependence affect one's influence and respectability, and consequently one's power? and it is, that such circumstance would militate strongly against the laudable objects of ambition mentioned, to be met with in a greater or less degree in every person. As it is with an individual, so it is with a nation. In whatever degree a country may be dependent on another for the necessaries of life of the inhabitants, to the same extent will be the sacrifice of national power and influence, for which no commerce or manufactures can ever exactly compensate. The truth of such a conclusion may be perceived by reflecting on the following supposititious case, by no means impossible of occurrence:—Suppose this, or any other nation, in a high state of civilization, to be *from legislative discouragement of agriculture,* or from any other cause, dependent on foreign supply for a portion of the necessaries of life, any interruption of the commerce of a nation so circumstanced would place it in jeopardy of the direst calamity that can befall mankind—more dreadful than the sword of the most ruthless enemy—that most terrible of all visitations, FAMINE! What advantages to be derived from trade can compensate the enormous evil that may result to a nation from dependence on a foreign supply for food? On reflecting on the subject every idea arising in the mind confirms the justness of the remark of an eminent writer previously quoted, and the conviction of paramount importance to the prosperity of a nation in self-dependence for the necessaries of life.

Opinions so contrary to reason as those which prevailed in producing the present system of our commercial policy, at present causing great distress amongst the agriculturists in every district of the kingdom, and, as the effects of the system day after day become further developed, also threatens serious disadvantages to the very interests and classes of the community it was supposed the measure referred to would most extensively benefit, could never have been entertained, but for the defective, or, it may be said, total absence of statistics, especially of those relating to agriculture, as *data* from which to arrive at true conclusions. It behoves the government, even now, to prevent further mischief arising from innovations founded on false notions, to obtain that which is readily within their power, but totally impossible for individual industry and enterprize to effect, viz.: full and correct information as to the social condition of the community, and as to the state of agriculture, manufactures, and commerce of the kingdom. Not the worthless and unintelligible enumeration comprising the decennial census; but a correct, properly arranged, and incontrovertible statement of facts, worthy the civilized state and enlightened age in which we live. Not the garbled hotch-potch of discrepant interests which ingenious, though ignorant or selfish dabblers in politics, may advance in support of false notions or selfish ends; but *data* on which to arrive at sound conclusions for the just government of the community at large, without favour to any particular interest or class.

In confining the remarks to follow to the subject of agricultural statistics, it is not in any way intended to disparage the importance of the fullest and most correct information relating to every other industrial pursuit that can in any degree advance the wealth or convenience of the community, or the power of the nation. The selection has been made in consequence of agriculture supplying the first necessaries of existence, and therefore deserving priority of attention in any inquiry into the state of the nation.

Whatever may have been in time past the difficulties with which government might have had to contend in any comprehensive measure with a view to obtain accurate information in what relates to the home production of food, such impediments to so important an attainment are now in a great measure, if not wholly, removed. The Ordnance survey, when completed, will accurately supply the geography, quantity of land, and elevation of the different districts of the kingdom above sea-level; and the geology of the whole of the kingdom being well known, the great physical basis of an accurate agricultural survey of the kingdom is by those means provided, and for the details of which the surveys under the Tithe Commutation Act might be available; thus leaving little to be done, involving either difficulty or expense.

With the appliances above-named to begin with, the fullest information on every matter relating to agriculture might easily be collected with almost perfect accuracy, by surveyors properly qualified for their office by intelligence, previous pursuits, and knowledge of the district to which they would be required to act. Such surveyors might properly be appointed to districts of moderate extent, say from 100 to 150 square miles, bounded by permanent and well-defined limits, such as rivers and public roads. Every 10 or 20 surveyors might be under the inspection of a superior officer (provincial inspector), to whom they might be responsible for the efficient discharge of duty, and respectability of conduct. It would be necessary that the survey should be completed for the whole kingdom in an office in London; and although the tithe commission be but temporarily constituted, the same commissioners might form a permanent board for the chief direction of the objects in question, to which the provincial inspectors might communicate, and be responsible.

The leading objects of the survey should be to ascertain the quantity of each different quality of land under different states of cultivation and crop; the number of the different kinds of live stock, distinguishing the different breeds of each kind, and specifying also the purposes for which they are kept—whether for breeding, rearing, working, or preparing for the shambles; the quantity of edible crop and meat produced, and the prices of the same; the extent and nature of improvements in agriculture in progress, and the capability of further extension of such improvements; the sources of the supply of fossil substances for manure; number of population, with their occupations; the annual value of property; local taxation; and every other circumstance relating to agriculture and rural economy. All which objects, under a properly organized system, might without difficulty be accomplished with perfect accuracy either for legislative or commercial purposes in regulating social economy.

To perfectly accomplish the above-mentioned objects might in the first instance perhaps be a work of considerable labour and time; but when once brought fully into operation, a corrected register for each year, of the alterations that might take place, might be kept without fully employing the time of the surveyors, who might then be enabled to extend the sphere of their labours to secondary, though scarcely less important, objects, such as keeping registers of meteorological, and other observations, calculated to advance knowledge in connection with practical agriculture.

The expense of attaining the object proposed would be amply defrayed by a rate, not exceeding 1½d. per acre per annum, on the superficial extent of the kingdom; but, as it would be equally important to all classes of the community as to the proprietor and occupier of land, the expense would more justly be charged either on the general revenue of the country, or on the county rates, by which the charge would be diffused amongst the rate-payers of the kingdom.

Newcastle-upon-Tyne, Oct. 13, 1849.

At a late meeting of the Tyneside Agricultural Society, a handsome service of plate was presented to Mr. Grey, of Dilston. It consists of a large and elegant candelabrum, with six branches, serving also the purpose of an empergne, together with four double dishes. The candelabrum stands upon a tripod base, on one side of which are engraved the arms of Mr. Grey, and on another side is the following inscription—

"To John Grey, Esq. Presented by the members of the Tyneside Agricultural Society (of which he was the founder), and by his numerous other friends, as an expression of the high estimation they entertain of his character and talents, and of his invaluable services rendered to the interests of agriculture—1849."

The Chairman—after describing the great change which the agriculture of the district had within the last few years undergone, and chiefly through the exertions of Mr. Grey and the Tyneside Agricultural Society, which he founded—asked (and the answer given is worthy of notice), By what magic power has this transformation been produced? He answered simply it was this—that Mr. Grey had combined with long personal and great practical experience in agriculture, great scientific knowledge of his art; that he had superadded to this great readiness of communicating information, and great facility of conveying it, both by speech and writing, by means of which Mr. Grey had earned for himself not only a provincial but a national reputation.

We are informed that Mr. Grey has added another item to the list of claims upon our gratitude by having adopted the principle of tenant-right in the agreements with the tenants upon the estates of which he has the management. His example will, we doubt not, induce others to adopt the same course.

TO THE TENANT FARMERS OF ENGLAND AND WALES.

The loss borne by you in consequence of the change in the Corn and Provision Laws *from Protection to Free Trade*, in my humble opinion, has been fairly estimated at 25 per cent. of the produce of your Farms of the past year (1848); and as your Rents, Tithes, and Taxes are based on *agricultural protection prices*, you may consider your Property sacrificed to that extent; and under ordinary circumstances you will continue to be annually mulct of your Property in about the same proportion; until Rents, Tithes, Taxes, and other outgoings are reduced to the level of Free Trade Prices. Meantime Landlords and Tithe Owners are reaping the benefit of your losses, by being enabled to supply themselves with agricultural produce at the reduced rates; also all persons having fixed incomes—Placemen, Pensioners, Fundowners, &c.

How far the commercial, manufacturing, working, and other classes of the community may be benefited or injured by the change, it is not my intention to offer an opinion: *my object being simply to throw out a few hints for the special consideration of the Tenant-Farmer, unbiassed by political or selfish motives, or pecuniary reward—to assist him in taking a correct view of his present position and future prospects.*

AGRICULTURAL ASSOCIATIONS.

The Tenant-Farmer must not depend upon those PROTECTION SOCIETIES — NATIONAL AGRICULTURAL ASSOCIATIONS, or any other ASSOCIATIONS now in existence, for the protection of his interests, or for any amelioration of his condition: they were established by Landowners, and are supported by them for the protection and promotion of their own interests; the few Tenant-Farmers who have joined them have for the most part a divided interest between Landlord and Tenant, and the former, I apprehend, generally preponderating. In that case, the members of those associations cannot be impartial representatives, or exponents of the interests of Tenant-Farmers. The Landowners suggest improved modes of cultivation, expatiate on their own hardships, and abuse free-trade measures; but not a word about a general reduction of Rents!

COUNTY MEETINGS AND OTHER PUBLIC MEETINGS

Have been held in different parts of the kingdom for the purpose of discussing the subject of agricultural distress, and to petition parliament for relief; but it is my humble opinion that the real interest of the Tenant-Farmers—as an independent class—has never been fairly considered or advocated at any public meeting, at least any that has come under my notice. Those meetings have been got up and attended by Landowners, under whose auspices such Resolutions have been framed and carried as they conceived to be directly, or indirectly, in accordance with their own class interest.

Free-trade corn-laws having been carried by large majorities of both Houses of Parliament (by the Landowners themselves), the consequences ought to have been foreseen, viz.: Deterioration of the value of agricultural produce. What a noble, liberal, high-minded course, and how it would have secured the gratitude of Tenant-Farmers and the admiration of the world, if the large and influential Landowners of the Kingdom had taken the earliest opportunity after Free-trade laws came into operation to assemble their Tenants and to have addressed them to this effect:—

"*The Legislature having abolished protection to agricultural produce, and adopted free trade, which will have the effect of depreciating your produce at least* 25 *per cent.; we shall be benefited to that extent by the diminished cost of provisions, corn, &c., and can, therefore, afford to Lower Your Rents to that extent—and shall do so accordingly.*"

CAUSES FOR THE GREAT COMPETITION AMONGST FARMERS TO TAKE FARMS, EVEN IN TIMES OF UNIVERSAL AGRICULTURAL DEPRESSION.

Although a large quantity of Waste Land during the present century has been brought into cultivation, the number of Farms or Holdings have considerably decreased, in consequence of two or more small farms having been thrown into one! This has occurred to a considerable extent in different parts of the Kingdom.

The number of Farmers, or Persons brought up to farming occupations, has naturally increased in proportion to the general increase of the agricultural population, hence the large numbers of Applicants for "Farms to be Let:" being naturally anxious to carry on that Business to which they have been brought up.

In times of great agricultural depression—as at the present—many farmers who are in the occupation of poor, dear Farms—and even good Farms—which are fast ruining them—when they hear of a Farm to be let in their own neighbourhood, will apply for it, in hopes of bettering their condition; and it is by no means unusual for them to make application to the Stewards of large Landowners for the refusal of any Farm that may happen to become vacant. Whereas, in ordinary times, when they are deriving a fair remuneration from their Farms, they are contented and do not seek a change. The effect of this competition amongst Farmers to take Farms is to keep up rents! When the supply of any commodity does not appear to be sufficient to meet the demand, the natural result is to raise the value of that commodity, and the Rental of Land has been increased upon the same principle.

When Landlords are applied to for a reduction of Rent, they stop the Farmer's mouth by reminding him of the number of Applicants for any Farm in the neighbourhood that has become vacant, although at the present time a good Farmer, with adequate capital, would not probably be induced to take a Farm, except at a reduced rent, corresponding with the times.

Another cause of rent of land being forced beyond its natural value: Landowners have a legal preference over other creditors for Rent, for which they can distrain, even in the event of the insolvency or bankruptcy of the Tenant! which is, in my opinion, not only partial and unjust to other Creditors, but, as it affords a guarantee or security to the Landlord, he is frequently induced to let his Farm to the Highest Bidder, without sufficient reference to character or responsibility: consequently reckless Men of very inadequate capital take Farms at a much higher rent than would be given by the honest, prudent, industrious, responsible Farmer, who possessed sufficient Capital to carry on the business to the best advantage. Whereas, if no such legal preference in favour of the Landlord existed, his Property would find its natural level in the Market, the same as all commodities, and every other description of property. I cannot understand why the Property of Landlords should be held more sacred in the eye of the Law than other property.

IDENTITY OF INTEREST BETWEEN LANDLORD AND TENANT.

A great deal has been said by the landowners about the "identity of Interests" between Landlord and Tenant, and that "*We sail in the same Boat, and must either sink or swim together!*" Taking a broad commercial view of this reciprocity of interest, *I consider it based in fallacy and delusion.* The interest of the owners of property in the market is to dispose of it on the best possible terms for themselves, viz., *the highest price — all circumstances and conditions considered:* whereas it is the interest of the buyers of any property to purchase on the most advantageous terms to themselves, viz.: *at the lowest price — all circumstances and conditions considered.* The same principle applies to Landlord and Tenant as to other parties.

CAPITAL AND LABOUR.

It is the general opinion of those who are considered the most scientific Agriculturists, that what is termed "high farming" requires the greatest amount of labour, and that, if combined with the judicious employment of adequate capital, it is the most profitable: on the merits of which, however, I am not competent to give an opinion. It is generally understood that the Capital employed by a large majority of Tenant-Farmers is quite inadequate to carry on their Business to the best advantage; however, as this is an evil not likely to diminish in the present state of agricultural depression, it behoves those who are so situated to do the best in their power, according to their circumstances: and here I would remark that Farmers are not the only Class that undertake a larger business than they have Capital to carry on to advantage. I have no doubt that the same disadvantage prevails, more or less, with all Classes connected with Trade and Commerce.

In purely Agricultural Districts there appears to be at present a redundancy of Labourers, particularly in the winter season, and it is to be lamented that, in the absence of Capital amongst the Farmers, the evil is likely to continue; there is, however, no reason why a Farmer should employ more Labourers than he—after maturely weighing all circumstances—calculates can be employed with ultimate profit to himself.

The manufacturing and commercial classes do not employ more labourers in their establishments than they consider can be employed with profit and advantage to themselves.

LEASES AND CONTRACTS.

I should not recommend Farmers to take Farms on lease or contract for a term of years, *unless at Free-Trade Rents*, or at such a rental as they calculate will secure them a fair remuneration or profit, for their Industry and Interest of Capital, as will enable them, with average Crops, and under ordinary circumstances, to produce their Corn at the following rates, viz.:—

Wheat	36s. per Qr.
Beans and Peas..	28s. "
Barley	24s. "
Oats	16s. "

Other Grain, Seeds, Cheese, Butter, Beef, Mutton, and all other Agricultural produce in proportion.

Any change that may hereafter arise in the value of the Currency or circulating medium of the Kingdom would affect prices. If the currency (which is not likely at present) should become *ap*preciated the value of corn, as all other commodities, would decline; whereas, if *de*preciated, the contrary effect would be produced in the same proportion.

In all Leases or Contracts for a term of years the Tenant should have a power reserved to grub up hedgerows. Hedges and Trees are a great nuisance in and about corn-fields, and moreover occupy a considerable portion of land: also, bear in mind that a fair consideration is given you in the Rent for the maintenance and preservation of your Landlord's Game.

ENORMOUSLY INCREASED RENTAL OF LAND.

In consequence of the protection afforded by the Legislature to the Landowners by the Corn and Provision Laws and other exclusive privileges, the aggregate rental of Land is enormously increased within the last sixty years, I believe in a greater proportion than other Property, probably even greater than it was in the time of the French war, when Agricultural Produce ranged 50 to 100 per cent. higher than the present value.

As the Tenant-Farmers' property has been sacrificed, in the opinion of the writer, as before stated, 25 per cent. on their last year's produce by the Change in the Laws from Protection to Free Trade, and no prospect whatever (under ordinary circumstances) of an advance in prices commensurate with Protection Rents, a respectful appeal should be made by them to their respective Landlords, without a moment's further delay, to reduce their Rents in that proportion, and avert the ruin of the Farmer. Landowners, however, cannot be compelled to reduce rents! The merchant is not bound to sell his merchandize at any stated price, but is at full liberty to dispose of it on the best terms he can obtain.

IF THE LANDOWNERS REFUSE TO LISTEN TO REASON AND JUSTICE, YOU, THE TENANT-FARMERS OF ENGLAND AND WALES, SHOULD GET UP PETITIONS TO PARLIAMENT

For the Abolition of the existing Law, which gives a preference to Landlords for Rent due from Insolvent Tenants over other Creditors; and to make the property of the tenant liable for the payment of all his just debts *pro rata;* and in every respect to place him on the same equality as the Trader as regards the bankrupt and insolvent laws—thereby affording *equal protection to all property and equal justice to all classes.* The abolition of this law would have the effect of reducing rents.

PETITION PARLIAMENT to grant Lessees of Land the option of cancelling their Leases and Agreements for land for a term of years—*entered into before the abolition of protection laws*—and to be allowed by the Lessors a fair and reasonable compensation for unexhausted improvements during their occupancy under the lease or agreement, or any other compensation they may be fairly entitled to, subject to arbitration if Landlord and Tenant cannot agree.

PETITION PARLIAMENT for a revision of the "Tithe Commutation Laws," and that they may be based on Free-Trade Prices, commencing with the average prices of grain of the present year, 1849.

PETITION PARLIAMENT TO REPEAL THE MALT-TAX.

This Tax presses heavily on the Farmers, and particularly on the Growers of Barley! it cuts them like a two-edged sword. It operates against the sale of their Barley by restricting the consumption of it for Malting purposes, of which there can be no reasonable doubt: the value of the article is prevented from reaching its natural level.

Also, as Farmers brew more Malt for the use of their Labourers than any other private class of the community, they pay a larger proportion of the tax.

Petition Parliament to exempt you from the payment of Income-Tax where it can be proved that no profit was derived from your Business. It is great injustice to charge Income-Tax where no profits are made, and it is a still greater hardship when a loss is actually sustained.

Petition Parliament to remove all burdens from land that can be removed by the legislature with strict justice to all other classes of the community.

ASSOCIATIONS TO PROMOTE THE INTERESTS OF THE "BRITISH TENANT-FARMER."

In all Associations—whether national or local—you may form henceforth for the protection and promotion of your own interests, confine yourselves to Tenant-Farmers, and not admit any Landowner a Member who is not also a Tenant-Farmer, and whose interest as such clearly preponderates. Ascertain as far as you can the Rental of your respective Farms about the year 1792; also the tithes, poor-rates, and other burdens at that period. The increase since that time is enormous, and cannot be made too public, as it will prove the effects of Class Legislation. Corn at that time was fully as dear as at the present period.

The exclusive dealing movement will not, in my opinion, assist you in obtaining redress of your grievances; and, as it interferes with liberty, is unworthy the British farmer.

The humble Writer of the preceding remarks can see no reason why Tenant-Farmers should not be as independent of their Landlords as the Shopkeeper or any retail Trader is of the Merchant or Manufacturer who supplies him with goods, and in his opinion they ought to be as free to enjoy their political rights.

THE TENANT-FARMERS' REAL FRIEND.

July 10th, 1849.

It is announced in the Journals of the day that—

"Lord Portman, J. L. Dampier, Esq., and D. Daly, Esq., have been appointed Commissioners to inquire into and report upon rights or claims over the New Forest and Waltham Forest, and that J. Burnley Hume, Esq., is named Secretary to the Commission."

We could have wished that a commission for a more comprehensive purpose, with the noble lord at its head, had been issued, namely, a commission to inquire by what mode the soil of the Royal Forests, now unremunerative in every sense, might be rendered immediately beneficial and ultimately valuable. We give elsewhere an account of the successful reclamation of a quantity of waste land, by Sir George M'Pherson Grant, and which is called "The New Farm at Ballindalloch." This is one of many other instances in which, by a judicious outlay of capital, land wholly unproductive has been rendered highly productive. We have often thought that those extensive wastes called Royal Forests might be so dealt with as to give a vast amount of employment to labour, and afford a useful example of the mode in which the owners of waste lands generally, provided they are of fair workable quality, might improve their property without any direct expenditure. We would have these forests divided into farms of various sizes, from 100 to 500 acres, and let upon lease at a nominal rent, for such a term as, after due consideration, should be determined upon, the tenant and his representatives undertaking to enclose, drain, cultivate, and erect buildings, according to a specification laid down, and to keep the same in repair to the end of his term. We know that Lord Portman has been an extensive and successful reclaimer of waste land, and hence our conviction that no individual would be so capable of carrying out such an important undertaking as the noble lord. Notwithstanding the present severe depression in the price of agricultural produce, we feel persuaded that persons would be found, were proper encouragement given, to engage in such a speculation, the effect of which would be to afford immediate employment to a vast number of labourers who must otherwise be supported out of the poor-rates, to furnish permanent employment to a great proportion of them, and in a comparatively brief term of years to raise up an extensive and very valuable national property.

LABOUR AND THE POOR.

THE RURAL DISTRICTS.

We have long since expressed our opinion, in the columns of this journal, that the greatest danger which this country had to apprehend internally was from the excessive numbers of the working classes as compared with the means of employment afforded, and hence we have from time to time inculcated as the first duty of the Government the opening up the field of labour, not by special interference in the prosecution of works of any kind, but by affording every facility for enabling and inducing the capitalist to embark in undertakings which will create a demand for labour. The proprietors of the *Morning Chronicle* have engaged some individuals, whose competency to the task is already amply proved by their writings, to prepare for publication a series of letters on the general subject of "Labour and the Poor;" but subdivided into the "Metropolitan," the "Manufacturing," and the "Rural" districts. Some of these have appeared, and open out to public gaze a scene of want and misery amongst thousands who are ever ready literally to fight for permission to earn their daily bread upon the uncertain tenure of a single day's engagement, and to repeat the same fierce and desperate struggle on each succeeding day, which could scarcely be contemplated. The revelation of such an incredible state of wretchedness at once points out the source of Chartism, and accounts for much of the demoralization for which a great portion of the working class is unhappily distinguished.

(From the Special Correspondent of the Morning Chronicle.)

Letter I.

At no previous time, perhaps, has the attention of thinking men been so generally or so anxiously directed to questions of a social character as at present. The events of the last two years have led to this, indicating, as they have done beyond all dispute, that the political systems of Europe were, and still are, tainted with a more deeply-seated malady than that which assumes the type of mere political defects. The extent to which the social systems of the Continent were rotten to the core became evident from the suddenness with which Government after Government crumbled beneath the shock of the French Revolution. Two States alone stood firm amid the storm, and these two (England and Russia) represented respectively the two extremes of political existence in Europe. In the one, order was maintained by the absolute supremacy of force; in the other, it was preserved by the ascendancy of sound opinion.

Proud of it as we may be, and thankful, as we no doubt are, for our escape from the ravages of the revolutionary tempest, we must carefully guard against the error of supposing that the social edifice which gave us shelter is absolutely perfect, because in the day of trial it did not prove itself utterly defective. Strong and compact as it showed itself, as a whole, there were, nevertheless, points at which it gave indications of weakness, which it would be folly to disregard. That which withstands one rude assault is not necessarily proof against a succession of shocks. Whilst to systems which had fewer strong points than weak ones the storm carried destruction and overthrow, it but indicated in ours such as were weak, that we might strengthen them for the future. Shall we profit by the warning? or are we, too, to wait until we see the hand-writing on the wall? There can be no greater enemy to the fortunes of England than the unqualified panegyrist of her institutions. Even had we enjoyed a complete immunity from the dangers of the recent unheavings of the moral elements throughout the world, it would be presumption as well as folly in us to suppose that we had not much to do to render our exemption from such dangers perpetual. But we had no such immunity. If order maintained its ascendancy, it cannot be forgotten that disaffection was in our streets. The revolutionary wave spread to our very doors, and, for the moment, threatened to involve us, too, in the inundation. If the movement here led to discomfiture instead of to a catastrophe, it was simply because the elements of order amongst us were stronger than those of confusion. But the elements of confusion were with us, and are with us still. It is true that they may not be formidable enough to overthrow the Government, or bring down society about our ears; but it is the tendency of weeds, if unplucked, to monopolise the soil, and of cancerous growths, if not carefully removed, speedily to involve the more vital parts of the system. So it is with society. Its weak points, if left to extend, will soon spread to the danger of the strong. What are the weak points of our system? Is it the political machine that is out of gear? The bulk even of its most ardent admirers admit that it has its defects, but these are less organic in their nature than defects of detail. Where, then, is the real difficulty? Is it in our social system? If here, it is all the more serious, for it is, in general, much easier to adjust a political difficulty than to cure a deep-rooted and widespread social derangement.

To some the very suggestion may seem strange, that there may be something radically wrong with the structure of English society. We are so much in the habit of regarding ourselves in the van of civilization, and as taking strides in the direction of improvement which no other people can equal, that we can with difficulty be brought to suspect the existence of serious blemishes in our social system. But it would be well for us to content ourselves less with superficial observation, and betake ourselves more to searching scrutiny. Such a course may possibly reveal to us a state of things which prejudice would at once stamp as unreal, and to which even candour itself would be inclined to turn the ear of disbelief. Is our social fabric that sound, compact, and harmonious whole which it appears to be? or is it, after all, but a deceptive image, with (as was said of the Russian empire) its body of brass and its feet of clay? In times like these, when political fabrics elsewhere are being engulphed in the quicksands at their foundations, this is a question into which it is not only desirable but necessary to inquire. And in pursuing the inquiry, let us not be misled by appearances. Society with us may look not only ornate, but also firm and stable; but is it in reality so from its base upwards? If it has improved, and is still improving, has it done and is it still doing so, as a whole, or only in some of its parts? If the latter, which is the laggard part? It is to be feared that the lower orders have not kept pace in the race of improvement with the upper classes; and the question is, why are they not better off?

Public attention in this country is daily concentrating itself more and more on this important subject. The relation subsisting, and which ought to subsist, between the different classes of society, is fast becoming the question of questions. Are our social duties towards each other adequately performed, or the obligations attaching to our respective positions properly fulfilled? Does wealth properly acquit itself of its obligations to poverty? Does ignorance find as active a foe in intelligence as it should? Is the punishment of crime on its right footing; and are the temptations to crime not unnecessarily multiplied? Are the relations between labour and capital satisfactorily adjusted; and are the physical, moral, and religious wants of the masses sedulously cared for? These, and others like these, are the great practical questions which are now rapidly supplanting in men's minds discussions on mere speculative topics. There are none more interested in their proper solution than the upper classes themselves. The chain of mutual dependence is complete, extending upwards as well as downwards; albeit the extremes of society are so far apart, that they scarcely seem to belong to the same general system. But let circumstances separate them as much as they may, they cannot escape the common tie which binds them together in the chain of mutual dependence. As well might the gilded weathercock, which overlooks half a county from the top of Salisbury Cathedral, fancy itself independent of the foundations of the spire, as the upper classes imagine that their interests are separate from those of the lower orders of the State. Their interests, when properly understood, are found to be common interests; their wrongs common wrongs. But there is this difference between them, that the upper classes have at their disposal means for pushing their interests and redressing their wrongs, which the lower have not at command. The question, therefore, as regards the safety and stability of society, resolves itself into a consideration of the condition of the lower orders. There could be no more fitting time than the present for embarking on such an inquiry. The times are tranquil. But let us not be deceived by the smoothness of the surface. If we have surmounted some dangers, we have others still to meet.

Subsoil ploughing is frequently resorted to as a remedy for exhausted soils. It is useful thus to bring that which is below occasionally to the surface. It is equally beneficial to bring now and then to light the truths which may be extracted from the depths of society. On others has devolved the task of doing this in the metropolis and the manufacturing districts, whilst to me has been assigned that of driving a deep furrow through the moral soil of the counties. In doing so I shall take them in groups, confining my observations in the first place to the counties of Bucks, Berks, Wilts, and Oxford.

To this group there are many features which are common, whilst in other respects they are distinguished from each other by marked peculiarities. They are all inland counties, and all chiefly dependent upon the same species of industry, being mainly, if not wholly, agricultural. They have every variety of soil, from the heavy clay of the Vale of Aylesbury, to the drier and lighter slopes of Salisbury Plain. They are also characterised by considerable diversity of climate, not varying so much as regards heat and cold, as in respect to dryness and humidity. The consequence is, that agriculture in almost every form which it can assume, is extensively prosecuted in the district. The combined area of the four counties is 2,312,300 acres, being about one-eleventh part that of all England. There are few spots throughout the whole of this wide expanse in which agriculture could not be pushed to its highest development. The largest tracts incapable of high cultivation are to be found in the southern division of Wiltshire, the surface of which is broken by the low chalk hills, which, stretching through Hampshire, run through Wilts, to the borders of Dorset and Somerset. But in parts even of this bleak and rugged district, such as Salisbury Plain, corn is produced in abundance. In some tracts, however, the chalk comes so close to the surface as to preclude the possibility of converting them into arable land, and there is no alternative but to leave them as downs for the pasture of sheep. With scarcely any other exception, the whole area of the counties in question is divided between arable and pasture lands; dairy farming, to which the latter are chiefly turned, forming a larger feature in the agriculture of Bucks and Wiltshire than in that of Berks or Oxfordshire, but being more or less common to all. There is a great deal of pasture land in the northern division of Wilts, which is low and flat; and dairy farms are not unfrequent in its central and south-western districts. Throughout the greater portion of the centre of Buckinghamshire, stretching from Thame to near Leighton, particularly from Aylesbury to Leighton, dairy farming is the rule, the raising of crops being the exception. The same may be said of the tract lying between Aylesbury and Bicester. Most of this district is comprised in what is generally known as the Vale of Aylesbury. In the southern portion of the county the plough is very generally used; whilst in the northern, that abutting upon Northamptonshire, the higher style of farming common to that county, comprising green crops, is in vogue. In Berks and Oxfordshire, on the other hand, the dairy farms are more isolated, there being in neither of them such continuous stretches of pasture land as in the other counties of the group. In addition to a fertile soil, thus yielding every variety of production common to this country, they have scattered over them, as stimulants to their agricultural industry, such market towns as Reading, Windsor, Salisbury, Marlborough, Devizes, Warminster, Trowbridge, Westbury, Calne, Chippenham, Oxford, Thame, Aylesbury, Buckingham, Wycombe, &c. They are intersected by numerous and excellent roads, and some of them are well irrigated by canals, whilst they are now all directly connected by railway with the great mart of the nation, and the chief focus of its industrial energies—the metropolis.

Having thus briefly glanced at their great physical features, let us now view them in their moral aspect.

The population of England was, by the last census, about 15,600,000 of souls. This, distributed over the whole area of the country, which is about 32,247,600 acres, would give about one person to every 2 1-7 acres. The population of the four counties under consideration was 737,496, which, distributed over their combined area, already noticed as being 2,812,390 acres, gave one person to about every 3 1-6 acres. The population of Wilts was 258,733 souls, its area 874,880 acres, giving one person to about every 3½ acres. In Bucks, the proportion was one to a little over 3 acres; its population being 155,983 souls, and its area 472,320 acres. In Berks, having 161,447 inhabitants, it was one to scarcely 3 acres, the whole area of the county being 431,280 acres; whilst in Oxford, with an area of 483,819 acres and 161,643 inhabitants, it was about one to every 3 acres. In Wilts the pressure of population upon the soil is the least, in Berks it is the greatest in the group; but even in the latter it is considerably less than the average pressure throughout England. Taking the average of the group, there is in it above an acre more to each individual than there is throughout the whole of England; in other words, the population of these four counties, before it could press in the same degree upon the surface as the whole population of England does upon the whole area of England, would have to increase about 45 per cent.

In 1841 there were;

	Farmers and Graziers.		Agricultural Labourers.
In Wilts	4,456	—	31,099
— Berks	1,876	—	18,649
— Bucks	2,465	—	18,860
And in Oxford	2,365	—	17,909

That is to say, there were in Wiltshire scarcely seven labourers to each farmer, in Berks somewhat more than nine, and in Bucks and Oxfordshire about seven and a half. Of the whole number of agricultural labourers in Wiltshire, there are about 5,700 under 20 years of age, of which number about 700 are females. In Berks the number under 20 years of age is 3,330, of whom only 318 are females; in Bucks 2,838, of whom only 136 are females; and in Oxford 2,937, of whom only 14 were returned as females. In none of them does the number of females of all ages employed come near the number of males employed under 20 years of age. The number of males under 20 years of age returned as employed in agricultural labour in Wilts was less than one-fifth of the whole number of males in the county returned as under 20 and over 10 years of age, including the town as well as the country population. In Oxford the proportion was also less than one-fifth; in Berks it was about a sixth, and in Bucks about one-seventh.

In 1841, there were engaged in trade, commerce, and manufactures in Wilts, 28,027 persons, against 36,390 engaged in agriculture. In Berks the numbers were 16,479 against 21,249; in Bucks, 19,664, against 21,897; and in Oxford, 17,369, against 30,789. It will be seen that it is in Wilts and Bucks that the proportion of those engaged in commerce, trade, and manufactures approaches the nearest to an equality with that of those engaged in agriculture. The extent to which lace-making and straw-plaiting are carried on in in the latter accounts for this. In the former the proportion of the first-mentioned class of persons was at one time much greater than now, the manufacturing industry of Wilts having, in common with that of the whole south-west of England, fallen greatly back of late years, owing to causes which will be explained hereafter. The total number of persons returned as engaged in all occupations in Wilts, was 88,756; in Berks, 55,678; in Bucks, 54,340; and in Oxford, 53,238. In the first three counties more than one-third of the whole population were returned as employed, and in the last somewhat less than one-third. Of the residue of the population of each, the great bulk consists of women and children of tender age, the rest being such as were returned as independent, and those represented as pensioners, paupers, almspeople, and beggars. The number returned as independent in Wilts was 5,996, or about 2.32 per cent. of the whole population. In Berks the number was 4,779, being nearly 3 per cent. of the whole population. In Bucks it was 3,084, or less than 2 per cent.; and in Oxford, 3,857, or 2.38 per cent. of the whole. Taking the four counties together, the average number returned as independent was about 2.40 per cent. of their aggregate population. The numbers returned, at the same time, as paupers, almspeople, and beggars, were — in Wilts, 3,790; in Berks, 2,229; Bucks, 1,695; and in Oxford, 1,622; making in all 9,336 returned as absolutely dependent —being about 1.23 per cent. of their aggregate population. The annual value of real property, as rated to the income tax, is in Wilts, £1,424,545; in Berks, £1,016,474; in Bucks, £832,889; and in Oxford, £1,025,620—making the total aggregate annual value of the property of the four counties, as thus rated, £4,299,528, or about 5.22 per cent. of the whole real property rateable to the income tax in England. The amount expended in each county in 1847 for the relief of the poor, was, in Wilts, £141,133—being an increase of 6 per cent. over the expenditure in 1846; in Berks, £85,252—being an increase of 8 per cent. over that of the previous year; in Bucks, £82,838—showing an increase of 7 per cent. in one year; and in Oxford, £87,033—also showing an increase of 7 per cent. Thus, the aggregate increase of expenditure for the poor in 1847, as compared with that for 1846, was almost 7 per cent. The greatest increase was in Berkshire, but that was far below the increase in some other counties, such as Nottingham, in which, for the year, it was no less than 19 per cent.

Having thus taken a rapid survey of the four counties in question, in their physical and moral aspects, it is now time to proceed to the consideration of what is proposed as the more particular subject of inquiry—the condition of the labouring classes engaged in agriculture. The general summary which has been made of the capabilities, resources, wealth, burdens, and population of the district, will be useful, inasmuch as it will enable the reader, before the real state of the case is laid before him, to form his own estimate of what should be the condition of the different classes of people inhabiting such a district, with which estimate he can afterwards contrast the real circumstances of the peasantry as they will be divulged to him. In laying bare what these circumstances are, it will be my first endeavour to give as accurate a description as possible of the labouring classes in their physical condition, in doing which I shall first deal with them in connection with their dwellings and persons, leaving the subjects of wages and diet for a future communication.

It is a generally received opinion that the condition of the female in a community, indicates the stage attained by it in civilization. This, however, would only appear to be a correct standard of judgment after several steps in advance have already been taken: for it is generally found that society has made considerable progress from its rude starting point, ere the condition of the female undergoes any visible amelioration. The first symptom of man's progress is furnished in the character of his habitation. Whatever progress he may make in other directions, every future step he takes is marked by improvement in this. First the hovel, then the hut, and lastly the house, progressing in perfection until, having become comfortable, it is rendered elegant and ornate. Such is the result when man is left free to develop his condition. Every step he takes in the higher walks of civilization is accompanied, if not preceded, by a superior degree of comfort and refinement in his external life. Hence it is that his physical condition becomes the test of his intellectual and moral development. To judge of the progress of a nation, we must consider its people in their relations to external nature; and in doing so it will not do to confine our observations to any one class of society. To estimate aright the civilization of England, we must not confine ourselves to such tests as Buckingham Palace, Stafford House, or Chatsworth. It frequently happens that the centre can only be raised at the expense of the circumference, and the greatest monuments to the glory of a nation have frequently been the most striking proofs of its wretchedness. There is a high and there is a low grade of civilization in every country, and its average advancement can only be known by considering them along with the grades which intervene. The distance between the two extremes of English civilization is as great as that between St. Paul's and a mud hovel. To keep the fabric together, it is as well that we should keep its extremes constantly in view.

There is nothing attended with unmixed good—not even railways. They have called into existence a larger travelling class than before; and it is the tendency of travelling to bring more or less to light every phase of national life. But although men travel now by hundreds where they formerly travelled by tens, less is known now than formerly of the rural life of England. In the old coaching days a traveller was dragged along the highway of the country, on which its towns and villages were standing—giving him an opportunity of observing every form of English life, from that of the peasant to that of the peer. At the end of his journey some definite impressions remained on his mind of the scenes through which he had passed. He had observed the nature and capabilities of the different rural districts, and the extent to which they were neglected or turned to account. He had seen the dwellings of the labourer clustered in hamlets and villages along the road, and the mansions of the proprietor peering, one after another, through the foliage which embowered them; and as he drove up the main street of each town, he discerned its peculiarities and the direction of its industry. He had thus an opportunity of studying the life of his country in its lowest and its highest stages of development, and in the phase which it assumes when, under the stimulus of numbers and competition, it puts forth its most concentrated energies. But to the great bulk of travellers this opportunity is no longer extended. We have made a small England of it by means of our railways and electric telegraphs. Thoughts now travel with the swiftness of lightning, and men travel almost with the speed of thought. We are wafted from London to Liverpool in one-fifth the time formerly occupied in the journey. But what do we see and learn by the way? The lines of the old highways are forsaken, the least populous parts of the country are traversed, towns are shunned instead of passed through, and the impression left upon the traveller are of the most unsatisfactory and confused description. At his journey's end, he has but a dim recollection of fields, hedges, and trees; tunnels, embankments, and cuttings; towns, now on this hand and now on that: but all flying past him, like the phantasmagoria of a dream—his senses alternately excited by the dread of an accident and the shrieking of the locomotive. He has a less definite impression even of the physical features of the country than he can get of the Mississippi from a visit to the monster picture at the Egyptian Hall. He has little or no chance of learning the different modes of life and the varied circumstances of the people. Men now travel over, where they formerly travelled through, the country. In undertaking a journey they now think only of its extremes—the chief consideration attached to the intermediate space being that it comprises so many miles to be rapidly overcome.

The consequence is, that although the gain to trade and commerce may be incalculable, the stock of general knowledge derived from a varied and extensive personal observation is diminished. It therefore results that the generation of Englishmen now springing up will know less of the rural life of England than their forefathers, unless the information which they cannot now so readily gather for themselves is supplied them from other sources. It is of the last importance to the well-being of society that this information should be constantly and extensively furnished; for it is to be feared that, whilst the material improvements of the day are such as are in their direct benefits confined almost exclusively to the upper and middle classes, their effect is to elevate those classes to a point where they, more or less, lose sight altogether of the lower orders. The danger of this is obvious, especially at a time when material and social considerations are exciting such an influence on political conditions. At this moment, in all quarters of the land, a cry is coming up to us from the lower orders. Is it the plaint of want, or the wail of despair? If either, it is as well that we should both understand and meet it, lest it come upon us with yet more startling echoes. To know the ground on which we stand, we must ascertain what the depths of society can reveal.

Letter II.

Having in a former communication taken a general survey, both in a moral and material point of view, of the district to which my inquiry is for the present confined, I now proceed, according to the arrangement proposed, to furnish as succinct a description as possible of the physical condition of the agricultural labourer in the counties composing it.

The importance of the investigation can only be estimated by considering, not simply the number of agricultural labourers in these counties, but also the number of those who are directly dependent for their subsistence upon agricultural labour. The number of labourers in 1841 was 85,910. Of these there were—

Adult males	66,790
Adult females	4,540
Males and females under twenty years of age	14,580
Total	85,910

But although these were all the labourers employed in the counties in question at the time of the last census, it does not follow that they comprised all dependent upon the labour in which they were engaged. The census, after enumerating those engaged in all occupations, together with those of independent means, and such as were absolutely dependent on charity, sets down the remainder in one gross total as the "residue of the population." This residue comprises two classes of persons —females not engaged in any specific occupation, and children either attending school or too young to work. These are all, or mostly all, dependent upon the two other classes returned as occupied and independent, the great bulk of them being, of course, dependent upon the former class. Of these it is fair to infer that the greatest portion are dependent on those following agricultural occupations, for by far the greatest proportion of those returned as actually occupied in the four counties follow such occupations. An approximation to the gross number dependent for subsistence on agricultural labour, which is all that can be looked for, may be had as follows.

Of the 66,790 adult males employed as labourers, the greater proportion may be taken as married men. The system which obtains in so many parts of the country, of paying married men more for their labour than single men, is one of the many premiums upon marriage held out to the lower orders by our agricultural system. It will certainly not be over the mark to take three-fifths, or about 40,000 of them, as married. This would leave 26,790 as the number of unmarried adult male labourers. To the 40,000 married must be added 40,000 adult females as their wives. The adult females returned as occupied in agricultural labour may be included in the category of married females. The number of children in each family will, on a low average, be three, exclusive of the unmarried male adults and of the number of males and females returned as occupied under twenty years of age. The whole number, therefore, dependent in the four counties on agricultural labour may be taken to be—

Unmarried males	26,790
Married ditto	40,000
Married women, including 4,540 adult females returned as occupied in agricultural labour	40,000
Children, three to a family	120,000
Males and females under twenty years of age returned as occupied	14,580
Total	241,370

It thus appears that one-third of the aggregate population of the four counties, which is 737,496 souls, are directly dependent for their subsistence upon agricultural labour. The inquiry, therefore, into their physical condition is an inquiry into that of one-third of the entire population of the district.

Amongst those not practically conversant with rural affairs, the impression prevails that the bulk of the labourers live in detached residences on the different farms, with a certain tie existing between them and the soil, and, by consequence, between them and its occupiers. In Scotland, and in some portions of the north of England, this is the case to a great extent, although not now to the same extent in Scotland as formerly. The times are past when, in the Lowlands, the farmer and his workmen were mutually on such a footing that, after toiling together in the same fields, they sat down together at the same table, and in many cases slept under the same roof. But still the bulk of the labourers there live yet upon the farms, accommodation being generally, in such cases, afforded them in the "square," the term frequently applied to the farm buildings. The consequence is, that farm labourers are in Scotland a less distinct and detached class than they are in England, and they are far less frequently to be found, bearing in mind the relative proportions of the two countries as to numbers, clustered together in towns and villages, of which they chiefly constitute the population. In England the case is different. Many labourers are hired, with their board included, when accommodation is of course provided them on the farm. But the great bulk of them form a distinct class of society, inhabiting the outskirts of the rural towns and the villages, which they monopolise to themselves, having no capital or resource but their labour, no certainty that they will be called into exercise, and no guarantee for its employment, even when it is called into use, beyond a week at a time. It were better for them, as a class, to be kept more apart from each other than they are—for it is not under all circumstances that men improve from the constant intercourse which is the result of their congregating in masses together. In some cases, the sites of their villages belong to one proprietor—in others, to several: but it by no means follows that they are employed either on the farm of which a village site may form a part, or even on the property of which the farm may be but a portion. Indeed, it frequently happens that the only connection between them and the proprietor or occupier of the soil on which their habitations are erected, is that of landlord and tenant. Their labour is at the command of any one who bids for it; and as their employment is precarious, and their wages fluctuating, their lives are spent, in the majority of cases, in constant oscillation between their homes and the workhouse, with no alternative beyond but starvation or the gaol.

Much has, of late years, been said in this country in reference to the dwellings of the poor, and public sympathy has been largely excited on the subject. Both in the towns and in the country districts the matter has been widely investigated, and facts brought to light which were a disgrace to the nation, because revolting to humanity. The consequence has been that much has been done for the amelioration of the domiciliary condition of the lower orders, but, though much, it has fallen far short of what is required. The very fact that, notwithstanding the extent to which the subject has been agitated, such frightful revelations in reference to the dwellings of the poor have lately been made in the metropolis, where one would have supposed their horrible condition was least likely to have escaped observation, will of itself suffice to indicate the trifling extent to which improvement in this respect has been pushed in the country districts, where its absence is less likely to obtrude itself upon the public attention. What has been done has not been effected on any large preconcerted plan, calculated to embrace the whole of a neglected class in the benefits of its operation. The effect has been local and partial, not national. Here and there a proprietor, from motives either of shame, benevolence, or interest, has, by improving their dwellings, enhanced the comforts of some of, or perhaps of all, the peasantry on his estates. But there has been no general action in this direction, and ordinary comfort is a thing yet estranged from the great bulk of the habitations of the poor. For one good cottage, with adequate accommodation for a family, numbers are still met with utterly unfit for human occupancy. There is no large district in the group of counties now under consideration in which the improvements have been universal, and there are few estates on which the bad are not yet largely intermingled with the cottages of a better description.

What is wanted for a poor man and his family is a cottage with sufficient room, in a healthy situation, and with adequate provision made for light, drainage, and ventilation. There is nothing extravagant in this demand, for it comprises nothing but what is absolutely required for health, comfort, and decency. To these the poorest, when industrious, as well as the richest, are entitled, as far as the resources of the nation can supply them; whilst every class is interested in their possession of them. In selecting the situation, the nature of the soil, as affecting the climate, should be one of the circumstances attended to, for on this greatly depends the extent to which provision should be made for the purposes of drainage and ventilation. The cottage should be constructed of stone or bricks, and covered with tiles or slate. It should contain at least five rooms—two below, viz., one for a kitchen and general purposes, and another for a pantry and washing room; and three bedrooms above, one for the parents, and the other two for the children, the boys and girls occupying separate rooms. It should not be built back to back with another cottage, which would prevent its having those openings in front and behind so necessary to proper ventilation. The flooring of the lower rooms should be of wood, bricks, or flags—never of mud. It should have a moderately-sized garden attached to it, and should be provided, at a convenient distance, with a necessary; care being taken, by drainage and otherwise, to prevent the *excreta* from exercising a pestiferous influence upon the health of the family. This is not asking too much for a class who by their industry and energies add so much to the general stock of comfort and wealth. There is nothing in it beyond what is necessary for their physical health and moral purity; nothing, be it remembered, beyond what is sedulously provided for the pauper and the culprit.

But where are such domiciles to be found in the possession of the agricultural labourer? In few places, indeed, and these situated at great distances from each other. Here and there a benevolent landlord has built them, and let them at moderate rents to the labourers on his estate. Nor does it occur to any one, on seeing them, that their occupiers are too comfortably housed. To a large family, accommodation short of this is privation, which is more or less the lot of nine-tenths of the labouring class. But it would be unfair to lead the reader to suppose that the few cottages which have thus been built on an adequate scale comprise all that has been done in the shape of improvement in this direction. Between the home thus depicted as his right, and the wretched hovel which he frequently inhabits, there is vast room for improvement and the amelioration of his condition. Much has been done within the intermediate space, small as may have been the amount of improvement which has been pushed to the desirable point. In many cases cottages have been built coming more or less short of the standard referred to, but still being, as regards both position, accommodation, and other circumstances, a very great advance indeed upon the miserable tenements which they have superseded. In some instances these comprise three rooms—one below, and two (sleeping apartments) above; in others, four rooms, two below and two above. Although, when a family is large, and some of the children are approaching maturity, a cottage with even four rooms, unless one of the lower rooms be converted into a bed-room, is wanting in the accommodation necessary to decency and moral purity: such a tenement, or even one with three apartments, is a vast improvement upon such as had but one or two rooms at the most. This intermediate class of cottages I found existing in many sections of the four counties, having in some instances entirely superseded the tenements of the worst description, but in others only partly so. On Lord Pembroke's estates, in the neighbourhood of Wilton, an example has thus been set which it were prudent as well as just in other proprietors more extensively to imitate. Neat brick cottages have been erected of different sizes, enabling the tenants, when leasing them, to consult their family necessities—the rent of the cottages, with some ground attached to each of them, being of the most moderate amount. Even admitting that in this his lordship submits to a slight pecuniary loss, he is more than compensated by the gratitude, respect, and attachment entertained towards him by the humble occupants. In addition to this, his tenantry are greatly benefited, for as every improvement in their condition begets improved habits in the labourers, labour is cheapened to the farmers, inasmuch as they get more work for their money, whilst they are saved from those systematic depredations too often practised in many parts of the country to make up for deficiencies of food and fuel. At Amesbury, too, about eight miles north of Salisbury, I found many cottages of a comfortable description. New cottages have not been erected here to any great extent, but much has been done by Sir E. Antrobus, one of the proprietors in the neighbourhood, to improve the general character of those already existing. The rents are not, on the whole, so moderate here as on Lord Pembroke's property; but I heard none of the cottagers speak in any but the most favourable terms of their landlord. Several of the cottages in this neighbourhood are owned by a Mr. Camm, who would do well both in extending the accommodation which they afford and in lowering the rents paid for them. In some parts of the neighbourhood of Westbury, Warminster, Devizes, and Calne, the labourers are also comparatively well housed; but, taking Wilts as a whole, their condition, as regards their domiciles, is anything but favourable. Of Berks and Bucks the same may be said, with the exception of a few districts in each; whilst in Oxford Mr. Henley, M.P., is one of the very few who has taken an active interest in the physical well-being of the poorer classes. "They know that they have a landlord," was the expression made use of to indicate to me the position assumed by Mr. Henley towards the labourer on his property. The expression is certainly capable of a double interpretation; but it was understood as it was meant, for Mr. Henley deals kindly, justly, and firmly by his people.

As with those of the better order, so there are different grades of cottages amongst those of the inferior description. Some of them, by undergoing considerable alteration, might be rendered habitable with some degree of comfort to the inmates, provided their number was not great; whilst others are in such plight, that no alteration of which they are capable would suffice to make them fitting receptacles for human beings. If the reader will accompany me, I shall lead him into a cabin constituting the abode of some of his cotemporaries and fellow-subjects.

The approach to it is by a narrow road flanked on either side by mouldering banks, crowned with decaying hedge-rows. The road leads down into a vale of rather limited surface, along the bottom of which, having cut a serpentine channel for itself through the deep alluvial deposit, extends a small and sluggish stream—so sluggish, indeed, that it seems at a loss to know which way to direct its course. It glides, though almost imperceptibly, through rich and well-wooded meadows, with clumps of willows here and there trailing in its muddy waters. At the foot of the descent you have a high stone wall on your left, the bank and hedge-row continuing on the right. It has rained hard for a day or two previously, and the lower part of the wall is immersed in water, which lies, to the depth of several inches, and of varying width, along the side of the road flanked by the wall. Having no visible outlet, it has now been exposed for many hours to the bright sun; and the scum with which it is already, in parts, covered, gleams in the sunshine like so much mother-o'-pearl. The air is close and stifling, the spot seeming to have been designed for engendering malaria of the most pestilential description. At the end of the short vista formed by the wall and the bank, stands the hovel to which we are directing our steps. It is one of a cluster, two or three being attached to it—the others standing at a little distance apart. They are overhung with foliage, which, in a healthier and more exposed position, would be their ornament and their shelter, but which here has the effect, by keeping them constantly in the shade, of rendering them cold, comfortless, and damp.

The cabin is so rude and uncouth that it has less the appearance of having been built than of having been suddenly thrown up out of the ground. The length is not above 15 feet, its width between 10 and 12. The wall, which has sunk at different points, and seems bedewed with a cold sweat, is composed of a species of imperfect sandstone, which is fast crumbling to decay. It is so low that your very face is almost on a level with the heavy thatched roof which covers it, and which seems to be pressing it into the earth. The thatch is thickly encrusted with a bright-green vegetation, which, together with the appearance of the trees and the mason-work around, well attests the prevailing humidity of the atmosphere. In front it presents to the eye a door with one window below, and another window—a smaller one—in the thatch above. The door is awry from the sinking of the wall;

the glass in the window above is unbroken; but the lower one is here and there stuffed with rags, which keep out both the air and the sunshine. As you look at the crazy fabric, you marvel how it stands. It is so twisted and distorted, that it seems as if it never had been strong and compact, and as if, from the very first, it had been erected, not as a human abode, but as an humble monument to dilapidation. But let us enter.

You approach the door-way through the mud, over some loose stones, which rock under your feet in using them. You have to stoop for admission, and cautiously look around ere you fairly trust yourself within. There are but two rooms in the house—one below, and the other above. On leaving the bright light without, the room which you enter is so dark that for a time you can with difficulty discern the objects which it contains. Before you is a large but cheerless fireplace—it is not every poor man that may be said to have a hearth—with a few smouldering embers of a small wood fire, over which still hangs a pot, recenty used for some culinary purpose. At one corner stands a small rickety table, whilst scattered about are three old chairs—one without a back—and a stool or two, which, with a very limited and imperfect washing apparatus, and a shelf or two for plates, tea-cups, &c., constitute the whole furnitnre of the apartment. What could be more cheerless or comfortless? and yet you fancy you could put up with everything but the close earthy smell, which you endeavour in vain to escape by breathing short and quickly.

As you enter, a woman rises and salutes you timidly. She is not so old as she looks, for she is careworn and sickly. She has an infant in her arms; and three other children, two girls and a boy, are rolling along the damp uneven brick floor at her feet. They have nothing on their feet, being clad only down to the knees in similar garments of rag and patchwork. They are filthy; and on remarking it, we are told whiningly by their mother that she cannot keep them clean. By-and-by another child enters—a girl, with a few pieces of dry wood, which she has picked up in the neighbourhood for fuel. Nor is this the whole family yet. There are two boys, who are out with their father at work; the three being expected in, every moment, to dinner. They enter shortly afterwards. The father is surprised, and, for a little, evidently somewhat disconcerted at the intrusion, doubtful as to whether it may bode him good or evil. We soon put him at his ease, and the family proceed to dine. The eldest girl holds the child, whilst the mother takes the pot from the fire, and pours out of it into a large dish a quantity of potatoes. This, together with a little bread and some salt butter for the father and the two eldest boys, forms the entire repast. There is neither beef, bacon, nor beer. Bread, potatoes, and water form the dinner as well of the growing child as of the working man. They had a little bacon on Sunday last—it is now Thursday; and they will not taste bacon 'till Sunday again, and perhaps not even then. But whilst they are over their scanty repast, let us take a glance at their sleeping accommodation.

These are above, and are gained by means of a few greasy and rickety steps, which lead through a species of hatchway in the ceiling. Yes, there is but one room, and yet we counted nine in the family! And such a room! The small window in the roof admits just light enough to enable you to discern its character and dimensions. The rafters, which are all exposed, spring from the very floor, so that it is only in the very centre of the apartment that you have any chance of standing erect. The thatch oozes through the wood work which supports it, the whole being begrimed with smoke and dust, and replete with vermin. There are no cobwebs, for the spider only spreads his net where flies are likely to be caught. You look in vain for a bedstead; there is none in the room. But there are their beds, lying side by side on the floor, almost in contact with each other, and occupying nearly the whole length of the apartment. The beds are large sacks, filled with the chaff of oats, which the labourer sometimes gets and at others purchases from his employer. The chaff of wheat and barley is used on the farm for other purposes. The bed next the hatchway is that of the father and mother, with whom sleeps the infant, born but a few months ago in this very room. In the other beds sleep the children, the boys and girls together. The eldest girl is in her twelfth year, the eldest boy having nearly completed his eleventh; and they are likely to remain for years yet in the circumstances in which we now find them. With the exception of the youngest children, the family retire to rest about the same hour, generally undressing below, and then ascending and crawling over each other to their respective resting-places for the night. There are two blankets on the bed occupied by the parents, the others being covered with a very heterogeneous assemblage of materials. It not unfrequently happens that the clothes worn by the parents in the day time form the chief part of the covering of the children by night. Such is the dormitory in which, lying side by side, the nine whom we have just left below at their wretched meal will pass the night. The sole ventilation is through the small aperture occupied by what is termed, by courtesy, a window. In other words there is scarcely any ventilation at all. What a den in the hour of sickness or death! What a den, indeed, at any time! And yet when the sable goddess stretches forth her leaden sceptre over the soft downy couch in Mayfair, such are the circumstances in which, in our rural parishes, she leaves a portion of her slumbering domain.

Let it not be said that this picture is overdrawn, or that it is a concentration for effect into one point of defects, spread in reality over a large surface. As a type of the extreme of domiciliary wretchedness in the rural districts, it is underdrawn. The cottage in question has two rooms. Some have only one, with as great a number of inmates to occupy it. Some of them, again, have three or four rooms, with a family occupying each room; the families so circumstanced amounting each, in some cases, to nine or ten individuals. In some cottages, too, a lodger is accommodated, who occupies the same apartment as the family. Such, fortunately, is not the condition of all the labourers in the agricultural districts; but it is the condition of a very great number of Englishmen—not in the back woods of a remote settlement, but n the heart of Anglo-Saxon civilization, in the year of grace 1849. It behoves the

"——— gentlemen of England,
Who live at home at ease,"

to ponder seriously upon the condition of such of their fellow-subjects as are so wretchedly circumstanced. Such anomalies but ill accord with the civilization to which we lay claim. In its main outline our national fabric may be brilliant and imposing; but is it sound in all its component parts? Whilst improvement has brushed over the prominent points, burnishing them brightly, it has passed over many of the deep crevices which intervene, and in which the gangrene is being engendered which is silently eating into the very vitals of society.

Illustrations are both by way of resemblance and of contrast. It is by contrast that the condition even of a backwoodsman illustrates that of many an English peasant. The first rude hut which the settler builds for himself in the woods is, in every way, more comfortable than the home of many an agricultural labourer. Even the wigwam of the Indian far surpasses it in this respect. I have seen one pitched in the forest in the course of a night, when the snow lay four feet deep around, which was dry, light, warm, and commodious, as compared with the hut which has just been described. The inmates, too, were well clad in their warm mocassins, dressed skins, and ample blankets, profusely decorated with beads, the stained porcupine quill, and the hair of the moose deer. Yet these are they whom we term savages. The difference between a savage and a civilized man is a mere difference of condition. So far as his physical condition is concerned, the American Indian is in advance of a large proportion of the English peasants. He has better shelter, better clothing, and more substantial food. If the Indian's mind is untutored, the intellectual training of the peasant is unfortunately not such as to make the contrast, on this side, very favourable to him. Yet the one is, in our estimate, a civilized and Christian man—the other a savage who paints himself. But a dash of paint is better any day than dirt.

But we are told that society is necessarily and immutably a system of inequalities. Granted; but it may remain so without its extremes being so far apart. It is not differences of condition, but the greatness of the contrasts—the brilliancy of some points, and the depths of shadow in which others are plunged—that is to be reprehended and dreaded. How great, how dangerous the distance between the palace and the hovel! It is not with the palace that we have to find fault, but with the hovel. If there is no reason why some Englishmen should not enjoy their palaces, neither is there any why comfort, self-respect, and decency should not be the concomitants of the lot of all. Let society have its inequalities, but let its foundations at least be high and dry.

But it may be urged that the misery here depicted is exceptional, and that it cannot be accepted as the type of the condition of any numerous body of the peasantry. I speak now of only four of the forty counties of England, and assert that it is the type of the condition of the great bulk of the peasantry in these counties. They may not be all equally wretched as regards some of the comforts of life, because they are not all equally burdened with large families. But the house accommodation of the great majority of them is of the lowest and most miserable description. The universal testimony, indeed, of those in better circumstances on the spot is, that the accommodation of the peasantry in this respect is far from what it should be. There is ground for this opinion in the condition of the labourer on the great bulk of what was once the Duke of Buckingham's property, as also in that of some of the peasantry on the Marlborough estates. The state of their domiciles in the vicinity of Aylesbury, Wycombe, and Crendon, will also attest its truth. Leaving Bucks and passing into Oxfordshire, we have not to go far for evidences of its soundness. Taking the town of Thame as a centre, and describing around it a circle with a radius of about seven miles, we have abundant proof in the portions of the circle which fall within that county—again excepting the property of Mr. Henley—that the house accommodation afforded to the labourer is not what it should be. Close to the town of Thame is the hamlet of Moreton, where any change made must almost necessarily be one in the direction of improvement. The same may be said of the village of Tetsworth, about three miles from Thame, and of Lord Churchill's property in the vicinity of Crendon. But, perhaps, the climax of misery in this respect, in the district, is to be found in the village of Towersey, about a mile distant from Thame. One house was pointed out to me there with four rooms, each room occupied by a separate family, some of the families being very numerous. It was a two-story house, covered with tiles. There was no communication between the upper and lower stories, the former being approached from the outside by a flight of stone steps, which rose over the door leading into the latter. One of the families counted eight or ten, of both sexes, some of whom had attained maturity. The immorality to which their domestic condition gives rise I shall have occasion hereafter to refer to. There was a common necessary for all, situated at a little distance from the house. It had no door, and its occupant, of either sex, was exposed to the gaze of the passer-by. This relation may shock delicate nerves, but it is as well that the truth should be told without mincing it. All around was filthy in the extreme. As the soil about was heavy and wet, the drainage was most imperfect. Something has recently been done in the way of improvement under the Sanitary Act, but the state of the village is still such that the work seems yet to be begun. Such is a specimen of the condition of British subjects within twelve miles of the greatest seat of learning in the world, and one of the *foci* of British Christianity.

Passing into Berkshire, we find insufficiency and even wretchedness of accommodation to be the rule in almost every direction. In the neighbourhood of Lambourn and Hungerford, not far from Reading, and almost under the shadows of old Windsor itself, this is found to be the case. In Wiltshire, it is notoriously and extensively so. Not far from Calne are cottages of a very inferior description. Near Chippenham, in excellent situations, like that of Colerne, not far from Bowood, in the vicinity of Marlborough, in the north-east, and of Mere in the south-west of the county; in the Winterbourns, and along the whole line leading from Salisbury towards Hungerford, they are, in the majority of cases, worse than bad. Almost midway between Old and New Sarum, too, specimens of a very questionable description may be seen. The Old and the New are here brought within the compass of a single vision, showing the advance which society has made in the lapse of centuries. But the peasantry seem not to have participated in that advance. The old seems to have gradually merged into the new without including them in the change. How far they have been left behind is well illustrated by their condition, in the near neighbourhood of these two monuments to time past and time present. Commencing our study of English society at its foundation, and confining for the time being our attention to that, we could scarcely escape the inference, judging from the physical condition of the people, that our whole system had been stationary for the last three centuries. I shall hereafter consider how far the extension of the inquiry into the intellectual state of the people would tend to dispel the illusion.

A considerable proportion of the agricultural labourers live in the outskirts of the larger rural towns. Here, as in the villages more exclusively appropriated to themselves, their domiciles are of the most wretched kind. Salisbury, Aylesbury, and Windsor are pre-eminent in this respect. Salisbury lies low, the Cathedral itself being sometimes inundated after long-continued and heavy rains. Nevertheless, it is most imperfectly drained, although a stream of water runs in an open channel through almost every street. During the prevalence of the cholera here, many of the inhabitants were encamped in tents in the fields, whilst their filthy habitations were being cleansed and ventilated. Salisbury, notwithstanding, lost about one out of every forty of its population. The "Duck-end" part of Aylesbury almost baffles description, whilst Windsor remains as it was when reported upon in 1842, as being about the filthiest and worst drained town in the kingdom. It would almost seem as if, in these and other places which might be named, filth was regarded as a distinct department of industry, in which men were emulous to excel.

Even were the diet of the peasantry good and ample, personal and domestic cleanliness would be indispensable to their health. But, existing as they do on insufficient food, to which they are condemned by the scantiness of their wages, their only chance of preserving health is by keeping clean their persons and dwellings. Soap and soda, the chief ingredients in the process of washing, are now cheap, and many keep their cottages, persons, and wearing apparel as clean as possible under the circumstances. But whilst their miserable condition gives many an excuse for the filthiness to which they are prone, it drives others, originally better disposed, into careless and untidy habits. There is a point at which man ceases to struggle with his fate, and resigns himself to the seeming necessities of his condition. Many an English peasant is, in his circumstances, sunk so far below the line of comfort, decency. and self-respect, that the effort to reach it seems beyond his power. He convinces himself that he cannot better himself, and ceases the endeavour. At length he does not even cherish the wish, and becomes indifferent. "How can we be clean with eight in a room?" replied one of them, on my alluding to the state of his lodging. Hence the complicated forms of disease with which the small communities in the rural districts are so often afflicted. Diseases of a catarrhal character, dysentery, and fevers, particularly of the typhoid type, are constantly lurking about their wretched habitations. Hence, too, the vice which so alarmingly prevails, for impurity of mind becomes the invariable concomitant of habitual impurity of body.

Soil has, in respect of health, a great influence on a peasant's dwelling. The cottage which might be healthy in one locality might be the very reverse in another. A hut which would not harbour disease on Salisbury Plain or amongst the Chilterns, might not be a safe dwelling-place if erected on the heavy clay soils of Bucks, Berks, or Oxford. Proper drainage should always be had; but in some localities where it is not had, it is absolutely indispensable.

It is not always easy to discern the laws by which epidemic diseases are directed in their course. The pestilence which is now disappearing, whilst it has spared some, has made terrible havoc amongst others of the rural communities. Hearing at Aylesbury of a village, named Gibraltar, about five miles distant, on which it fell with terrible severity, I proceeded to the spot to ascertain, if possible, the cause of a visitation so peculiar in its malignity. The situation of the village is suggestive of health, being about half way between Aylesbury and Thame, on an elevated ridge, looking upon the Chilterns to the south-east. The first thing I inquired into was the state of the drainage, but was told by one of the villagers that there was but little water to draw off. "There is not a pond in the neighbourhood," said he, "and sometimes for weeks we are very ill off for water." The village consists of a very few houses of an inferior description, and its whole population did not exceed fifty-six previous to the visitation of the cholera. "How many died here?" I inquired. "Nineteen," replied an old woman, to whom the question was put. "Twenty," said a man in a smock frock, standing by. "Well, to be sure," said the crone; "one of the women that died was near her confinement, and that makes twenty, if you like." Nineteen deaths out of a population of fifty-six! Dumfries has been held up as a model of affliction, because its deaths by cholera ascended to one in thirty-seven. But here was one out of every three carried off! "I helped to lay out five in one day," said a woman about thirty, who herself lost her husband by the scourge. The population was thus decimated in a day. Sixteen died the first week, and three the second. It then disappeared. One family, consisting of a man and his wife and six children, entirely disappeared, with the exception of one child. The worst feature in the case is, that the mortality was chiefly amongst the heads of families. Thirty-seven of the population have been spared, but eleven of them are orphan children. They were almost all sent to the union, but "after having been there a week, and being well cleaned," they were taken out again by their relatives, who are now eking out their subsistence by the proceeds of the children's labour in the fields. During the height of the disease the surviving children were kept in a tent some distance from the village. "All that we can say is that it was the work of Providence," said a woman to me, who had been a resident on the spot for forty-seven years; "but they were a wicked set," she added, "and perhaps deserved it." "But were they not an underfed, and, from the want of water, a filthy set?" I asked. "Well," said she, "perhaps they were; but they were not that way much worse off than their neighbours." Since the plague has left, the huts have been whitewashed, and additional holes have been made in the walls to serve as windows for the admission of more light, and the promotion of a better ventilation.

For the accommodation which they possess, insufficient and scanty as it is, the cottagers almost invariably pay rent, and in some cases a high rent. The rent varies from 6d. to 2s. per week, the amount of rent not being so much determined by the character of the house as by that of the landlord. Mr. Camm's tenants pay much higher rents than Lord Pembroke's, for which they are in general far less comfortably lodged. In most cases a small piece of ground is attached to the cottage by way of a garden. In Bucks, Oxford, and part of Berks, this, which seldom exceeds the eighth of an acre, is included in the rent; but in other parts of Berks, and throughout Wilts, generally, it is not. Here again the Pembroke estates are an exception. When extra rent is charged, the lowest is three-halfpence a pole. In some cases it is threepence, and in others as high as a shilling. Now the average rental of land in Wilts is about £1 per acre, or about three-halfpence a pole. The poor wretch, therefore, who rents, say twenty poles, and pays 2s. 6d. a year for it, pays the farmer's rent *pro tanto*. In cases in which he pays beyond that, the farmer makes a profit out of him. In addition to this, allotments are sometimes made to them in the fields. This is particularly the case in Bucks and Oxford, where they take each, on the average, from a quarter to half an acre, for which they pay at the rate of about 30s. per acre. On the estate of Dodershall, the property of Mr. Pigott, I witnessed a large field thus appropriated. In general, the little plots of ground seemed well and carefully cultivated, and the poor creatures seemed happy to be in possession of them. Their homes are in the adjacent village of Quainton, where they were made as happy as possible by the constant and benevolent attentions of the worthy rector of the parish and his lady. There are many cottages without any ground attached to them at all; but these are oftentimes such as have been built as investments. The demolition of cottages, particularly in close parishes, has been one of the results of the Law of Settlement. This has, in some places, led parties with money to buy small lots of land, and build houses upon them for the poor, where cottages were scanty. For these houses the highest rents are generally charged, it being seldom, as already stated, that they have any garden annexed to them.

If this paper has swelled to a great length, it must be borne in mind that it was no easy matter to generalize the varied results of one's observations over a surface embracing so many diversities of circumstance, and extending to nearly three millions of acres.

Considering the extent to which, in all ranks of life, their domestic circumstances influence the views and conduct of families, the condition, in this respect, of the great mass of the peasantry affords matter for serious reflection. If the description here given be applicable—and I challenge an assertion to the contrary—to the domiciliary condition of a great proportion, if not the great majority of them, it is evident that our social system is based upon a quicksand; for where privation is left to usurp so largely the place of comfort, men's notions of right and wrong are apt to become confused, modesty will succumb to impurity, recklessness supersede self-respect, and vice of every kind gain the mastery over religion and morality.

LETTER III.

BUCKS, BERKS, WILTS, AND OXFORD.

WAGES AND DIET OF THE AGRICULTURAL LABOURER.

In each of the counties forming the group now under consideration, I found two distinct sets of opinions current respecting the condition of the labourer, traceable to the different points of view from which the parties entertaining them made their observations. In one respect there was a concurrence of opinion amongst all parties, every one admitting, that not only was the condition of the lower order considerably below the standard of ordinary comfort, but that it was also such as was calculated, by its continuance, to give rise to the most serious apprehensions. But, in making this admission, those in better circumstances almost invariably couple it with an assertion to the effect that, bad as their state was, the labourers were better off in that particular county than in the surrounding districts. The opinion prevalent amongst the labourers themselves was quite the reverse of this, their notion being that they could not be worse off anywhere than where they were. This betrays everywhere a conviction on their minds, that their circumstances are so low and abject, that it would be impossible to push them further in the descending scale.

I was told, for instance, that in Bucks, Oxford, and part of Berks, I would find the wages of the labourer intermediate in amount between the higher rate paid in the neighbourhood of the metropolis and the lower scale prevalent in the west and south-west. In this I was not deceived, so far as Bucks, the greater part of Oxford, and a small portion of Berks are concerned. But when I was also told that the same might be said of the other elements which enter into the sum total of the labourer's condition, I was prepared to find his circumstances, with regard to his household accommodation, his food, clothing, education, and moral culture in these counties far in advance of what, in the main, I actually found them. As compared with his class in other parts of the country, there is little in the circumstances of his physical condition to indicate the superiority of his wages. More, in proportion to their whole number, may be better housed, clothed, and fed than in the west; but in all these respects the great bulk of them in the counties named are about as low in their circumstances as it is possible for them to be, compatible with mere existence. But when I was informed that in Wilts, proverbial for the low scale of its wages, the labourers were better off as a class than some of their neighbours, I could not avoid ejaculating—God help them elsewhere!

These statements, on either side, do not, so far as they were not borne out by the fact, originate in all cases in any wilful perversion of the truth. They are the result more of ignorance than of design. Not only are the circumstances of one county little known or inquired into in another, but ignorance of their respective conditions pervades the different districts of one and the same county to a degree which must be witnessed to be fully comprehended. The higher orders, who are more in the habit than others of holding intercourse and interchanging opinions with each other, may be well acquainted with the circumstances of their county; but the middle classes, the traders, merchants, and artizans, know little of what is transpiring beyond the bonnds of their own districts. Ask any of them what are the circumstances of the labourer in the parish adjoining their own, and separated from it, not by a barrier of impassable hills, but by a low fertile ridge, well intersected by good roads, and in nine cases out of ten the answer will be—"Well, sir, I have lived here these twenty years, but never thought of askin' particularly." It is seldom that from these persons you can get any definite information as to the ownership of the soil in their own localities—their ignorance in this respect being partly to be attributed to the non-residence of many of the proprietors. Buckingham, for instance, is notorious for absenteeism. Of course the labourers themselves are profoundly ignorant of what is happening around them. The consequence is, that to obtain an adequate knowledge of the state of a county, one is compelled to make a personal inspection of almost every district within it.

In inquiring into the condition of the agricultural labourer there is nothing more important to be considered than his wages, as upon them mainly hinge his physical circumstances. They are characterized by great variety, not only as regards amount, but also in respect of their kind and the time of their payment. The wages in one county do not differ more from those in another than do the wages in one district from those in another district of the same county. To some extent they depend, as to amount, upon the quality and the quantity of the work in return for which they are given; but, generally speaking, their amount is determined without any direct relation to the nature of the labour to be performed. There are higher grades of work connected with farming for which superior wages are paid, such as carters' work—that is to say, the work of those who are entrusted with horses in the fields, and the work to be performed by shepherds, who are generally as well paid, because it is indispensable that they should be a trustworthy class. There are also species of work which do not necessarily involve the consideration of trustworthiness; but which, from their acknowledged severity, secure the higher scale of wages to those employed in them. Of this class "breast-ploughing" is an instance; the first, as well as the most laborious, process in the cleaning of foul land. It need surprise no one to find a distinction drawn as regards wages between these occupations and the inferior kinds of work connected with tillage. But that which does very naturally excite surprise is the different rates paid, not only in different counties, but even in different parishes, for the same species of work. The ploughman who gets £12 a-year, with his board, in one parish, might not be able to procure more than £10 in that adjoining it; whilst the ordinary farm-labourer may have 10s. a week for doing in one county that which would only bring him 8s. in the county adjacent to it. It is this discrepancy that strikes one as singular, especially when the circumstances of adjoining districts, between which it may exist, are similar as to the soil to be operated upon, and the skill required, or the labour to be undergone in working it. The existence of such a discrepancy at once suggests that the circulation of labour is less free than it should be. This leaves the standard of wages a matter almost entirely regulated by the *arbitrium* of the employers. How otherwise is a man compelled to take 7s. a week in the neighbourhood of Salisbury for doing that which would bring him 9s. in the vicinity of Aylesbury? This could not be so if the labourer were less ignorant of the circumstances of surrounding districts, and more free than he is to transfer his labour to the best market. With this discrepancy there is, of course, a high and a low standard of wages in each county; the low standard in one being, perhaps, the high standard in another. But, although it is low in all as compared with the point at which it has stood, I found, go where I would, that the apprehension was general amongst the labourers that it was to be still further reduced. Nor is this a vague presentiment with them, but a conviction arising from the fact that the contemplated reduction has already, in numerous instances, been partially effected. But before inquiry into the extent to which this has been done, and is still further threatened, it will be as well to glance cursorily at the average standard of wages in the four counties during the portion of the current year which is now past.

In Buckinghamshire and the greater part of Oxfordshire the wages have been comparatively high; throughout most of Berkshire and the whole of Wiltshire they have been very low. In the first-named counties 10s. a-week have been earned by the labourer; whilst 8s. was the maximum rate, except during harvest time, in the greater part of those last mentioned. In all the agricultural districts the wages of course vary with the season of the year and the work required to be done. It is from April to November that the highest wages are had, including the harvest time, when they everywhere reach their maximum. From November to April again the scale of remuneration is comparatively low and employment precarious, particularly during the winter months, when, sometimes for weeks at a time, great numbers are out of work. In Buckinghamshire and Oxfordshire 10s. 6d. and even 11s.

a-week, the latter rarely, have been paid to those at work in the neighbourhood of the larger rural towns. These have since been reduced to 10s. and 9s. 6d. Taking the wages paid since January over the greater portion of the surface of these counties, 9s. 6d. is an ample figure at which to place their average weekly amount. If the reductions already made and those still contemplated for the remainder of the year be taken into account, the average for the whole year will certainly not exceed 9s. a-week. In Berks and Wiltshire, even including the higher rates paid during harvest time, the average for the last nine months will scarcely exceed 8s. a-week; whilst, taking the reductions made and contemplated, as in the other case, the average for the whole year will be but little above 7s. 6d. per week. As much as 12s. a-week have been earned during the present harvest in Wiltshire; but it must be remembered that against the high rates there paid, must, in order to get the average, be put the very low rates of winter, and the time when, longer or shorter as it may be, they may receive no wages at all, because there is no work to be had. We must also bear in mind that when a poor wretch is prevented for a day, or even half a-day, by heavy rain from working, his wages are stopped for the time. It is not every employer that deals in this way by his workmen; but the majority of the labourers themselves will tell you that this is the manner in which they are generally treated. This is a parsimony by which nothing in the long run is gained; for from men so treated it is impossible to expect, or even to get, full and efficient work when they are actually employed. A farmer carefully attends to the wants of any agricultural machine which he may possess, and in the purchase of which capital may have been invested. If it goes to wreck before it has replaced this capital, it is so much lost, and fresh capital must be applied to the purchase of another. But if, from neglect and privation, a human machine becomes useless, no capital is required to procure another. The human machine reproduces itself, and he can have it to work for him at his bidding. But for this he would be more careful of his well-being than he too generally is. Both the slave and the horse are fed even when circumstances compel them to be idle. But a heavy rain on a summer afternoon frequently consigns an English labourer and his family to want for the day.

If the earnings of a working man are to be taken as indicating the extent to which both he and his family can command the necessaries and comforts of life, what are we to infer as the condition of families whose dependence is here upon 9s., and there on from 7s. 6d. to 8s. a-week? But it may be urged that this is not to be looked upon as their sole reliance, inasmuch as the wife and some of the children not unfrequently, by their labour in the fields, add considerably to the common stock. Let us consider, for a moment, how far they do so. In some counties, classed amongst those that are purely agricultural, petty manufactures are carried on, which furnish employment to the children (particularly girls) of the labourer. There is little of that species of work to be had in the counties in question, except in the western parts of Wilts, where manufacturing is carried on to some extent in the neighbourhood of Abingdon, in Berks, and in Bucks, where many females are still employed in lace making and the plaiting of straw. But it is with the purely agricultural districts that we have now to deal. It is generally said that a woman, by working in the fields, earns half as much as a man. This, however, is not the rule, but the exception. It is seldom that a woman, except during harvest, earns more than 7d. a-day, and this even when a man's wages may be from 9s. to 10s. a-week. The extent of their earnings is frequently not more than 6d. a-day, and in some parts of Wilts women have worked this year, during the harvest, for no more than 3s. 6d. a-week. I was informed by one woman, near Mere, in the south-west part of that county, that she had worked ten hours a-day for 5d.—that is, at the rate of one halfpenny per hour! Taking the year round, a woman's earnings will not average 3s. a-week. In Bucks and Oxford, the earnings of a man and wife would thus together make 12s. a-week; in Berks and Wilts, scarcely 11s. If this additional sum were procured without any countervailing disadvantages—if it were a clear money gain, without drawback of any kind, it should not and could not be omitted in our estimate of a family's circumstances. But it is not a gain without drawback, and the first drawback is one of a pecuniary nature.

When a married woman goes to the fields to work, she must leave her children at home. In many cases they are too young to be left by themselves, when they are generally left in charge of a young girl hired for the purpose. The sum paid to this vicarious mother, who is generally herself a mere child, is from 8d. to 1s. per week, in addition to which she is fed and lodged in the house. This is nearly equivalent to an addition of two more members to the family. If, therefore, the mother works in the fields for weekly wages equal to the maintenance of three children for the week, it is, in the first place, in many cases, at the cost of having two additional mouths to feed. But this is far from being all the disadvantages attending out-door labour by the mother. One of the worst features attending the system is the cheerlessness with which it invests the poor man's house. On returning from work, instead of finding his house in order and a meal comfortably prepared for him, his wife accompanies him home, or perhaps arrives after him, when all has to be done in his presence which should have been done for his reception. The result is, that home is made distasteful to him, and he hies to the nearest ale-house, where he soon spends the balance of his wife's earnings for the week, and also those of his children, if any of them have been at work. A great deal is lost also through the unthrifty habits of his wife. Her expertness at out-door labour has been acquired at the expense of an adequate knowledge of her in-door duties. She is an indifferent cook—a bad housewife in every respect. She is also in numerous instances lamentably deficient in knowledge of the most ordinary needle-work. All that she wants in these respects she might acquire, if she stayed more at home and was less in the fields. In addition to this, her children would have the benefit of being brought up under her own eye, instead of being, as they are, utterly neglected and left to themselves; for the party left in charge of them—and it is not always that any one is so—is generally herself a child, having no control whatever over them. It is under these circumstances that the seeds of future vice are plentifully sown. On the whole, as regards the system of married women working in the fields, I cannot, when the children are young, but look on the balance as being on the side of disadvantage. In that case I think it would be decidedly better for the poor man, having reference only to his physical comforts, that his wife stayed at home. And this is the position of many a labouring man. In many cases, when the family is large, some of the children are at work, adding their scanty wages of from 1s. 6d. to 2s. a week to the common fund. But I have known numerous cases of families of seven children, of which the eldest was not eight years old. Besides, when these are fit to work and earn wages of their own, his children soon become independent of him, and set up for themselves. This is in one way a relief to him, unless his family, while diminishing at one end, is increasing at the other. There can be no doubt but that a family is frequently aided by the earnings of the children, but in by far the greater number of cases the means of support are procured by the parents themselves. From what has been already said of the disadvantage to the whole family at which the wife bears her share in procuring them, it will be evident that the husband's earnings are, after all, the true test and standard of his own condition and that of those dependent upon him.

Moreover, in a very large proportion of cases, the wife remains at home, attending to duties more appropriate to her sex and position, in which case there is no other test to be had, unless it be the trifling and fitful earnings of one or two of the children. We have seen that, in the counties in question, there are about 40,000 married couples, who, with their children, numbering about 120,000, depend exclusively upon agricultural labour for support. Of the 40,000 mothers, fully one-half stay at home, some being compelled to do so on account of the extreme youth of their children; and others, save when their families are somewhat advanced, preferring from calculation to do so, as being the best mode of turning their scanty means to good account. This may be taken as the case with half the married couples, who, with their families, will number about 100,000 individuals. So far, therefore, as these are concerned, the children, in about the same proportion of families, being too young to add anything to the common stock, there is nothing else to adopt as the test of their condition and the standard of their comforts but the earnings of the husband. Let us inquire, therefore, into the condition of a family thus solely dependent upon such wages as the husband has, on the average, received during the past portion of the current year. I can best illustrate that condition by one of the numerous cases which came under my consideration in Wiltshire. The labourer in that case had had 8s. a week, but he was then only in receipt of 7s. He had seven children, the eldest of whom, a girl, was in her eighth year. Two of his children had been at a "dunce's school;" but they were not then attending it, simply because he could not afford the 4d. a week which had to be paid for their education. To ascertain how far he was really incapable in this respect, I requested him to detail to me the economy of his household for a week, taking his earnings at 8s. The following is the substance of the conversation, discarding, for the reader's sake, the portions in which the names are given.

When are your wages paid?—On Saturday night, but often only once a fortnight.

What do you do with the money on receiving it?—I first lay by my rent, which is a shilling a week. I then go to the grocer's and lay in something for Sunday and the rest of the week. I buy a little tea, of which I get two ounces for 6d. Sugar is cheap, but I cannot afford it. We sometimes sweeten the tea with a little treacle, but generally drink it unsweetened.

Do you purchase any butcher meat?—Generally for a Sunday we buy a bit of bacon.

How much?—It is seldom that I can afford more than half a pound.

Half a pound amongst nine of you?—Yes; it is but a mere taste, but we have not even that the rest of the week. It costs me about 5d.

Do you buy your bread, or make it at home?—We buy it. We have not fire enough to make it home, or it would be a great saving to us.

Do you buy a quantity at once, or a loaf when you need it?—We buy it as we need it.

Have you a garden attached to your cottage?—I have about 15 poles, for which I pay 1½d. a pole. It is less than the 8th of an acre.

What do you raise from it?—We raise some potatoes and cabbages.

Do you raise a sufficient quantity of potatoes to serve you for the year?—No, not even if they were all sound.

In addition to the potatoes and the cabbages which you raise, how much bread do you require for your own support, and that of your wife and seven children for the week?—We require seven gallons of bread at least.

What is a gallon of bread?—It is a loaf which used to weigh 8lbs. 11 oz., but which now seldom weighs above 8lbs. Those who supply bread to the union seldom make it over 8lbs.

What is the price of the gallon loaf?—Tenpence. It is cheaper than it was, but then there is not always so much of it. It is often of short weight.

Seven gallons of bread at 10d. a gallon would make 5s. 10d. would it not?—I believe it would make about that—you ought to know.

Do you always get seven gallons a week?—No, seldom more than six.

Then you spend 5s. in bread, and make up for the want of more by potatoes and cabbages?—Yes.

You have still some money left; what do you do with it?—It costs us something for washing. For soap and soda, and for needles and thread for mending, we pay about 5d. a week.

Do you buy fuel?—We get a cwt. of coal sometimes, which would cost us about 1s. or 1s. 1½d. if we took in any quantity and paid ready money. When we do neither it costs us about 1s. 4d. a cwt. If there is one poor man who can afford to buy it in any quantity for ready money, there are forty who cannot.

How long would a cwt. of coals serve you ?—We make it last one way or another for two weeks.

Your fuel, therefore, will cost you about 8d. a week ?—It will.

Is there anything else you have ?—We buy a little salt butter sometimes, which we can get from 6½d. to 10d. a pound. We are obliged, of course, to take the cheapest; "and really, sir, it is sometimes not hardly fit to grease a waggon with."

But your money is already all gone, how do you pay for your butter ?—It is not always that we have it, and we can only have it by stinting ourselves in other things.

You have said nothing about your clothing: how do you procure that ?—But for the high wages we get during the harvest time we could not get it at all.

How long does the time last when you get high wages ?—About ten weeks, and but for what we then get I do not know how we could get on at all.

From this recapitulation it must certainly appear a mystery to the reader how they get on as it is. The weekly expenditure, in our view, is as follows, the family being nine, and the weekly receipts 8s. :—

	s.	d.
Rent	1	0
Tea	0	6
Bacon	0	5
Bread	5	0
Soda, soap, &c.	0	5
Fuel	0	8
Total	8	0

The provision for clothing is in the extra wages paid at harvest time, whilst the family cannot be treated to the luxury of bad butter without sacrificing the tea, two ounces of which must serve for a week, the half pound of bacon, which affords but a "mere taste" on Sunday to each; some of the bread which is already but too scantily supplied; or a portion of their fuel, the absence of which renders their home still more cheerless and desolate. Sugar, too, is out of the question, without trenching upon items more absolutely necessary. Nor is there any reserved fund for medicines, too often required by a family of nine thus miserably circumstanced. What, in short, have we here? We have nine people subsisting for seven days upon 60lbs. of bread—scarcely a pound a day for each, half a pound of bacon, and two ounces of tea, the rest being made up by a provision, too scanty in nine cases out of ten, of potatoes and cabbages raised in the garden. Could they descend much lower in the scale of wretchedness, especially when we couple with their stinted supply of the less nutritious kinds of food the miserable hovels in which it is taken by them, either shivering in the winter's frosts, or inhaling the pestilential odours engendered around them by the summer heats!

I could no longer express any surprise at 4d. a week being grudged for the education of two children.

This being the mode in which his weekly wages were expended, I asked the same individual to give me an account of his daily life, including his labour and fare. In reply to my questions on this point he answered, in substance, as follows:—

At what hour do you go to work ?—At six in the morning, generally, in summer; but I have gone much earlier. In winter time work begins at a later hour.

Do you breakfast at home ?—When I do not go out very early I generally do.

Of what does your breakfast consist ?—Principally of bread, and sometimes a little tea. Sometimes, too, we have a few potatoes boiled.

When do you dine ?—About twelve.

Of what does your dinner consist ?—On the Monday my wife gets a little flour and makes a pudding, which, with a few potatoes, forms my dinner. Sometimes we have a pudding on other days, but generally our dinner is bread and potatoes, with now and then a little cabbage. When the family is not large, there may be a bit of bacon left that has not been used on Sunday, but that is never the case with us.

You return to work again ?—I do, and when I come home at night may have a little tea again, with the bread which forms my supper. The tea is never strong with us, but at night it is very weak.

Do your children get tea ?—We have not enough for that.

What is their drink ?—Water; sometimes we get them a little milk.

What is your own drink ?—Water.

Do you never drink beer ?—Never, but when it is given me; I can't afford to buy it.

When your dinner consists of bread, potatoes, and water, have you nothing to season it or make it palatable ?—Nothing but a little salt butter; and we can only afford that when the bread or potatoes happen not to be very good, or when we are ailing, and our stomachs are a little dainty.

When your bread or potatoes are bad, or your stomachs are dainty, you take as a relish the butter which you said was scarcely fit to grease a waggon with ?—We have nothing better to take.

Suppose you had nothing but bread to eat, how much would you require to sustain you at work in the course of a day ?—Two pounds at least.

And how much would one of your children require ?—About the same. A child, although not at work, will eat as much as a man; children are always growing, and always ready to eat, and one does not like to refuse food to them when they want it. I would sooner go without myself than stint my children, if I could help it.

Then, at the rate of two pounds a day for each, you would require for all about 126 pounds for the week ?—I suppose about that.

And, as you only get about sixty pounds of bread a week, you have to rely on your potatoes and cabbages, your half pound of bacon, and two ounces of tea, to make up for the sixty-six pounds which you cannot get ?—We have nothing else to rely on.

Have you enough of these to afford you as much nourishment as there would be in 66lbs. of bread ?—Not nearly enough.

Is what you have stated your manner of living from week to week ?—It is when I have work.

And when you have not work, how is it with you ?—"In the winter months we have sometimes scarcely a bit to put in our mouths."

Such is the substance of the statement, as regards his own and his family's circumstances, made to me by a labouring man in the receipt of the average rate of wages for the last nine months in Wiltshire. Comment is scarcely needed, the facts speaking but too plainly for themselves. Had the family been smaller, or the wages a little higher, instead of a "taste," they might have had a meal of bacon once a week. But even then it would be but once a week, potatoes and bread still constituting the staple of their diet, and even these not being had by them in sufficient quantity. Besides, even if they had it more frequently, bacon is not the most nourishing food in the shape of butcher meat; it is fat, and goes to fat. The little lean that is in it is almost destroyed by the process of curing. But it is greasy, and soon satisfies. "It fills us sooner than any other kind of meat," was the reply given to me when I asked why they preferred it to beef? But the fault is that it does not fill them; it satiates, without filling them. Bulk is required as well as nutriment in food. The stomach has a mechanical as well as a chemical action to perform. A man could not live on cheese, nor could he exist on pills having in them the concentrated essence of beef. They buy bacon because it goes a longer way than other meat—in truth, they buy it because it soon cloys them. Nor is it always that they have even a "taste" of it once a week. I have seen several families who had not tasted butcher meat of any kind for weeks at a time. When French and English workmen came together during the construction of some of the French railways it was found that the Englishman could perform far more work than his French competitor. This was universally attributed to the superiority of his diet, it being supposed but reasonable on all hands to expect more work from the man who fed on beef and porter than from him whose fare was bread and grapes. But the fare of the man who is expected by his labour to develop, year after year, the agricultural wealth of England, is, in a large proportion of cases, little better than bread and water—the fare of the condemned cell! Contrast the condition of the English farm labourer with that of the farm labourer in Canada. In England he eats butcher meat once a week, and not always that; in Canada he has as much of it as he wants once, at least, and frequently twice a day. Contrast his condition even with that of the slave in the southern states of America. In Virginia, the great slave state, it is seldom that a day passes without the slave eating butcher meat of some kind or other. In addition to this, when he is old and infirm, he has a claim on his master for support. But the English labourer, if he has a family to sustain, has not, even during the days of his strength, when he can do, and does work, the same nutritious diet as the slave; whilst, when he is disabled, or loses his work, he must starve, or, as the alternative, become a vagrant, or the recipient of a formal and organized charity. In the words of one of themselves, "it is not a living, sir—it is a mere being we get;" by which he intended to convey that their reward for their toil was their being barely enabled to exist.

It may be said that the case put is an extreme one. It is the case, however, of nearly one-half of those who are dependent upon labour in the fields. But it may be said that I have omitted to take into account some little privileges which the labourer has, and which, when he avails himself of them, tend to enhance his comforts. He may keep a pig, for instance, and his employer will sometimes find him straw for it, which, in process of time, will serve as manure for his little garden. This looks very well on paper, but that is chiefly all. In the four counties under consideration the number of labourers keeping pigs is about one in twelve. It is also a striking illustration of the condition of the labourers, that even such of them as do feed a pig seldom participate in the eating of it. Then we hear a great deal about the coal and clothing clubs, to which I shall hereafter more particularly advert, and the chief merit of which is that they tend to render life not pleasant, but barely tolerable to the poor.

The class of labourers best circumstanced is of course that composed of unmarried men. When not boarded and lodged on the farm, they generally stay with their relatives, or with some other family. But by the pernicious system which obtains throughout the country of giving them lower wages than married men, a direct premium is set upon marriage. The result of this ill-advised distinction is, that it drives many away from the culture of the soil, and hurries others into premature marriages. During my peregrinations through the county of Oxford I was driven from Thame to the city of Oxford by a young man possessed of acuteness and intelligence superior to those of most of his class. "How long have you been connected with the inn?" I inquired. "For some years now, sir," he answered. "Did you leave any other employment to take to the stables?" I then asked him. "I was born in the hamlet (Moreton) to the left there, and brought up to farming; but I left it, and took to stabling, because the farmers would not give me fair wages for my work." "Was there any difference between your work and that of others?" "No," said he, "but I was single and others were married. I didn't want to marry, and I wouldn't work for less wages than others worked for, and so I left." To have got the higher rate of wages, he must have married had he remained. "Then," continued he, "they make no distinction between one who knows how to do his work and one who doesn't. I learned to work properly on the farm, but I was never paid more than other single men who knew nothing about their work." This practice of discriminating between married and single men is fraught with no little mischief.

Such being the condition of so large a proportion of the labourers and their families in Wiltshire and Berkshire, where 8s. a week has been the average maximum rate of wages—a condition but little improved in Bucks and Oxford, where the maximum has been little if anything above 1s. higher—it becomes important to inquire into the prospect more immediately before them, with a view to ascertaining whether that condition is likely to be bettered or deteriorated. If I mistake not, rumours of an intended reduction of wages were recently very prevalent. Incredible as it may appear, these rumours have proved in general but too true. Throughout the four counties which I have already traversed, the reduction either is or will be general. There is scarcely a district in either of them where the work of reducing wages has not already commenced, and there is scarcely a district in which the poor are not apprehensive that that work is to be carried still further. I had an excellent opportunity at Thame of discovering how things were tending, in this respect, in Bucks and Oxford. It so happened that I was there on the day of the annual fair, when a great many cattle change hands and servants are hired for the year. The town was very full of booths, travelling shows, whirligigs, jugglers, tumblers, and barrel organs; pigs, horses, and oxen; labourers in clean smock frocks, and farmers in top boots. The gaity and uproariousness of the day were succeeded by the multiform debaucheries of the night. The servants hired at this fair are generally such as are boarded and lodged on the farm; but the wages offered them were a good indication of what was likely to be the rate in vogue, so far as the ordinary farm labourer was concerned. Lower rates were almost invariably offered and accepted. In some parts of Bucks, where 11s. a week were paid, 10s. are now given; and where 10s. were paid, 9s. are now taken. Almost throughout the whole of Wilts a reduction has taken place, to a greater or less extent. Even as early as last June wages in some districts were reduced from 8s. to 7s. It is true there was a temporary rise during harvest, but they have again sunk to 7s., and apprehensions are everywhere entertained that they will be reduced to 6s. Indeed, in numerous instances it is known that this has been determined upon by the farmers at their meetings, both in Wilts and Berks. "My master," said one man to me, "is not going to reduce, but what he pays away in one way he saves in another." "How much does he pay?" I asked. "He pays 8s.," replied he. "And how will he save the difference between 8s. and 6s.?" I demanded. "Why, sir," said he, "he is going to discharge some that he was in the habit of keeping during the winter. He's going to save in that way, but he has already saved in other ways. I have myself hoed turnips for a third more than I got this year, hoeing them by the job as usual." "You speak," said I, "of your master discharging some of you. Are you likely to be included in the number?" "I can't say, sir," he answered; "when they discharge, they generally first send off such as have no families, lest by discharging those that have, a greater burthen should fall on the parish. They then send off those with the smallest families for the same reason. You see, sir, it's made a matter of pounds shillings and pence throughout, and not of rewarding them that faithfully serve them." "Are you engaged for any length of time?" I asked. "No," said he; "none but the carters and shepherds are so; they are engaged from Michaelmas to Michaelmas. The rest of us may be sent away on a moment's notice. To be sure, if we are sent away on a Monday we may demand a whole week's wages; but then to entitle us to that, we must do nothing else during the week for hire." "Is there any combination amongst yourselves to keep up wages?" I inquired. "None, sir. We are too much in their power for that. If any man complains, they call him saucy, and discharge him at once. The employers all understand each other, and won't employ him again until he has learnt better manners, or is punished enough for his impudence." "On what ground," I then asked, "are they lowering the wages around you?" "On the ground that living is cheaper," he replied. "And is it so?" was my next inquiry. "It is," said he: "bread is a good deal cheaper, and so are tea and sugar for such as can buy them. Meat, too, is a little cheaper, but not much." "Are provisions now so cheap, that you could live comfortably with your family on 8s. 8d.?" "Lord bless you, no!" he answered; "we can live better now on 8s. than before, but not comfortably yet." "What will they do who are reduced to 6s.?" asked I. "I don't know what will become of them," he replied. "As it is, it's wonderful how they get along. The hand of God is in it, sir, or they couldn't do it. But how they can live on 6s. a-week, sir, I don't know. They can't do it, sir—they can't do it," he added, with a scowl upon his face, and an asperity in his tone, which contrasted strangely with his bearing and utterance throughout. He was from Amesbury, and my conversation with him took place in front of the "Old Castle"—a small inn on the high-road to Salisbury, and just outside the outer mound of Old Sarum.

The same day, whilst strolling in a neighbouring parish, I espied an old man proceeding along the highway in front of me. He was very infirm, tottering along with the aid of a large staff which he carried; and I soon overtook him. After saluting him, I got into conversation with him, and found that he had been long resident on the parish, and was now an out-door pauper receiving relief. "I have been off work these two years," he said, "and now get two shillings and half a gallon of bread a-week from the union." "Do you pay any rent?" I asked. "Yes," said he, "sixpence a week. Aye, aye," he continued, "I have been in the King's service, and have worked here for more than thirty years; and it has all come to that at last," pointing to the repulsive-looking walls of the workhouse, which rose over some tree-tops in the distance. "When were you discharged from the King's service?" I inquired. "I can't remember," said he, "it's so long ago; but it was the year after the battle of Waterloo." I then ascertained that he had returned to his parish, and worked as a labourer, married, and had two sons, who were since dead, but not, he said, before they had known what it was to toil for a scanty reward. Their death was a great blow to him at the time; but he said that he had been since glad, for their sakes, that they were gone; for he could have left them nothing as an inheritance but his own misery and toil. "Do you hear anything about wages coming down?" I asked him. "Hear anything about it!" he exclaimed; "it's what all the poor people are talking about. They expect to be told next pay-day that they must come down to 6s." "Why are they to be brought down?" I inquired. "The farmers say," he replied, "that the poor people can now live cheaper, and that they themselves can get hardly anything for their corn." "Can they live more cheaply?" asked I. "A little," was his answer. "Since you have been in the parish, have you known wages as low as they are now?" "Never," said he. "Have you known them much higher?" "A little higher," he replied. "Have you known corn much higher than now?" "Much," was his answer. "And were wages high in proportion?" "No," said he. "When corn was twice as high as now, wages were but very little higher. They beat the poor people down when things are cheap; but they won't raise their wages much when things are dear. They do the same with the landlords. They want to beat down rents when things are cheap, but they won't raise them when corn is high. They won't pay their poor people, because, they say, they can't; but they ride their nags and keep their greyhounds for all that."

But, as regards the threatened reduction of wages, the worst has not yet been told. In the neighbourhood of Mere, some of the farmers have come to an understanding with each other to force upon the labourer 6s. in money, and a bushel of wheat at 6s., for a fortnight's work. Now, what is generally thus given to the labourer is what is called "tailings." At this moment the best grain is not selling in the markets of Wilts at more than 5s. a bushel; and to force upon the labourer an inferior grain at a superior price is an injustice of the grossest kind. Taking the grain which they would receive as equal in value with the best wheat, it would be but five shillings' worth. But it is not worth 5s.; and it would cost them nearly a shilling more to convert it into a shape fit for food. The value of the fortnight's wages would thus be about 10s.—that is to say, *about 5s. a week!* Such is the prospect before the labourer, for the ensuing winter, in a part of Wilts.

Is it any wonder that, with such a prospect before them, the agricultural labourers should brood over their circumstances with the ominous sullenness of despair? What is that prospect? The winter is approaching—the season when most is required by us all to administer to our comforts. They are entering upon that season with here 8s., there 6s., and there again but 5s. a-week for the support of their families. How far will these pitiful portions go in households of five, six, seven, eight, nine, or ten individuals? We cannot, in estimating a labourer's comforts at any given time, apply to them the test of his average wages. It is his wages for the time being that decide the measure of his condition. Had he at any time more than was necessary to carry him and his family up to the line of comfort, he might lay by the surplus for adverse times. But he never has what secures him perfect comfort, and is always more than tempted to spend all he gets. He therefore commences this winter, as he does every winter, without any reserve-fund to fall back upon; and the fact is appalling that, in this month of October, thousands of families in the very heart of England have no better prospect before them than that of living on 8s., 6s., and even 5s. a-week, in their cold, damp, cheerless, and unhealthy homes.

(To be continued.)

THICK AND THIN SOWING.

We have not had time ere this to allude to the additional evidence which has recently been afforded on the thick and thin sowing of wheat. Two circumstances have contributed to make the subject interesting—the one is, the introduction of the hand seed-dibble of Dr. Newington, which met with so much approbation by the judges at Norwich as to carry off the prize, and some notices of which have been several weeks unavoidably on our table; and the other is Mr. Mechi's confession at the annual dinner at Witham. Dr. Newington's is, no doubt, an ingenious machine. That it will deposit accurately three seeds per hole there can be little doubt, as in the experiment tried with his six-inch depositor, 120 deposits left 118 with three grains to the hole, and the remaining two with four. This, at rows of four inches, would be about one bushel per acre. The peculiarity of the implement is, that it is its own depositor as well as dibble, and the man who carries it carries also the seed which he wishes to deposit. When the hole is made (or cup, as it is called by the doctor) the dibble presses the seed firmly in; and thus doubtless we have one great desideratum for the wheat plant—a sound, firm bottom.

One great fault with dibbling is, that many of the seeds never germinate. We are by no means prepared to state the precise why and wherefore of this; but of the fact there can be no doubt, that a very large proportion of the dibbled seed never comes to the light of day. It may be the dibble plasters or mortars the hole, and thus it holds the water, in strong soils, till the vitality of the seed is destroyed; or it may be some seeds are planted too deep, or some are injured by planting; but Dr. Newington's dibble appears to obviate this difficulty—the seed is all deposited at one uniform depth, no plastering of the holes takes place, and hence these objections cannot arise to the implement in question. The paper contains testimonials from a great many authorities, public and private, as to its success as a dibble; but it is only fair and candid and straightforward to admit that we cannot find one single case where the dibbling system, in the abstract, is proved by experiment to be strikingly better than the drilling, or even the broad-cast methods. There are several who say they have tried it against the broad-cast or drill, and its *appearance* is better, but further they do not go; and we must say that until they submit their trials to the test of the bushel and the scale, we attach to them not the slightest importance. We may mention one case as an exception—this is that of Mr. Shuter, of Henley, who says he has got 39½ bushels of barley per acre with dibbling, and 34½ only with broad cast. The return of either is not a large crop. But most of the statements are of a different character, speaking only of the dibbling system in itself. Thus Mr. Wilkins drives his hobby so hard as to dibble with it *one peck per acre*, and says of it, "The whole of it came up, and is a beautiful crop." Of course he did not try it against 6, 8, or 10 pecks, and therefore we learn nothing comparatively by this experiment. A Mr. Lysaght says, that the only fault of his plant, at one bushel per acre, is, that it is too thick! Mr. R. White, of Foxhole, is of opinion it will answer well. Another, a Yorkshire gentleman, Mr. Geo. Rymer, of East Ayton, says of it, "It has exceeded my expectations." Mr. Morton, of Whitfield, an excellent authority, gives this qualified praise—"*If* we can save only one bushel of seed-wheat per acre with these machines, the inventor of them is manifestly entitled to our best thanks." Mr. Wilkins says of Mr. C. Nunn's wheat—"That sown at 2 to 3 coombs per acre is knocked down with the wind and rain, while all the machine-dibbled in the same field stands up manfully—the ears of the latter are double the size of the former."

Leaving the doctor and his friends with this remark only, that his implement appears to be all that the thin-seeder's heart could desire, and will carry out their theory, if ever anything can, we turn to the confessions of a thin-seeder, our friend Mr. Mechi, who has lately been so hard pressed by Mr. Hodgson and others; and seeing these confessions are made in the very stronghold of the Rev. Mr. Wilkins, of thin-seeding and anti-box-feeding celebrity, they will tell very strongly against new-fangled theories among the yeomen of Witham.

For the last four years Mr. Mechi said he had been trying experiments between one bushel and two to an acre; and as these are before the public he would not then repeat them. They were, however, so satisfactory to his own mind, that this year he gave up the extreme trials, and made others, between four pecks per acre and five, and also between four pecks and six per acre, of seed; and the result was, that the five pecks per acre gave an increase of two pecks per acre over the four; and the six pecks, an advantage of three pecks per acre over the four; so that, deducting the seed, the advantage of the larger over the smaller quantity was one to two pecks per acre. As to beans and peas, the thick-sown had much the advantage over the thin-sown. Of the latter he sowed three bushels per acre, against about five pecks, and the larger quantity gave forty bushels per acre, while the smaller gave only twenty-four. Well may Mr. Mechi come to the conclusion he did at Witham, that "*the state and quality of the land had much to do with thick and thin sowing!*"

But light appears to be also breaking in from other quarters. We have for years expressed an opinion very unequivocally, that *if* thin sowing were adapted to, and successful in, a southern climate, it was neither in a northern one; and the recent meeting of the Maidstone Farmers' Club seems to go even beyond this opinion. At the last meeting of that Club a gentleman who read the paper on Mechi-ism in general, and thin sowing in particular, himself a thin-seeder, for he sows only seven or eight pecks per acre, states that on one occasion he happened to sow by accident a double quantity of seed, and the produce was in favour of nine pecks per acre against seven, in money value, after the difference in the cost of the seed was deducted, of £1 2s. 3d. per acre; and in favour of *sixteen* pecks per acre over seven, after making the same deduction, of no less a sum than £1 4s. 4d. The gentleman does not unfortunately give the details and weights, but it is evidently carefully wrought out, and the Club comes to the resolution—expressed almost in the words we used in the *Journal* in July, 1847—that "with regard to the quantity sown in this district, *it cannot be safely reduced;* but that there is an advantage in the increase of the distance between the rows, from six inches apart to eight inches."

The thin-sowing experiments of the Rev. Mordaunt Barnard, also, at the recent meeting of the Saffron-Walden Agricultural Society, tell another tale of the failure of thin sowing in Essex. The soil was a sandy loam, of the value of 35s. per acre, dibbled Nov. 1st, 1848, with Smoothy's red wheat; on one patch, one-sixth of an acre, 1½ pecks, and one pint over, of seed, was sown per acre. The produce was 5½ bushels, or at the rate of 33 bushels per acre, and the weight of straw was 3558 lbs. per acre. On another portion of equal extent, 1 bushel and 19 pints per acre was sown, and the produce was 6¼ bushels, or 37½ bushels per acre, and the weight of straw per acre was 3936 lbs. The weight of the two samples of corn was the same, but the thin-sown ripened later. The thicker-sown wheat was rather the better sample. Here, though both were thin sowings, the thicker-sown gained 4½ bushels per acre; and if this had been doubled, the gain might have been much more. At any rate, the progression was in favour of the larger quantity. As far as it goes, therefore, we cannot help adding, that this, coupled with the recent experiments made, and added to the previous testimony, justifies the conclusions of Mr. Thompson in his lecture, and Mr. Milburn in his prize essay, that it is not safe to greatly diminish the quantity of seed.

We cannot help thinking, also, that though it is manifestly impossible to lay down any rule of seeding for all localities, it is the safest to adopt a system varying from eight pecks at the least, to eleven pecks at the most; and far to exceed either the maximum or the minimum, though it may answer in particular seasons, will not succeed in the average of years.

Thin seeding is a saving in the abstract; but if it involves a larger amount of risk as to produce than the value of the seed saved, it is manifestly not worth the venture; and against this there are a variety of reasons, such as these:—That there is less plant to resist attacks of frost, vermin, or the manifold casualties of the crop; there is a danger of much not germinating where little can be spared; there is a liability to ripen later; there is a necessity to sow earlier; the plant is called upon to make unnatural efforts to tiller, which impair its productive energies; there is more liability to weeds; there is more excitement and expenditure of vital power in the clover, if it is sown; there is a coarseness of sample; there is a deficiency of weight; there is an excess of offal corn;—all these and other reasons convince us that a *moderate* is better than a *small* quantity of seed-corn.—Gardeners' and Farmers' Journal.

THE LONDON FARMERS' CLUB.—MONTHLY DISCUSSION.

The club held its first meeting for the season on Monday evening, Nov. 5, at the Club House, in Blackfriars, when a considerable number of the members were present; amongst whom were Mr. J. Payne, of Felmersham, who presided in the absence of Mr. Robert Smith, the Chairman for the year; Mr. Fisher Hobbs; Mr. Mechi; Mr. W. Shaw, of the Strand; Mr. Cheetham; Mr. Owen; the Hon. Mr. Wilson; Mr. Bennett; Mr. Spearing, &c.

The CHAIRMAN said:—Gentlemen, I am sorry to have to inform you that our Chairman is absent on the present occasion, and that it has devolved upon me to represent him. I wish I were able to congratulate you that something favourable had turned up during the short interval which has elapsed since we last assembled. All I can hope for is, that we shall be able to wriggle on until some grand move has been made. I feel perfectly certain that the time is not far distant, for one class of society cannot long exist at the expense of another. It cannot be but that there is something in store for us. I will not detain you any longer. Mr. Webster will now open the discussion of the evening, which will be on the cultivation and improvement of bogs and peaty soils.

Mr. B. WEBSTER:—Mr. Chairman and gentlemen, as I fear it will be quite impossible in the short space of one evening to go into *all* the important matters connected with this subject, I will only call your attention to those points that have, from time to time, struck me as being more particularly necessary to attend to in the improvement and cultivation of bog and peaty soils; and I trust that such information will be given by the members of the London Farmers' Club this evening as will eventually lead to the profitable cultivation of these soils. Peat moss, or bog, is not properly a soil, but an accumulation of dead, dying, and living plants, growing in water. It appears from analysis that 400 grains of fertile peat moss contain when dry—

Fine siliceous sand	156 grains
Undecomposed vegetable fibre	2 ,,
Decomposing vegetable matter	110 ,,
Muriate of lime	4 ,,
Silica	102 ,,
Alumina	16 ,,
Oxide of iron	4 ,,
Soluble vegetable and saline matter ..	4 ,,
Loss	2 ,,
	400

Dry barren peat moss contains 400 grains—

Fine pure siliceous sand	29 grains
Inert vegetable matter	289 ,,
Alumina	14 ,,
Oxide of iron	30 ,,
Soluble vegetable matter, containing also sulphate of potash	11 ,,
Sulphate of lime and gypsum	12 ,,
Loss	15 ,,
	400

Although the small bogs, or patches of peaty soils, found in the south of England are composed, in a great measure, of the same material as the larger tracts of moss lands in the north and in Ireland, the cause in most instances is perfectly different; the former arises from the springs that break out on the side of hills, and the latter (the large beds of moss) from the gradual accumulation of stagnant water. The red bogs are of a very inferior kind, much lighter, and when burnt producing little or no ash. The extent of bog lands in the south of England, except in Devonshire, is not very great, although few estates of any great extent, with retentive subsoils, can be found without some portions of low swampy bottoms of a boggy nature. In the north of England (in Lancashire in particular) large tracts of moss land are to be found; they also exist in various parts of North and South Wales, and in Scotland to a considerable extent; but, if we cross over to Ireland, we there find not less than 2,800,000 acres of actual bog; and I think I may venture to assert that not one acre of this is so situated that it could not be drained—whether or not so as to pay may admit of question. Before commencing the improvement and cultivation of these soils the following points ought to be well considered:—

1st.—What outlet is there, the expense of making it, and whether or not it can be done independently of other owners or occupiers?

2nd.—The quality of peat or moss which the bog is composed of, the depth of it, and whether it contains much old timber, which may aid considerably in cutting your drains.

3rd.—Is marl, clay, sand, gravel, or lime, found in abundance near at hand?

4th.—What mode have you of obtaining manure?

5th.—Can you produce good crops, and are the markets good?

6th.—What kind of drainage is required, and is there any material on the spot for it?

7th.—Is the subsoil upon which your bog rests of a character to make good land or not?

8th.—Is there any sale for peat in the neighbourhood as fuel, or for any other purpose, or can you consume it profitably yourself?

9th.—The price of labour, and whether plenty of hands are to be obtained.

10th.—Is there any good sound land to be had with the bog, for stock and the erection of buildings?

Lastly.—Will the tenure upon which you hold it justify you in going to the necessary outlay?

The advantages of cultivating this kind of soil are, that you obtain it at a low rent, or purchase it for a very small sum; that you work it with very little strength (I have seen one horse plough an acre a day with ease), and with cheap and simple implements; that it will produce the finest root crops of every description; and that potatoes are not liable to the disease in this soil to the same extent as in other kinds of soil; that the wire-worm is not found on this soil if it be well farmed, so far at least as my observation has extended.

Mr. Mechi:—I have found it.

Mr. B. Webster:—That you are almost sure of producing all the crops you plant on this soil if they are properly managed; and that all clover and artificial grasses grow most luxuriantly. The disadvantages seem to be that you cannot get on the land at all times, and therefore must have other work for your horses as well; that it is not a soil suited to feeding off turnips; that on large tracts of deep bog you cannot, without incurring great expense, erect any building; that, as a general rule, it wants always some care to keep it up to the mark, and is not improved, but is rather injured, by being left idle. The very out-of-the-way places in which these soils are to be found must also detract from their value. The drainage of these soils is decidedly of the first importance, as nothing can be done without it; but many persons are under the erroneous impression that draining will do all. By no way in which drains can be put in can some bogs be dried effectually, unless they are broken up afterwards, so as to separate the particles of matter, and to do away with the force of capillary attraction, which is found to act so powerfully in this kind of soil. The small bogs which are met with in the south of England (Devonshire, perhaps, excepted), being injured by springs, must have them cut off in the sound land about where they break out. If they feed the bog below, forcing their way through a situation of sand or gravel, they must have drains taken directly into them, or the cause of the mischief discovered and remedied. The size of the tile must depend on the quantity of water to be taken away: in some cases boring is requisite. The most effectual drainage of these small bogs may be seen in Essex, on the farms of Mr. Fisher Hobbs, Messrs. Dixon, of Witham, the Hutleys, and Mr. Mechi, in the same neighbourhood. Besides the cutting off of the springs, a certain extent of surface or underdraining is requisite, according to the extent and nature of the bog. The drainage of the large tracts of moss, so common in Ireland, is a very simple operation, but must be undertaken with great care and attention, or very large sums of money may soon be thrown away. The great error has been to attempt a system of deep drainage at once. All must be done by degrees. As the water escapes the peat consolidates, and the expenses are trifling, since no work has to be done over again. I would recommend that the first sod should be taken out about 14 inches, and that you should proceed in this way, as the soil will allow. All the material taken from drains must be thrown well away from the sides. In most peat soils it is now found that open main drains stand best if cut perpendicularly; the wet, in conjunction with the frost, has not then such an effect on them as otherwise. After the roads have been formed, and the main drains marked out, which ought to be done in such a way as to leave fields of about 300 yards long by 66 yards wide—I mention these sized fields because from experience they have been found to be the most convenient—the small drains can be run across these fields from one side to the other, from one to two rods (of 16½ ft) apart, about three feet deep; but this must depend on the nature of the soil and subsoil, and the draining nature of the peat. If the peaty soil is only two feet thick, resting on a hard blue clay or marl, it is not requisite to do more than bring the tiles or pipes safely in this subsoil; and should the peat soil be of very greater depth, it has been found that 36 inches is better than a greater depth, as in dry weather moisture from below is absolutely requisite. Another mode of draining these soils has been found very successful and very cheap. It is, after having made a proper outlet and main drains, to throw the peat into large beds, two rods each (33 feet), with an open drain between. Some land in Ireland, in the county of Kerry, which I have just returned from, was drained in this way in the year 1837, at an expense of only a few shillings per acre. This land is now quite as dry as another portion of the same bog drained at an expense of £4 per acre with under-drains; but I think that if a good covered drain were placed in the open cuts formed in 1837, it would be a great improvement; for there must be a greater tendency in these open cuts to carry away the valuable portion of the manure than there would be if the land were flatter and the water had to percolate through the soil. The most perfect drainage and cultivation of this description of bog, or of extensive tracts of moss land, may be seen on a large scale at Rawcliff, in Preston, Lancashire, on the estate of R. J. Willson Ffrance, Esq., who has a large tract of land which only brought his father 1s. 6d. per acre, now paying him more than 40s. per acre, with a most thriving tenantry. The fact of the potatoes not having been affected on this land, and of the demand for them having been very heavy, may partly account for the tenants being in such a thriving state. Mr. Ffrance had a very interesting paper in the *Mark-Lane Express*, a few years ago, on the drainage of these soils with turf dug on the moss land. I can speak very highly of the beneficial effect, and the permanency of that mode of drainage, as well as of its great economy. I may here mention that nothing is found better suited to road-making on bogs than sand—I mean for the first formation. As to the material to be added to bogs, in order to give them solidity, it has been found that there is no ordinary description of earth which will not act beneficially on a moss, although some varieties are much better than others. All clay or marl ought to remain on the surface before being ploughed in, to break down and mix with the soil; and in the application of all heavy substances, it must be remembered that as they have a great tendency to sink, it is of importance to keep them as near the surface as possible. If the heavy material at hand is only clay, lime must be added in some other form; whereas if a good marl is at hand, it will act directly. For light peat soils, a good clay marl should be sought. In Ireland, nature seems to have given on the spot all that is required for the reclaiming of these soils. Large quantities of lime-stone gravel (a drift of the lime-stone rocks) are to be found in most parts of the country, and this has been proved to be the finest material. In other parts a sea sand is found composed of minute particles of shell, 75 per cent. being the proportion; and on the Galway coast, a coarse coral sand is found. In other places the subsoil is a fine blue marl. Any heavy material, applied in the proportion of not less than a ton to the rod, will prove beneficial. With regard to manures, all dung should be well rotted; guano is found very beneficial, and bones for turnips, with plenty of ashes made from the peat: all good artificial manures act well on these soils. Peat well saturated in liquid manure must not be forgotten. Another most important matter connected with this subject, is the value of peat in its natural state, as well as when manufactured into charcoal. First—As a fuel for all home purposes. Second—For burning bricks, tiles, &c. Third—For making into composts with lime and liquid manure, to add to soils which are deficient in vegetable matter. Fourth—As charcoal for smelting iron. Lastly—Its value as a charcoal powder, as a disinfector, is very great. I have lately returned from a part of Ireland where no other fuel than common peat is used either in the drawing room or in the kitchen. I have also given much attention to peat as a fuel for burning bricks and tiles, and I am quite convinced of its superiority over coal for that purpose. The purity of peat charcoal gives it great value for the manufacture of all iron and steel articles. Such convincing proofs have lately been brought forward by Jasper Rogers, Esq., Engineer to the Irish Amelioration Society, of the value of peat charcoal as a deodoriser and disinfector of animal excretiæ, that I think we have now only to congratulate ourselves that the time has arrived when we can have in a cheap and easy form a dry powder which will take up all feculent matter; and in a very short time a most valuable manure for our drills, equal to any guano, is made from the now wasted matter of our large towns. This peat charcoal has also been proved to be very valuable as a fertilizer, as may be seen by statements in a paper read at the London Botanical Society, on the 3rd of August last. The mode of cropping on these soils I have reason to think ought to be regulated by the demand for crops which pay best—that is, provided the occupier is able to add the requisite manure for each crop, and to keep the land in a good state of cultivation.

Mr. W. Fisher Hobbs said: Mr. Chairman and Gentlemen,—I am not prepared to make any lengthened remarks with regard to the drainage of peaty soils or bog lands, but I must express my gratification at the manner in which our friend Mr. Webster has introduced the subject, and my only regret is that he did not dwell more on the bogs and peaty soils of England; for, had he done so, he would no doubt have enlightened us quite as much on that point as he has done with respect to the drainage of bogs in Ireland. As Mr. Webster has mentioned my name in connexion with the drainage of the bogs in Essex, it may perhaps be well for me to explain the manner in which I have turned my waste land to profitable purposes (Hear, hear). A few years ago, a person of the name of Pearson came down to the county of Essex to drain the Brentwood railway cutting, which was then considered an almost insurmountable obstacle. I believe one or two parties had attempted it, and had failed. The system which Pearson adopted is called the Elkington principle, and he was successful in its application. He also came lower down into Essex, and was employed by Messrs. Dickson, Mechi, and others, in draining boggy soils in the district. He was afterwards employed to a small extent on my own property, and in both cases he succeeded remarkably well. The system which he adopted on my property differ from that which was followed in other parts of the country. He ascertained where the springs lay by digging down what he called telegraphs (though some persons consider the term inappropriate), and this mode was effectual with the view of ascertaining the substrata. By digging a number of these telegraphs he discovered to what depth it was necessary to go for drains; and by the cutting of one deep drain, three furlongs in length, to an average depth of nine feet, at one place thirteen feet, the result arrived at is, that land which had previously been unproductive, the value of which was certainly not more than 5s. per acre, and over a part of which no human being was ever known to walk, is now amongst the most profitable land in the parish, and has for the last three years produced more than 100 tons per acre of good vegetable food. That has all been done by one deep drain, and I must say, that I have never met with any man who appeared to understand this system of drainage so well as Pearson. He was trained up in Warwickshire, and his whole life has, I believe, been devoted to this kind of work. With regard to surface-draining I would not trust him. I think that on that subject he is narrow-minded, not being informed perhaps in reference to the best principles which are being carried out in the present day, but I would readily entrust to him the subjecting thousands of acres of land to deep drainage for springs of water. I must repeat my regret that Mr. Webster has not told us a little more as to the rule to be laid down or the plan to be acted upon in diverting the water on side hills instead of allowing it to flow over to form those masses of vegetable matter which are termed bogs. It is the more necessary that he should have dwelt on that point because it is not understood throughout the kingdom. I have met with many persons who have considered themselves quite capable of giving others information with regard to drainage, who, when questioned, have simply laid down a rule that you should go a certain depth, or use a certain kind of pipe or tile. Now my opinion is, that much must always depend on the character of the substrata, and on the quantity of water which we are likely to find on the side of the hills; and I had hoped that Mr. Webster, having devoted a great portion of his time for some years past to subjects of the same nature, would have enlightened us on this point. I still hope that that point will be enlarged upon in the progress of the discussion (Hear, hear). The drainage of bogs in Ireland is, no doubt, an interesting question, and I look upon it as opening a wide field not only for Irish labourers but for English labourers and for English capital also (Hear, hear). Still it strikes me that the discussion ought not to be closed this evening without our going into practical details as to the best modes of draining our own peat bogs and swamps. I do consider that we all require information on that point. We may not be prepared this evening fully to decide the question, but the little experience which I have had in the matter leads me to the conclusion that the system to be adopted is totally different from that which it is desirable to pursue in the drainage of tenacious soils. One drain judiciously applied may frequently carry water from 20, 50, or even 100 acres of land, at an expense of from £5 to £10 for tiles, and perhaps from £15 to £20 for manual labour; whereas a person proceeding upon the common system, and placing his tiles from 30 inches to four feet deep, and from 9 to 10 yards apart, would never succeed in draining effectually. Therefore I do think that we cannot discuss that matter too much, and the more experience we obtain the more shall we find that it must be to our advantage to bring into cultivation those tracts of land, which although, as Mr. Webster says, they are not so frequent or extensive in this country as in Ireland, are far too important and too extensive to be left as waste land, when they would at least provide food to fatten a well-bred animal, though they will not now return sufficient even to meet parochial charges. Such land may in many cases be made a profitable addition to the farm. Even as charred peat I have found it profitable by drilling it in with artificial manures; while, if mixed with chalk or marl, it may even be made available for the growth of corn or for other agricultural purposes. There are many parts of this question, such as the description of tiles to be used, the cutting of tile drains, and the implements to be used for the protection of the drainers, upon which it is desirable that information should be diffused throughout the country.

Mr. Baker said: I did not intend to take any part in this evening's discussion, but some observations which have fallen from Mr. Hobbs induce me to do so. I have carried out the system of deep drainage in Essex as extensively, I believe, as most of my neighbours; and I did so long before Mr. Pearson made his appearance in that county. The principle to be applied in the draining of bog lands must of course depend very much upon the substrata of the soil on which the bog rests, and therefore the mode properly adopted here may differ greatly from that adopted in Ireland. I believe that in Ireland bogs extend to an immense depth—resting, in fact, on the primitive rock; and consequently the draining there must be of corresponding depth. But in Essex—I confine myself to that part of the country with which I am best acquainted, in order that I may be able to speak practically—in Essex the subsoil on which we find bogs is principally the London clay, on about the centre of which we are at this moment standing. It is very irregular in its deposits, and in its surface. In some places it forms extensive basins, which are filled with porous soils of a gravelly character, and the water sinks through the upper portion till it meets the resistance of the clay below; it then finds a convenient point at which to ooze out, and through its streaming down the side of a hill the bog is formed. Now it is quite evident, without the assistance of a diagram, that if we intercept the water in the soil lying above the clay, and there fix it, so as to prevent it from reaching the bog, we effect the whole of our object by means of one drain. It is, then, most important that any one who makes an attempt at deep draining should thoroughly understand what he is about. It is, in fact, impossible for a person to engage in deep drainage successfully unless he have a tolerably competent acquaintance with the science of geology, unless he understand the disposition of strata, the various arrangements of them, and how, therefore, the object may be best achieved. Now, in Essex we have only one difficulty to contend with, and that is the outfall. The outfall is generally at such a level that there is great difficulty in getting the water to run from the deep drain by which you attempt to effect your object; though that is very much compensated at times by continuing the drain for a greater length. But the outfall once obtained, then being able to cut through the porous soil lying on the clay till you reach the clay, the object is accomplished. I have drained some very extensive bogs. Some of the draining was done under my superintendence nearly fifty years ago, and the drains are still running upon the farm which I occupy. When I entered upon the farm it was so notorious as a snipe-shooting farm that scarcely any one would undertake to cultivate it. All the land by the side of the river was one continued bog, nearly a mile in length. I set about the work, however, and I succeeded in draining the whole without an exception. I do not say that it is all perfectly drained even now; there are a large number of willow-trees at the edge of the river, and some of those trees have introduced their roots into some of the drains, and thus the operation of draining may, in some cases, require to be performed again. I never found water at the part requiring to be drained. I was always obliged to cut above the bog itself, and I used to sink wells for the purpose of ascertaining the proper position. In this respect there was no difficulty whatever; directly you touch it with the boring-iron the thing is ascertained, and then you bore only to make a drain deep enough to effect your purpose. Between the house in which I now reside and the road, there runs a sort of terrace. When I first went there, the house stood on the lowest part of the farm, so that the water fell several feet towards it. I found some very excellent gravel, which repaid me for taking it up nearly a quarter of a mile in front of the premises. I took out the gravel down to the London clay, and we were annoyed by inundations of water every morning. We still persisted, however, till we arrived at the end of the premises, where we excavated the London clay. I have now one of the finest ponds of water in the neighbourhood. In the conducting of this affair a very important fact was elicited. On the western part of the house the clay suddenly rose to the surface, and there we found the obstruction which had prevented the water from percolating through the gravel, till at last it was obliged to force its way out at the opposite side, where it formed a quagmire. On the opposite side of the house was a pump, which stood at some distance from the building. The water in the gravel was not very good, and with the consent of the landlord, who agreed to pay the expense, I determined to effect an alteration. The position of the well was removed sixteen or twenty feet. The original well was only sixteen feet deep, and was at a point on a line with that where the gravel was found in front of the house; but where we commenced boring or digging, the well was exactly opposite the part where the clay rose to the surface. We dug several feet without finding any water, and then I knew it was impossible to accomplish the object without perforating the clay to the chalk. The difficulty which we had to encounter presented itself in the London clay, and that could only be overcome by perforating the clay. We had to bore 225 feet, and the water has never since flowed over the surface, and has afforded a supply, not only for my own family, but for three or four others also, besides providing a supply for a horse-pond, watering the garden, and affording occasional assistance to persons from the village, this water being of a very soft character. This shows that a little knowledge of the science of geology is essential to the right understanding of this question of the draining of bogs. (Hear, hear.) Wherever the London clay approaches the surface. we have to go, in digging for a well, from 100 to 500 feet in depth before we can perforate it. The lower parts of Essex, which used to be so notorious for bad water, are now entirely compensated by the boring of Artesian wells. It will be recollected that in a former discussion I brought some diagrams for the purpose of illustrating the character of these springs, many of my facts having been derived from practical experience of the matter. As to the question of pipes, when once the drains are cut and an outfall is obtained, there can be but little difficulty in effecting the object. I have found that in crossing a quicksand, before you arrive at the main drain sufficient to enable you to carry off the water, the best plan of proceeding is to get an elm board, lay it along the quicksand, and place the concave tiles over it; and after the pipes are put in, it has proved beneficial to have them covered over with stones one or two feet thick.

The Hon. Mr. WILSON wished to know whether he had rightly understood Mr. Hobbs that what was formerly bog land on his farm had produced 100 tons of vegetables?

Mr. HOBBS replied in the affirmative. In two successive years he had had crops of mangel wurzel; in the last year there was a crop of cabbages decidedly over 50 tons.

Mr. WILSON: I concur in the acknowledgment which has been made as to the excellent manner in which this subject has been introduced by Mr. Webster. All that gentleman's remarks were of a thoroughly practical character, and such remarks must be especially desirable in this Club. Having had some little experience, not indeed in Ireland, but in England, I can corroborate his statement that perpendicular drains are far more likely to stand on bog lands than slanting ones. I can also confirm his declaration that it is throwing away your money to attempt to lay in a bog a four or five feet drain. The best course is to make a drain 18 inches or 2 feet deep at first, letting the surface, so far as it will draw, dry itself, and then to make the drain deeper and wider until you get to the bottom. That is my own practice. From the bogs of Ireland it is a very small transition to the bogs of our own country. There is a certain tract of fen land, which I am acquainted with, in the neighbourhood of Downham, in Norfolk. Of some parts of that land I happen to be the proprietor; and where for a number of years we could not obtain from the tenant a rental sufficient to pay the parliamentary and other taxes, through a judicious system of drainage a considerable portion of land which had been sold at from £3 10s. to £4 per acre was actually let for three guineas per acre—it was let for nearly the same sum as it had been sold for (Hear, hear). The first essential point was to obtain a bottom outfall; the next was to apply the system of claying; and as many here may not be acquainted with the process I will shortly explain it. The workmen dig a trench four feet wide and quite perpendicular; they shore up the sides to prevent curving, and they then cast out the clay on either side; the instant the clay is put upon the peat, all the water having been previously to a certain extent extracted, the peaty soil is compressed by the weight of the clay; and in my own case that which had been five years a fox cover, where we used in my younger days to enter with the hounds, and where we used to grow nothing more valuable than sedge, has, through the application of this process, been producing wheat for years. I have known a production of 12 or 13 coombs per acre; and a corn merchant at Downham told me that he had known one of the fields used in the cultivation of wheat to produce 9 quarters per acre. Such was the result of judicious draining and a prudent outlay of capital. We may turn from this system of bog-draining to the draining of our uplands; and I am sure no subject can be brought before a meeting of agriculturists more important than that of draining. At the last meeting but one of the Royal Agricultural Society I took the liberty of making some observations on this mode of draining. Certain fixed principles had been laid down. One person asserted that $4\frac{1}{2}$ feet was the right depth; another preferred $3\frac{1}{2}$. I stated that, in my opinion, no man could lay down any principle which would be applicable to different localities (Hear, hear). Further, I said that no man could lay down a principle which would be applicable throughout the same farm; nay, I went further, and declared what is my real experience—that I have never seen a man yet who could lay down a principle applicable without exception to the same field. Near my own premises I have cut drains 6 feet deep with the greatest possible effect. My plan has been to cut holes; and if I found a drain empty, I had then no occasion to proceed higher; for the matter depends not on the slope of the ground, but upon what you encounter underneath (Hear, hear). My rule is to go down until I reach a porous texture in the clay. I have a great deal of most intractable stuff. I was told by Mr. Parkes that, if I went $4\frac{1}{2}$ feet deep, that would be sufficient; and he instanced Mr. Pusey's estate as an example of success with that depth. I found it a perfect failure. When, however, I used common sense, I had but little difficulty in effecting the object. At from 3 to 6 or 7 feet, I found little particles of white stone; and as we proceeded, my drainer pointed out to me some little fibres. He took up a piece of the clay, and, pinching it between his fingers to show me its nature, said: "It is no use draining. Until we come to this porous matter, we shall not find one single drop of water." On looking at the clay attentively I found it as full of fibres as possible. What these fibres are I leave the learned to declare; all I know is, that they exist. The point is to go down until you reach something of a porous nature, and then you may rest satisfied. Another very simple point with respect to draining—attention to which would have saved me thousands of pounds—is to require the person who is entrusted with the draining to make a map of the field: he should enter, for example, in one place, "Main drain, No. 1, to 5 feet deep," "Submain drain, such a depth," and so on. This will greatly facilitate the subsequent operations. If anything happens afterwards, you have nothing to do but to look at the map, and observing where the wet part is, you can dig down at once. This is a little point of practice which I conceive to be of great importance. Another thing to which I would refer is the position of the drains. Our ground in Leicestershire is very hilly. There are several fields which the tenants declared to me they had drained for years and years, but the drains would not hold. In trying to ascertain the cause of this, I came to the conclusion that a great flush of water coming down perpendicular washes under the tiles, and in many cases make holes large enough for a fox to enter. The taking of the drains transversely across the hills, and not at so great a fall, making them as it were overlap one another, was found to be a great advantage. To return to the use of bogs in agriculture, I may state that twenty-five or thirty years ago I was shooting in Scotland, while on a visit to an old friend, named Capt. Barclay. My friend was taking up agriculture very warmly, it having been previously much neglected in that part of the kingdom. He showed me, near his house, a most beautiful crop of natural clover, upon which a number of animals were feeding. To show me how this was produced, he took me into a plantation where there was an old bog. His men threw up this bog, and mixed it with lime, and the result was, that the grass lands near his house were greatly improved. At one of our previous meetings I mentioned the great advantage of covering up manure the instant you take it out of the yard. I have found by experience that burnt earth is one of the best things to apply to the growth of turnips; in fact, where I had applied burnt earth and afterwards folded sheep upon it, I found it equal to guano in my crop of turnips. Last year I took a great portion of bog earth and applied it to my wheat: it had a most powerful effect. My bailiff told me, the other day, when I desired him to mix this earth with lime, that he could see every inch of ground where the mixture had taken place before. A short time ago I desired him to mix from 100 to 150 loads of bog with some lime. He was bringing it raw out of the bog, and I said to him, "This will not do by itself." I shall feel great pleasure in communicating to the meeting the result. Whenever I can give the slightest amount of practical information which may be of use to the club, I shall be very happy to do so.

Mr. Mechi: Mr. Chairman and gentlemen, it is, I think, evident from what we have heard to-night that he who has a bog has a treasure. Having had four acres of bog land on my farm, a portion of it being exactly like the Irish bogs, I know the nature of such land. My bog has been drained as described by Mr. Hobbs, by Mr. Pearson, at various depths; and the result is, that we have discharged from four acres of land 30,000 gallons of water per day, or 25 gallons per minute. The water, which is of the best description, has been conveyed by ditches many miles; and it has, I learn, been the means of destroying fever in the district, both as respects man and beast (laughter). It has been supposed that bog-land is not adapted for wheat. After I had drained the land of which I speak, the question arose, what was to be done with it? Some of my practical friends said, "You may attempt to grow oats, but you will get nothing but straw;" others said, "If you grow potatoes they will not be worth eating." I was very much puzzled what to do. At length I was induced to try wheat; and the very first crop which I grew averaged six quarters per acre: this was in the year 1846. Allow me here to say, gentlemen, that thin sowing is essential. I am quite sure that if you put a great quantity of seed you will be disappointed. I put on three and a-half pecks per acre, dibbled. The wire-worm destroyed a considerable portion in the month of May. In the following year I had a crop of mangel wurzel, the lowest estimate of which was 35 tons per acre. Last year, which was not a good year, I had 5¼ qrs. of wheat per acre. This year I have a crop of clover. Do not let us be told again that bog-land will not produce wheat crops as well as green crops. I believe Mr. Webster saw my wheat.

Mr. Webster: Yes; and it was very fine.

Mr. Mechi: I ought to state, perhaps, that the draining of this bog—you know that bogs present a very rugged, uneven surface—cost from £6 to £7 per acre. I have since been bid by a market-gardener in the neighbourhood £5 per acre for land which previously to its being drained never produced 2s. 6d. per acre. I believe all that it had ever realized was 5s. now and then for fern. It is quite clear to me now that bog-land will yield a return for the investment of capital. I can confirm what Mr. Webster has said with regard to shallow or top draining as compared with spring draining. The drains in this case were placed four feet deep, at intervals. Another point is that bogs must be decomposed by atmospheric action or by lime before they will yield a crop. If you expect to grow a crop immediately upon this bed of tan—for it is really nothing else—without the influence of lime or atmospheric action, you will be disappointed. Time must be allowed. I can also confirm the statement as to the utility of bog-soil, whether as a bottom for cattle-yards or for mixture with heavy soils, and I repeat, therefore, that he who has a bog has a treasure, and he will find it to be so if he uses it. There is one peculiarity about the water, which is worthy of observation. It is quite clear that this immense body of water of which I have spoken falls from hills many miles distant. We could not have derived thirty thousand gallons a day during the whole summer from a limited area. I have intercepted its course over a very considerable hill, and have thus laid dry a hill three quarters of a mile off; and others have dried a hill of considerable extent on the other side. This illustrates the soundness of Mr. Baker's observation that a considerable amount of geological knowledge is essential to the success of draining operations. With regard to putting stones on the pipes, I do not think that it is at all necessary. I anticipate the arrival of a period when the bogs of Ireland will produce an enormous amount of grain as well as other food. But this can only be done by means of the application of a large amount of capital. At the same time, if the capital be judiciously applied, no one who has paid any attention to the subject can doubt that it would be profitably invested (Hear, hear).

Mr. Nesbit: I did not intend to offer any observations this evening; but no gentlemen having spoken in reference to the moor lands of Devon, I desire to state that I have recently visited them, and have therefore had an opportunity of forming an opinion with regard to them. I spent a fortnight at Midsummer in going over the land at Exmoor, over which our friend Mr. Robert Smith has control. The bog lands of that district are in general different in their nature from those of which we have heard this evening. Some of them are easily drained. You have only to plough the soil to the depth of 18 inches, this breaks the pan, and the water drains perfectly away into the porous substratum. By using a paring plough and burning on the flat, the soil is easily made to bear splendid crops of turnips. Where the peat is much deeper—8, 10, 12, or 14 feet in depth—the plan, as already described, is to cut a trench deep enough to drain the whole. Were Mr. Smith here he would be able to give you further information on the subject. I have no doubt whatever that the land of Exmoor will form first rate soils for the production of roots and green crops of every description, and that while you cannot expect, on account of the great altitude, that it will produce wheat like the south of England, you may reasonably expect to obtain from it a great amount of stock produce. I then went to Mr. Fowler's, of Dartmoor. That gentleman is making equally great improvements with those of Mr. Smith; but he has to contend with what they have not to contend with at Exmoor, viz., large masses of granite. There is great expense connected with the blowing up and removal of this granite. The plough is of no use against that. You might suppose that the peat found upon granite rock would have little subsoil. It is not so. I was much astonished to find in many places in this district 8 or 10 feet of decomposed granite gravel as subsol. It is therefore very easy to get granite decomposed to mix with the top when you have put in your lime. All the elements that you want, except lime, are there. I believe that with the addition of lime, both the districts to which I have referred may be brought into first-rate cultivation. I may mention that in one part of Dartmoor Forest, Moreton Hampstead, exceedingly good potatoes and wheat are grown.

Mr. Shaw, Strand: Mr. Chairman and Gentlemen—I do not profess to have any practical knowledge with regard to the draining of peat land. In the West of England, however, I have had an opportunity of seeing something of its cultivation; and I am rather disposed to make a remark or two on this occasion in reference to what I picked up there, than to dilate on the general question of the management of peat land. There is one fact upon which I can speak practically, having frequently witnessed its evil consequences, and that is that the wire-worm does most inevitably inflict a vast deal of mischief on peat land. (Hear, hear.) I have seen proof of that in the West of England. I have seen the whole of the crop in a field destroyed by the wire-worm. The point to which I shall now, in a very few sentences, invite your attention has reference to the expression which has been used to-night, that "he who has a bog has a treasure." (Laughter.) I have lately been meddling a good deal with bogs as regards the mixing of one bog with another. (Hear, hear.) If to have a bog be to have a treasure, there is indeed a vast treasure in this metropolis, for it is almost one huge bog. (Laughter.) And I do anticipate, from the experiments which have recently been made, that the bogs of Ireland may be very profitably used in converting the bogs of the great towns of England into treasure. (Hear, hear.) You have all probably seen in the public prints accounts of some experiments which have been made in the process of deodorizing, or rather rendering what we commonly call bogs capable of being manipulated and used by the admixture with them of a production of the bogs of Ireland, called peat charcoal. Now much as has been said on that subject, and much as many persons may be disposed to doubt its rapid and immediate effect on the bogs of the metropolis, I assure you that the process has been in no degree over-rated. The great question yet to be decided, and which will, I trust, be decided very soon, is the practical one—how far the material is available in the operations of agriculture. With respect to the contents, or rather the analysis of peat charcoal, there can be no dispute that it is in itself a very valuable manure. As regards common charcoal, two or three years ago Lord Essex gave, before the Council of the Royal Agricultural Society, an account of an experiment, in which he showed that, as a primary stimulant to push the plant forward, nothing was equal to charcoal. His lordship did not tell us whether or not he thought it would suffice to carry the plant out to full perfection, and produce the bulb; and I must confess that at present I don't think we are prepared to make the statement that it is sufficient for that purpose. It is quite sufficient to say that it is an active stimulant of the turnip in its incipient stages, when it is most in danger from the attacks of the fly. In Lord Essex's experiment seed was sown in the natural soil, without any manure, with charcoal and salt mixed, and with charcoal alone. The result was, that the plants which were sown in the native soil, without any addition, were just pushed up into rough leaf, those with a mixture of charcoal and salt were 6 or 7 inches high, and those with charcoal alone were 22 inches high, all having been othrwise treated alike. Then respecting the matter to which I have referred, night soil, no man can question the value of that article as a manure provided it can be put into a proper state for use. The effect produced by admixture with peat charcoal is such, that you may actually put it into your pocket. Those who have not had an opportunity of seeing the experiment will scarcely believe me when I say that a portion of nightsoil, after being put into a mill, was turned out in such a state, that three or four medical men—whose noses may well be supposed to be peculiarly quick at detecting scents—declared that they were not able to detect any odour whatever. A number of persons carried it away in their pockets just as you would carry sweetmeats (laughter). Now, gentlemen, if the one substance be admitted to be in itself a most valuable manure, and if the other be allowed to possess valuable manuring propeities, the simple and sole question is this —Will the two, if mixed together by any chemical operation, injure each other? If not, then they must form a most valuable fertilizer.

Mr. Nesbit: Impossible.

Mr. W. Shaw: If that be impossible, as our analytical chemist declares it is, then it is perfectly clear that the two combined would form a good manure. Then comes the question of what is its strength? and at what price can it be produced? (Hear, hear). Now, gentlemen, to those points I am anxious that the public attention should be directed. I should not have ventured to trespass upon your attention this evening, if I did not consider that the bogs of Ireland and peat charcoal were peculiarly worthy of attention. I have told my friend Mr. Rogers, who is deeply interested in this question, that it is of no use to content himself with showing that night-soil may be easily manipulated; that he must get some practical men to try this manure on the land, and so ascertain what are its effects, and that he cannot otherwise be successful. I would take this opportunity of saying that, in addition to the other advantages which we may expect to derive from the cultivation of the bogs of Ireland and those of England—for, of course, if peat charcoal can be made in Ireland it can also be made in England —is that of preserving one of the most valuable and important fertilisers, which is now not only wasted, but which, especially in our large towns, is converted into a noisome pestilence, to the great injury of the health of the inhabitants. As I observed before, I know nothing of the practical management of bog land; but I could not help reminding you that there is an immense mass of valuable matter now available for the agriculture of this country, if it can be produced at a sufficiently small cost.

Mr. Bennett said there was no necessity for going to Ireland to obtain peat charcoal, when they had a railway—the Eastern Counties—running right through a district which abounded with that kind of substance. There was an immense tract of bog earth all along the south-eastern side of Norfolk and part of Cambridgeshire; and if farmers had the treasure which had been spoken of, he could not see why they should resort to these learned gentlemen, in order to apply it to their own use. Surely they might use it without buying it by the bushel, at perhaps a considerable cost. He had been exceedingly entertained by the discussion that evening, and he had no doubt that the valuable observations which had been made, would tend to the advantage of the community at large.

The Hon. Mr. Wilson would like to know how the charcoal mentioned by Mr. Shaw was made.

Mr. Shaw replied that Mr. Rogers had a patent for its manufacture.

Mr. Webster believed it was made in much the same way as other charcoal. What the special application was he could not tell. It was burnt in a kiln.

Mr. W. F. Hobbs believed that since Mr. Jasper Rogers took out his patent they had not been at liberty to char peat without his sanction. The substance could not be very expensive. He (Mr. Hobbs) had used it with very great benefit for turnip crops, and he had no doubt that if it were generally applied the result would be equally satisfactory. Would the meeting allow him to make a remark with respect to the question of finding tiles for tenants? He had before expressed his opinion that the principle of the landlord providing the tenants with tiles, which the latter were to use, was an ansound one. The true principle was, he believed, for landlords to employ the most skilful agricultural engineers of the day to execute draining, in order that it might be done effectually, and then to charge the tenant a fair per-centage for the outlay. If tiles were found for the tenant, the outlay for labour was greater to him than to the landlord. In that case, too, it was frequently left to the agent to order the tiles; and the agent not being aware, perhaps, of the relative value of different tiles, a difference of one or two shillings per thousand in price often led to the putting of an inferior article into the ground, and in a few years the land was almost in the same state as though it had never been drained at all. The tenant's capital in labour, and the landlord's in tiles, were thus thrown away; whereas, if the landlord were to employ a good engineer, he would prevent the loss of his own capital and that of the tenant, because the work would be well done.

Mr. MECHI was decidedly of opinion that tenants generally were not fit to undertake the draining of bog lands. He had his own drains covered over with hay, to prevent the silth or grass from getting into them. If such matters were left to tenants generally, the probability was that they would not go deep enough. For the sake of a little economy, much damage might be done to the interests both of landlord and tenant. He hoped, therefore, that the Club would join in the recommendation that landlords should perform draining by means of competent workmen, charging the tenants a fair interest for the money expended.

The Hon. Mr. WILSON said this question was one of great importance, connected as it was with the general one of the relations between landlord and tenant—a question in which the country at large had a deep interest. The reason why he had not before entered further into the question of providing tiles, was that that was not the immediate subject of discussion; but he would now state, and he hoped without being considered egitistical, he had done himself in that matter, and had found to answer. Some years ago, certain portions of the property with which he was connected were found to be in a very depressed state, the tenants declaring that it was on account of the increase of the poor-rates. The principle which he then adopted was this: He said to his tenants, "I will not make you a return of rent, but I will give you so much—to one, £30; to another, £50; to another, £70; and so on, according to the size of the farm, which shall be laid out in draining or claying." That was 15 or 20 years ago, when draining was done with turf or straw. He had since set up a kiln for making tiles; and now land which before grew nothing more valuable than sedge, was producing very good wheat; he had known it to produce as much as 12 or 13 coombs per acre, and a corn-merchant at Downham had told him that one of the fields of wheat had produced nine quarters per acre. He admitted that there might be cases in which the landlord's performing the work, and being compensated by a per-centage, would be beneficial; but he had found practically that, where the landlord laid out money, and charged five per cent., the tenant afterwards came to him and complained that his rent was too high; and when asked why it was so, he replied: "Why, because there is this five per cent. charged" (Hear, hear). That was the way in which landlords were frequently met. He would here observe that, in order to prevent sand from getting into pipes or tiles, Mr. Smith, of Deanston, had recommended, before the Royal Agricultural Society, that they should be sealed—that is, that a certain quantity of clay should be applied. He (Mr. Wilson) had himself adopted that plan, and had found it beneficial. He had put in lumps of clay, and had had them trodden down, so that it was afterwards impossible for any sand to penetrate through. Before he resorted to that mode of procedure, when he adopted the plan first recommended of putting stones on the tiles, the water passed into the pipes, carrying with it sand or clay in solution. Under the plan upon which he had more recently acted, the drains had stood remarkably well.

Mr. RAMSAY said: I felt much gratified at hearing the remarks of our excellent friend, Mr. Webster; and I have no doubt that they will lead indirectly to very beneficial results. The discussion appears to me to have been carried on by gentlemen who are not in the occupation of large tracts of bog-land, but who hold small tracts of such land situated on farms where there is an abundance of other sorts of soil. I know that in the north of England there is a considerable amount of such land. There are thousands of acres which lie at the tops of high mountains, at so great an altitude that, if they could be brought into the same state as some of the land already spoken of, they would still be very unproductive. The difference between the bog-lands of England and those of Ireland depends very greatly on the respective altitudes. The bog-lands of Ireland generally are at a favourable altitude, while the reverse is true of those of England. I know thousands of acres of bog-land, I repeat, which, if they were drained immediately, would be very unproductive indeed. The question resolves itself into this—Bog land having too much vegetable matter, and other land having too little, how may an admixture be made, so as to produce benefit to both? (Hear, hear). If I had a small tract of bog land, either in the south or the north of England, where the altitude was not unfavourable, I should employ men to cart off the bog soil to other soil, and then the difficulty of draining would be much less. The laying of chalk or marl on bog soils, as described by Mr. Webster, may in many cases be beneficial; but I should prefer the carting of bog soil, and the laying it on other soils as contrary to its nature as possible. The expense of carting bog soil for any considerable distance may prevent the realization of any real benefit. There is one point which has not been much touched upon, viz., the expense of reclaiming bogs. In many cases the reclamation must be very expensive indeed. The drains must be very deep; the utmost care must be taken in laying the tiles, and unless they are carried down to a particular depth all will be of no use. As to the charcoal, to be made by I don't know what process, the question requires to be considered by practical men with great care. It may even be that bog land should be burnt into ashes at once. The vegetable matter contained in weeds ought not to be charred beyond a certain point. It is of such a nature, that when burnt, it is formed into two kinds of particles, and the exclusion of the air is a point to be borne in mind. The great question is, after all, whether there will be any advantage in the immediate draining of bog lands as compared with waste lands generally. We have so much work before us in relation to unreclaimed lands of various descriptions, that I am afraid that a considerable time must elapse before we shall be able to attend to the bogs. (Hear, hear). At the same time, I do not think the question ought to be disregarded. Indeed, we are, in my opinion, exceedingly obliged to Mr. Webster for introducing it. As farmers, we like to have a good deal of time to think of these matters before we commence operations. (A laugh). It is useless to set about the reclamation of bogs unless we proceed with care, and ascertain what strata we are going to work in. Without such enquiries we shall only spend money in vain. As to the question whether landlords or tenants should execute draining, it appears to me that that is entirely a matter of arrangement between the parties. I should like to see landlords drain the lands, and then let them to tenants for what tenants think them worth (laughter). I have never been able to understand why agriculture should not always be viewed in a commercial light. I know it is said that commercial principles are not applicable entirely to land; but I think that sound commercial principles are as applicable to land as to commerce itself (Hear, hear). If I were a landlord I would certainly never ask a tenant to drain. I would drain myself according to the best of my judgment, and then say to the tenant "What will you give me for this?" (laughter). Of course I should try to make a bargain with him (laughter). The question would arise, what sort of a lease he was to have, and that would form matter of arrangement in connection with the value of the draining operations. Of course the landlord has a right to make the best use he can of his property (Hear. hear), and in like manner the tenant is bound to look to his own interest. There is nothing else to be considered in any of the questions which we agitate. The owner of the fee simple should of course make the best bargain for himself; but if farmers will go heedlessly to work, and promise more rent than they can fairly pay, they must, like other men, take the consequences of their own imprudence (Hear, hear).

Mr. Smith, of Edmonton, said that about 25 years ago he entered into the occupation of about 40 acres of bog land, under a landlord who, unfortunately, was not in a position to drain it for him. In 1832 he obtained a lease, under which he set about draining it himself. He did not go through the bog in order to drain it. It was situated by the side of a stream with a rising ground above it, and he feeling convinced that the water came from a distance, he put his drain higher up, in the solid formation of the ground, succeeded in effectually tapping the spring which did all the mischief, and thus draining the bog. This land had never before grown anything but sedge; it was a snipe and duck pond, within eight miles of London, and no doubt there were many London shots who were well acquainted with it (Hear, hear). At first he could not get more than 12 feet of fall, which was not sufficient; but he afterwards went deeper, and the result was satisfactory. The drain, which was made 17 years ago, was now running with force as much as ever. He had grown wheat and potatoes alternately upon that land; 12 tons of potatoes per acre, 5 qrs. of wheat, 6 or 7 qrs. of rye, and turnips after the rye in the same season. He had sold the produce in the London market at £7, £8, and £9 per acre, all from one manuring, and it was now clearing away 30 tons of mangold wurtzel and 25 tons of swedes. The drain pipes were all laid in a solid bed of clay away from the bog, which was in form parallelogram. There were upright drains to relieve the main drain. It was of course very important to have drains separate from bogs.

The Chairman said: Before I call upon Mr. Webster to reply, I would make one remark in reference to what Mr. Hobbs said as to the execution of drainage, or rather as to who should do it. I have seen a practice in my own district, which, though no doubt it is pursued with the best intentions, is, I think, likely to be highly injurious to tenants. A team, if I may so term it, of drainers is sent to the farm, no questions being asked as to what part requires to be drained most; a certain field is drained without consulting the tenant, and a per centage of 6, 7, or 8 per cent. is charged. This I have seen done in the face of the fact that there were, at that time, 6 or 7 men standing idle on the farm, under the supposition, perhaps, that they were incompetent to do the work. I am perfectly convinced that, taking the country generally, tenant farmers are perfectly competent to do the draining, and that they will do it if they do but receive sufficient encouragement and a fair return. It appears to me very undesirable that a master-drainer should be sent upon a farm in the manner I have described, and supersede the men who are employed upon it.

Mr. Owen would like to learn from Mr. Hobbs what was the difference between the expense of burning earth or refuse, of which he had spoken, and charring it.

Mr. Hobbs:—I cannot exactly answer you with regard to charred peat, but I can with regard to charred wood. The difference between the expense of charring logs and roots of trees, and that of burning them, is most enormous. A few years ago I stumped up a quantity of pollard trees, and sold a considerable number of them after reducing them into logs. My neighbours pursued the same system; and as there was no sale for my logs, I wished to see what I could obtain from them as ashes applied to the soil for manuring. In our county logs are stacked fourteen feet long, three feet high, and three feet wide. Those stacks generally sold at 8s. each. The price was reduced to 7s. by the competition, and parties applied to me offering to purchase them at 6s., wishing me to find horses to cart them away. As I had given 4s. to have them knocked up into logs, this offer afforded a prospect of loss rather than of profit. I thought, therefore, that I could use these logs more advantageously for agricultural purposes. I placed two of the stacks together, and blazed them; and out of 14s. worth of logs I got six bushels of ashes, which, at 6d., the utmost value per bushel, produced, of course, 3s. Finding that that system would not do, I made inquiry with regard to charring. I found out a charcoal-burner, and asked him what he could produce from a stack of logs. He replied, "From twenty-eight to thirty-three bushels, according to the quality of the wood." I then agreed to pay him 1¾d., and he charred upwards of 1,300 bushels at that price, and the quality was exceedingly good for agricultural purposes. I have used some thousands of bushels mixed with guano, superphosphate of lime, or other manures, for turnips. I also now collect hedge roots, and have them charred in the same manner. I find that peat could be charred as easily as wood, while the expense would not be very great. I have no doubt that peat charcoal may be manufactured at an expense of from 1d. to 1½d. per bushel.

Mr. Webster replied. He said that with regard to the placing the drains, the first great object was always to go to the dry land above where the water broke out, and not to the soil in which the water had dispersed itself. As to the execution of the work, he considered that labourers who had not been accustomed to it could not alone do the work in a proper manner. There must be at least one or two practical labourers who had been in the habit of putting in spring drains. It was, in his opinion, quite a mistake to put stones on drains, or anything of that nature. Mr. Baker had remarked upon the importance of geological knowledge with reference to draining purposes. He (Mr. Webster) must congratulate the club on having obtained a good geological map since he last had the pleasure of meeting them—a map which he believed to be exceedingly accurate. For his own part he never travelled without having such a map with him. Nothing scarcely could be more important to farmers than to study the outlines of geological knowledge. A man who, after farming in the weald of the south, suddenly came to farm in the north, must be at a great loss when he came upon the blue lias without having such knowledge to assist him. The systems pursued in these two separate districts were almost wholly different. Mr. Shaw had shown so fully the important connection which existed between the bogs of this country and those of Ireland, that he (Mr. Webster) would not say anything further on that subject, except to hope that the combination of the age would produce a child which would be useful to all the farmers of this country (laughter). Mr. Ramsay had made a remark on the altitude of bogs; that point had escaped him in his opening address, but it was, in truth, very important, and ought never to be forgotten. No man ought ever to think of draining or cultivating a bog without finding out what are the altitudes. Many of the bogs in the north of England, and in Scotland, were at such an altitude that they were perfectly inapplicable to the growth of wheat. The remarks of Mr. Wilson and Mr. Hobbs in reference to the finding of tiles for the tenant were most important, and the subject should receive a careful attention. He agreed with the chairman to a certain extent. It was very hard for the tenant to have a number of strange labourers sent on his farm when his own were idle; but, as a a professional drainer, he knew the importance of care to have the work performed well. Within the last few weeks he had put into his hands, in Ireland, estimates for draining upon five or six different geological formations, at an expense of about £10,000, and not one of the drains would, if laid down according to the specifications, be worth 6d. (Hear, hear). It was, therefore, most essential to take precautions against a waste of money (Hear, hear). He had no doubt that immense sums were being thrown away throughout the country. The tenant was interested in the matter no less than the landlord; if the capital of the one were invested in pipes, the capital of the other was invested in labour. He thought he might congratulate himself on the tenor of the remarks which had been made that morning, and on the course which the discussion had taken. He had certainly been borne out by Mr. Mechi in his statement, that large crops could be grown on peat; and other gentlemen who had spoken had borne similar testimony. He trusted that the discussion would indirectly be beneficial to the whole community.

Mr. Shaw said that, in accordance with the practice of the club, he would move the adoption of a resolution; and as the club always wished to avoid committing itself on questions of a delicate or doubtful nature, he would simply propose the following:—"That the improvement and cultivation of bogs and peaty soils may in many cases, where the climate is congenial, be beneficially adopted."

The resolution, after being seconded by Mr. Owen, was agreed to, and a vote of thanks to the Chairman terminated the evening's proceedings.

GLEANINGS IN AGRICULTURE.

(*Continued.*)

49. *Farmers and Landowners*, by furnishing employment for the labouring class, will pay in wages (from which there will be a profit) what they now pay in poor's-rates, and for which nothing is received in return but a bad name, bad feelings, and occasional predatory and incendiary visits expected. It will therefore be their best interests to encourage the working classes, not only by advice and instruction, but by letting them land, and assisting them occasionally with the means of working it; and the owners of waste land will find their own interests promoted by their so doing. If, for instance, a gentleman having a tract of waste land—and many, yes, too many, have—were to begin by building cottages for the accommodation of as many families as would be requisite to cultivate the land, and to let it at such a price as a working man could earn a comfortable living, he would soon have his estate occupied by thriving tenantry, and his rent-roll swelled considerably.

50. *English Farmers* are in general not readers; therefore they lose all the recorded improvements of individuals, or of agricultural societies. The only agricultural education which the farmer receives is from the practice of his father, and the district in which he dwells, and which has been handed down from one generation to another, and adhered to with obstinacy which no reason can induce them to change.

51. *Educated Farmers.*—It is stated as a remarkable fact, drawn from an extended observation in agricultural districts, that in every case the sons of those farmers who had been reading men, retained or rose above the station of their father—that the sons of men holding 200 or 300 acres, for example, sunk to the station of labourers in one case, while in the other they either remained in their parishes, and had farms there, or went into the cities and rose above the station of their fathers, or emigrated and attained the stations of still more permanent comfort. In every case, where no special cause intervened, it is said that the sons of reading men either maintained the level of their fathers, or rose above that level.—*Prof. Johnston.*

52. *Curing Bacon.*—I think it is generally admitted that York bacon is equal to any; I will therefore give my plan. After being killed, it is allowed to hang twenty-four hours previous to being cut up; I then rub one pound of saltpetre on a twenty-stone pig (of 14lbs. to the stone), and one-and-a-half or two stones of common salt, taking care that it is well rubbed in: it is then laid in a tub kept for the purpose. After having laid a fortnight, it is turned over, and a little more salt applied, say half a stone. It then remains a fortnight longer in the pickle tub; it is then taken and hung up in the kitchen, where it remains two months to dry; but should the winter be far advanced, and dry weather set in, a shorter period might suffice. After being taken from

the top of the kitchen, the inside is washed over with quicklime and water to preserve it from the fly. It is then removed into a room not used by the family, away from heat, and where it will be kept perfectly dry, and is ready for use at pleasure. The smoking system is not adopted in York, at all events not in the part in which I write. The plan I have given never fails if done with care. The saltpetre and salt should be of the best quality, for upon those articles depend success in producing a good article for the table.—*Devizes Gazette.*

53. *Turnip Bread.*—Take any turnips and boil them in water till they are well done, then press out all the juice; pound them fine; add their weight of wheat flour, lalt, and warm water; knead it up like dough or paste, seaving it for a short time to ferment a little; then bake it like common bread, and eat it when cold. We have requently partaken of this sort of bread, and found it wholesome, nor is the taste of the turnips (except to dainty or nice palates) much perceived.

54. *Cow Manure.*—According to the best calculations the manure from a cow is worth, upon an average, about £5 sterling per annum.

55. *Turnips* should always be sliced, whether given raw or steamed to cattle, which will also enable old cows to eat them who could not break a whole turnip; and there is besides no danger of the animals choking. When sliced they can be boiled in a short time; but when, on the contrary, they are in a whole state, a longer time is required to steam them, and they also retain the heat much longer, which sometimes burns the cows when feeding. Steamed food produces more milk, and makes the cattle fatten sooner. Potatoes, distillers' grains, and wash produce the greatest quantity of milk, but the quality is thin and poor. On the other hand, green clover, ryegrass, clover hay, yellow and Swedish turnips, bean meal, oilcake, &c., produce rich milk and a fair yield.

56. *Cows.*—Keep no more cows than you can keep well. One cow well fed will produce as much milk as two indifferently treated, and more butter; and if the cow be wintered badly, she will rarely recover during the succeeding summer so as to become profitable to the feeder. Cows should by all means be housed in extreme weather, and particularly those which give milk, or the failure in the quantity and quality of the milk will be experienced: wherefore, instead of keeping twenty cows poorly fed, and but half of them housed, sell ten, and give the remaining ten food in amount equal to what the twenty originally had, and you will receive quite as much milk and butter as you originally did from the twenty.

57. *Horses* should not be too much deprived of the liberty of motion, as they too often are. Close confinement after hard labour will be apt to abate their circulation too suddenly, make them chilly, and stiffen their joints. Horses, therefore, should never be confined for room in their stables. Some stables are so low overhead as to bring horses into a habit of carrying their heads low. They should also have plenty of room to turn their heads to any part of their body.

58. *The Sunflower.*—The value of this plant, which is easily cultivated, is scarcely known amongst agriculturists. The seeds form an excellent food for poultry, and it is only necessary to cut off the heads of the plant when ripe, tie them in bunches, and hang them up in a dry situation to be used as wanted. They are also capital food for sheep and pigs, and for pheasants. The leaves when dried form a good fodder for cattle, and when in bloom are most attractive to bees.

59. *Horse Feeding.*—Take half a peck of unground Indian corn, half a peck of bran, and mix well with one peck of cut hay; moisten the whole with water. Occasionally substitute oats or beans for the corn. Feed only twice a-day. Your horses will thrive well, endure fatigue, and the nosebag will be dispensed with, as you need not feed them after they leave the stable in the morning until they return in the evening.

60. *Comparative Values of Food.*—A Mr. Joseph Martin, writing from Liverpool, gives the following statement of the relative value of different kinds of farinaceous food:—

240 pounds of wheat flour, at 40s., will yield 330 pounds of bread, at nearly 1¾d. per pound.
240 pounds of potatoes, at 20s., will yield 180 pounds of food, at nearly 1¾d. per pound.
240 pounds of oatmeal, at 48s. 6d., will yield 720 pounds of food, at nearly 1d. per pound.
240 pounds of rice, at 61s., will yield 960 pounds of food, at nearly 1d. per pound.
240 pounds of hominy, at 40s. 8d., will yield 1,200 pounds of food, at nearly 0½d. per pound.
240 pounds of maize powder, at 45s., will yield 1,200 pounds of food, at nearly 0½d. per pound.
240 pounds of Indial meal, at 38s. 6d., will yield 960 pounds of food, at nearly 0½d. per pound.

61. *Foot Rot in Sheep.* — Quicklime occasionally sprinkled over the sheep pens is an effectual precaution against the foot rot.

62. *Earths.*—The solid contents of the globe are composed of several elementary substances, amongst which have been enumerated no fewer than ten different kinds of earth—

1. Silex	5. Glucine	8. Strontian
2. Alumine	6. Yttria	9. Lime
3. Thorinum	7. Barytes	10. Magnesia
4. Zircon.		

These, when freed from foreign admixture, are for the most part of a white colour, not soluble in water, not combustible, and do not exceed four times the weight of water.

J. M'Intosh, Milton Abbey.

(To be continued.)

THE MODEL FARM AT FARNBOROUGH, ON THE BORDERS OF HAMPSHIRE.

It has given pleasure, on a former occasion, to notice a small farm under the above title, as a model for the district; it is now wished to report progress, and speak of the success which has attended the spirited outlay. Every old hedge was grubbed, the fields made square, and redivided with new quick or thorn hedges, which by proper culture and attention has now become good division fences, occupying only twelve inches of surface: whereas the former divisions engrossed ten feet or more ground. This land, part of Bagshot sand formation, was in the market for sale for many years, without obtaining a customer; now, if it should be again for sale, it would not be long wanting a purchaser. But does the outlay pay?—does the high farming yield a return? These are questions often asked by those who do not understand the principle that if an animal or track of land does not pay when well and properly supplied with the necessary pabulum, neither will they pay for being stinted or starved. The same rent, taxes, ploughings, and other incidental expenses pertain to an indifferent crop as to a very good one, the cause of the difference being often only a few shillings more expended in labour and in manures per acre, than is usual with needy farmers. It is the proprietor only who can know if his system of farming pays for the outlay, and yields him an interest on the expenditure for the very great improvements in the aspect of the estate. It is interest only that can be, in justice, asked on the improvements and fanciful purchases, such as bulls and cows, and rams, at excessive prices, because they are from the stock of a particular person. A gentleman demands right to have hobbies in farming, as others have in horse-racing or fox-hunting: either may tend to obtain good health by exercise in the air. A few hundred pounds spent in farming, for the pleasures of the enjoyment of the country, and for the attainment of appetite and blessing of health, may well be spared by those who can afford the same. The traducers, or those who feel jealous at seeing innovations made on old practices, and who are so ready to say such expenses cannot pay, may be answered, in this instance, by the proprietor himself, who has very lately purchased another farm adjoining, and has treated it in a similar way, by putting several fields into one, making them square, effectually draining, ditching, and fencing; not content in draining his own land, but volunteers to drain other persons', so the more effectually draw off the water from his own.

Few professional gentlemen, such as Joseph Timms, Esq., the proprietor, like laying out money for the pleasure of expenditure alone—they expect a return for their outlay; traducers may, therefore, infer (if they like to understand the subject clearly) that the success attendant on the first model farm has induced a further expenditure on additional land on the same principle; not only has more land been purchased in a low situation, for pasturage, but an additional farm has been taken at a rental, in a more elevated spot, so as to raise roots, and pasture sheep and cattle, in high and dry positions, and in unpropitious seasons. The proprietor now can rear all kinds of stock, and fatten them also; those moors, swamps, sandy heaths, and wastes, that formerly would scarcely keep a rabbit per acre, have now beceme fattening land. Such must be the case, where five quarters of wheat, seven quarters of barley, 30 tons of swedes, 40 tons of mangold wurtzel, four tons of clover, are grown per acre, per annum. At this time may be seen barns full of corn and yards full of stacks, the produce from 130 acres of arable, 70 acres of grass, and some rough pasturage on hills and under treés. In this land are now being reared and kept, in the very best manner, eight farm horses, principally brood mares, thirteen colts obtained by a cross with the best Cleveland blood, famed for symmetry, bone, and action. There are 33 head of superior Durham short-horn cattle; 330 Hampshire down sheep, 300 of which are brood ewes, with which have run some prize rams from the stock of C. E. Rumbold, M. P. Of the swine, there are 70 head of the large Yorkshire breed. Thus is the land stocked; and the following produce will enable them to be wintered, the lambs reared or fattened for markets, the neighbourhood supplied with fine animals of every useful kind. Nor are the lesser supplies to the district neglected, for the assiduous housewife of the bailiff (Abraham Hutty) is no less attentive and careful of the crumbs and the pence, than is the good husbandman of the land and the valuable stock, for she has poultry, eggs, and butter, ever ready for the calls upon her for the same. The dairy-room, also, is a pleasure to behold, the utensils being ever as cleanliness commands.

In the principal yard, near the cottage residence, may be seen six stacks of wheat, of a peculiar symmetrical form, hollow-backed, and pigeon-breasted; three stacks of barley, one of peas, three barns full of barley, ten hay-stacks; and there are on the farms, 21 acres of swedes, common turnips, and kohl-rabbi; 7 acres of red and yellow mangold wurtzel; 13 acres of mustard, after peas and barley; 23 acres of clover have been cut, of a luxuriant growth, and the aftermath fed off by sheep. Scarce a weed is to be seen in the fields, nor can the hedges supply the fields with seed for another year's weeding—all have been cleaned, and 46 acres of stubble have been scarified, and rubbish cleared from the surface to supply a winter demand for litter. Thus have been afforded opportunities for the quick growing turnips and mustard, so as to make a late and an early winter food, or offering a clean surface for any spring cropping. Of the farm-steads little need be said, than that the comfort and health of the animals have been studied; the liquid manure tank judiciously placed away from the yard, that the fumes therefrom might not injure the inspiration of the cattle; all buildings having been guttered, the rain water is led into wells in an opposite direction.

Much is said relative to farming not yielding a return for the outlay; this, if a fact, would soon cure itself, for the pursuit would not be followed, farms would become more plentiful, and hence cheaper; less rent would be demanded of the tenants, who will have also all their other necessary expenses lowered, when food on an average of years becomes so. Poor-rates consist principally of food, and so also of all the labour of a farm, either of the ploughman or the ploughmaker. The tithe will also necessarily be lowered in the course of years by the price of food, so that the farmers will be on the same advantageous footing as before when rent is lowered: like water, every thing will find its level. It is only a severe loss to farmers in the instances of long leases, at set rents, disproportionate to the altered times. Corn rents cure themselves. It is the owners of land only who will suffer, as they will receive a less money rent for their property; the cry, therefore, should be on the part of the landlords only; it is hypocrisy to cry out for the benefit of tenant farmers. The landlords should bear in mind, that all their necessary expenses have been, and will further be, much reduced, either of food, clothing, or shelter from the seasons. If more gentlemen farmers will rear fine, fashionable animals, similar to what has been described at the Hants model farm, then would the buying in of these animals be less costly, because more plentiful, and farmers need not then give £80 for a bull or cow, and £30 for a ram; it is such expenses as these that often make farming not remunerative, particularly when accidents or premature death occurs to these expensive animals. There has been lately as much competition (madness) for the possession of particular breeds, as, at times, there is for old and unique books (a bibliomania). A free importation and exportation must ultimately cure this madness, from a more plentiful supply: it is futile to attempt the conversion of the effect into the cause. G. J. L.

Barossa, Bagshot.

[It is scarcely necessary to observe that we do not concur in the sweeping remarks contained in the above.—Ed. F. Mag.]

CHEMISTRY APPLIED TO AGRICULTURE.—SIR ROBERT KANE.

No. V.

BY A FARMER.

That it is much easier to find fault than to do better—more especially if we do not understand the process or practice on which we venture our fault-finding remarks—is admitted by every one; and yet how often do we see the folly committed! We have just met with a very striking instance of this in the following remarks of Sir Robert Kane, on Fallows, as quoted from the second edition of his Elements of Chemistry, in the *Agricultural and Industrial Journal of Ireland*:—

"A mode of restoring to the soil the principles lost by *indiscreet* cultivation, is that of *fallowing*. It is," says Sir Robert, "a method synonymous with an ignorant and improvident agriculture. The soil having, by overwork, lost on the one hand some of its essential ingredients, requires time to gather, by the decomposition of the underlying subsoil or rock, a proper quantity of them to supply the elements of the succeeding crops; and having been deprived of its organic elements, it must be allowed to gain from the atmosphere a suitable quantity of ammonia, or by the gradual decay of the roots of the preceding crop, a quantity of carbonic acid suitable to the wants of that which is to follow. But all these effects may be more profitably and more perfectly secured by the intervention, in a succession suitably arranged, of other crops, which exercise upon the soil actions alternately opposed. *There is absolutely no other reason assignable, for allowing a field to lie idle every second or third year, but ignorance on the part of the farmer of what could otherwise be done with it.*"

That Sir Robert Kane is not a practical farmer, and therefore capable of giving such a decided opinion, is evident. That he is profoundly ignorant of the subject is also shown by the facility with which he spurts out against the farmer such accusations of "ignorance," "improvidence," "indiscretion," and such like. No one thoroughly acquainted with agriculture would have penned the paragraph above quoted.

It is hardly necessary for us to prove the necessity of fallows, and that, instead of being synonymous with an ignorant and improvident agriculture, they are in reality the cheapest method of maintaining one very large class of soils, namely, all strong clays, in cultivation; but as the practice and its followers are here so openly attacked, a few remarks in defence may not be unnecessary.

The farmer, on a strong clay soil, has no very enviable situation. On the one hand his fallows are ridiculed and his practice condemned, until he is compelled to try, by means of potatoes, turnips, beans, peas, tares, green crops ploughed in as manures, and lastly, by the use of artificial manures, whether he cannot reduce the extent of his unproductive land. Much has been undoubtedly done by all these means, conjointly with draining, to lessen the extent of bare fallows; but still there are thousands of acres upon which the farmer finds, by experience, that bare fallow, succeeded by wheat, clover, and oats, is the most profitable rotation.

There is one class of soils from which fallows have been banished—namely, those on which turnips can be eaten on with sheep. As the turnip is undoubtedly one of the crops by the intervention of which Sir Robert Kane says fallows may be dispensed with, we will show the important difference between the rotation where turnips are obliged to be pulled off the land (if even they can be grown), and the rotation where they are eaten on with sheep; thus proving the necessity of fallows in the former case, and assigning a reason why they have been dispensed with in the latter.

1st. The turnip, when eaten on with sheep, leaves a large quantity of *vegetable* matter in a state of fermentation and decay.

2nd. On the other hand, the large quantity of vegetable matter which is necessary for the following crops can only be added to strong clays by the use of farm-yard manure, and which can only be applied to wet clay soils during a summer fallow. The comparative effects of eating turnips on land, and bare fallowing with farm-yard manure, will be best seen by the following tables:—

Turnips leave on the ground—

Nitrogenous substances,	..	555 lbs.
Carbonaceous ditto	..	4446
Ashes, or inorganic matter		267

Ten tons of farm-yard manure supply—

Nitrogenous substances	..	224 lbs.
Carbonaceous ditto	..	4256
Ashes, or inorganic matter		672

The question here forcibly intrudes itself upon our notice—If, as above shown, farm-yard manure will supply carbonaceous matter and ashes to the same extent as the turnip crop does, why cannot farm-yard manure enable the farmer to dispense with fallows? The previous table shows at least one reason, namely, that farm-yard manure only supplies of nitrogenous substances, 224 lbs.; whilst the turnip crop contains 555 lbs. During the fallow, the soil, as Sir Robert Kane himself remarks, absorbs ammonia from the atmosphere in sufficient quantities for the following crops. Here, again, another difficulty startles us. If this were the only reason for fallows, might this ammonia not be supplied by the use of sulphate or muriate of ammonia? In answer to this question, we can only say that all experiments with this view have failed.

Such, then, is a scientific view of the necessity for bare fallows on certain soils. It is quite unnecessary to enlarge upon the mechanical difficulties which present themselves to the farmer of strong clays, whenever he attempts to alter this part of his farming arrangement. Nothing is easier, as we said at the outset, than to find fault with the farmer; but there is no harder problem than to do better.

Besides the carbonaceous matter, to the supply of which, during a bare fallow, we have made some allusion, it is well known that our crops remove much more inorganic matter than is contained in the manure supplied. There is, it is true, no difficulty in merely adding these inorganic substances to the soil. But science and scientific men have hitherto failed most signally, in their attempts at supplying by artificial means, and *in a state fit for entering into the circulation* of the wheat crop, the potash, soda, lime, magnesia, silica, &c., which it requires—we say they have failed signally in doing so more economically than, and half as perfectly as, the farmer does by his bare fallow.

These remarks on fallows are introduced by Sir Robert Kane into a brief summary of his views on "The Chemical Phenomena of Vegetation." We may reasonably expect that, when any one ventures to accuse a body of men of ignorance, he has at least taken due care to have some title for doing so, by his own more perfect attainments. If this view of "The Chemical Phenomena of Vegetation" be Sir Robert's proof of capability, it is certainly a very poor one, as it does not contain one original view on the subject, nor has it even the merit of being a good summary.

EXTRACT FROM REPORT ON DAIRIES.

Judges.—B. P. Johnson, H. C. Tuthill; Thomas Burch.

The committee on dairies respectfully report that but one application has been presented for their examination, by John Holbert, of the county of Chemung. By an arrangement of the Executive Committee, the subject of dairies, embracing butter and cheese, was referred to one committee. The application of Mr. Holbert will be particularly noticed in a subsequent portion of our report.

The dairy business of this State is becoming one of its most important interests. It is yearly increasing in extent and importance, and as our wild lands in central, northern, and western New York shall be improved and cultivated, it is destined to become second in importance to no other branch of industry. It is apparent then, on a single moment's reflection, that the manner in which this branch of the business of the farmer is conducted has an all-important bearing upon the prosperity and success of the farmer, as well as upon the character and interest of the State itself. The difference which is now paid for the article of butter, between dairies of the first character and the large proportion of dairies in this State, averages from 6 dols. to 8 dols. per 100 lbs. The securing, then, such a change in our system as will bring all up to the standard of our best butter would add millions to the wealth of our own citizens, and contribute largely to the comfort of those who are the consumers of our products. Is there any good reason why this may not, to a very great extent at least, be accomplished? Looking at this subject as we would upon all others connected with the right management of the farm, and believing that what has been accomplished in a given case can in a hundred or a thousand others be accomplished, we hesitate not to say it can be accomplished. If it can be, the question then occurs, Shall it be done? To this we say—the answer rests mainly with the dairymen of New York; and we will not for a moment permit ourselves to doubt, that when this subject shall be brought home to their very fireside, the answer from every hill and from every vale will be "We will try," and then, from our knowledge of the character of the farmers of New York, we venture to predict that they will succeed.

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Preparation of Butter.

The manufacture of butter, in all well conducted dairies, does not very essentially vary. The manner given by Mr. Holbert is that which is substantially adopted in many of the best dairies in the country. The churning of the milk is strongly insisted upon as highly important and necessary for butter, especially designed for warm climates, and for preservation any considerable period of time. Mr. Hawley, of Binghampton, who has for many years been engaged in the purchase and shipping of butter for foreign markets, says, in speaking of the Orange county butter, which owes its celebrity mainly to the manufacture: "The perfect neatness and cleanliness of everything about the dairy, the *churning of the milk* instead of the cream, and the attention to the quality and quantity of salt used. are the principal peculiarities. The churning of the milk *I deem essential* to butter intended for long voyages. It gives it a peculiar firmness and fineness of texture, and wax-like appearance when fractured, which butter made by churning the cream seldom or ever has. These peculiarities can generally be detected by the eye. There is a cream-like flavour to milk-churned butter, which I have never found in butter manufactured in a different manner.

Mr. Holbert, it will be perceived, also churns the milk, and gives, with particularity and clearness, the method of his manufacture; and from the price which he has obtained for his butter for the last ten years—never, in a single instance, falling below 18 cents, and sometimes reaching 28 per lb., for his whole dairy—it would seem advisable for him to continue a system which has produced such satisfactory results. Very many of our first-rate dairymen churn only the cream, and it is believed that far the largest portion of our dairymen pursue this course. In looking at the statements of the seven competitors who received the premiums at Buffalo, of whom Mr. Holbert was one, six others churn the cream, and Mr. Holbert *only*, the milk. Of those who received the first premium in three of the classes, they were awarded to those who churned the cream—Mr. Holbert receiving the first premium in the other class. Of those competitors, it is proper to say, that two of the dairies are well known to the chairman of the committee; and one of the competitors, it is believed, has never yet been beat where he has exhibited, as he often has done, and it is believed, at three State fairs, if not more.

Where a difference of opinion exists on this subject among those who are every way competent to judge, and whose interest will certainly induce them to pursue that method which promises the largest return both in quality and quantity, the committee do not feel themselves called upon to give a decision. Each of the methods has its advantages undoubtedly; and there can be no doubt whatever, that butter on both these plans is made throughout this State, in a great variety of dairies, that cannot be excelled.

The samples exhibited here at our present meeting, for premium, is illustrative of this. Two competitors present themselves; one Mr. Holbert, and the other Hon. Mr. Tuthill, of the assembly, an original Orange county dairyman, though now a resident of Cayuga, where he now makes as good butter, and, as he thinks, a little better than he did in Orange, and which does and has commanded at all times as good prices as when he lived in Orange. These samples were made in the two modes alluded to, and the committee whose province it was to pass judgment upon these samples, say to us that both are first rate, and such it is presumed is the judgment of every gentleman who has examined and tested them, especially of those who readily gave 25 cents per lb. for it.

We give the manner of making butter of E. R. Evans, Esq., of Marcy, Oneida county, who is one of our best dairymen, whose statement will be found in the report of the committee on butter at the fair.

"Milk is strained into pans, and remains 36 hours, and skimmed into pots with a small quantity of strippings, and stands until it becomes a little sour. Churned with the old-fashioned dash churn, operated by dog power. Milk is freed from the butter with the ladle, and without washing, as it is believed that much washing injures the flavour and the grain of the butter. Use the Ashton ground salt, and no other substance. The quantity of salt regulated by the dairy maid."

We have no doubt that in either these modes, made with the care and neatness with which these gentlemen have for so many years, and with signal success managed these dairies, butter can be produced that will lead the fanciful in such matters, to pay 33 *cents per lb.* for it in New York, and call it *Goshen butter!*

Premium awarded to John Holbert's Dairy, Chemung.

A statement of Mr. John Holbert's butter dairy and farm, located in the town and county of Chemung, New York, adjoining the Pennsylvania State line: elevation about 800 feet above tide water, and at 42 degrees north latitude. The farm contains 200 acres of land, which was farmed the past season as follows. I have kept and milked forty cows, and my grain pastures and meadows are as follow:—24 acres of wheat, 8 of buckwheat, 10 of oats, 20 of corn and potatoes, 2 of summer fallow, 40 of meadow, 74 of pastures, 22 of wood and waste land.

The soil is a gravelly loam with a slight mixture of black sand; subsoil the same. I use no roots or slops for my cows; all that I feed them on is hay and grass, and corn stalks. My pastures are clover and timothy, and hay the same; and my meadows produce from one to two and a half tons per acre per annum. I sow plaster on all my pastures and meadows every year, and use the Cayuga plaster.

Breed of Cows.

My cows are generally the common breed. I have a few that have a slight mixture of Durham blood in them. Their ages will range from three years old to twelve. I prefer a cow not less than five years old for the dairy, and as much older as she winters well. I change pastures often, and think it a good plan to change twice a week. Too much care cannot be taken to have your cows well watered and salted. I keep a large watering trough in my cow yard, where I frequently observe cows drinking large quantities of water immediately after coming from the brook. I keep salt lying in the yard all the year round.

Making Butter.

I take care to have my cellar thoroughly cleansed and whitewashed early every spring. I keep milk in one cellar and butter in another. Too much care cannot be taken by dairymen to observe the time of churning. I usually churn from one hour to one hour and a half. I put from one to two pails of cold water in each churn, before commencing to churn, and one pail more when nearly done, in order to thin the milk, and make it produce all the butter it contains. When done, take the butter out, wash it through one water, then set it in the cellar and salt it, then work it from three to five times before packing. Butter should not be made quite salt enough until the last working. Then add a little salt, which makes a brine that keeps the butter sweet. One ounce of salt to a pound of butter is about the quantity I use. I pack the first day, if the weather is cool; if warm, the second day. If the milk is too warm when churned, the quantity of butter will be less, and the quality and flavour not so good as when it is cooled to a proper temperature. I have always worked my butter by hand. Last fall I bought a butter worker; but I disapprove of its use entirely, and recommend the hand ladle in its stead. In packing, I fill my firkins to within two inches of the top, then lay a clean cloth on the top of the butter, and put salt on the cloth and keep it covered with salt and brine all the season. Great care should be taken not to let the milk stand too long before churning, as in that case in hot weather it becomes too sour, and the butter will be sour also, and in cool weather it becomes bitter. All of which can be prevented in cool weather by putting about one quart of buttermilk in each pan or tub before straining the milk, and in hot weather by churning as soon as the milk becomes thick and moist on the top of the cream. I use the Turks Island salt of the Ashton sacks. I have never used any of the solar evaporated salt, or steam-refined salt from the Onondaga salt works.

Experiments.

I tried several experiments in making butter the past season, among which are the following:—Commenced making butter about the 1st of April, and up to the 4th of May made 512 pounds of butter. May 5th, 1848, commenced packing for fall market, and closed about the 15th December. June 15, drew the milk from 37 cows; morning's mess, 525 pounds; evening's mess, 632 pounds of milk; in all 1,157 pounds of milk, making 3 pounds 11½ ounces of butter to 100 pounds of milk. June 20, had three more cows come in, which made my dairy full. My cows commence coming in, or calving, in March, and do not all come in until the middle of June, as was the case this year. My dairy was not full till the 20th of June. I do not rear all the calves, but generally save a few of the finest; this year I reared six. I keep swine to consume the butter-milk.

I drew the milk from 5 cows for 30 days in succession, commencing with the 28th day of May, with the following results, viz.:—I made 248 lbs. of butter from 5 cows in 30 days. On the 11th day of June, I drew from 5 cows 187 pounds of milk, which made, when churned, 8½ pounds of butter. I churn all the milk, and churn by horse power, and usually churn 4 one and a half barrel churns at once.

On the 8th day of August last, I drew the milk from 40 cows; in the morning I got 508 pounds, and in the evening 519 pounds; in all, 1,027 pounds of milk, which, when churned, made 39 pounds of butter. The morning's mess made 3 pounds and 14 ounces of butter from 100 pounds of milk; and the evening's mess made 3 pounds and 10 ounces of butter from 100 pounds of milk. I find that the morning's mess or milk, made four ounces more butter than the evening's did from 100 pounds of milk. I also find that the difference between the morning's and evening's milk is not as great as it was for the last year, for the reason that the messes are nearly equal.

The table omitted shows the difference between the milk of different cows. I find by churning the milk separate, that one of my best cows will make as much butter as *three of my poorest*, giving the same quantity of milk. June is a much better month for making butter than July or August, as I made one hundred and seven pounds more butter from thirty-seven cows in June, than I did from forty in July. I find also that one hundred pounds of milk drawn from my best cows (that is, those that give the richest milk) will make *one pound more butter* than one hundred pounds drawn from the whole herd. There is more difference in *quality* than in quantity. For making butter, it will pay all dairymen well to look to the quality of milk their cows give. One cow well kept is worth two cows poorly kept, for dairying. I am inclined to think that two many farmers overstock their farms, and consequently keep their pastures too short; as lands that are kept with a good coat of grass on them through the season stand a drought much better and produce pasture earlier the next season, and cows will do better on them than on shorter feed.

Quantity of Butter made.

As I have said before, I commenced making butter about the 1st of April, and up to may 4th made five hundred and twelve pounds, then commenced packing for the fall market. Made in May, twenty-six days, seven hundred and forty-seven pounds; in June, thirty days, made eleven hundred eighty six pounds; in July, thirty-one days, ten hundred and sixteen pounds; and from September first up to December 15th, three and a half months, nineteen hundred forty-eight pounds, which is about the close of the season for making butter. I sold my dairy this year to R. Clearwater. at 183, Washington-street, New York, on the 30th day of November, for twenty-three cents per pound, which amount was five thousand and thirty-four pounds; the spring butter, and butter that was sent to the different fairs, and the butter that was made after the dairy was taken off, amounted to fourteen hundred fifty-four pounds, the whole averaging twenty-three cents per pound, amounted in cash to fourteen hundred ninety-two dollars and twenty-four cents, that is over and above family use—andour family will average over eight in number—and which finally makes an average of thirty-seven dollars and thirty cents per cow, including heifers.

I sold my dairy last year to C. Adams & Co., at 224, Fulton-street, New York, for twenty-four cents per pound. I am told by them that it went South, and stood the climate well.

All of which respectfully submitted.

JOHN HOLBERT.

—Transactions of N. Y. State Agr. Society, 1848.

BURTON-UPON-TRENT FARMERS' CLUB.

The club met on Thursday the 6th of September last. Among those present were Messrs. Worthington, Lyon, Daniel, A. Bass, Gretton, Lathbury, Robinson, Harding, Coxon, W. Hopkins, Bernays, Wagstaff, S. Higgott, Warren, G. Greaves, H. Yates, and Darley. Several strangers were also present. Mr. WORTHINGTON took the chair; and after other business had been disposed of, Mr. GRETTON was asked to introduce the subject appointed for discussion. This he did by reading the following paper :—

ON THE PROCESS OF CHEESE MAKING, AS APPLICABLE TO THIS DISTRICT.

Gentlemen, it is hardly necessary for me to remark that the subject of cheese making is a most important one; and since my attention was engaged on it, with a view of getting the best information as a guide to my own process of manufacture, I have found that there is scarce anything certain about the practice. It is, therefore, a very proper subject for us to discuss ; but as I have not hitherto had much experience in dairy farming, and as since I was requested to introduce the subject to your notice, I have not had opportunity or leisure to attend minutely to it, I am aware how very imperfectly I must fulfil the task you have given me. If I had been present when it was proposed to give the subject into my hands, I should have intreated you to select some member of the club who had had longer experience than myself. But as I have accepted the office, I have now only to endeavour to state my opinions and practice clearly, in the hope that I may turn the discussion to points which may prove interesting and profitable to you.

It was only last year that I commenced cheese making on my farm. My first business was to make inquiries personally, and through my friends, of persons in this and other districts whose cheese was celebrated for its quality. My inquiries have been tolerably extensive, and the information I have received is valuable. But I cannot say that I have found many instances where manufacturers have conducted the process on anything like a scientific principle. I have learned a good deal about what is done, but very little indeed about why this or that method is pursued. Cheese making is a process partly chemical and partly mechanical, and cannot be rightly understood unless the effect of the rennet on the milk, the effect of various temperatures on the curd, the effect of salting in various ways, the effect of various plans for crushing and pressing the cheese, and lastly, the effect of the temperature of the cheese-room on the cheese, be known. Now, when we remember that a thermometer is seldom used by cheese makers, and that without one a person is quite incapable of ascertaining within many degrees the temperature of the milk, it is not strange that there should be much inequality in the cheese of the most carefully managed dairies. If dairy farmers would pay minute attention to every part of the process, cheese making might be reduced to a system, which, when the principles were known, might be varied according to circumstances. But under the present state of things a man must follow a fixed method, which is to be entrusted to a dairy maid to carry out, and when the cheese is imperfect he knows not how to repair the defect.

My aim, as I have told you, was to gain information of the practice followed in the best dairies, and to adopt what seemed to me best fitted to such principles as I had gathered from other sources. I cannot assert that I have been able to choose the best method, or that my opinions are just; but I have tried to understand what I was about.

I will detail to you my first attempts, on which I made some failures, and also my present practice. But before going into this detail, I think it will be best to ask your attention to a very few brief remarks on the general properties of milk, and the effect of the various agents employed in cheese making. I will not detain you more than a very few minutes on this part of my subject, because we are met to discuss the question in a practical, and not a scientific way. Milk consists of several ingredients—curds, butter, sugar of milk, and various saline matters. The proportion varies in the milk of different cows ; and in that of the same cows at different periods from calving, and when fed in different pastures. But I extract from Professor Johnston's lectures the following analysis, which may be taken as a usual proportion of matter in milk : —

Pure curd	4·48
Butter	3·13
Milk sugar	4·77
Salines	0·60
Water	87·02
	100·00

The quantity of curd and butter of course determines the quantity of cheese given by any quantity of milk. But the proportion of salines has most probably a very considerable influence on the process of making cheese. The quantity of salines or ashes of milk may vary from 2 to 7 lbs. in 1,000 lbs. I extract from the same lectures two analyses of these ashes, to show the different kinds of proportions in two samples of milk :—

Phosphate of lime ..	2·31 ..	3·44 lbs.
Phosphate of magnesia	0·42 ..	0·64
Phosphate of iron ..	0·07 ..	0·07
Chloride of potassium	1·44 ..	1·83
Chloride of sodium ..	0·24 ..	0·34
Free soda	0·42 ..	0·45
	4·90	6·77

You will see that phosphates and chlorides are the main ingredients, and that there is a quantity of soda not united with any acid. This free soda is a very important ingredient, for by means of it the curd is held in solution in the whey; and when it is neutralized by an acid, the curd is separated by coagulation, and the butter is mixed with the curd. We know that when milk stands long in a warm atmosphere, it goes sour and curdles. The sourness is caused by the conversion of the milk sugar into an acid, called milk or lactic acid; this acid unites with the free soda, and thus the curd is separated. By putting rennet to the milk, this process of souring immediately takes place; and as soon as it has proceeded far enough to neutralize the acid, the curd separates. A certain height of temperature is needed to cause coagulation, and the degree of tenderness or toughness of the curd depends on the heat at which the milk is mingled with the rennet. The degree of sourness to which the milk is carried also has an effect on the curd, as every one knows who has tasted sour cheese. I will now state to you what I believe to be the effect of different temperatures and different quantities of rennet. If the temperature of the milk be low, the curd will be tender, and the whey will not separate from it. If the temperature be high, the curd will be tough, and the cheese, when made, will be too waxy. If too much rennet be added, the souring will go on too fast; and before the curd is firm enough to be broken up, it will be affected by sourness. If too little rennet be added, the milk will necessarily grow cool before the curd coagulates sufficiently, and will, therefore, be too tender. The object, therefore, should be to steer clear of extremes, either of temperature or of the quantity of rennet.

Though the cheese of various districts is different in some qualities, yet a good cheese has in all districts some qualities in common. Its texture should be tender and buttery, its flavour mild, its outside firm and nicely coated; and there should be no cavities within caused by heaving. If the milk be put together rightly as to temperature, and the curd well managed, the cheese will be such as I have described. But why are not all our cheeses of this kind? I will try to explain the causes of the common faults in cheese. There are three which are most common—a strong flavour, heaving, and a mawkish sweet tainted flavour.

The strong taste is, I believe, caused by changes in the butter, similar to those which happen when butter itself grows strong and rancid. The use of too much rennet is generally thought to be one cause of it. Heaving of cheese is caused by a fermentation in the whey left in it. Gases are formed which expand the coats of the cheese; it is said that in some dairies heaving can scarce be prevented. I believe some pastures do create great difficulties; but that difficulty, I apprehend, arises from its not being easy to get such a curd as will allow the whey to be well pressed from it. There is always great risk in heaving unless the whey be well got out, and a cool cheese-room is also necessary to ensure cheese standing in some dairies; but with these precautions I do not think cheese will ever heave. The sweet cheese, I believe, is caused by the milk or curd contracting a putrid taint; and I have reason to believe that a little saltpetre or common salt, mixed with the milk in the cheesepan, will prevent it.

I most earnestly recommend a strict regard to cleanliness in every part of the process: much mischief may arise in various ways from want of attention to it. Many reasons could be given why cleanliness should be regarded; but it will, perhaps, be sufficient if I say that the butter may become rancid and affect the flavour of the cheese, and the cheese may be sour from want of proper attention to cleanliness.

I now proceed to my own experience, and the practical rules I have formed from it. When I proposed first to make cheese on my farm, I was informed that the land, and one pasture especially, would not make good cheese, unless a good proportion of butter was taken from the milk, and the cheese scalded. I desired to avoid both these plans, and began to make cheese from wholly new milk, and continued to do so generally throughout the season. After trying various heats, the degree of 86 was adopted, and the milk was reduced to that temperature by water from the pump before applying the rennet. The milk stood about one hour and a half, and the curd was then broken up in the usual way. At first the curd was gathered by hand, but afterwards a curd gatherer was used, of which I will speak further by and by. When the cheese had been in the press a short time, the edges were pared and broken into the centre. The cheese was then placed in the press for about thirty-four hours, dry cloths being applied to it three or four times. The cheese was then salted by rubbing salt into the surface; and on the fifth day the cheese was removed from the press to shelves to be dried, and from thence to a plaster floor. As no butter was taken from the milk, and as neither the curd or cheese was scalded, the skin of the cheese was thin and tender; and some cheeses cracked, owing to the surface being too dry where the parings of the edges had been broken up into the centre. The paring was, therefore, discontinued. As the season grew warm, some cheeses heaved, the cracks were opened and flies became troublesome. With few exceptions, there was a good coat on the summer-made cheese; and on the whole the quality was fair, though not free from fault. The party who bought my second weigh informed me that the cheese had too much quality, or richness, and that some of it was sweet—a fault which, he said, was very frequent in the rich cheese of Derbyshire.

I continued the same plan through the autumn and winter. In the very cold weather I warmed the cheese-room with coke fires, and many cheeses cracked. This, however, might have been avoided, perhaps, if I had taken the precaution to hang wet rugs, or wet the floor of the room, so as to load the warmed air with moisture. On reviewing my practice and its results, I came to the opinion that the heaving and tender coat of my cheese was due, mainly, to five causes, which I have attempted, and am still attempting, to remove.

1st. From the natural richness of the milk.
2nd. From the use of new milk exclusively.
3rd. From too tender a curd.
4th. From insufficient power in my presses.
5th. From placing the cheese in a situation too warm and dry.

I now propose to state to you my present practice, and the alterations in it which I contemplate to obviate the foregoing causes of defect in my cheese.

Instead of using all new milk in this season, about one-sixth part old has been mixed with the new, and about half a pound of butter per week has been taken from each cow's milk. The richness of the cheese has thus been diminished. I will not venture to say decidedly whether it be advantageous to take away butter; but I am decidedly of opinion that it is good for many reasons to use old milk mixed with new. I am so much convinced of it that I am now making arrangements for keeping the night's milk cool by a very simple method, and I purpose making cheese only once a day. This is the practice in the most celebrated dairies in Cheshire, and has a very obvious advantage in the saving of labour, and in confining the business to that time of the day when servants are alert and active, and the master or mistress's eye can overlook them. I dare say some of you have found servants anxious to get the cheese out of hand in the evening, and it is scarce to be expected that what has wearied them over night will be pleasant to them early in the morning. When old milk is used less rennet is required, which I conceive to be an advantage, and I believe the curd is of that character which allows the whey to flow from it, and that thus heaving is indirectly prevented by the practice.

I come now to that which I consider the most important point in cheese making, namely, the attainment of a curd firm enough, and not too firm.

I have found that with a heat of from 82 to 86, when the rennet is applied, the curd will separate from the whey, and I consider it desirable to use the lowest temperature which will ensure the clearness of the whey. But as the curd is tender when gathered from milk at that temperature, I have adopted the plan of rendering it firm by pouring over it water or whey, heated to a given point. This method is often pursued, but seldom, I believe, with the exactness necessary to ensure its constant success. All depends on the degree of heat at which the liquor is applied. My experience goes to prove that if the curd be raised to the heat of about 84 to 86 degrees, it becomes sufficiently firm for all the ends it is desirable to attain.

I believe that cheese makers generally who scald the curd do not use a sufficient quantity of liquor for the purpose, and make it too hot; and in such cases it is obvious that a part of the curd which first comes in contact with the hot liquor will become raised very much above 84 degrees. I have therefore taken care to use a larger quantity of liquor at a lower temperature. The quantity of liquor which we use for curd, which yields 44 lbs. of dry cheese, is nine gallons, at a temperature of 94 to 98 degrees, according to the degree of heat of the curd in the pan.

You will at once see that unless a thermometer be used this operation would be liable to such a degree of uncertainty as would effectually prevent the cheese of one day being like that of another. I cannot, therefore, too strongly point out to you that this instrument ought to be an invariable article of furniture in the dairy. To reduce the milk from 98, at which heat it comes from the cow, to 82 or 84, at which we put the rennet to it, we have sometimes added cold water, and sometimes cooled part of the milk in shallow vessels. I have observed no ill effect from the addition of cold water; but perhaps when other conveniences are at hand for cooling the milk quickly, it may be advisable to use them in preference to cold water.

Saltpetre is added to the milk after the proportion of half an ounce to fifty gallons. The time allowed before breaking up the curd is the same as I stated in my account of my first year's make; but instead of gathering by hand as we did part of the first year, a gatherer, the invention of Mr. Carrington, of Creighton, near Uttoxeter, is used, with some alterations which I have made in it. I have enlarged the gatherer so as to make it fit the inside of the cheesepan, and have applied a screw instead of weights to compress the curd, and have added a small pump to remove the whey. This gatherer causes a saving of labour, and while it presses the whey from the curd, removes less curd and butter in the whey; I therefore recommend its use to all cheese makers. After the curd has been warmed in the manner I have described, it is pressed by hand a little, and then put under the lever in two portions; while under the lever-press, skewers are thrust into the curd through holes made in the sides of the vat, and withdrawn several times to help the escape of the whey. After the curd has been thus pressed it is broken up by hand and returned to the vat, and again pressed in two portions, and the skewers are used as before. When the cheese has become pretty firm a dry cloth is applied, and is changed three or four times. The cheese is then salted as I have before stated, and removed to the shelves, and thence to the floors.

Besides warming the curd to secure the more thorough escape of the whey, I have found it necessary to increase the weight of my presses, and I now find the cheese sufficiently firm.

Some makers prefer scalding the cheese. I consider the plan of warming the curd preferable, for these reasons: The scalding of the cheese can do nothing towards assisting the escape of the whey from the interior of the cheese. It can only prevent heaving by condensing the skin of the cheese; and it prevents a good coat from appearing upon it. If the scalding is continued long enough to reach the inside of the cheese, it alters the texture, and deteriorates the quality.

I have nothing to add on this part of the subject, except the remark that sometimes I have added saltpetre to the liquid with which the curd was warmed; but without perceiving any difference between the cheeses so treated, and those which were made from milk to which saltpetre was added in the cheesepan. I have also on two occasions put salt in the liquor used for warming, once four, and once two ounces.

The effect of the salt was to produce a much softer curd. I should mention also that I have found that rennet is not to be depended on unless it has been kept twelve, or, still better, eighteen months. It is the practice in some dairies to mix lemon and cloves with the rennet; I do not, however, see what great advantage can be gained by it.

I believe the right temperature and degree of moisture of the cheese-room is a very important part of the management of the dairy.

The objects to be attained by the management of the cheese-room are—

First, to prevent heaving and strong taste, it must not be too warm, and especially at an early age of the cheese.

Secondly, to prevent cracking of the cheese, which is caused by the outside drying before the inside contracts. Too quick drying should be avoided.

Thirdly, to get a good coat on the cheese; therefore the air must not be too dry.

Before concluding, I wish to offer a very few remarks on a part of my subject, on which I have been least able to obtain any practical and useful information, and on which scientific men throw little light. I allude to the difference in the quality of cheese, and the greater difficulty of making it in certain pastures. I find that Professor Johnston says—"It is obvious that whatever gives rise to the natural differences in the quality of the milk, must affect also that of the cheese prepared from it. If milk be poor in butter, so must the cheese be. If the pasture be such as to give a milk rich in cream, the cheese will partake of the same quality. If the herbage or other food affects the taste of the milk or cream, it will also modify the flavour of the cheese."

And Professor Liebig says—"The difference in flavour and odour of various kinds of cheese depends on the methods employed in their manufacture—upon the state of the rennet when added to the milk, upon the addition of salt, and upon the state of the atmosphere during the period of making. It must be admitted that the plants, and especially the aromatic plants, upon which the animals feed, exercise some influence upon the quality of the cheese; but this influence is very slight and subordinate. The milk of the cow in spring, summer, and autumn, is very unequal in its composition; but this does not occasion any perceptible difference in the cheese prepared in one and the same dairy. If the plants upon which the cows feed exercise any considerable influence upon the quality of cheese, the same pastures could not at different seasons furnish cheese of similar quality, inasmuch as the development and flowering of different species of plants belong to various seasons."

You will see, therefore, that these authorities differ in some respects. I believe, however, that the food of the cows has a great effect on the cheese. On one pasture cheese will heave, and on another it will stand firm, though the cheese be made exactly in the same manner on both; and some pastures yield strong, and others mild-tasted cheese. I have said that in my opinion the difficulty of making the cheese stand, arises from the whey not being got well out of the curd; still, there must be some cause for the greater disposition to heave in cheese made from certain pastures. I imagine we must look for this cause in the different proportions of saline matter found in the milk. You are aware that the herbage of one field contains more alkali, and some more phosphates and chlorides than is found in that of another, and the ashes of the milk will of course resemble those of the food of the cow. Some years ago I had a small cow pasture, which had a rank, sour herbage; we could not make good butter—it was very ill-flavoured; but by dressings of salt the herbage was improved, and the butter became perfectly good.

I only make these remarks with the view of suggesting that perhaps by dressing with appropriate manures, the herbage of pastures might be improved in their cheese-making properties; and it is certain that pastures which have been grazed by milking cows may be often made to yield much larger crops, by laying on them the substances which have been carried away in the milk. Liebig was, I believe, the first to point out that bones would restore pastures which had been long grazed by milking beasts. I would recommend this dressing or guano for all deficient pastures. I have myself tried salt with great advantage to several fields, and I advise its use on all light soils.

Mr. Robinson, of Tamworth, had listened to Mr. Gretton's paper with great pleasure, because it showed that the art of cheese making was likely to keep pace with the general art of agriculture, which had of late received and used so many suggestions from the science of chemistry. Cheese making was one of the most important of all the departments of husbandry, and the worst understood. We read of cheese making in the Old Testament, and it would really seem that little had been learned about the process of manufacture in the 4000 years that had elapsed since the mention of it in that place. It was a process which depended wholly on the nice application of chemical science, and could only become perfect or certain when the exact methods and observation of the chemist were brought to its improvement. Mr. Gretton had himself begun in the right way, and he hoped others would be induced to follow his example in substituting the exact test of the thermometer for the uncertain measurement of heat by the touch, and in noting the precise effects which ensued from every variation in the method of manufacture.

Mr. Lathbury said that if the plan of making cheese only once a day was practicable and safe, it would be a great convenience and saving. He hoped it was practicable, and should be very glad to be assured it was; and he believed farmers' wives would be still more rejoiced than farmers, to know that such a plan was more successful. We have heard of farmers' friends, but Mr. Gretton may more appropriately be called the farmer's wife's friend. Mr. Gretton's paper had been very instructive to him, and he could only wish that he had known in his younger days many things which it contained. It was, however, never too late to learn.

Mr. W. Hopkins thought Mr. Gretton's plan very good, and agreed that the important point was to get the whey well separated from the curd. To attain this object the curd must be of a certain firmness of texture. He agreed, too, on the advantage of using partly old milk; but he doubted if, as a general system, it was practicable to make cheese only once a day. He apprehended that in warm weather there would be an insuperable difficulty in preserving milk from sourness for twelve hours.

Mr. G. Greaves said that there was a point omitted by Mr. Gretton which seemed to him of importance, namely, the ascertainment of the strength of the rennet. The success of the whole process depended on the proper quantity of rennet, and how could that be known until the strength was first ascertained?

Mr. Gretton replied, that he knew of no test of the strength; the quality must be ascertained by trial. The skins cannot be relied on, until they are twelve or eighteen months old; but when of that age their strength is tolerably uniform. In some counties it is the practice to make a large quantity of the solution of rennet beforehand; so that when the liquor has once been tested, there is no more doubt or difficulty throughout the season. All the answers to inquiries he had made in various counties led to the conclusion that the skins became more certain and more equal in quality by long keeping.

Mr. G. Greaves: Every thing which relates to the quality of the rennet is of consequence. Was it not a fact that the stomachs of calves fed by hand on meal, &c., were not so good for making the rennet as those of calves fed on milk?

Mr. Bernays, of Derby: I have not the very remotest knowledge of the practice of cheese making; but I am sure we all feel very much indebted to Mr. Gretton for the very able paper he has just read to us, which has put us into possession of many valuable facts. One thing among many appears clear, not only from what Mr. Gretton, but from what others who have preceded me have said, viz., that cheese making has not yet been reduced to a system. But to refer to one of the subjects mentioned by one of the last speakers, there can be no doubt of the importance of preventing the milk from becoming sour. This, I think, may be easily effected by the addition of a small amount of soda, and by maintaining the temperature of the milk at an even, and, as far as possible, low temperature. We know that the acidity is due to the conversion of part of the sugar of milk into lactic acid. We likewise know that the coagulation of the milk is due to the combination of the acid with the free soda, which keeps the cheese in solution. There must always be difficulties in the way of testing the value of rennet. I can easily conceive why old rennet should be better than fresh. From the mode of preserving the skins, I should assume that the longer they have been kept, the more easily they will decompose when placed in water. One thing is certain, that from the experiments of Liebig, and from the light which he and others have thrown upon fermentation generally, the action of rennet is not due alone, or even in great part, to the gastric juice, curd, or anything else naturally contained in the stomach. The more evenly moist the rennet has been kept, the more readily effective will it be on the sugar of the milk. I need not point out to Mr. Gretton the importance of the state in which the diastase exists in the malt; but there is an analogy. The more solid the membrane has become, the larger will be the amount of milk it will be capable of curdling. It must indeed be of importance to add no more rennet than is absolutely necessary, as otherwise there is danger of a fermentation being commenced in the cheese. The heaving of cheese arises, no doubt, from the action of a ferment on sugar or butter. From experiments I myself have made as to the temperature at which the curd should be thrown down from the milk, I should fix 85° Fahrenheit; for this purpose a thermometer should always be employed. The quality of the cheese must naturally depend upon the age of the cow, the state of its health, the distance it has to traverse in search of food, and on the quality of the herbage. Pastures with a plentiful deep-green herbage will yield a milk richer in butter than cheese; whilst the contrary is the case if the pasturage appear lean.

Mr. H. Yates said: There is certainly great difficulty in making cheese of good quality on some land. The poorest land usually makes the best cheese. The same management which succeeds on poor land yields heavy or sweet cheese on rich land. A warm room up stairs as a cheese-room will render the cheese liable to sweetness. I do not think that any particular system will succeed on various soils; rules must be varied to suit circumstances and localities. It is not a general practice to scald the curd; but I believe some of the best cheese-making districts pursue the plan. Scalding either the cheese or the curd is, in my experience, a very good plan. When I was in Warwickshire I lived in a district where it was not usual to make cheese, in consequence of the difficulty of making a good article. People were astonished that I could make so good cheese as I did. But I have found that one way does not always succeed. As to rennet skins, they are well known to vary very much; one skin will make six or eight cheeses, and another sixty-eight. A good dairy-woman once told me she made more than sixty cheeses from one skin. All the sellers of rennet will choose the oldest skins as the best to send to their most favoured customers. A good test of the quality of rennet is very desirable.

Mr. Ordish: I make cheese on ninety acres of land; but it is only on fifty acres that my dairy-maid can make good cheese. When my cows are turned into certain pastures, the cheese will heave in spite of all the care we have been able to apply. One dairy-maid, who lived with me fourteen years, always failed to make good cheese on one part of the land, though the other part yielded an excellent quality. I find, however, that it is the rich land which yields my best cheese. The cause must be in the herbage; but the only difference I can detect is, that pig-nuts are abundant in the closes which are liable to make the cheese heave.

Mr. Gretton said he would advise Mr. Ordish to try a rather higher temperature of the curd, and thus to ensure a more thorough draining of the whey from it. Perhaps, too, a greater degree of pressure would be beneficial.

Mr. Lathbury said he should be glad to hear from the practical men present, whether there was not a particular part of the season when cheese was liable to heave. His dairy-maid had noticed that June was the time when cheese heaved most. Was this caused by the presence of certain plants in the pastures at that time of the year, or was it caused by the temperature of the air? He asked for information.

Mr. A. Yates said he had only noticed cheese to heave when the weather was very hot and close; he attributed the heaving, therefore, to heat; but there was a greater liability to heave in cheese made on certain pastures.

Mr. Daniel lamented his deafness, which had prevented his catching the exact import of the remarks of other speakers. Three things were necessary in cheese making—exactness, industry, and cleanliness. He was of opinion that the strong taste of cheese usually was produced by peculiar herbs, whether bitter or scented, in pastures. The tainted cheese he thought was produced by foul rennet. The process of dissolving the rennet was important; and he would enquire of Mr. Gretton if he steeped the rennet in whey or in water? Mr. Gretton replied that he used water, to which Mr. D. added that nothing was so good as pure water. He also urged the necessity of using a thermometer, and said that while scarce one dairy-man in a hundred used it, good and equal cheese could scarce be expected. He thought, too, that it would be serviceable in experiments if the saccharometer was used.

Mr. G. Greaves enquired of Mr. Gretton how he would prevent milk from turning sour; and how he would raise the temperature of old milk to the heat at which the rennet was added?

Mr. Gretton said he proposed to set up two large stone troughs, which he happened to have on hand, and to convey water to them fresh from the well. The water from the well being of the constant temperature of 54 degrees, and in warm weather being allowed to run through the troughs in a constant stream, would keep the milk placed in them of that temperature, and effectually obviate souring. He proposed to have two tin shallow vessels made, in which to let the milk stand or float in the cold water troughs. These vessels would be about twelve inches deep. The space around the trough would be latticed off, and over the lattices would fit close doors removable at pleasure; so that air might be made to pass over, or be excluded from the troughs, according to the heat of the weather. He proposed to raise the temperature of the old milk by placing it in a tin vessel, and suffering it to float in a boiler of hot water.

Mr. Harding proposed a vote of thanks to Mr. Gretton, which being seconded by Mr. Bernays, was passed, and the Club separated, after signifying its approval of Mr. Gretton's system of cheese making.

THE PROGRESS OF AGRICULTURAL SOCIETIES.

No one can read the various local newspapers which circulate throughout the country without observing that there is a manifest decadence in the reports of small, local, agricultural shows. We could take almost any single county, and we should find the societies embracing a small and narrow area of operations, decaying or dead; and if one retains its vigour uninjured, it is where some spirited or energetic nobleman or extensive landowner directs it, who is at once a head and rallying point around which it is marshalled, and by whose energies it lives.

Nor do we altogether regret the disappearance of so many small associations. That they were useful —more useful than any could have been which were less circumscribed, we are very decidedly of opinion; but that the full measure of utility is in many points accomplished, we have equally little doubt, and hence, we say, we do not altogether regret that they are, in many cases, amongst the things that were. At the start there was so much to be done, that it was a point to gain attention, and to set up a standard of excellence, not too high, lest it should distract the new-born energies of the cultivator or the breeder; and to bring before him the models of a wide-spread area, would teach him so much of his imperfection and distance, that he would never have been induced to make one feeble effort to extricate himself from the slough of inactive supineness in which too many were willing to rest. The small cattle or root show, or the crop sweepstakes, called out an amount of emulation, small indeed, but adapted to the capacities and skill of untaught and untrained energies, and was the infinitesimal dose of an homœopathic school, suited to the case, and circumstances, and capabilities of the subject.

The winner set others to follow—he aimed at a wider range of competition—his ideas and his practice expanded by attrition and by a wider field of view and investigation, and he looked for a greater scope for his efforts; and for such rising farmers, the provincial and county societies afforded a field of emulation for which the smaller competitions had prepared him. The Royal Societies of this and the sister country, and the venerable and valuable Highland Society on this side the water, were again a medium of more extended usefulness and wider range; and these, with the districts embraced by county associations, seem to be what the wants of the agricultural improvers require, and which they are not inadequate to satisfy.

Hence up to a certain point there is a desire to centralize, but to centralize in localities; for a period of ten years must elapse at least before the meandering societies can revisit a district, composed as it often is of several counties. Hence while the local societies are fading, the county ones are flourishing, and the points they aim at are such that, instead of being opponents, they are feeders to the great central bodies; and though these can do amply without the smaller associations, the national societies would do much worse without their efforts.

County associations possess both the means for rewarding merit in the locality, and obtaining local information as well as diffusing it. They bring together a more extensive range of agriculturists, without taking them too far from home; and they bring out a field of competition without spreading it beyond the grasp of the breeders, the mechanics, or the practical men of the neighbourhood.

As a sample of the energy and vitality possessed by provincial associations, we need only name the well-managed North Lancashire Agricultural Society, whose proceedings have too long been made to give way to matter of a more temporary, but not more extensive interest. We see not only an exhibition of stock and implements — the usual and necessary attendants on a vigorous institution—but we also have a practical and animated discussion on a matter possessing both a general and local interest, viz., "On the best method of preparing and laying down land to grass, with reference to the different soils found within the limits of the Royal North Lancashire Agricultural Society." We hardly know where to begin in bringing its statements and results before our readers; but we will venture to give the able remarks of Mr. Grey, of Dilston, who opened the discussion, on the necessity of a proper preparation for the reception of the seed. He well said—

"It was a great desideratum in agriculture that they should, as far as possible, rid the land of every description of weed, inasmuch as weeds were calculated to rob the soil of those properties which ought to be applied to the crop it was intended to grow. This clearance of weeds was a point of perfection that had never yet been attained; and perhaps it was more difficult of attainment in a humid climate like this than in most other places. It was desirable that the soil should be so completely cleared of weeds and noxious plants as to leave it nothing to do but to grow the description of crop the farmer wished to see upon it. If it was of great importance in the growth of other crops to rid the land of everything they wished to see it clear of—if it was essential the land should undergo the very best description of preparation for any crop they wished to put upon it, it was still more essential that this should be attended to in case of laying it down with grass; because the seeds of grass, in the first place, were so minute in size, so exceedingly delicate, that they required every encouragement that could be given them in the melioration and pulverization of the soil; and because, from their growth at first being slender, they were easily overcome by plants of a more robust kind, it being always found that strong plants usurp the soil to the detriment of smaller plants. On this account it was a most important thing, in reference to sowing land with grass seeds, to have it properly prepared in the first instance by pulverization and by eradicating those seeds which might grow up in place of the plants they wished to see. He considered this clearing of the soil of weeds the first step necessary towards sowing the land with seeds."

In the course of a variety of remarks on pulverization, sowing, and covering lightly, so as not to bury the seed too deep, he stated he should leave the remarks on the principles and details specially applicable to the district, to local speakers; and a Mr. Binns, of Lancaster, thus ably takes up the point, which is worth attention. Speaking of laid-down grass-land in Lancashire, he says—

"A considerable portion of the land in that part of North Lancashire lying between the Ribble and the Lune, not at present under the plough, is in miserable condition, and cannot be honoured with the name of pasture. It has often occurred to me that it could not return the value of rent and taxes. The lands I allude to have been exhausted by a succession of grain crops, till they would no longer respond to such extravagant and unreasonable demands; when the grasping and ungrateful hand of man has exhausted all the bountiful provisions of nature, they are left to her to supply, in her boundless generosity, what has been so recklessly and improvidently extorted from her. After this scourging process, they are left without grass or any seeds being sown. The blue tint of these lands, which may be observed by the traveller passing along the public roads and lines of railway, may not be disgusting to the eye of the casual observer, unacquainted with the character of the various plants of which they are composed, but the agriculturist at once sees that the produce is composed of carex and juncus, provincially 'pink grass,' which all animals refuse to eat, if not compelled by hunger. These worthless plants, combined with couch grass and the worst kinds of agrostis, have for years held possession of the soil, even when in grain. These unprofitable pastures ought, in my opinion, to be again ploughed, and undergo, without delay, a course of fallowing and manuring, and be brought into a regular rotation. This exhausted land, covered with the vegetation described, is exceedingly difficult to restore, even with great expense, without ploughing and loosening the soil and incorporating the manure with it. I am aware that many tenants in the county are not to be trusted with ploughing up good grass land, because when they profess to lay it down again, there is little to be seen but thistles and coltsfoot. This reminds me of going over some fields, the soil being good, not far from Garstang, the property of a large landed proprietor, in which I was obliged to deviate very considerably from the track I was aiming at, because of large beds of thistles, four or five feet high. I remarked to the tenant that if I were his landlord he should not have an opportunity of having another crop. He seemed surprised at my ignorance, and said that he found thistles of great use. From this I hoped to obtain some information, and begged he would state the use. He replied, 'They sheltered sheep in winter;' and I was obliged to admit the fact."

The same gentleman gives some excellent practical remarks on the mode of remedying this, and the bringing about of a better state of things. He says—

"The effect produced the first year of pasturage, upon being properly prepared and sown with a sufficient quantity of suitable seeds, even upon previously exhausted land, could not be believed by those who have not experienced it. Upon the farm that I entered on, succeeding a most slovenly tenant and exhausting system of cropping—as proof of which I need only mention that several fields of oats, the crop of the off-going tenant, when ready for reaping, were valued to me at 25s. the statute acre, and one field of beans of twelve acres at 32s. per acre—one of the fields of this farm, equally impoverished (for not one yard of land escaped), was cleaned and well manured, for turnips and mangold wurtzel, four years after I entered on the farm, and the next year sown with barley and grass seeds. The seeds were rye-grass (I believe the leafy kind, called Solima Stickneyinsis, from being raised by William Stickney, a celebrated agriculturist in Holderness—he calls it 'Old Holderness,' from its being selected from the best old pasture in that district). This was combined with white clover. I turned what I considered an extraordinary number of sheep into this field in spring, but the grass increasing upon them, one addition after another was made; but the grass still gaining, on the 15th of April I had 65 ewes of the large Leicester breed and their lambs (mostly double) upon rather less than four statute acres. I regret that I have no memorandum of the time that the field supplied them, but I know they were in for several weeks; and a friend remarked at the time that if their tails had been a little longer, they might almost have been tied together. I am not sure if the field was ploughed after the first or second year, but I know it produced when ploughed between five and six loads of meal per statute acre."

Mr. Logan, of Barton Lodge, gives the following deplorable account of the state of unimproved land in North Lancashire, and shows how much the efforts of such societies are needed—

"Between 35 and 45 years since, or more, the propensity for marling on the green sward was so prevalent, that it was applied to the land in large quantities, for the purpose of raising heavy crops, in the mistaken expectation of extraordinary profit. With the marl so applied, without previous draining, on land naturally wet, and of a clayey nature, the evil commenced. It was increased by cultivating the land under a bad system of management, under which it was the custom to take, in the first instance, after marling, seven, eight, or nine crops of oats in succession, without any attempts to pulverize the soil beyond that which was inseparable from turning it over to receive the seed. By this process the land became exhausted, and a naked fallow was introduced by way of restoring or giving rest to it. This system was continued for many years, during which no farm-yard manure was carried back to the soil to keep up its productive qualities, whilst as the ploughing was done with three or four horses in length, the treading of the horses at a regular depth battered the soil under the furrow so much that it became so solid and trodden down that the water could no longer pass through the soil until it had been broken up again, and cultivated with the plough. The soil having undergone such treatment, the exhausted marl having become clay, and the surface having been left to grass itself over, such is, or was, till within a few years, the condition of a large proportion of our strong clay soil in North Lancashire. The loss which must have resulted from such a system of farming is obvious. The tenant, in most instances, was next to ruined at the end of fourteen years; the landowner suffered by the depreciated state of his property; whilst the whole of the community suffered in a degree, particularly the agricultural labourer, who was forced to seek employment elsewhere, on a very different system to that to which he had been brought up."

The grass land is little better than the arable, in many cases, as the following anecdote from Mr. Binns shows—

"I was once inspecting an estate not far from Garstang, belonging to a large landed proprietor, and as I went along through the farm writing down the state of each field, I came to one where I found nothing but a bad miserable sprinkling of the very worst kind of agrostis, mixed with carex and a small kind of juncus. I was at a loss what to call it—it was not worth the name of pasture—and I asked the tenant what he called it. He replied, 'Oh, we let it lig!' that is, he let it lie, after several crops, without any seeds, that kind nature might have the opportunity, after a few years, to bestow a covering of grass. In passing through many fields of this description, I noted down, 'Let lig,' as the most convenient term. Thus he has a growth of rubbish that will assist in neither paying a rent, putting money into his own pocket, or providing food for the increased population. It is no wonder, then, we require the assistance of foreign nations to support the people. The kinds of grass before mentioned which grow or rather exist upon these 'let lig' fields, for I will not designate it by the name of pasture, are, though very deficient in quantity, still more deficient in quality, in comparison with the best grasses."

Mr. Logan's mode of improvement is sensible and instructive. He thus describes it—

"Having completed the draining as early as possible, say twelve months before breaking it up, I have ploughed it early in the following winter for a crop of oats; and I have sown with the oats in the spring two and a half or three hundred weight of Peruvian guano to the statute acre. When the oats are taken off, the draining will have been done two years. I have then ploughed and subsoiled or trench-ploughed before winter. In the following spring I have commenced by cleaning and pulverising for turnips, sown with farm-yard manure and guano. The spring following, the land has been sown with barley or oats, and seeds for a pasture, to lie three or four years. This system has been attended with good success. To similar land, but thinly swarded and in a poorer state than the last, I have given a summer fallow, and then subsoiled or trench-ploughed with the common plough. In the year following I have taken a crop of turnips, grown with farm-yard manure and guano, and in the spring, after the turnips, seeds have been sown with great advantage. Lands of a similar character, but in a still poorer state, I have summer-fallowed and trench-ploughed with the common-plough, twelve inches deep, and limed it in the spring of the following year. After the lime, the field was grub-harrowed; the seeds were then sown on the surface, and harrowed in lightly. This land has become an excellent pasture, and the improvement on it, as well as on the others before described, may be stated at from 10s. to 20s. per statute acre. The last-mentioned field was considerably improved by draining alone; but I found it necessary to plough it, as it had been left to nature without any assistance. The quantity of lime applied in the cases above was about 180 or 190 bushels per statute acre, the cost of which, carted from Chipping, and laid down on the field, would be between £3 10s. and £4. Of manure the quantity used was fifteen tons when spread on the surface, and twenty tons, together with three hundred weight of Peruvian guano, when drilled in for turnips. The cost of lime and manure, when used on the same fallow, amounted to £9 or £10 per statute acre. The mixlure of seeds used in the examples described was—White clover, 4 lbs.; cow grass, 3 lbs.; red clover, 3 lbs.; trefoil, 2 lbs.; rib grass, 2 lbs.; Timothy grass, 1½ lbs.; perennial rye-grass, half a bushel, and a small quantity of Italian rye-grass. When sown without a crop, I have given nearly 1 lb. more of each kind; the cost of the latter mixture would be about 18s. or 20s. for the statute acre.

We say after this sample of their doings, and the immense work they have before them, Long live, and success attend, the Royal North Lancashire Agricultural Society!—Gardeners' and Farmers' Journal.

AGRICULTURAL PROSPECTS.

This is a season of the year at which many agricultural meetings take place, and the periodical journals have for the last two or three weeks been full of reports of the proceedings at such gatherings. Most of these reports exhibit the wonted amount of lecturing upon the necessity for "high farming" to meet the reduction of prices occasioned by foreign competition, and they are not wanting in philanthropic exhortations not to discontinue the employment nor reduce the wages of the labourer. During a period of nearly twenty years we have put prominently forward, and zealously advocated, every measure which was calculated to promote improvement in agriculture; and we have no hesitation in asserting that practical agriculture has made more rapid progress during that time than in any other period of the like duration in the history of this country. Now, however, that measures have been taken to reduce the price of agricultural produce without a corresponding reduction of those burthens to which the "manufacturer" of that produce is subjected, parties come forward under various influences—well intentioned if you please, but in our opinion mistaken—and assert that "nothing should pay better than farming when sufficient capital is invested, and when it is treated as any mercantile transaction, requiring indeed discrimination and management, but *not dependant on high prices*;" that a system of farming may be adopted generally by which a thousand a-year may be cleared from every 260 acres of land, and thus the "crutch" protection may be thrown away; that the growth of turnips, hitherto considered the foundation of good husbandry, should be discontinued; and other such like propositions. And when we venture to differ from them, we are upbraided as evincing a disposition to "snub agricultural improvers," charged with a desire to uphold ancient prejudices, and told that we "ought to endeavour to inspirit those whose all depends upon hearty and intelligent exertion being made." The advocates of such dogmas are, for the most part, sufficiently guarded to generalise their language. If, however, they can by any means be driven to work out their own propositions they almost as certainly fail. Will my Lord Kinnaird favour the agricultural public with the like statement for 1849 as he has given for 1847? We shall perhaps be told the proper time has not yet come. We shall be content to wait, if we have but the promise, to the end of the year. We particularly refer to his Lordship, because we consider the statement of his eleven years' experience to be the most straightforward and honest of any we have recently seen. But however sound his conclusions may have been in 1847, we cannot concur with them in 1849. There is a notion prevalent that because corn has been lower in price than it is now, during the existence of protection, after a succession of good harvests, and afterwards rallied, that the same will occur again. There cannot be a greater fallacy, unless indeed a general scarcity should prevail. The Anti-Corn-law League held out the price of 40s. per qr. for wheat as the blessing which the repeal of the Corn-laws would confer upon the country. All we desire, in commenting upon the schemes propounded for raising agricultural produce "*profitably*, independent of price," is that their practicability may be demonstrated so as to come home to the understanding of the more intelligent of that class of scholars—the farmers, and to whom these "agricultural improvers" tender their instruction. To be conscious that a class of their fellow-countrymen, in whose occupation they take such a deep and active interest, are steeped in ignorance and prejudice—to possess the knowledge whereby they may not only be rescued from their mental darkness, but be rendered happy and independent in their business affairs, and not to take every means in their power to impart that knowledge—is, as it seems to us, to evince a want of patriotism and philanthropy which we should not expect to find associated with such extraordinary faculties. We have lately been reperusing the fourth edition of "Morton on Soils," a work which every cultivator of the soil should possess, and from the perusal of which once every year the practical farmer could not fail to derive useful information. The volume contains a report of the Whitfield Example Farm, which our readers are aware was established by Earl Ducie for the purpose of ascertaining the extent to which capital might be beneficially invested in the improvement of the soil. Upon referring to that part of the account entitled "Farmers' Income," we find that at the expiration of three years, ending 1842, after allowing 10 per cent. upon the capital employed, and which sum amounted to £574 8s., there was a clear profit of £161 16s. 3½d. In the same account, under the head "Cultivation," we find 65 acres wheat, 24 acres beans, and 18 acres oats, which appear to be the extent of the grain crop that season. We also find that the then price of wheat was 56s., beans 38s. (?), and oats 24s. per qr. We gather from the report that 5 qrs. per acre will not be too high an estimate for the wheat, and we will put the beans at 4 qrs. per acre, and the oats at 6 qrs. The grain produce, therefore, will stand as follows in 1842—

	£	s.	d.
Wheat, 325 qrs., at 56s.	910	0	0
Beans, 96 qrs., at 38s.	182	8	0
Oats, 108 qrs., at 24s.	129	12	0
	£1,222	0	0

Now, if we take the same quantities at present prices, we shall have in 1849—

	£	s.	d.
Wheat, 325 qrs., at 41s. 9d.....	678	8	9
Beans, 96 qrs., at 29s. 3d.	140	8	0
Oats, 108 qrs., at 17s. 6d.	94	10	0
	£913	6	9

The difference in prices upon these articles of produce alone, without reference to any other produce of the farm, will amount to £308 13s. 3d. This will not only absorb the profit of £161 16s. 3½d., but will leave an amount of £146 16s. 11½d. to be deducted from the 10 per cent. interest on capital. If to this latter sum be added the further deduction to be made for the reduced price of other produce sold—cattle, sheep, and pigs—but which we have not the means of ascertaining, we feel persuaded, that upon an occupation which has been rendered in every respect fitting to enable the tenant to practise his business with every prospect of success, the result will be to give him barely five per cent. for his capital, and little or nothing for his labour. We should be glad to see our view of the subject, in its application to the case in question, contradicted. We are most desirous of learning in what departments such a reduction of expenditure can be made, yet carrying on the business of the farm properly, as will meet the reduction in the receipts consequent upon reduced prices. It is satisfactory, however, to observe that at our agricultural meetings the talk is not all on one side. The pressure upon the farmer's pocket has produced an effect upon his tongue. Scarcely a meeting now takes place without some strong truths being told as to the present position of agriculture. That farmers should pay the same rent, employ the same number of labourers, and pay the same rate of wages, when their saleable produce is reduced in value 25 per cent., is so absurd and preposterous that we should scarcely think sound men could be found to advocate such doctrines. However, this, like other serious evils, will work its own cure. The effect will become so intolerable that a remedy must be provided. In the case of land of good staple, tenants with capital may be found; but speaking generally, we believe the remarks of the writer of our agricultural report for Yorkshire will be found too true. He says—"Hundreds of farms are being given up, and if taken at all will be by persons in desperate circumstances. The impression now prevails that cold clays must, as was anticipated, go out of cultivation. *Thirty per cent. reduction* has in some cases been *offered and not accepted.*" The effect of the reduction in the price of corn will be to narrow the means of expenditure of the great mass of the people, and to bring all nearer to the continental level—opposed as the doctrine may seem to the theories of the day. In by far the greater portion of the kingdom rents must be reduced, unpalatable as the doctrine may be; the excepted cases being where lands are already let at a low rent, or where the landlord has the means of making such permanent improvements as are required, of affording relief from existing disadvantages, and giving ample security for the investment of capital. The unhappy effects of this cold-blooded policy will be, that, as in the case of the monetary revolution of 1819 a whole generation was swept away, so will another generation of farmers be now consigned to destruction, unless, indeed, the present Premier shall follow the dictates of his own better judgment, and impose that moderate fixed duty upon foreign corn which he once wisely offered to the agricultural interest. Had the fixed duty proposed by Lord John Russell been adopted, the revenue would have been benefited to the extent of nearly two millions since the 1st of February last, and our farmers would have realized, although a low, still a price somewhat more commensurate with the burthens they have to bear. If the present course is persevered in, we feel persuaded that instead of obtaining relief, landed property will have yet more burthens imposed upon it. The tenant-farmers, and all associated with or dependent upon them, will swell the ranks of the advocates for the repeal of the excise and customs duties, to which their foreign competitors are not liable. They will be joined by the commercial and manufacturing classes; and property of whatever kind, and wherever found, must bear the burthen. It is plausible enough to say that free trade in corn must have a fair trial; but that trial cannot be made but at the cost of an amount of suffering, at which the most iron-hearted politician should shudder.—Mark Lane Express.

GOSSIP ANENT FALKIRK TRYST.—HIGHLAND SHEEP FARMING.

In our last we gave a report of the transactions at the October Falkirk Tryst, the last of the three and the most important of the season. Apart from the business of buying and selling, a visit to the tryst affords a matter of interest, instruction, and amusement; and it may not be out of place to string a few sentences together regarding this great central rendezvous, where the breeders from the north and the feeders from the Lowlands and Border counties assemble and complete their transactions for the year. The tryst, as most of our readers may be aware, is held on a spacious level field or muir, named Stenhouse Muir, fully one hundred acres in extent, we should think, and situated in the parish of Lambert, in the immediate vicinity of the station of that name on the Scottish Central Railway. The field is about three miles on the north of the town of Falkirk, and is the property, we believe, of Sir Michael Bruce, of Stonehouse. The tryst has been held on this spot for upwards of seventy years; but previous to that time the rendezvous was at Bonnymuir, about four miles on the other side of the town—a locality which has attained some little notoriety from being the scene of the Radical rising in 1820. With the causes of the change of site, or with the exact date of the institution of the trysts themselves, we are unacquainted; but from time immemorial it has existed, and grown in importance with the increase of the flocks and herds of the land. The great staple of the trysts used to be cattle, of the Highland breed; but the extension of sheep husbandry, within the last thirty or forty years, has rendered the trade in the woolly people scarcely less important than that in the beeves.

Monday has been the day hitherto appointed for the sale of sheep, and Tuesday for cattle and horses; but we may observe that on this occasion a new arrangement of days has been effected, which will likely be observed in all time coming. The sheep tryst is in future to be held on the 2nd Tuesdays of September and October, and the cattle and horse tryst on the second Wednesdays of August, September, and October. The effect of this change will much conduce to the convenience of all concerned, and to a great extent supersede the necessity of travelling on Sunday, or of buyers and sellers spending that day in an inn instead of at home. Under present circumstances the sheep breeders from the north, and the buyers from the south, must be in the precincts of Stenhouse Muir on Saturday, to be in readiness for the important work on Monday morning. But in future, farmers in the north, but especially those in the south (where the railway system is better developed) may remain at their homes till Monday at midday, and yet be on the tryst ground on Tuesday by the first streak of the morning light. As it is, great feats can already be done in the way of reaching the market from a long distance, in a short time, by the use of rail; and, on Monday last we met a gentleman on the field who had left his own home in Forfarshire that morning, driven fourteen miles to the Meigle Station of the Scottish Midland railway, thence joined the Scottish Central, and was deposited by it on Stenhouse Muir at eleven in the forenoon.

The scene on Monday last was quite exciting and exhilarating; but gentle exercise, for which there was ample scope, was necessary to keep up the native heat in the clear cold temperature of October. Here were at least 80,000 sheep, many of which had been on the road from three to five weeks, tended by the gillies from the north, aided by their guardian sheep-dogs—a class of animals whose activity, intelligence, and vigilance is quite astonishing. A lot of sheep in a crowded market is a very restless gathering, and the duty of the collies in walking sentry round the lot, and hunting out and driving back stragglers, is so incessant, that they have scarcely a moment's time to lie down and lick their weary, and sometimes bloody, feet. The blackfaced breed occupy the northern portions of the field; Cheviots and crosses the southern, and thus the buyer of the respective kinds knows exactly to what part of the ground to direct his steps. The lots are generally extensive in point of numbers, varying from 200 to 1400 strong. We may state that it is not always the prime lots of sheep that are brought down to Falkirk; for the bleaters on many hills are now disposed of at the Inverness market in July; but in this latter instance the sheep are not seen at market at all. They are on their pastures, it may be, at the distance of some hundred miles or two in Sutherlandshire; and the buyer concludes an important transaction merely from his general knowledge of the breed, quality, and condition of the lot, although he may not have seen it for months. The droves are subsequently "lifted," and sent south at the convenience of the respective parties. Some of the gentlemen who attend Inverness and Falkirk are perfect patriarchs in their possession of herds and and flocks; and we may mention, for instance, the Messrs. Cunningham of Loch Arkaig, Mr. Cameron of Corrychoille, and Mr. Kennedy of Kirkland and Fassiefern—the latter a man who estimates the extent of his farms, not by acres but by square miles, and some of whose lots are so extensive that they take three hours to pass a toll-bar in a continuous line. Irrespective of sales made by him at Inverness, the September tryst, and a beautiful lot of 2000 sent into Dumfriesshire, Mr. Kennedy had still no fewer than 4000 sheep left of the saleable produce of his northern hirsels, all of which had changed hands at Falkirk before twelve o'clock in the day. It is an important feature in a stock farmer's character to be a good buyer. In this market the eye must do the work of the yard measure and the weighing scales; and the man who thoroughly understands his business, and can gauge the quality of a lot by handling two or three of the number, is always several per cents. better at the end of the year than his less enlightened neighbour. A good salesman, again, has a wonderful "knack" in hitting the market at flood tide; and it happens that, in a great majority of instances, those who sell first sell best.

At these trysts one hears a great deal of a district of country which very few tourists visit, namely, Sutherlandshire. The hills are grey, dark, and uninviting, and few strangers love the land till after more than one visit, although Mr. Kennedy tells us the atmosphere is so clear that one may read a letter at any period of a July night. Yet these hills afford abundantly a kind of pasture which produces the best sheep in the kingdom. There is especially a kind of early pry or moss-crop which grows in tufts, and the roots of which have a honied taste, and are greedily devoured by the sheep. They thrive upon it amazingly. The effect of the introduction of Dumfriesshire and other Lowland farmers into the north has been vastly to increase the amount of mutton and wool sent to the south, and at the same time to increase the rent-roll of the Highland laird. The secret of the change is capital and enterprise. For instance, under the old jog-trot system, the northern farmer would send a thousand of his hogs (as the case may be) to some wretched wintering ground, and perhaps 600 of the lot would return as lean as greyhounds, the rest having left their bones in the field. Now the present system is to send the hogs to turnip feeding during the winter in Ross-shire, or some other agricultural district, where they are boarded at so much per week. This may be costly, it s true, in the first instance; but the sheep, instead of returning lean and weakened, come back to their spring pastures in first-rate condition, and, instead of losing twenty or thirty per cent. at winter quarters, the present class of sheep farmers are disappointed if they lose more than from two to three per cent. The new men, in fact, act on the system of preferring to keep three sheep in good condition to six sheep in ill condition; and the result is that, though the numbers on many farms are less than they used to be, a greater number are sent to market and larger profits realized. Another change which has taken place of late years is, that in many districts Cheviots and Cheviot crosses have taken the place of the small blackfaced breed; and the result is, a greater weight of mutton, and a larger, better, and earlier clip of wool. Still, there are walks on which the blackfaced will always be the preferable stock. It is not a little interesting to know that when Sir Charles Ross of Balnagown attempted, some half century ago, to introduce sheep into Sutherlandshire, the people rose *en masse* against them, and drove the woolly pioneers southward across the Ness. Previously, Sutherlandshire was a cattle-rearing and small crofting district; and the people had even then foreseen that as sheep came in man would go out; but bitter though the Sutherland clearings may have been at the time, we believe the change was best for all parties, both for those who went away, and those who remained. It is surely better to till one's own acres in Canada, than to starve on another man's croft at home.

Farmers who have not sold their wool at the usual summer fairs of Inverness, Fort-William, &c., generally endeavour to get quit of it at the October Tryst; but this year, in consequence of the brisk demand for wool in the early part of the season, very little of it was left over. We did see, however, missives for three superior lots of blackfaced, amounting to 3500 stones, which were sold at this market, and the prices of which, if anything, were a shade lower than those going at Inverary. Parties also who have not previously supplied themselves with smearing materials, generally do so at this time, either by ordering it from the merchants on the ground, or on their way through Glasgow. On the whole, the sheep farmers have come pretty well off this year, for the fall in the price of sheep has been fully compensated by the rise in wool. Smearing materials, viz., butter and tar, are also twenty-five per cent. cheaper than they were this time last year.

The cattle market, where the bestial from a hundred hills are shown, takes place on the day succeeding the sheep fair; but this muster is so well described in a recent number of the *Quarterly Review*, that we prefer transcribing it to giving a narrative of our own. "Every isle and holm (says the *Review*) which opposes its rugged crags to the fury of the Western Ocean, between Islay and the Orkneys; every mainland glen, from the Mull of Cantyre to Cape Wrath, pours in its pigmy droves, shaggy and black, or relieved only, as to colour, by a sparkling of reds, and of duns graduating from mouse to cream colour. From northern and eastern Sutherland, Caithness, Ross, Inverness, they come in longer on the leg, smooth, and vulgar. From central Argyll, Perth, and from some of the islands, come the carefully-bred West Highlanders: these are the flower of the show, engage every one's talk, and attract every one's attention; every individual of them is a delight to the eye of a connoisseur. Aberdeen and Forfar send in droves of large and bony, but useful bullocks. A few Ayrshire cows and heifers for the dairy, some miscellaneous lots, and a few Irish make up the account. We do not know the numbers; we have heard of 30,000, and again of 60,000. The October show is the most imposing. The almost universal colour is black; the moor is in appearance one black mass. You may be accommodated with every size, from that of a Newfoundland dog to a bullock of 100 stones. The cattle are mostly in the hands of dealers, having been bought up at the northern and western markets; many, however, of the best West Highlanders are brought to the tryst by their breeders, and you may see a kilted laird from the Hebrides standing, like Rob Roy, at the tails of his own bonny stots and queys. Every dealer in small cattle offers you Skye beasts, and you would be inclined to attribute almost miraculous productive powers to that celebrated island, till you were informed that (as a merchant would say) 'that is a favourite brand,' and that large numbers of these beasts are brought from the other Hebridean isles to the Skye markets. To speak generally, every one of these animals has his predestined course; the smallest, called six quarters, from being only eighteen months old, will clean up rough pastures and eat a little straw in Clydesdale, Dumfriesshire, Cumberland, and the neighbouring districts. The older of the small cattle will proceed to Brough Hill, a very favourable fair with dealers, because it is said to be attended by more gentlemen's bailiffs than any other in the United Kingdom. The finest West Highland heifers are for Yorkshire, and the bullocks for the counties of Leicester, Northampton, and Buckingham. The heavy north-eastern bullocks will supply the Lothians with stall-feeders, and will go in large numbers for the same purpose to Northumberland, Lincolnshire, Norfolk, and the south-eastern counties of England. These are all Norfolks when they get to Smithfield market. The proceedings are as orderly and the dealings on as large a scale as those of the preceding day. A few small lots of a score each may be found, but generally they run from 50 to 300 and upwards. A purchaser of less than the whole of one of these large lots gets his number not by selection, but by a cut; a drover passes through the black mass, and cuts off by estimation the number; they are then counted and made up to the required figure by alternate selections on the part of the buyer and seller. A third day follows, but it is not of much account. The cattle are for the most part miscellaneous lots, and what a Scotchman calls his shots and an Englishman his calls. We have been somewhat minute in describing these proceedings, because they are on a scale of magnitude quite unknown to southern agriculturists."

We have much pleasure in mentioning one interesting circumstance, which shows the estimation in which the West Highland breed of cattle is held on the Continent. A few days ago Prince Louis Napoleon, the President of the French Republic, sent over to this district the Inspector-General of Agriculture, to purchase some lots of this staple produce of our hills; and, after an anxious tour, the Frenchman selected from the stock of Dugald Sinclair, Esq., Kilchamaig, Tarbert, on Loch Fyne, a lot of cows at £20 each; a lot of heifers at £20 each; and a three-year-old bull at £55. Mr. Sinclair bought at the tryst a bull for his own stock, from Mr. Macdonald, Monachie, at £50.

A novel feature now on the tryst ground is the marquee of the London and North-Western Railway Company—(a very pretty affair) in which orders are received for the transmission of stock to all parts of England. The facilities in this respect are now very great. Sheep, which have taken a month to travel to Falkirk along the old drove roads, at the rate of from ten to fifteen miles a-day, are now whisked a distance (equivalent to all they have travelled), to their feeding grounds in twenty-four hours. We saw, for instance, sheep trucked on Monday night, which, it was expected, would be at their pastures in Westmoreland on the following day. The agents of the Edinburgh and Glasgow Bank and the National Bank were upon the ground, as usual; but their accommodation is wonderfully primitive—the former "banking establishment" resembling a policeman's sentry-box, and the latter a little showman's caravan *minus* the wheels. These banks, however, have been a great convenience to the dealers on the one hand, and a "heavy blow and great discouragement" to the thieves on the other; for although everything is conducted on ready money principles at the tryst, there is really little ready money going. A southland buyer brings a draft, for which he receives notes to pay his stock; and the seller generally lodges the money where the other got it, and takes a receipt to be cashed at his own time and place. Such is the mode which most intelligent men adopt; but still there are many who adhere to the old custom of carrying a well-lined pocket book, and they sometimes suffer for being the custodiers of their own money, instead of letting the bank keep it for them.

Apart from seeing such legions of cattle, sheep, and Highland shelties, which have never known bit nor bridle, a visit to the tryst is a great treat to any town-bred tourist. The men who have accompanied, and tend the lots, are so dissimilar in tongue, dress, and aspect, that it is difficult to believe they own the same sovereign and belong to the same country as their lowland brethern. Although the kilt is now rarely seen, there is plenty of the bonnet and the tartan, and Gaelic is heard on every side. Indeed, the first occasion that a young Highlander attends the Falkirk Tryst is notched in his calendar as an event of no small importance; and he returns to his primitive kindred among the hills and glens of the north with the consciousness that he has seen a good deal of the world and its ways. At times when the market is densely crowded, and there is danger of the separate lots being mixed, the Celt is seen in all his fury and excitement; his Highland blood is up, and he screams himself hoarse in shouting to his dogs, ordering his neighbours or assistants, and threatening with the infliction of his cudgel those who show a disposition to encroach upon his stance, or throw his lot into confusion. The malediction between the herdsmen are exchanged in Gaelic; and as the collies seem to catch the spirit of their masters, the contention is sometimes wound up by a regular worry—presenting altogether a scene of the most admired disorder, and of no little amusement to those who have nothing else to do but look on and enjoy it. In the main, however, the Highland drovers are good-natured fellows, and disposed to be civil and obliging; but occasional squabbles are unavoidable where so many are gathered together, and where there is so much risk of the various lots getting mixed and confused. As their trust is a very responsible one, these Highland drovers are well paid during their excursions to Falkirk. Some of them dispose their surplus wages in a jollification, when the business is over; but the knowing ones make a profit of it, and this they can easily do, for a big bowl of broth is sold on the ground for a penny. One old cast-metal faced Celt, who might have sat for the portrait of a Cateran, entered the Bank tent, while we were refreshing there, and demanded to be supplied with "a preed and a sheese for a penny," and was somewhat indignant when informed that business was not transacted on these terms. We have no doubt, however, that this old chap would have from 2s. to 2s. 6d. a-day for his Falkirk trip.—Dumfries Courier.

THE DESTRUCTION OF THE WIRE-WORM.

Sir,—The very prominent position which the wire-worm takes amongst those *creatures* considered as opposed to the labours of mankind, induces me to forward for publication in your journal the extraordinary result of certain experiments, the object of which was the destruction of the wire-worm. Some years since, the locality in which I was residing was more than usually troubled with the wire-worm—many hundred acres of wheat, presenting all the appearance of health, vigour, and abundance, were completely destroyed; and I believe the same evil exists at the present time, differing only in amount with peculiar change in seasons and other circumstances. At the time alluded to, I begged of a farmer to furnish me with a quantity of the wire-worm in their natural state, that is, in the earth where they were found. In my first experiment, I tested their tenacity for life with the most corrosive and powerful poisons. Preparations of corrosive sublimate and arsenic were used in vain. Their immersion in solutions of these poisons occasioned them no inconvenience; in fact, it appeared to give them more pleasure than pain. I then tried the effect of vitriol and aquafortis: these liquids certainly destroyed the worm, but only after a very considerable time. At length, by accident, I was induced to try liquid ammonia. The result was marvellous; in an instant these creatures, which had hitherto resisted with comparative indifference the most deadly and corrosive acids and poisons, were shrivelled up, and reduced almost to the state of a cinder. Finding that ammonia possessed this astonishing power, it then occurred to me that this agent might be employed in an extremely simple and effective way. I took a portion of the earth containing the worm, and mixed with it a small quantity of lime; to this I added a quantity of powdered sal-ammoniac; the effect of this was the decomposition of the sal-ammoniac by the lime, and the liberation of ammoniacal gas: this had precisely the result of the liquid ammonia; the worm was instantly destroyed as by an electric shock.

Now these experiments are the more remarkable, from their showing that these destructive creatures can only be destroyed by that which constitutes the very essence of the most valuable manures. It might, perhaps, be worth while to try this experiment on an increased scale. As an experiment only, it is exceedingly curious, and may be performed by any farmer, in a tea-cup; sal-ammoniac can be purchased at any druggist's or grocer's, and common slaked lime can be procured anywhere. All that is necessary is to moisten the earth first with a little water, then stir in the lime and add the sal-ammoniac. The escape of ammonia may be easily detected by its smell. This discovery may, possibly, be impracticable, under certain conditions; at all events, I trust its novelty and scientific interest will be a sufficient excuse for this intrusion on your valuable space. I am, sir, your obedient servant, W. LITTLE.

—Illustrated London News.

THE HOLY WELL.

(FROM ELIZA COOK'S JOURNAL.)

It is not generally known that the tavern in Holywell Street, Strand, London, known by the sign of "The Old Dog," is raised on the site of the "celebrated Holy Well," from which the street derives its name. Fitzstephen mentions this well in 1660, as being "famous and frequented by the scholars and youths of the City, when they walked forth to take the air;" and Stowe alludes to it as "being much decayed and spoiled with rubbish, purposely laid there for the heightening of the ground for garden plots." The coffee-room, at the tavern above-mentioned, is supposed to be built immediately over the spring. The following lines were prompted by the interesting remembrance which forms one of the many thousand poetic legends connected with our modern Babylon.

They say, three hundred years ago
The cold pure water used to flow
From a gurgling fount, with trees around,
Where "The Old Dog" Tavern may now be found.
They say it was a wondrous spot,
And the "Chronicles" keep it unforgot;
For the pages of History often dwell
On the storied fame of the "Holy Well."

I can see the place as it was of yore,
When its crystal riches would ripple and pour
From a fountain channel, fresh and dank,
Mid flowering rush and grassy bank;
When the pale cheek left the City wall,
And the courtier fled the palace hall,
To seek the peaceful shadows that fell
On the waters of the "Holy Well."

The scholar sat on some old grey stone,
Where the ivy was thick and the moss had grown,
And he conned his book, while the gentle tide
Came softly bubbling up at his side.
Plighted lovers went wandering there,
Blending their sighs with the twilight air;
And many a warm lip stooped to tell
Its first romance by the "Holy Well."

Sweet birds came to plume their wing,
And lave their beak in the healing spring;
And gorgeous butterflies stopped to play
About the place on a sultry day.
Folks came from the east, and came from the west,
To take at that fountain health and rest;
For the north and the south they came to dwell
From the far-famed stream of the "Holy Well."

Oh, a goodly sight was the old place then,
When the waters were sought by the Red Cross men;
When the brave Knights Templars there were seen,
With their "hostelrie" gay on the field of green;
When the famished pilgrim lingered there,
Blessing the draught with a grateful prayer,
As his cockle hat and scallop shell
Were thrown aside at the "Holy Well."

And now we see in the busy street
A "hostelrie" where men do meet;
Though they wear no symbol red-cross bands
And draw no steel with their strong right hands,
For many a year there has been no trace
Of the legend lore that marks the place;
No stranger dreams of the verdent dell
That was famed afar for its "Holy Well."

Close and narrow that place is now,
Where the beautiful water used to flow;
But those who will may go and see
Where the waters sprung up—pure and free.
On the mouth of the tide they may lightly tread,
As they would on the graves of the honoured dead
At the sign of "The Old Dog" gossips still tell
Rare things of the ancient "Hold Well."

Ah, many among us, like this old place,
Exist in the world without a trace
Of the exquisite truth and goodly power,
That filled our spirits in Life's young hour.
Time has choked up the magical spring
With the burthens that Trouble and Toil e'er bring,
Yet we turn with joy to let Memory tell
Of the days when our heart was a "Holy Well."

ELIZA COOK.

FORTY-DAY MAIZE.—We observe that the cultivation of the forty-day maize is occupying considerable attention at the present moment. We would earnestly caution our readers not to be led into attempting to grow upon an extensive scale; a limited experiment can do no harm. The past season has been most unprecedented for the continuance of dry weather throughout the autumn. Assuming that maize can be brought to perfection as regards the grain itself, the great difficulty consists in drying, through the thick, succulent covering or case which encloses it. Unless the heat be sufficient to penetrate thoroughly, and render it quite dry, the whole becomes mildewed and musty. Cobbett made the attempt, and failed. And although we are told that the forty-day maize is an earlier sort, still it labours under the disadvantage of not being so productive as his. Moreover the land upon which the largest crops of this grain are raised in America, is of the richest quality; that crop being first taken, to reduce the soil and render it fit for the growth of ordinary grain crops. We shall always be able to purchase maize cheaper than we can grow it.—Mark Lane Express.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

The Council resumed their sittings, after the recess, on Tuesday, the 6th of November, when a monthly meeting was held; present, Mr. Thomas Raymond Barker, Vice-President, in the Chair; Hon. H. W. Wilson, Colonel Austen, Mr. S. Bennett, Mr. Brandreth, Mr. Burke, Colonel Challoner, Mr. Garrett, Mr. Brandreth Gibbs, Mr. Fisher Hobbs, Mr. Kinder, Professor Sewell, Mr. Shaw (London), Mr. Shaw (Northampton), Mr. Shelley, Professor Simonds, Mr. W. Simpson, Mr. Tanqueray, and Professor Way.

The following new Members were elected:—

Bale, S., Flint Hall, East Harling, Norfolk
Crabtree, John, Halesworth, Suffolk
Delves, William, Frant, Tunbridge Wells, Kent
Hallam, Thomas, Bridlesmith-gate, Nottingham
Saxby, William, Rottingdean, Brighton
Smith, Henry, The Grove, Cropwell-Butler, Bingham, Notts.
Tillett, Samuel, Hill-house, Lexden, Colchester
Wodehouse, the Lord, Kimberley Hall, Wymondham, Norfolk.

The names of 26 Candidates for election at the next Meeting were then read.

Finances.—Colonel Challoner, Chairman of the Finance Committee, presented to the Council the Report on the Finances of the Society to the end of the previous month; from which it appeared that the current cash-balance in the hands of the Bankers on the 31st Oct. was £453. He also laid on the table, for the information of the Council, the quarterly statements connected with the income, expenditure, liabilities, and funded property of the Society. A vote of thanks was unanimously passed to Messrs. Gurney and Co., of Norwich, for the kind manner in which they had accepted the appointment of the Local Bankers of the Society in connexion with the Norwich Meeting, and for the courtesy and exactness with which they had transacted the financial business of the Society on that occasion. The Council adopted the suggestion of the Committee, that the President should be requested to direct a Special Council to be summoned on Wednesday the 12th December, for the purpose of taking into consideration the financial state of the Society. Agreeably with the order of the Council, lists of members in arrear of their subscription, alphabetically classed in counties, with a statement of the amounts respectively due from each, having been prepared during the recess, were at this meeting suspended on the walls of the Council Room, in order that an examination of these names might take place by Members of the Council residing in the particular localities, and reports made on the subject to the Finance Committee previously to the Special Council in December.

Member of Council.—The Council received with deep regret the announcement of the decease of their venerable member, Mr. Hillyard, of Thorpelands, near Northampton.

Prize Essays.—Mr. Pusey, M.P., Chairman of the Journal Committee, transmitted to the Council the Report of the Judges of Essays, Plans, and Specifications for Farm Buildings, from which it appeared that the following adjudications had been made:—

I. The Society's Prize of £50 for the best Essay on the Construction of Farm Buildings (with Plans, Elevations, and a working estimate of the farm-buildings, exclusive of dwelling-house, in prices enabling parties to calculate the cost accurately, suited for a farm of moderate size, from 200 to 300 acres, at a reasonable cost, and adapted to the requirements of a practical farmer), awarded to Sir Thomas Tancred, Bart., of Cirencester, Gloucestershire.

II. The "Commendations" of the Judges to the Essays bearing the following mottoes:—

1. "Concordiâ res parvæ crescunt."
2. "Pro bono publico."
3. "Ita ædifices," &c. (Cato).
4. "The talk of a Farmer is of his bullocks."

Journal.—Mr. Pusey also reported that the new Part of the Society's Journal was in the press, and would be ready for distribution among the members soon after the ensuing December Meeting.

Stock Prizes.—On the motion of Mr. Fisher Hobbs, the following Committee was appointed to take into consideration, and report to the Council on Dec. 12, the Prizes to be offered for Live Stock at the Exeter Meeting, namely, Lord Portman, Col. Challoner, Mr. Raymond Barker, Mr. Shelley, Mr. Shaw (London), Mr. Fisher Hobbs, Mr. S. Bennett, Mr. Jonas, Mr. Brandreth, and Mr. George Turner.

December Meeting.—Mr. Pusey's Report on Lectures for the December meeting having been read, it was moved by Mr. Shelley and seconded by Mr. Brandreth, that Prof. Simonds and Prof. Way should be requested to deliver each a Lecture before the Members in the House of the Society on the occasion of that Meeting; a request to which those gentlemen (who were present) kindly expressed their perfect willingness to accede. The following arrangements were then made for the business of the period :—

1. Tuesday, Dec. 4. Monthly Council at 12 o'clock.
2. Tuesday, Dec. 11. Weekly Council at 12 o'clock.
3. ,, ,, Prof. Simonds's Lecture on the Anatomy and Diseases of the foot in Domesticated Animals, with particular reference to the "Foot-rot" in Sheep, at 8 P.M.
4. Wednesday, Dec. 12. Special Council for Finance, and Committee for Stock Prizes.
5. ,, ,, Prof. Way's Lecture: Elementary Illustrations of the Chemical and Physical Conditions of Water, at 8 P.M.
6. Thursday, Dec. 13. Special Council for Stock Prizes at 11 A.M. precisely.
7. Friday, Dec. 14. Audit of Accounts at 11 A.M. Special Council for Report, at 1 P.M.
8. Saturday, Dec. 15. General Meeting of Members, at 11 A.M.

Devon Cattle.—Mr. H. Manning having laid before the Council a communication from Mr. W. Ewings, inquiring whether the South Devon cattle would be qualified to compete for the Society's prizes at the Exeter Meeting, the Council decided that all "Devon" cattle (whether bred in the north or south of the county or elsewhere) would be qualified to compete, provided they were duly entered, agreeably with the Society's rules for such competition.

Steward of Implements.—Sir Matthew White Ridley, Bart., communicated his readiness to act as one of the Stewards of Implements at the Country Meetings of the Society, agreeably with the request of the Council.

Farm Accounts.—Colonel Challoner, Chairman of the Farm Account Committee, laid on the table a complete copy of the forms proposed for adoption, subject to the comments and suggestions of Members of the Council, to each of whom a copy had been addressed for that purpose, on the previous day.

Veterinary Inspector.—Professor Sewell communicated the assent of the Governors of the Royal Veterinary College to the proposition made to them by the Council, that Professor Simonds should be allowed to act as the Veterinary Inspector to the Society. The cordial and best thanks of the Council were voted to the or elsewhere Governors of the College for this instance of their kind co-operation in promoting the great object of the application of veterinary science to the live stock of farmers.

Smithfield Show.—Mr. Brandreth Gibbs reminded those Members of the Council who intended to make entries for the ensuing Smithfield Club Show, that the 17th of November would be the latest day for that purpose.

Numerous donations and communications for discussion were received, and referred to the Weekly Council on the 11th of December.

OBITUARY.

On the 29th Oct., Clark Hillyard, Esq., of Thorpelands, Northamptonshire, in the 83rd year of his age. In fulfilling the destinies of this life, the subject of our present notice acquitted himself in a most creditable manner. As a good practical farmer, a working one, one who by his example taught the tenant-farmer how to improve without introducing novelties which but increase expense, few men of the present day can be compared with the late Mr. Hillyard. As a writer on practical farming he was well adapted to the class of readers he wrote for: his style was condensed, plain, and unaffected; and to show the value placed on his writings by the agricultural community, we will only state the fact that the first work he published, entitled "Practical Farming and Grazing," passed through four editions. This journal, too, has often contained his much-coveted contributions, formerly under the signature of "A Northampton Farmer," and latterly in his own name. Mr. Hillyard was the founder of the Northampton County Agricultural Society, and afterwards the Northampton Farming and Grazing Society, of which he was the President for a quarter of a century; and in 1837 the members presented him a splendid silver bowl, as a testimony of their respect. Lord Spencer, in presenting it, said,—"I never felt more satisfaction than in contributing to this piece of plate, and I am most happy in being the instrument by whom the members are pleased to convey it to you." The farmers of Northamptonshire owe much to his exertions, not only in founding this society, but for his other labours in the cause of agriculture. Through his exertions was the Northampton Wool Fair established; and that his good deeds should be felt by the labourer as well as the farmer, he, in conjunction with two other gentlemen, established the Northampton Savings' Bank—the second ever opened in his county—and he endeavoured to induce a thrifty spirit amongst his labourers, of which he employed a greater number in proportion to the extent of his holding than any other man in his county. Mr. Hillyard was an original member of the Council of the Royal Agricultural Society, a constant attendant at most of the leading agricultural societies of the kingdom, and on terms of intimacy with the majority of the leading agriculturists of his day. Too many, alas! of those who were entertained and improved by associating with him, are also gone to that irrevocable bourne "whence no traveller returns"; but there are still some, whose space of acquaintance or intimacy was more or less limited, who will feel and mourn with us the loss of an old and sincere friend, who was remarkable, notwithstanding his talent, for an unassuming deportment and great kindness of heart.

EVIDENCE ON DRAINAGE.

[The following is the evidence given on the above subject before a Committee of the House of Lords, by Robert Neilson, Esq.]

Do you occupy a farm about seven miles from Liverpool? I do.

Were you examined upon the 30th of April, 1845, by a committee having the same object as the present one? I was.

Has the experience which you have had since that time confirmed you in the opinion that drainage is of great importance for the permanent improvement of land? Quite so.

Have you continued to drain that farm? I have.

Have you found that that which you first drained continues to work as well as you expected? I effected a considerable improvement in the land which I first drained, though I had not drained it very judiciously, and I found subsequently, that by judicious draining the improvement was so much greater, that I went to the expense of again draining that which I had previously drained, but not properly.

You began draining with stones? I did.

You now drain with tiles? I do.

With pipes? With a horse-shoe and slate-sole; I drain with tiles made at Lord Derby's kiln, and they only make the open tile.

That is your only reason for preferring them? The only reason.

Should you prefer pipes? I should prefer pipes of a sufficient size.

I suppose you would not use a pipe under an inch and a half, would you? I have had frequent opportunities of observing small pipes, and I find that unless they are laid in collars, or very carefully laid in the clay, the channel in which they are laid being exactly corresponding with the size of the pipe, a small pipe is very apt to get out of place, and damage ensues in consequence.

Have you been upon a farm of Lord Derby's, called Mossborough Farm? I have.

Will you describe to the committee in what state that farm was a few years ago, and in what state it is now? I can best describe it by saying that it could scarcely be called a farm at all; it was several small holdings, in wretched condition.

Whereabouts is it? It is about five or six miles from his Lordship's seat.

I believe some few years ago there were a few small cotter tenants upon the waste or moorland? There were.

It was almost uncultivated? It was quite so. There is a considerable difference of soil on the farm; part of it is strong land, and part of it only moor or moss land: the face of the whole range of the farm was most miserable; the fences were awkward, broken down, and crooked; the fields were small and mis-shapen, and the whole surface of the strong land exhibited scarcely anything but a mass of rushes and weeds, and a wasted, worn-out, and most uncultivated appearance. It was taken in hand by Mr. Hendrie, the sub-agent, by the direction of Lord Stanley, and in the course of two or three years the whole face of the farm was changed; the principal improvement in the cultivation of the land arose from the drainage; the face of it was so changed that no one going over it could have known it again.

I believe there was part of the moor land upon which a horse could not go? I went upon it a few years ago with Mr. Erle, before it was improved, and my horse was bogged, and had to be pulled out.

I believe the way in which this work was executed was in taking part of the soil of the farm and putting it down upon the moss; there was an exchange made of moss land and clay land? Yes, by means of a light portable railway; I had one which I invented and worked on my farm; Mr. Hendrie took a pattern from it, and they thus transferred the land backwards and forwards by contract work.

They took down the clay soil to put upon the moss, and they brought back the moss to put upon the clay, by means of a portable railway? Yes.

Did they not dig ditches through the moss? They did.

Of what length was the railway? The result of several experiments I made led me to make it in lengths of 18 feet each.

Of wood, or iron? Of wood. I use them entirely for taking off my heavy crops of swedes. My land is of a nature that I cannot use carts upon it in wet weather, without doing it considerable damage. I made this railway in consequence of having broken two carts and left them fast in the land; since then I have found it so much more beneficial than carting, and so much cheaper, that I have taken off my turnips to a great extent with it. It is in lengths of 18 feet, and two feet wide; the sides are made of deal timber, two inches thick by three inches deep, and a light rim of Iron laid along the inner edge. The waggons hold about 10 cwt. of turnips, and from 15 cwt. to a ton of soil or clay.

What has been the cost of it? The cost, per double yard, is about 1s. 4d. complete.

What is the expense of moving? Two strong boys or men will move nearly a quarter of a mile of the railway, and replace it, in from 25 to 30 minutes; clever lads would do it in less. Perhaps I may explain to your lordships how it acts: some of my fields are from 400 to 500 yards long; I lay the railway down one length and gather from six yards on each side, so that that clears about an acre of land; I then move it 12 yards further on and lay it through the turnips again; it takes from 25 to 30 minutes to shift the whole line and replace it, where the land is level.

Have you tried with men? I have never been very accurate about testing the time by a watch, but we have generally considered that it will take about half-an-hour to do it.

I believe you have a permanent railway in your buildings, so that the end of the temporary railway abuts upon that, and takes the turnips into the sheds where you feed your cattle? Yes.

Must you have carts specially made for the purpose? Yes.

Will they travel upon ordinary roads? No, they will not; they are made with a flange to the wheel, which might break on a road.

I believe in this improvement of Lord Derby's he had ditches made to carry off the water from the moss? He had.

Did not those ditches require, after a certain number of years, to be deepened again, in consequence of the moss sinking? I have observed that both the moss sinks and a certain kind of deposit oozes through at the bottom of the ditches by the superincumbent pressure, so that it is very evident that in the course of time they require to be re-excavated.

Do you know if Lord Derby has let that farm? I am not aware; they have had several applications, but it is the wish of Mr. Hale, and I believe Lord Stanley, to have efficient and responsible tenants; I do not think the farm is let yet.

I believe the extent of the land which has been improved is 400 or 500 acres? It is about that.

There is no doubt that the money which has been laid out upon that farm will amply repay the owner who has laid it out? I have no doubt of it, from what I have observed upon another farm, not very far from Mossborough, the Lodge Farm, which was improved in the same way. A strict account was kept of the expense of the improvement, which was added to the value of the farm, and I understood from Mr. Hendrie the farm was paying well.

What do you consider to be a remunerative interest for such an outlay? It depends upon a variety of circumstances; in my own case, I had a great number of small fields to throw into larger ones; the ditches were very wide, and the fences very crooked, and occupying a great portion of the land, so much so, that I have gained to the plough in a farm of about 260 acres, I think about 25 acres; and in one portion of it, where I kept an accurate account of the labour, seven fields in length were thrown into one; and upon that land, by the saving of time alone in working it, during four years I regained the whole outlay and interest, independently of the advantage gained by the additional land which I thus obtained.

What do you consider would be a remunerative interest for a permanent outlay, such as draining, upon a farm? On a farm of 220 acres of heavy land, on the four-course system of farming, the saving to the tenant in wear and tear of machinery, diminution of horse-labour and implements, interest upon capital reduced, and other things, exclusive of the beneficial effect upon the land, is equal to from 9s. to 11s. an acre. With regard to the landlord, I consider that he is remunerated if he gets 5 per cent. for his outlay; but the beneficial effect upon the land is equal, in many cases, to 20 and even 30 per cent. on the cost of drainage. I consider any permanent investment on land is sufficiently remunerative that will give you 5 per cent. per annum; and the investment of capital in drainage will give far more, directly and indirectly, because it increases the value of the land to such an extent, that you may obtain a tenant with ample capital, upon drained land, at a rent which, exclusive of interest on the outlay, would far exceed the utmost rent which you must be content to take from a tenant without capital, if it were not drained.

That must depend mainly upon the class of land of which you are speaking; would you say that there would be such an increase upon land already in cultivation, or would you apply it to unreclaimed land? To land already in cultivation.

Do you mean that, supposing the landlord drains for a tenant, he only ought to charge 5 per cent. for the money so laid out? No, I did not mean to make that observation. I said that 5 per cent. would be a profitable investment; but I think the charge should be a matter of agreement between the landlord and the tenant, because I am sure, in many cases, it would be profitable for the tenant to pay more than that. But then the question would arise, whether, under a lease, the tenant had not better drain the farm himself than pay an exorbitant interest. But the beneficial effect to the tenant is far greater than the interest hitherto charged under the loan from the government; and perhaps, in illustration of that, I may mention a circumstance occurred within the last two months, under my own inspection, upon a property in Northumberland, belonging to Mr. Atkinson, who has applied for a loan under government. There is a farm held by Mr. Drysdale, a very intelligent and sensible man; the farm is about 1,500 acres: I went over it in the early part of the summer of 1847, and came to a field covered with rushes and sour herbage, which I recommended to be drained. Mr. Drysdale said he did not think it would yield a crop to repay the drainage. I saw from the land that it was of a good quality, though in sad condition, and I urged it upon his attention; he agreed to drain the worst portion of it, as he thought the other portion, being higher, did not require draining; he thought it was dry enough. Both parts of the field were put under the same cultivation—the worst, which he drained, and that which he thought did not require draining. When the season for sowing wheat arrived, it was too wet to sow the part of the field he had not drained, but he sowed that which was drained; and in the spring following, that is, the spring of 1848, he sowed the undrained part of the field with barley, laying down both portions with clover. At the beginning of this month I went to inspect that estate, with Mr. Atkinson, the proprietor, Mr. Appleby, the agent, and Mr. Drysdale, and at a distance of several fields, I should think 400 or 500 yards off, I pointed it out to Mr. Drysdale, and said, "I can see to a yard where you have drained." When we went down to it, Mr. Atkinson asked me what I thought would be the difference of crop; I guessed double; Mr. Drysdale subsequently mentioned the exact return. He had sold from the drained part of the field, which he at first thought was scarcely worth cultivation, 40 bushels of wheat to the statute acre, and he had only gathered, from the part he considered the best of the field, 23 bushels of barley: that was a difference in one crop of upwards of £9 sterling per acre. The upper part of the field, which was not drained, was better adapted for barley than the other part of the field, previous to drainage, was adapted for wheat; and I have no hesitation in expressing my opinion that if the upper part had been drained also, it would have given just as good a return of wheat. I may also state, that the difference in the clover root in the drained portion was as great as in the previous crop.

What was the quality of the land? It was a strong dark loam of about 10 or 12 inches deep, on a strong clay subsoil, with a slight admixture of sand.

Are the top and bottom the same over the whole? No; the superstratum is a good dark loam over the whole; the substratum is a strong retentive clay, with a slight admixture of sand. In consequence of the higher part of the field being less exposed to the action of wet, it is of a rather more friable nature, and therefore better adapted to spring crops.

What is the thickness of each stratum? The superstratum of loam is about 10 or 12 inches, the substratum is of the depth of the drainage, which in that field was 3 feet 6 inches.

You stated when you were examined before that you would rather pay 20 per cent. more rent for land that was drained than work it undrained? Yes.

You are of that opinion still? Quite so.

Have you any statement that you could give the committee of the produce of any one field of your land, before draining, and afterwards? No, I have not any detailed statement. The land I took was very much exhausted; it had been badly farmed, and was in a great many holdings; though I have only about 260 or 270 acres, they were held in 18 different holdings. I have obtained them, at great inconvenience and expense to myself, at very different periods, so that I have been unable as yet to adopt one regular course of tillage over the whole.

Was it old common or waste land? No; land very much exhausted by severe cropping, and full of weeds and scutch.

You have been employed under the Commissioners of Draining for the purpose of inspecting and certifying under the Three Million Act? I have.

You have, therefore, in the discharge of your duty had an opportunity of seeing land in various counties of England? I have.

Do you consider that the advance which the government made under the Three Million Act was one which was likely permanently to improve the land of the country? Very greatly so, and still further to improve the comfort of the districts where the money has been laid out, not only by the extension of labour in the drainage itself, but also by the ample field for continuous employment by the improved system of cultivation consequent on it.

Has it, or has it not, promoted the health of the people residing in those districts? Very materially indeed. Perhaps I may be allowed to mention a circumstance in connexion with this: I had the superintendence of the drainage of Mr. Errington's property at Puddington, in Cheshire; the course of the main brooks was such as not to admit of the land being drained to a greater depth, in some places, than perhaps 12 or 18 inches, and scarcely that in winter. I suggested a larger and partly new draining canal to the Commissioners of Inclosure, who thought proper to approve of it upon my representation. It was taken into operation by Mr. Stuart, the very intelligent agent to Mr.

Errington, and carried through. In less than three months after the operation of it had commenced I was over there, and one of the farmers came up to me and said, "You have done a benefit to the whole country; you have given us a clear run of water which always used to stand stagnant, and fill the neighbourhood with foul air." The same advantage has occurred at Sir Piers Mostyn's property, where they carried a deep drain, and the whole face of that part of the country is completely changed by its operation.

Do you think it would be desirable that there should be a power given by parliament, subject to the assent of the Inclosure Commisioners, to deepen the outfalls in the country? It would be most desirable and most beneficial, and I am quite sure that the full benefit of any act which the committee may contemplate will never be carried out unless power is given to compel the deepening of the main outfalls.

You stated, in 1845, that you were very averse to old pastures; do you still retain that opinion? Yes, I do; and as connected with many parts of England, I am even more strongly of that opinion than I was.

Does not it depend in a great measure upon the expense of cultivation, the produce to be received, and the value of that produce? Certainly. I meant my reply on the former occasion to be, of course, only general, and chiefly with reference to heavy land liable to moss on the surface. There are many instances of lands which it would be injudicious to break up, from the distance to the market, the want of roads and other appliances for taking advantage of the soil when broken up, and from the peculiarly excellent state of the grass, as in parts of Leicestershire and parts of Northamptonshire. My evidence was given principally upon the subject of strong clay land, with which I am more acquainted than any other; upon strong heavy land I am still of opinion that wherever an access can be got to the market, it is decidedly advantageous to break up old pastures, if there is capital and manure to work and cultivate them properly.

Upon breaking up the old pastures, do you ever find that you can substitute other pastures capable of fatting stock? I have not myself had sufficient experience to speak to that point, but I have had a great deal of conversation with agriculturists, who think that by a judicious selection of grasses adapted to the nature of the soil, by draining the soil and replacing those grasses when the soil has been enriched by cultivation, cleaned and well manured, you will get a better surface than there was before.

For how many years do you propose it should stand? It will vary according to the nature of the soil; I have found the more clay there is in soils the better they will pay for breaking up, when you have sufficient manure and strength to work them properly.

How many years do you think, on such a soil, a pasture should remain laid down? It will depend very much upon the capital of the tenant; presuming the principle of broken land to be the most productive, the tenant that had the largest capital would be enabled to have the largest quantity of land broken up; the tenant that had the smallest capital would divide his land into a greater number of courses, or rather courses admitting of a greater number of years of grass, so that his land would be longer in pasture; the time would vary from one to four or five years, according to the capability of the tenant effectually to cultivate the land he broke up, and the quantity of manure he had for each acre so ploughed.

The usual course in Lancashire is to break up the third year, is not it? You can scarcely call any method the usual course in Lancashire, the farming is generally so indifferent.

You allow a great many considerations, such as markets, the possibility of getting manure, and so on, to be taken into account? I think markets only, because the possibility of getting manure, where you use stall-feeding, can be realized by breaking up your land and feeding in four stalls.

Do you think that a farmer can procure in all situations sufficient manure for his land by feeding stock? I think he may; and I think he will find that the manure he obtains by the consumption of his crops in his farmstead, if he has accommodation for it, will far more than realize the same quantity of crop, when it is replaced upon the land and worked into it.

Is it your practice to make all the manure you use? I have been in the habit of obtaining manure in every way that I can; my land was so exhausted that I could do nothing without putting large quantities of manure upon it, and I therefore purchased largely in Liverpool; I contracted for the refuse of the markets, the fish and offal, and vegetables, from 1,500 to 2,000 tons annually, till I was prosecuted for a nuisance to the neighbourhood.

Do you think it necessary to continue that? I was then obliged, upon giving up that contract, to turn to getting stock of different kinds and putting them in loose boxes. I am collecting a large stock of manure now by that means; upwards of 4,000 cubic yards.

Do you purchase a great deal of provender of different kinds? I do, very largely; and at the present moment, though I am feeding about 90 head of horned cattle, I am not consuming a single grain of my own production.

Could you get more productive crops without the purchase of provender? If I fed off my own crops I could get an equal quantity, but I find it more profitable to endeavour to raise a good quality of grain, and to sell that, and to purchase inferior grain in the Liverpool market.

In your pastures, have you ever fatted a beast? I have no pasture.

Upon your artificial grasses? No; I frequently manure largely with liquid manure.

Do you entirely keep your stock in the yard? Both winter and summer.

Can you state, upon the average, what the expense of fatting your beasts is, per head? I am now keeping an exact account of the quantity consumed by the different classes of cattle I have in my yard. I have a number of milch cows, a number of young and dry stock, and a number of fat cattle; every week I take an exact calculation of the expenditure of the previous week, including wages and a certain allowance for wear and tear of machinery and whatever is consumed, but not counting interest of money or loss on capital; and I find, from that calculation, that my fat cattle are costing me about 1s. 3d. to 1s. 4d. per head a day; the milch cattle are costing about 9d. a head, and the dry and young cattle are costing about 6d. a head. In this calculation I charge the market price of the day for everything that is consumed, deducting the expense that would be attendant on carting it to market. I am at present charging 10s. a ton for my turnips, £1 a ton for my straw, £3 a ton for my hay, and the grain or provender at the market price, charging 3d. a bushel for grinding it, which I do upon my own farm.

And the gross cost upon fatted cattle is 1s. 3d. per day? Yes, from 1s. 3d. to 1s. 4d.

How long do you usually tie up your cattle, or put them in boxes? Upon that point I cannot give your lordship a very satisfactory reply; for this reason: I have been in the habit of making notes and observations upon the feeding in Yorkshire, Durham, and Northumberland, and I arrive at the conclusion that long feeding does not pay; I therefore keep an exact account against each beast, according to the number of the stall he is in, and the moment I have an offer which gives me a profit of even 10s. upon him, exclusive of his manure, he goes.

From your knowledge, as a farmer, you can tell me how many months it is desirable to keep up cattle? I should say, the sooner you can fatten them the better for profit.

How soon can you fatten them? In three months, unless they are in a starved condition when you buy them.

According to the expenditure which you have stated, 1s. 3d. per day, that would amount to £5 12s. 6d. or thereabouts? That must be buying them well in; you must not buy them in starved and wretched order, but with a loose hide, healthy and tolerably fresh; it never pays to buy them too thin, at any price.

Are you aware that there is a great deal of old pasture land which is capable of fatting a beast per acre? Yes, there is.

Has it come to your knowledge that the expense of that land is anything approaching to your outlay? No, it is not; but my outlay is materially diminished by the accumulation of good manure.

Then it would not be desirable to break up such pasture? Yes, for if broken up it ought to feed more than one beast per acre; and you get the whole of the manure, wet and dry; this manure dropped upon a field in a state of pasture, is not supposed to give more than, perhaps, one-fifth or one-sixth of the real value it would be to the land if it were mixed up and then replaced; that is, put inside the land, instead of thus being wasted upon the top of it.

Then one advantage arises from a chemical preparation of the manure? Undoubtedly it is far superior to that dropped in the field; and the increased produce of the land broken up after the application of the manure you make in the yard will feed three times as much stock as the previous pasture. It is a judicious combination of circumstances which causes the land to yield a larger return by being broken up; and this is lost sight of by the advocates of old pastures. If you take the simple fact of an acre of land fatting a beast, and you are paying perhaps £2 for that acre of land, and it will cost you £5 odd to fatten a beast in a loose box, you must deduct from the £5 odd the value of the manure, and you must place to the credit of the broken-up land the difference between its crop and the crop of grass which would only fatten one beast.

Does your land, upon the average, produce you a net profit superior to that which has been stated? Upon my land it would, beyond what I could get from pasture; my land is not good grass land. Your lordship has taken the range of the best grass-lands in England. My observation, as I said before, applies generally to those strong heavy lands which you seldom find yielding the pasture which you will meet with in some parts of Leicestershire and Northamptonshire.

You no not apply your observation to all grass-lands? I do not; to those under the restrictions to which I have already alluded.

Do not you find that breaking up the land reduces the poor-rates? Most undoubtedly; I consider that the effect of breaking up grass-land is decidedly beneficial to the land owner in reducing the poor-rates, by the greatly increased field for labour it affords. I may observe, that the annual amount of wages in my farm was from £100 to £200 before I took it, and now, exclusive of the drainage, it is upwards of £1,000 annually, affording labour adapted to all ages, from 10 or 12 to 70, of both sexes. As to the increase of the population, I consider we have room, if we had money, to stop the whole tide of emigration that is now draining the kingdom of both capital and labour: we have plenty of land destitute of cultivation that would amply repay the cost, and that for years and years would profitably employ and abundantly feed ten times the number of those who, by their departure, are thus depriving the country of so large an amount of productive strength.

In a grazing district, do not you perceive that old grass-land is much less liable to burn in summer than land fresh broken up? No, I have not observed that, beyond what you can account for; in old grass-land you have always a quantity of decaying vegetable matter which holds the moisture and allows the action of the sun, or rather absorbs the power of the sun, without the land being so much burnt; but in land that is well cultivated and drained, you will find it is in a damper state in the height of summer, and in a drier state in the depth of winter, than land that is not drained, whether old pasture or not.

Are not you referring to clay land exclusively? No; that observation will apply generally, I think.

Are you much acquainted with dairy farmers? Only in Cheshire.

Is not it a general opinion which exists among them that the land will support the stock to a much greater extent, if it is old grass? They have that opinion in some cases.

You do not agree in it? No, by no means.

Is not the expense of a proper selection of seeds so great as not to be within the means of an ordinary farmer to undertake it? No; I do not think that the expense of proper seeds ought to be beyond the reach of a farmer. The mode in which many farmers usually lay down their land is to take two crops of grain from it, and sometimes more; and, whether they break it up to work as open land or to lay down again, they equally adopt the practice of taking two crops of grain; they generally break it up with a crop of oats, work it with potatoes or turnips, and then lay it down with wheat, or sometimes they have two grain crops after the green crop. The principal point of my observation was to show that they deprived the land in those two crops of grain of more of the best constituents of the grasses than five or six crops of grasses alone would take out of the land. The most nutritious portion of the land is absorbed by the crop of wheat and the crop of oats being allowed to ripen upon it; whereas, if those constituents of the soil had been left in for the nourishment of the grass-seeds, I believe that if the manuring and cleaning the green crop had been properly done, you would get very early and very speedily a turf that would fatten faster than the previous old grass upon the same land.

What course could you suggest as the proper one to secure that land? Wherever the land (being drained of course) was broken up merely for the purpose of being laid down again as pasture land, without a green crop, and as speedily as possible, I would recommend it to be well manured and thinly ploughed in the autumn; as soon as the sod was rotten, before the frost, if possible, I would plough it deeply across the former furrow, and leave it for a winter fallow; I would then work and clean it well early in the spring, taking care to remove all quitch-grass and other roots inimical to grass seeds. I would lay it down with grass-seeds alone, well selected and adapted to the nature of the soil, and only pasture it with sheep for the first two years; and I am convinced, if that were done, the land would be very much better, and capable of carrying more stock than before breaking up. If you wish to have the advantage of a green crop in the intermediate time, I would adopt the same course with the sod; and would manure it and cross plough it for a winter fallow, then clean it well both before and during the growing of the green crop, and plough it deeply as soon as the crop was off the ground, giving it the advantage of the second winter's fallow, instead of taking any corn from it; I would then sow it with grass-seeds, as in the first case.

I understand that your intention in breaking up the old pasture is not to grow corn upon it, but to lay it down again? Exactly; if it is wanted in grass, as, for instance, in front of a gentleman's park, that is the mode I would pursue to get up fattening grasses. I believe crops of corn taken from land intended to be laid down in grass again are very detrimental to the nutriment of the subsequent grasses.

You do not conceive that the breaking up of pasture land, and taking a number of crops of corn from it, is likely to increase permanently the value of land? No, by no means; I mean to say that no land should be broken up without being well manured and cleaned before it is laid down again.

Are you disposed to approve of the four-course or the five-course system? That depends very much upon the quality of the land.

In the case of strong land? In strong land I should vary them according to circumstances; my own land I am working as close as I possibly can, in order to get it into a regular system.

It depends a good deal upon the climate which course is preferable, does it not? Upon the climate, and upon the soil also.

It is your opinion that a greater amount of manure of a better quality can be produced from a farm when it is broken up, than previously when it was under grass? Undoubtedly.

Would that greater quantity of manure compensate for the additional expense of cultivation upon arable land? I think it would.

Will you state what would be the expense upon 100 acres? I am afraid it would be difficult to state the expense off-hand; the expense is principally in labour, and I think that labour, if it is judiciously applied, must be beneficial; as a general rule, wherever human labour is judiciously applied, the probability is that there will be a profit from it.

Is there any other observation which you wish to make to the committee? With regard to drainage, there is one point which I think renders it desirable for a measure for that purpose to be passed, which is the difficulty which will be created wherever money has been lent by the government upon the works ceasing. The pressure of poverty will be severely felt in several instances through the intervention of this loan. Large families are supported through the winter by the labour employed in drainage alone: in several cases which I can speak to, those families will be thrown out of employment in case of these funds failing. The cost of draining one acre of land is equal to the support of 35 adult people for one day, and supposing them to represent a family of only three to each, that will be upwards of 100 people for a day; the withdrawal of that amount will therefore produce a very large extent of misery. There is another point which has been very strongly impressed upon my mind by the effect of drainage, that the general extent of the farm-buildings requires great alterations and great additions; anything that would lead to an improvement in the farm-buildings is as necessary, and would be as beneficial to the agricultural public, as draining.

In consequence of increased drainage the farmers require more efficient buildings, for the purpose of making more manure? Yes.

Will you have the goodness to specify what you mean by buildings? I mean farm-buildings exclusively.

What sort of farm buildings? All accommodation for fatting stock, manure-tanks, granaries, implement sheds, stables, &c., &c.

Not actual houses? You cannot expect to get good tenants without comfortable houses. In Cheshire and Lancashire the farm-houses are in a very bad state, but that must be a matter of consideration with the proprietor as to the class of his tenantry, and their wants.

You mean buildings for the advantageous consumption of the increased produce? Yes.

You are not of opinion that large barns are necessary? No, certainly not.

Do you think it just or economical that you should put upon the barns the straw you ought to give to the cattle? Quite the contrary: slate is the best and cheapest in the end.

I believe you yourself have a steam-engine which you have erected, and that that steam-engine does everything which you require? It does.

Even to the steaming the food for your cattle? Yes.

What power is it? Six-horse power.

What was the cost of it? The whole of the machinery together, including the engine and everything I have put up, might be erected for between £400 and £500; that includes a threshing-machine, a dressing-machine, a pair of mill-stones, a large range of steam-boilers, a pug-mill for mashing potatoes or turnips and mixing meal with them, a grind-stone, a turnip-cutter and crusher for mixing with chaff, crushing apparatus for oats, beans, peas, and linseed, a circular saw, a turning-lathe, a drilling machine for boring iron (for I make my own ploughs and carts, and so on), two chaff-cutters, and a forcing-pump that supplies the whole yard, and drives the blacksmith's bellows, and churns.

What weight of coals does that consume per hour? In full work it would consume about eight to nine hundred weight of slack per day; they use a little wood with the slack, the old timber of worn-out carts, or anything that is broken up.

You get fuel very cheaply? Yes; I am very near a colliery.

Have you seen any machine which has been put up to drain land where the land is lower than the surface of the river? I have.

Where? At the Altcar Meadows, in Lancashire; belonging to Lord Sefton.

Do you know the expense of that engine? I do not exactly; it drains about 1,000 acres of land.

Do you know what volume of water it pumps over in an hour? I do not know accurately; I erected one myself on a property I have in British Guiana, and drained 800 acres of land with an eight-horse engine, raising the water occasionally six feet high.

Do you imagine that it could be put up for a slight expense? I think for about £2,000 to £3,000 you might put up a machine that would drain from 1,500 to 2,000 acres of land upon the level which I saw of your Lordship's property, upon the road from Hull to Normanton.

Would the keeping of that engine in repair and in work be a very heavy expense? No; it would require an engineer and an assistant occasionally, and the cost of coals and carting, which the tenants would do.

Do not you imagine, as the engine would not be required during the dry seasons for pumping the water, it might be so constructed as to be employed also for the purpose of grinding? Undoubtedly; and use the water in winter as a secondary power.

The water which you throw up would turn a thrashing-mill? Yes, you might very easily have it attached by a belt to your grinding machine.

So that during wet weather you could grind by water, and during the dry weather by the steam-engine? Exactly so.

CALENDAR OF HORTICULTURE.—DECEMBER.

Retrospect.

On the 21st of October the last Calendar was closed, having then passed the short period of cold weather that the month comprised: the last ten days of that month presented an average temperature (night and day) of 54 deg. 84 cents.; the highest mean, in the shade, by day being very nearly 60 deg. The weather was fine, interspersedly, with moderate showers; consequently the gardens bore a summer-like aspect. All vegetables were fine and abundant. Potatoes very superior in quality—far beyond any that have been in the markets, generally, since 1844. November came in with splendour! Who, indeed, can forget the first 13 days, which, excepting the trifling rain of the 4th and 7th mornings, were altogether fine, and with much sun. The perfection and splendour of the *chrysanthemums* attested the truth of these assertions; and even now, on the 19th, after one or two sharp morning frosts, much pelting rain, and a good deal of November haze, they yield very handsome cuttings for the bouquet. These are glorious flowers, and prosper either in the open ground or in pots, if they meet with judicious treatment. A pot should be large, containing a good generous loam, watered occasionally with liquid manure. A south wall affords the best of aspects; and the soil about the roots ought to be renewed yearly, or the site changed early in the year, when the roots are to be divided. In bad seasons the plant is discretited; and it does not prosper well in close houses under glass.

Scarlet pelargoniums are yet healthy, and many dahlias remained in fair condition till the rain of the 15th, succeeded by two rimy mornings.

Before entering upon the ordinary operations of the season, which at best, must be contingent on the weather, I offer some remarks upon that subject of vast national importance—the *carbonization of peat.* The great facts adduced, and proved (if there be such a thing as practical demonstration) by Mr. Jasper Rogers, ought to be known and felt by every one who pretends to understand cultivation. His theory is opposed; but proofs are stubborn things, and we hope that the statements published in the *Mark-lane Express,* and *Farmers' Magazine,* will be extensively read, and closely studied. In the meantime, any careful gardener may obtain carbonized animal and vegetable matter by a process sufficiently simple. Collect cuttings of every thing, as made; hedge-clippings, dried stalks of cabbage, broccoli stems, scrapings of ditches, and all the waste bones and fragments of the domicile. Pile around the space allotted, with sods taken from the sides of roads and ditch banks, kept till moderately dry. Lay a quantity of rough straw at the bottom of the open space, and on *that* dry chips and cuttings, sufficient to raise a strong fire; as the mass ignites pile around it, convergingly, sods and turves, adding to the fire all the refuse matters, over which throw lumps of dirt, such as the scrapings of ponds, pools, and ditch bottoms, so as to cover the burning materials completely, without entirely excluding the air. The heap may be fed for the space of several days, according to the quantity collected; and at night be secured by a closer covering of sods. If the process has been properly conducted, every piece of wood and bone will be charred and blackened, without being consumed, or converted to ash. These matters will be of themselves manure, valuable to crops, and very inimical to insects; and, if I mistake not, would deodorise and convert to manure all the "*cloacine*" of a closet or privy.

Operations in the Kitchen Garden.

The state of the ground must decide. The work directed to be done last month, may now be much the same, so far as cropping and sowing are concerned. In general, trench vacant spots, and manure deeply. If *broccoli* plants stand in trenches, hasten to earth up the stems to the lowest fine leaves, after inclining the heads towards the north. Force *asparagus, dwarf rhubarb,* and *sea-kale.* Earth *peas* and *beans,* and protect the former by small branches of fir. The best *celery* ought to be covered in some way; boards like a ridge would be most effectual; under which, on each side of the celery leaves, some dry fern might be laid along the ridge of earth, to guard from frost, and keep off the pressure of the boards: some large plants ought to be taken up and stored in sand. Cover mushroom beds with clean dry fern or straw; and in the mushroom-house keep a heat of about 50 deg. Fahrenheit.

Cauliflower plants, in frames, or under glasses, will be kept in health by free air, whenever the weather shall be open and dry. Let the yellow leaves be removed at all times. In rainy weather tilt the glasses a little, but close them before dusk. For frosts they must be kept close, and also protected by mats or litter. For sliding sashes over frames no covering can be more effectual than reed-straw mats; the objection to them is their weight when wetted. These mats are easily made by an intelligent man: they roll on and off with great freedom, and if taken care of, do not rapidly decay.

Small salad herbs can be sown in pans and shallow boxes, kept under cover of a vinery or a temperate pit; also radish seed in a frame, to come in early.

In the *Hardy Fruit Department* we recommend that no pruning be done till February, unless the pressure of business require despatch.

Forcing.

Vines.—About Christmas the prudent gardener will commence his first crop, rather than at an earlier period. Gradual increments of heat from 50 deg. are desirable. If the vine border be out of doors, it should have been deeply covered many weeks since, to maintain the temperature of the soil, and ward off chilling rain and snow. Whatever may be said in favour of strong stimulating adjuncts, such as raw bones, dead animals, &c., be it remembered that road-sand, calcareous earth, broken fragments of brick. and the like, with a free unctuous turfy-loam, as a staple, 12 to 14 inches deep, and resting upon a sloping bottom, made of six inches of brick, rammed hard, will produce grapes of finer flavour than will other rank soils. Large clusters, fit for exhibition, may be procured by stimulants; but flavour must depend upon a temperament of soil which shall represent the dry and calcareous earths of the grape-producing countries. The mildew, or aptitude to acquire mouldiness in grapes, may perhaps be induced by the rank manurings of the vines.

I doubt the validity of the theory and practice of strong steamings and syringings; these may promote extensive developments, but do they improve the vine or its fruit? Mr. Williams, of Pitmaston, acts on a reverse principle. As to the acarus called red-spider, the vapour of sulphur (not ignited) and warm steam may do some service; but, as before suggested, might not a *very prudent* application of chlorine gas, excited by mixing together 4 drachms of the best dry chloride of lime with 3 drachms of powdered alum, distributed among three or four saucers, be equally efficacious, and more safe?

Peach trees.—The *Noblesse* is, I believe, a safe forcer; treat the plants as the vine, but moderate the heat; and in this case fumigate often, and wash freely with clear liquid sulphuret of lime.

Floral and Ornamental Ground.

Nothing can be done in the grounds beyond the operations of cleaning and protection. Leaves half reduced to mould will protect the *fuchsias*, *azaleas*, and all the heath tribes, if scattered deeply as mulch around the stems. Fine roses may be mulched and enriched with mellowed horse-droppings.

Conservatory and Greenhouse.

Admit all the dry air possible with prudence. Remove every bad or mouldy leaf. Clean the leaves of *camellias, oranges, rhododendrons, kalmias,* &c., which are apt to acquire dirt, and some kind of fungus that disfigures certain evergreens. *Heaths* can bear a great deal of cold air, but they are impatient of humidity. Water the *pelargoniums,* and juicy herbaceous or semi-herbaceous plants, very little. Keep up very moderate heat by fire, and depend mainly upon secure coverings. *Sollya* is a beautiful, but now almost neglected shrub: its sky-blue bells are lovely among the pale green foliage; it climbs, or can be retained as a bush, and is almost hardy.

Stove and Plant House.

Some plants, as the *cinnamon, clove,* and *alspice* must have heat; but, in general, we aim at a too high temperature by night, when 45 to 50 deg. will be sufficient. Atmospheric heat and moisture within a house should always be regulated by the amount of solar light. Winter is the season of repose; and time is not gained by urging growth, when the days are short, the solar rays few and far between, and the heavens overcast and obscured.

A propagation house, and a good forcing pit, are capital appendages. Herein I would urge the abandonment of tan, leaves, or a mixture of both, as the medium of bottom heat. Charcoal-dust, mixed with fine siliceous sand, *as a bed,* warmed by pipes, or a tank of hot water, are clean, always sweet, free from worms and wood-lice. In a house so prepared cuttings may be struck, and the heat regulated with precision and constancy. Rhododendrons, azaleas, kalmias, roses of various sorts and tints, daphnies, rhodoras, &c., also several kinds of advanced bulbs may be introduced, and gradually brought forward by an atmosphere of 60 to 65 deg., aided by a bottom heat of 75 to 80 deg. This latter ought always to be sweet, and not subject to the alternations which self-fermenting materials are ever liable to.

FINAL REMARKS.

The frost suddenly passed away; the wind at south-west, brought back a warm and moist atmosphere, with some rain. On the 18th the current became north-easterly, but warm; it it still very far from cold, but there is an absence of sun. Barometer rising, and at 30 inches 12 cents.

Croydon, Nov. 20th. J. TOWERS.

AGRICULTURAL REPORTS.

GENERAL AGRICULTURAL REPORT FOR NOVEMBER.

The weather of the past month having been unusually fine, all out-door farm labours have progressed very rapidly in most parts of the United Kingdom. Nearly the whole of the winter wheats have been sown under the most favourable auspices; and the plants above ground are looking remarkably well.

Several unfavourable reports have reached us respecting the winter store of potatoes. In some quarters the "pits" are represented to have fallen in. Severe individual losses have been referred to by several of our correspondents; yet we doubt much whether those for the whole country have been sufficiently large to have any effect upon the value of grain. The various markets have been very extensively supplied, and prices have ruled low, viz., from £2 15s. to £5 per ton. We learn, on very good authority that the crop grown this year on the Continent is large. During the month the arrivals thence in the Port of London have amounted to nearly 7,000 tons, chiefly from France, Holland, and Belgium, with a few from Germany.

Much attention has been lately directed to the consumption of corn in this country; but we may observe that great misconception is abroad in respect to the actual yield of the various crops. At a recent meeting, in a large provincial district, it was asserted that the annual produce of wheat, barley, oats, beans, and peas in the United Kingdom was upwards of 79,000,000 quarters, which immense supply was derived from the 22,000,000 acres under cultivation. The fallacy of such statements must be obvious; yet it may be useful to refer to some statistics for the purpose of showing that for some time past we have been dependent upon foreign producers for a large portion of our "breadstuffs." By way of illustration, we will take the quantities of English wheat returned as sold by the corn inspectors in England and Wales during the last five years, and place them in juxtaposition with the importations :—

Years.	English Wheat sold. Qrs.	Foreign Wheat imp. Qrs.
1844 ..	5,456,307 ..	1,021,681
1845 ..	6,666,240 ..	313,245
1846 ..	5,958,962 ..	2,943,926
1847 ..	4,600,600 ..	4,612,111
1848 ..	5,800,260 ..	2,189,876
Total . ..	28,482,369	11,080,839

The above large importations, it must be observed, are irrespective of the immense supplies of barley, oats, Indian corn, &c., received in each year: and which, if given in detail, would swell our actual importations to an almost incredible amount. To assume, therefore, that we produce adequate supplies of grain to meet consumption is a complete fallacy.

There has been a slightly improved demand for fat stock. The rise in the general quotations has been trifling; but it has induced increased importations from abroad. The approaching Smithfield show is expected to be a very good one, both as to number and quality. The quantity of stock, both here and on the continent, ready for our markets is large. Fortunately for the graziers, the supply of natural food has continued large. The linseed-cake market has, consequently, suffered, and prices have ruled very low. The falling off in the importations of cake and linseed has been unusually extensive.

The wool trade has ruled tolerably steady; and we understand that large public sales of colonial qualities will be held in London in January next.

The turnip, carrot, and beet crops are well spoken of. Prices, however, have ruled extremely low. In hay and straw very few transactions have taken place. The supplies, in almost every instance, have exceeded the demand.

REVIEW OF THE CATTLE TRADE DURING THE PAST MONTH.

For the time of year, the principal stock markets in England have been well supplied since we last wrote. Notwithstanding the low prices of bread, salt provisions, and potatoes, rather an extensive business has been transacted; and, taking the quotations realized at the commencement and close of the month, we have observed a slight improvement in them. As the graziers almost generally have been clearing out their inferior stock, and holding back their best beasts for the ensuing month, which is expected to bring forward a large number of really prime animals for Christmas consumption, the quality of the supplies on offer in Smithfield and elsewhere has been inferior. The best stock has therefore commanded more attention than of late, and a great disparity has existed between the highest and lowest figures. The stock has fared remarkably well, owing to the mildness of the weather, and the superabundant supplies of natural food, which have sold at unusually low prices.

The following supplies have been shown in Smithfield:

Beasts	19,388 Head.
Cows	342
Sheep	120,060
Calves	1,113
Pigs	2,116

COMPARISON OF SUPPLIES.

	Nov., 1846	Nov., 1847.	Nov., 1848.
Beasts	20,361	20,514	19,700
Cows	470	583	600
Sheep	114,460	121,320	103,770
Calves	1,186	1,608	1,483
Pigs	2,838	3,206	2,326

COMPARISON OF PRICES.

	Nov., 1847.	Nov., 1848.	Nov., 1849
	s. d. s. d.	s. d. s. d.	s. d. s. d.
Beef from	3 2 to 5 0	2 8 to 4 2	2 8 to 4 0
Mutton	3 8 to 5 4	3 0 to 5 0	2 10 to 4 2
Veal	3 10 to 5 0	3 4 to 4 4	3 2 to 4 0
Pork	4 0 to 5 2	3 10 to 4 8	3 2 to 4 4

The bullock-droves from Lincolnshire, Leicestershire, and Northamptonshire have amounted to 8,000 shorthorns; from the eastern, western, and midland counties, 2,600 Herefords, runts, Devons, Scots, &c.; and from other parts of England, 2,100 of various breeds. Scarcely any stock has reached us from Scotland; but 78 beasts and 500 sheep have arrived by sea from Ireland.

The foreign importations have been as under:

	Head.
Beasts	4,228
Sheep	14,204
Calves	618
Pigs	409

COMPARISON OF IMPORTS.

	Nov., 1846.	Nov., 1847.	Nov., 1848.
Beasts	2,823	3,486	3,488
Sheep	8,939	16,213	13,424
Lambs	—	121	77
Calves	124	667	669
Pigs	—	41	—

At the outports, 3,456 head of stock have come to hand, chiefly from Holland.

Newgate and Leadenhall markets have been tolerably well supplied with each kind of meat. The general demand has ruled steady, at, in most instances, very full prices.

CORNWALL.

The year 1849 is fast drawing to a close, and a more favourable one for farming operations few men can remember; the various seasons all in their turn being of a most favourable character, producing good crops, and affording a most delightful season for gathering them in. It is very true some fields of corn are to be found under an average; but we are safe in saying, taking this county together, it is a year that will long be remembered for its abundance and superior quality of all kinds of grain. The hay is exceedingly good; the greater portion having been saved, without rain, and a full average quantity. The green crops are extensive and excellent, so we have an abundance of winter food for cattle; the influence of which is already felt by the increased demand for cattle and sheep. The season is very mild, the clovers and pastures producing a plentiful supply of sheep's keep, and looking as green as if it was spring: vegetation as yet has received no check. But in the midst of this abundance for the support and comfort of man, we are all murmuring and complaining; and the spirit of discontent is shewing itself in strong colours. However men differ as to the cause, in this all agree—that with our present prices, viz., wheat 40s., barley 22s., oats 16s. per qr., beef and mutton (average) 4½d., and wool 5½d. per lb.—by the time labour, poor's-rate, rent-charge, and the other outgoings on land are paid, little or nothing is left for rent. That things cannot remain in this state for any length of time is self-evident; and if we wanted an instance to support the correctness of our observation we should say, Look at Ireland—look at that fertile but unhappy country, where land can neither be let nor sold, and where the poor's-rate is eating up the very vitals of the country. This is a matter in which the English landowner and farmer are mutually concerned, and requires their best energy and co-operation manfully to meet; for unless we have a speedy change similar results will follow in England. No one who considers the subject coolly and dispassionately, can for a moment doubt—"Ireland is ruined, and the right-hand of England is paralyzed." It is a just observation, "Shift the matter as you will, the rental of land is a question between the landowner and the tenant." Some able writers on this subject tell us we must go back to 1792, and rents must settle down there; others show us, if land with wheat at 56s. per qr. was worth so much, what is it worth with wheat at 40s.? We know the value of the produce must give the value of the land itself; and we have been long of opinion that the value of a certain quantity of grain is a better representation of the value of arable land than a fixed money value.—Nov. 21.

The wheat in the Weald has come up well and evenly, and is growing fast; but by some it is considered to be too strong and forward, and therefore in danger of becoming "winter proud." In some instances sheep have been turned in, to check the luxuriance. This not only keeps the blade from running away, but causes the root to become stronger and more firmly set in the ground. Tares are looking well, and, in consequence of the partial failure of the young clover, have been somewhat extensively sown. Trifolium is also adopted this year in the Weald as a substitute, and looks well. It is not generally enough known that this seed does not require the land to be ploughed before it is sown. It is far better to clean the ground with the edget and harrow, taking care only to get grit enough to cover the seed. Many farmers this year let it alone too long, and the plant is looking sickly in consequence. Trifolium should be sown as soon as possible after harvest, either in August or the first few days in September. Trefoil is looking much better and stronger on the ground than clover, and is well set. Swedes have turned out very uneven, and in many places, especially on the stiff lands, the crop is a poor one, while on more genial soils there are splendid exceptions. White turnips are better, but backward sown rape does not look prosperous, the dry weather having set in. Carrots turned out better than was anticipated, but having latterly grown very fast, many are split at the crown. Parsnips were good when taken up, and will be found an excellent substitute for carrots, where they have failed. There are various reports as to the yield of wheat. In some parts of the Weald of Kent and Surrey it is said not to be so good as was promised, and in the neighbourhood of Westerham, Limpsfield, &c., is reported to be not more than from ten to twelve bushels per acre. We must think this to be much underset, and are inclined to treat it as the cry of an alarmist. In the Weald of Sussex most certainly it generally yields well to the straw, and the acreage is about an average—in many places more. Markets are terribly dull, although the home supply has not been very extensive. This is accounted for by the anxiety of the farmers to get in the season, and barley has been thrashed and carried to market in preference to wheat; but the foreign supply has been large, and the millers do not seem inclined to buy, except from hand to mouth. They have not a heavy stock on hand; and as they must keep up or establish a stock, it is not supposed that prices will vary much; still we must not look for much better. Employment is already getting scarce, and many hands have nothing to do in the Weald, while wages are very low. The winter is looked forward to with no very pleasurable feelings, and the accounts from many rural districts are disheartening.—Brighton Gazette.

NORTH-EAST OF SCOTLAND.

The weather since the conclusion of the harvest has been remarkably fine, and extremely mild for the season of the year. Field labour of all kinds has been well brought up, and every necessary preparation made for winter. A considerable portion of the land has already been turned over in preparation for another crop, and a variety of labours, more or less out of the usual routine, have been overtaken. The practice of subsoil ploughing the field intended for turnips is, we are glad to say, becoming more extensive, and we trust it will soon become universal. Subsoil ploughing might, we think, be made an operation of much easier accomplishment than it has in general hitherto been. A much lighter implement than that which has generally been used might, in our opinion, be found sufficient for the purpose of loosening the soil to the depth of say four or five inches below the bottom of the ordinary furrow; and this, if occasionally repeated, going perhaps a little deeper on each succeeding occasion, would be found amply sufficient and highly beneficial. The operation might to this extent be accomplished, in perhaps all cases, by three horses yoked abreast (by means of the compensation yoke) to a light implement. Now that some portion of the crop has passed through the barn, we are able to speak with more confidence as to the quantity of grain that it is likely to yield; and the experience thus gained confirms the estimate that we ventured to give in our report before harvest. The bulk in the stack-yards is about an average, but the quantity of grain will be rather below the average of ordinary seasons. To whatever cause this is to be attributed, whether to the deficiency of sunshine in harvest or to the fogs that preceded it, it is now found that the corn had not filled well. Last year the quantity of grain yielded in proportion to the bulk of straw was very great, while at the same time the grain was fine and heavy—averaging perhaps 41 to 42 lbs. per bushel. This season the case is exactly reversed; the quantity of corn yielded by a stack of a given bulk is small, and the grain light. Even on the best farms in this district, and on the best grain-producing soils, the weight per bushel will scarcely exceed the standard of 40 lbs.; and throughout the greater part of the north-east of Scotland, on all the ordinary and inferior soils, the weight per bushel will not, we believe, average more than 39lbs., while there is a great deal that will not reach even that figure. The lightness of the grain, taken in conjunction with the ruinously low price at which it is selling, will tell heavily in curtailing the receipts of the farmer this season. The usual practice in this part of the country is to sell oats (our staple produce) at so much per quarter "for 40 lbs."—that is, for grain weighing 40 lbs. per bushel, with an increase or decrease of eightpence per quarter upon the price for every pound that the grain is found to exceed or to fall below that weight. We know of some instances in which parties have sold grain this season at 14s per quarter, and which, having been found to weigh only 36 lbs. per bush., was paid for, in accordance with the established arrangement, at the rate of 11s. 4d. Under such a state of things as thus indicated, many will find some difficulty in making up their rents; and it may well be supposed that complaints as to the circumstances in which we have been placed are loud, deep, incessant and universal. Last year we, in this part of the country, did not feel the pressure of the rather low prices that we received, in consequence of the abundance of our produce; but had we happened to be differently circumstanced, had we had a deficient instead of an abundant crop, it would have been the same. This, we believe, will be found one of the worst, and, to the British farmer, one of the most trying results of the present state of things—that he may have a deficient crop, and, at the same time, a low price. In former times if our crop proved deficient, we received a proportionally higher price; if we had few quarters to sell we received perhaps nearly as much for these few as we received for a greater number in a season in which our fields yielded a more abundant produce. Now that our purchasers deal not with us only, but in the market of the world, a deficiency in *our* crop scarcely affects the price.—Nov. 20.

Mr. Sergeant Stephen has given it as his opinion that threshing-machines are exempt from toll, and the Northamptonshire Justices have so determined upon a summons against a toll-gate keeper heard before them. Legal opinions have heretofore pronounced that a threshing-machine is not an implement of husbandry, but Mr. Sergeant Stephen says—

"I am of opinion that any implement employed for a purpose immediately connected with industry, and for no other purpose, must be considered an implement of husbandry, and that a threshing-machine consequently falls within that term."

This will of course include portable steam threshing machines.

METEOROLOGICAL DIARY—1849.

Barometer.			Thermometer.			Wind and State.		Atmosphere.			
Day.	8 a. m.	10 p.m.	Min.	Max.	10 p.m.	Direction.	Force.	8 a. m.	2 p.m.	10 p.m.	Weath.
	in. cts.	in. cts.									
Oct. 22	30.07	30.06	43	56	55	S. Westerly	airy	fine	cloudy	fine	rain
23	30.05	30.14	56	60	53	S. Westerly	airy	fine	fine	fine	dry
24	30.14	30.12	54	64	53	idem	gentle	fine	sun	fine	dry
25	30.05	29.90	51	60	56	idem	brisk	fine	cloudy	cloudy	rain
26	29.80	29.86	56	56	51	idem	variabl.	cloudy	sun	fine	rain
27	29.90	30.10	50	60	56	W.S.W.	gentle	cloudy	sun	cloudy	rain
28	30.30	30.15	54	63	51	North	calm	fine	sun	fine	dry
29	30.62	30.53	50	60	47	Sy. to S.E	calm	fine	sun	fine	dry
30	30.35	30.00	48	61	49	South	airy	fine	sun	cloudy	dry
31	29.81	29.55	47	56	46	South	gentle	haze	sun	fine	dry
Nov. 1	29.48	29.60	46	56	47	S. Easterly	lively	fine	sun	fine	dry
2	29.61	29.61	41	57	51	S. East	gentle	fine	sun	fine	dry
3	29.53	29.40	46	54	53	East	calm	fog	cloudy	cloudy	dry
4	29.27	29.10	47	53	49	S. E. Westerly	stirring	fog	cloudy	fine	showers
5	29.10	29.34	42	52	42	Westerly	brisk	fine	sun	fine	dry
6	29.48	29.80	38	48	40	Westerly	lively	fine	sun	fine	dry
7	30.00	30.18	36	54	54	S. West	brisk	cloudy	cloudy	cloudy	dry
8	30.23	30 33	53	56	54	idem	brisk	cloudy	fine	cloudy	dry
9	30.38	30.28	49	56	50	idem	gentle	cloudy	fine	cloudy	dry
10	30.26	30.24	48	58	47	idem	gentle	cloudy	sun	fine	dry
11	30.27	30.29	46	60	47	idem	gentle	fine	sun	fine	dry
12	30.18	30 04	46	55	48	idem	calm	haz e	fine	cloudy	dry
13	29.95	29.80	46	53	47	idem	airy	cloudy	cloudy	fine	wet
14	29.81	29.60	41	50	40	idem	brisk	cloudy	cloudy	fine	wer
15	29.59	29.75	36	46	37	W.N.W.	lively	cloudy	fine	fine	showers
16	29.94	30.10	36	45	36	N. by W.	gentle	fine	sun	fine	dry
17	30.20	30.27	30	43	34	Various	gentle	fine	sun	fine	rain
18	30.23	30.00	33	48	48	S. West	gentle	cloudy	clo udy	fine	rain
19	29.99	30.08	40	49	45	N.N.E.	calm	cloudy	cloudy	cloudy	dry
20	30.10	30.10	41	45	43	N.E. Various	calm	cloudy	cloudy	cloudy	dry

ESTIMATED AVERAGES OF NOVEMBER.

Barometer.		Thermometer.		
High.	Low.	High.	Low	Mean.
30.27	29.08	62	23	42.9

REAL AVERAGE TEMPERATURE OF THE PERIOD.

Highest.	Lowest.	Mean.
54.46	41.86	48.16

Weather and Phenomena.

October 22.—Changeable, soft and gentle. 23, 24.—Soft, genial. 25.—Changeable, showers. 26.—Showers. 27.—Very damp. 28.—Fine, gloom, hazy clouds. 29—Various currents. 30—Superb forenoon, cirro-stratus in the evening. 31—Fine day after the haze.

Lunations.—Last quarter, 24th day, 7 h. 4 m., morn; full, 31st, 4 h. 17 m., afternoon.

November 1.—Some clouds and rain. 2, 3.—Very fine. 4.—Foggy, and extremely damp. 5.—Lively and fine, after wind. 6.—Much the same, bright sun. 7.—Misty and wet morning. 8.—Overcast. 9.—Fine, glorious sun-set. 10, 11.—Superb. 12.—Hazy and changeable. 13.—Wet, change. 14, 15.—Close, showers, gleams, cold. 16.—Fine day. 17, 18.—Keen hoar-frost, changeable. 19, 20.—Overcast, but with no rain; falling weather.

Lunations.—Last quarter, 7th day, 8 h. 23 m., morning; new moon, 14th, 9 h. 14 m., evening.

Remarks referring to Agriculture.—Every circumstance has been favourable to the operations of Autumn. Rye is gay in several places. Turnips, swedes and kohl good, the last being cleared off as feed for cattle. I have not seen wheat up; but the land is in a state so fine that, ere long, it must progress.

Croydon. J. Towers.

REVIEW OF THE CORN TRADE

DURING THE MONTH OF NOVEMBER.

The impossibility of the agricultural interest of this country prospering under free trade in grain, has now been so abundantly proved, that many who were at one period favourable to the new system are satisfied of their error, and a return to protective duties is no longer viewed as chimerical. Meetings have lately taken place in various parts of the kingdom, for the purpose of taking into consideration the present distressed state of all interested in the cultivation of the land, and to organize measures for checking the evil. We trust that no difference of opinion may arise to mar the usefulness of efforts about to be made to place our farmers in something like a fair position to enable them to compete with the foreign producers. Unity of action is the grand requisite for bringing any project to a successful issue; it has been the want of this quality amongst agriculturists, and the possession thereof by the manufacturing classes, which has always enabled the latter to obtain (what have for a time appeased them) advantages at the expense of the former. The principles of free trade have been so often and fully argued, that it would be idle to enter into the field of endless discussion: but that the practical working has disappointed many of its most ardent advocates cannot be questioned. To theorise any longer would be ruin. A practical proof of the fallacy of many of the arguments employed by the admirers of Mr. R. Cobden, is afforded by the depression of our commerce, the distress among our labourers and artisans, and the fast approaching ruin of our farmers. We are inclined to hope that this state of affairs will at length have the effect of causing our legislature to take a common sense view of the matter, and that upon the meeting of parliament something will be done to rescue the country from its present unenviable position.

The grain trade has since our last monthly notice remained in an exceeding languid state, and the value of most kinds of agricultural produce has suffered a further depreciation. The downward movement of prices has not been caused so much by any actual pressure on the market, as by a total want of confidence in the future. The steady and progressive fall in the value of corn since the removal of the import duties has lasted so much longer than was expected, as to upset all previously conceived calculations. Parties who some months ago reckoned that prices had touched the lowest, and acted on that conviction, have had to repent of their rashness; holders who declined then to sell, believing that the worst had been past, have since been compelled to realize on much lower terms; and experience having proved that, whatever might be said to the contrary, foreign supplies would continue to pour into the country, anything like a permanent improvement in business has begun to be despaired of. Our merchants, millers, and dealers, having discovered that to hold stocks was attended by loss, have for some time past acted on the hand-to-mouth system, confining their purchases to such quantities as they deemed sufficient for their immediate wants. Any excess in the quantity brought forward over what may have been required for actual and present consumption, has consequently had the effect of further lowering prices. How long this state of affairs may continue it is not easy to determine. So long as we have mild, open weather, the trade can scarcely be expected to improve; for though stocks of corn have been greatly reduced at most of the continental ports by the large exports to this country, still, whilst the different rivers and harbours remain free from ice, we may calculate on shipments to a greater or less extent being made from the north of Europe for the British markets. A severe and protracted winter would put a stop to supplies from thence, and give our farmers command of the home markets for at least a few months; and whilst we were principally dependent on them for supplies, some slight rally might perhaps take place in quotations. The weather continued mild and damp up to the 26th instant; since then we have had frost; its general character has been favourable for out-door work, but by no means such as to improve the condition of new grain in stack. The sowing of wheat, and other out-door labours, have been finished under very auspicious circumstances, and there will be little to engage the attention of the farmer from the present time up to the close of the year in the shape of field work. This is the period when thrashing is usually carried on extensively; and as the depressed value of all agricultural produce will require a larger portion of corn to be sold to raise the required funds to meet Christmas engagements than when prices are more remunerative, we may calculate on good deliveries during the next month or six weeks. The probable future range of prices must be so entirely dependent on circumstances of which it is impossible to know anything at present, that it would be unsafe to venture on an opinion; we may, however, direct attention to a few facts which are likely to have some influence hereafter. We have already stated that the character of the weather is likely to have more effect than any other circumstance. Frost, besides checking foreign supplies, would cause the home-grown corn to improve in condition, and thus raise its intrinsic value; it would likewise increase, and throw the consumption more upon bread, than if the weather should continue open and mild.

The next point of consideration is the state of the stocks in the kingdom. That there remained very little old corn of home growth of any kind on hand at the time of harvest, has been proved by the fact that the supplies since then have been almost wholly composed of new grain, and further by the rapid manner in which the large supplies from abroad have gone into consumption; we are, therefore, of opinion that, taking English and foreign together, the quantity of OLD corn in the country is reduced into a narrower compass than is usually the case at the corresponding period of the year. What proportion of the last crop may have already been used we have no means of knowing; but that farmers do not hold more than is customary (even after a good harvest) in the beginning of December, is, we think, a fair inference, owing to the early commencement on the new produce immediately after it was secured. It seems to us, therefore, that with a large consumption caused by low prices and by no means heavy stocks, prices have been mainly reduced to their present level by the hitherto large foreign imports; and if these should fall off (in case the Baltic should be frozen we should probably not have any arrivals from that quarter till April next), a not unlikely event, some rally might be calculated on.

We shall now proceed to give our usual retrospective view of what has occurred at Mark Lane since our last; this will afford a pretty good idea of what has taken place elsewhere, the fluctuations there having been pretty closely followed at most of the leading provincial markets.

The tone of the grain trade at Mark Lane has been decidedly dull throughout the month; and though the price of wheat showed a tendency at one time to advance, the small improvement which was established was not long maintained, and quotations are at present rather lower than they were at the close of October.

The arrivals of wheat coastwise have not at any period been liberal; but so cautiously have the millers in general conducted their operations, that what has come forward has proved amply sufficient to satisfy the demand. In the commencement of the month the weather was dry, and the samples of wheat exhibited at Mark Lane on Monday the 5th instant, by land-carriage from Essex and Kent, were in fair condition; sales were consequently made without much difficulty on that occasion, at rates quite equal to those current on that day se'nnight. During the succeeding week very little wheat of home growth appeared, and on the 12th the supply from the near counties was so short as to enable factors to establish an advance of 1s. to 2s. per quarter on superior qualities of white, and about 1s. per quarter on good dry parcels of red. Buyers were, however, indisposed to follow up their purchases at the enhanced rates; and though the show on the Essex, Kent, and Suffolk stands was scarcely larger on the 19th than had been the case on the preceding Monday, the improvement then established was again lost, and since then the tendency has continued downwards, most of the sales made on the 26th of November being at rates fully 1s. per quarter below those obtained in the beginning of the month.

A fair quantity of wheat has reached us from Lincolnshire and Cambridgeshire, principally by railway; the highest price attained for good 62 to 63 lbs., red, from that quarter, was 43s. per qr., which was about the current value on the 12th inst.; since then there have been offers at from 40s. per qr., without inducing our millers to purchase freely. The wheat of this year's growth, though heavy in weight, and generally of sound quality, requires a large mixture of old to make good flour, which we are inclined to attribute to the humidity of the atmosphere and want of sunshine in the early part of the summer. Of old English there are literally no stocks remaining; and notwithstanding the enormous extent of the importations from abroad since the commencement of the present year, the quantity of fine old foreign wheat in warehouse is not large in any part of the kingdom. Holders of the same have, consequently, exhibited a good deal of firmness, and the best sorts have been held relatively higher than English wheat.

The arrivals from abroad into the port of London were moderate during the first three weeks in November, and though they have since been more liberal, the total quantity received during the month has amounted to only about 70,000 qrs.

During the last eight days prices have slightly given way, but scarcely to an extent rendering it necessary to alter quotations. A considerable proportion of the late arrival has gone direct into the hands of our principal millers, and the quantity offered on the market has therefore been less than might have been expected. This has, no doubt, tended to prevent that pressure which would otherwise most likely have been experienced; but it has, at the same time, had the effect of greatly circumscribing the transactions. The wants of the millers having been provided for by these direct imports, they have had little need to purchase at Mark-lane, and the attendance of country buyers having been far from numerous, the trade has been more firm than active. Comparatively little of what has recently come to hand has yet been sold; some of the importers showed a disposition to give way 1s. to 2s. per qr. on the 26th November, but this failed to lead to extensive operations, and there is reason to believe that the greater part will, in the first instance, have to be landed. Fine Danzig wheat has not as yet been sold below 48s. to 50s., and for the best kinds of red 42s to 44s. per qr. has been asked; the ordinary descriptions may be quoted from 35s. to 40s., with a very slow sale.

The nominal top price of town-manufactured flour has remained steady at 40s. per sack, and good household has been held at corresponding rates. In the commencement of the month the bakers were rather free buyers, and we believe that they are still tolerably well-stocked, though the consumption of bread has been and continues large. We have hitherto received very little flour from America; but from France the supplies have not been unimportant, and offers from the latter country continue to be made from time to time at such rates as to leave a small margin for profit in our market. Really fine foreign flour has maintained its previous value with considerable firmness, but secondary and inferior sorts, of which the imports have principally consisted, have been sold with difficulty at relatively low rates. Within the last week or two we have received a good supply of this article coastwise and by railway from Norfolk, &c., and ship samples are about 1s. per sack cheaper than they were at the close of November.

During the first three weeks of the month English barley came to hand sparingly, but since then the arrivals coastwise have increased. No change took place in prices of fine malting samples until the 19th inst., when an advance of 1s. per qr. was obtained for choice parcels—33s. to 34s. being then realized. The improvement did not, however, extend to the commoner sorts, and even the best have since receded as much as they then rose, quotations being now precisely the same as they were when we last addressed our readers. The market has been abundantly supplied with foreign barley, more particularly during the last week or two. Considering the extent of the arrivals, prices may be said to have been uncommonly well maintained—good sweet parcels having rather risen than fallen in value. The best heavy sorts have for some time been selling; we are still worth 23s. to 24s. per qr., whilst the value of ordinary to middling qualities may be quoted from 19s. to 22s. per qr. A large part of the supply from abroad has gone to the distillers' without appearing on the market, having been sold from on board before arrival. This grain has, owing to the lowness of price, been rather extensively used for feeding purposes; and though some quantity is known to be still on passage to this country from the Danish islands, &c., the chances are that the present rates will be about maintained.

The inquiry for malt has not at any period of the month been active, and considering the firm manner in which the value of Barley has hitherto been supported, quotations of the first-named article have hardly been so well maintained as might have been expected. Really fine samples of new Ware malt have lately been offered at 56s. to 58., and old has been selling at from 48s. to 54s. per qr., according to quality.

The receipts of home-grown oats, including Irish, have been only moderate, nor did we receive any supplies of magnitude from the continent until within the last week or two, but since the 17th inst. the foreign arrivals have been very liberal. The principal dealers have throughout the month acted on the reserve, and they cannot now be holders of large stocks. They appear, however, to calculate on purchasing somewhat lower when the lying days of some of the vessels from abroad—of which we have a considerable fleet in the river—shall have run out. As yet importers have not manifested any particular anxiety to realize, and really fine corn has been held at prices similar to those current at the close of October, whilst the fall which has since then taken place in the value of the commoner descriptions has not exceeded 1s. per qr. We received a fair sprinkle of new Irish oats in the commencement of the month, but during the last fortnight the receipts from thence have been small. The quality of the oats hitherto received from the sister isle may be denominated good; some cargoes have indeed come forward in soft condition, and the weight generally is not equal to the average produce of good seasons; still there is not much to complain of. The higher sorts have been parted with at low prices, but good Limericks and other approved qualities have realized from 18s. to 20s. per qr. The English supply has been principally from Lincolnshire, and for fair feed 15s. to 17s., and Polands 18s. to 20s. per qr. has been realized. The greater part of the business in oats at Mark Lane has, however, been in foreign; ill-conditioned light parcels have been forced off at low rates, say from 14s. to 16s. per qr., whilst bright heavy feeding corn has realized as much as the best parcels of home growth. Should frost set in, and cut off further supplies of this grain from abroad, we should have to depend in a great measure on what Ireland may be enabled to send us, as the English and Scotch receipts are not likely to suffice for the consumption. On the whole, we are inclined to think that prices will not recede, and severe weather would, in our opinion, be very likely to cause a rally of 1s. to 2s. per qr. in quotations.

The arrivals of home-grown beans have been moderate, nor have the supplies of that article been important since our last. The inquiry has at no period of the month been lively, but it has been sufficiently active to keep pace with the receipts, and prices have undergone no change requiring notice. Our own crop of beans is generally considered as large, but the value of the article is so low that many farmers prefer consuming a large proportion of what they have grown at home to send to market. Stocks of Egyptian beans are reduced into a small compass, and we quote prices the same as last month, 24s. for superior, and 22s. per qr. for the commoner sorts.

In the early part of the month the inquiry for white boiling peas was active, and quotations rose 1s. to 2s. per qr. Grey and maple did not participate in the advance, and the improvement on the former was not long maintained, prices of all descriptions of peas being now much the same as they were when we last addressed our readers.

The transactions in floating cargoes of Indian corn have been unimportant; the prices asked have been 26s. to 27s. per qr. cost and freight, at which little disposition has been shown to purchase.

That the extent of the potato disease was at one period greatly exaggerated is certain, and though it is more than probable that a portion of those in the pits may not prove serviceable as human food, there seems to be little reason to apprehend that potatoes will be so scarce either here or in Ireland as to cause Indian corn to be very largely consumed ; it may, therefore be questioned whether the present value of the latter article will be maintained. On this side of the channel it is very little used, and most of the cargoes still to come forward will most likely be directed to proceed to Ireland.

Before concluding our remarks we shall take our usual notice of the position of the grain trade in those countries from which we are the most likely hereafter to receive supplies, and which therefore exercise the most direct influence on our markets. We shall begin with the Baltic ports, that being the quarter which mostly furnishes the largest share of the foreign arrivals.

The latest advices from the north of Europe are not of quite so firm a character as the accounts previously received. The continued depression in the value of all sorts of grain in the British markets appears at length to have produced some effect. That wheat will recede in price on the other side during the winter months, if nothing unforeseen should occur to give rise to speculation, is more than probable. The stocks of old are, it is true, quite trifling; but the new crop (which may be considered as generally good throughout the countries bounded by the Baltic Sea, as well as in Poland and other parts which furnish supplies for Danzig, Konigsburg, &c.,) has scarcely been yet commenced upon. It is therefore likely that when the roads shall have been hardened and improved by frost, and made passable for sledges by a covering of snow, so as to allow of the supplies from the growers being transported to the various markets, merchants will become more anxious to sell ; indeed there are already indications of this, the last accounts from the principal places quoting wheat somewhat lower. At the Lower Baltic ports, from whence we are in the habit of receiving some of the best red wheat, contracts for spring shipment might be closed at 34s. to 35s. per qr. free on board, and for immediate shipment it would not be difficult to buy 1s. to 2s. per qr. above the prices named. Comparatively little has been bought at those places, and most of the purchases of wheat made on British account during this and the preceding month have been at Danzig. This may be accounted for by the fact that the last named port was nearly the only one in the Baltic where stocks of old of any consequence were held. The shipments from thence have, on the whole, been considerable, from the opening of the season up to the end of October the exports of wheat from Danzig to Great Britain, exclusive of the Channel Islands, amounted to 205,000 qrs., and in the month of October nearly 50,000 qrs. were shipped. What has since been despatched we have not yet been able to ascertain correctly, but judging from the number of vessels chartered the quantity must we think be rather important. Old wheat has brought from 38s. to 44s. per qr. free on board, the former price having been paid for common mixed and the latter for superior high mixed. New has realized from 35s. to 39s. per qr., according to quality, weight, &c. When we take into account the high rate of freight and insurance at this period of the year, we may safely affirm that the parties concerned were not likely to realize any profit in the English markets.

From Hamburgh, Rotterdam, and Antwerp, shipments of wheat have from time to time been made for England ; prices have not varied much at those places since the beginning of the month, but the tendency has on the whole been downwards.

In the French markets quotations have also given way more or less, and unless our merchants should be tempted to send out orders, we may calculate on a further reduction taking place in the value of wheat at most of the near continental ports.

Prices being relatively lower in the Baltic, in the Netherlands, and in France, than at the more distant ports, scarcely anything has lately been bought for shipment to this country at Black Sea, Mediterranean, or American ports, and we are of opinion that the quantity of wheat on passage from the more remote quarters is not by any means important.

CURRENCY PER IMPERIAL MEASURE.

	Shillings per Quarter. OLD.		NEW.	
WHEAT, Essex and Kent, white	40	to 50	43	to 48
Ditto, fine selected runs	—	—	48	50
Ditto, red	40	45	38	43
Ditto, extra	42	43	43	45
Norfolk, Lincolnshire and Yorkshire	40	42	—	—
Ditto, white	42	46	—	—
BARLEY, English, malting and distilling	—	—	25	27
Ditto, Chevalier	—	—	27	31
Ditto, grinding	—	—	23	25
MALT .. Essex, Norfolk and Suffolk	53	54	55	56
Kingston, Ware, and town made	54	56	56	58
OATS, Essex and Suffolk	—	—	16	18
Lincolnshire and Yorkshire (Polands)	—	—	18	20
Ditto, feed	—	—	15	17
Devon & West Country, feed	—	—	15	16
Northumberland and Scotch, feed	—	—	20	24
Dundalk, Newry, and Belfast, potato	—	—	17	19
Limerick, Sligo, and Westport, potato	—	—	17	19
Ditto, feed	—	—	15	17
Cork, Waterford, Dublin, Youghal, and Clonmel, black	—	—	14	16
Ditto, white	—	—	15	17
Galway	—	—	13	15
BEANS, Mazagan	27	29	25	27
Tick	31	33	27	29
Harrow	33	35	29	31
Pigeon, Heligland	35	39	31	33
Windsor	—	—	27	29
Long pod	—	—	27	29
PEAS, non-boilers	—	—	29	30
White, Essex, and Kent, boilers	—	—	30	31
Ditto, fine Suffolk	—	—	31	33
Maple	—	—	29	31
Hog and grey	—	—	28	29
FLOUR, best marks (per sack of 280 lbs.)	—	—	35	40
Norfolk and Suffolk, ex-ship	—	—	30	33
RYE	—	—	23	24

FOREIGN GRAIN.

	Shillings per Quarter.	
WHEAT, American	41	to 43
Canada	36	43
Dantzic and Konigsberg	43	46
Dantzic, fine white, extra quality	47	51
Stettin and Hamburgh	39	43
Danish	36	40
Rostock, Pomeranian and Rhine	42	45
French and Belgium	42	44
Mediterranean, Odessa, and St. Petersburgh	35	37
Black Sea (nominal) hard to soft	35	37
Buck or Brank	24	26
BARLEY, malting	24	26
Grinding and distilling	21	24
Hamburgh, Dantzic, Konigsburgh, and Riga	21	24
Danish, Mecklenberg, and Pomeranian	21	23
OATS, Dutch, brew. Poland, Friesland, and Groningen	17	22
Danish and Swedish	15	18
Russian	15	18
BEANS Small	31	35
Egyptian	22	24
PEAS, white boilers	28	30
Yellow ditto	29	31
Non-boilers	26	28
MAIZE, white	25	27
FLOUR, American, sweet	23	24
Ditto, sour	21	23
Canadian, sweet	22	24
Ditto, sour	21	22
French, per sack	32	36
RYE MEAL (per ton)	£6 6s.	to £6 10s.
INDIAN CORN MEAL (per brl. of 196 lbs.)	15s	to 16s.

IMPERIAL AVERAGES.

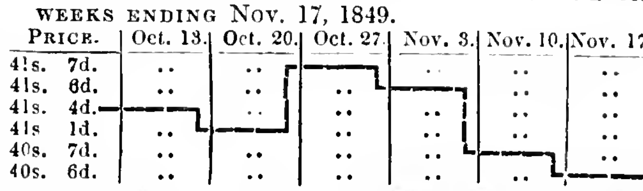
FOR THE LAST SIX WEEKS.

WEEK ENDING:	Wheat. s.	d.	Barley s.	d.	Oats. s.	d.	Rye. s.	d.	Beans s.	d.	Peas s.	d.
Oct. 13, 1849..	41	4	28	0	17	2	24	5	28	10	31	8
Oct. 20, 1849..	41	1	28	2	17	4	24	9	29	5	30	3
Oct. 27, 1849..	41	7	28	5	17	2	23	8	28	11	31	7
Nov. 3, 1849..	41	6	28	7	16	10	22	9	29	10	29	7
Nov. 10, 1849..	40	7	28	8	16	11	22	6	29	4	30	11
Nov. 17, 1849..	40	6	28	3	16	11	23	7	29	7	30	7
Aggregate average of last six weeks	41	1	28	4	17	1	23	7	29	4	30	2
Comparative avge. same time last year	51	8	32	11	20	6	30	7	36	9	39	10
DUTIES	1	0	1	0	1	0	1	0	1	0	1	0

COMPARATIVE PRICES AND QUANTITIES OF CORN.

Averages from last Friday's *Gazette*.	Qrs.	Av. s.	d.	Averages from the corresponding *Gazette* in 1848.	Qrs.	Ave. s.	d.
Wheat	107,323	40	6	Wheat	96,886	52	3
Barley	81,539	28	3	Barley	78,030	34	1
Oats	17,849	16	11	Oats	20,073	20	5
Rye	509	23	7	Rye	155	30	10
Beans	3,663	29	7	Beans	3,326	38	1
Peas	2,205	30	7	Peas	1,874	40	6

DIAGRAM SHOWING THE FLUCTUATIONS IN THE AVERAGE PRICE OF WHEAT DURING THE SIX WEEKS ENDING Nov. 17, 1849.



ACCOUNT SHEWING THE QUANTITIES OF GRAIN AND FLOUR IMPORTED INTO THE UNITED KINGDOM DURING THE MONTH ENDED 5TH NOV., 1819, THE QUANTITIES ADMITTED FOR HOME CONSUMPTION DURING THE SAME MONTH, AND THE QUANTITIES REMAINING IN WAREHOUSE AT THE CLOSE THEREOF.

Species of Grain.	Quantity imported.			Quantity entered for consumption			Quantity remaining in warehouse.		
	qrs.	bush.		qrs.	bush.		qrs.	bush	
Wheat, from British Possessions	1866	1		1997	0		170	5	
Barley, do.	—			—			—		
Oats, do.	—			—			—		
Peas, do.	578	0		578	0		—		
Beans, do.	—			—			—		
Maize or Indian Corn, do.	—			—			—		
Wheat, foreign	143751	5		152196	0		46215	3	
Barley, do.	50162	6		50640	2		1292	2	
Oats, do.	55090	3		56626	6		1492	1	
Rye	780	4		886	4		533	4	
Peas, do.	12087	3		13162	3		4729	0	
Beans, do.	14307	5		15803	5		17115	3	
Maize or Indian Corn, do	101050	1		101050	1		185	2	
Buckwheat	1	2		1	2		—		
Beer or Bigg	—			—			—		
	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.
Flour from British Possessions	51280	1	4	51489	3	10	282	0	2
Flour, foreign	137322	2	21	144608	3	26	21801	3	10

PRICES OF SEEDS.

BRITISH SEEDS.

Cloverseed, red 35s. to 40s.; fine, 45s. to 50s.; white, 34s. to 42s.
Cow Grass (nominal)........................ —s. to —s.
Linseed (per qr.).. sowing 54s. to 56s.; crushing 40s. to 42s.
Linseed Cakes (per 1,000 of 3 lbs. each).. £9 0s. to £10 0s.
Trefoil (per cwt.) .... 14s. to 18s.
Rapeseed, new (per last) .... £28 to £29
Ditto Cake (per ton).................. £4 5s. to £4 10s.
Mustard (per bushel) white .. 6s. to 9s.; brown, 8s. to 11s.
Coriander (per cwt.)...................... 16s. to 25s.
Canary (per qr.) new .... 78s. to 88s.
Tares, Winter, per bush................ 4s. 6d. to 4s. 9d.
Carraway (per cwt.)........ 28s. to 29s.; new, 30s. to 32s.
Turnip, white (per bush.) —s. to —s.; do. Swedish, —s. to —s.

FOREIGN SEEDS, &c.

Clover, red (duty 5s. per cwt.) per cwt. (nominally) 30s. to 40s.
Ditto, white (duty 5s. per cwt.) per cwt. „ 24s. to 42s.
Linseed (per qr.) .. Baltic 38s. to 44s.; Odessa, 42s. to 46s.
Linseed Cake (per ton)................... £6 0s. to £8 0s.
Rape Cake (per ton).................. £4 5s. to £4 10s.
Hempseed, small, (per qr.) 32s. to 33s., Do. Dutch, 33s. to 34s
Tares, (per qr.)........ small 20s. to 22s., large 28s. to 33s.

HOP MARKET.

BOROUGH, Monday, Nov. 26.

Our market continues in a very inactive state, and the demand is limited to the wants of consumption. We note no alteration in prices. Horton & Hart.

WORCESTER, (Saturday last.)—The few new hops held by the trade are worth more money to-day, but old ones are neglected, except the finest 1848, which are now being looked after at full rates. In other descriptions very little doing.

POTATO MARKET.

SOUTHWARK, Waterside, Nov. 26.

The arrivals the past week have been considerable; particularly from the continent, which exceeds three thousand tons; all potatoes have sold heavily the last week with the exception of choice Yorkshire Regents, which still command a high figure; the following are this day's prices—

York Regents.... 90s. to 100s. per ton.
Wisbech do...... 60s. ,, 70s. ,,
Scotch do. .... 60s. ,, 70s. ,,
Do. cups........ 30s. ,, 60s. ,,
French whites .... 60s. ,, 70s. ,,
Rhenish do. .... 50s. ,, 65s. ,,
Belgian, do. .... 50s. ,, 65s. ,,

ENGLISH BUTTER MARKET.

November 26.

Our trade generally is in a state of extreme dulness; nothing is inquired for except fine new-made Butter, which is now very scantily supplied to us. Prices of all stale butter is drooping.

Dorset, fine weekly .... 92s. to 94s. per cwt.
Do., stale and middling .... 60s. ,, 80s. ,,
Devon, new .... 80s. ,, 84s. ,,
Fresh .... 8s. ,, 12s. per doz. lbs.

BARK.

Per load of 45 cwt.

	£	s.	d.		£	s.	d.
English, Tree...............	£14	0	0	to	£15	10	0
Coppice...................	15	0	0		17	0	0

FLAX.

BELFAST (Friday last.)—Flax: fine, 60s. to 65s.; good, 56s. to 58s.; good middling, 49s. to 52s; middling, 40s. to 45s.; coarse, 34s. to 40s. per cwt.

HIDE AND SKIN MARKETS.

			s.	d.		s.	d.	
Market Hides,	56 to	64lbs.......	0	1¼	to	0	1½	per lb.
Do.	64	72lbs.......	0	1½		0	2	„
Do.	72	80lbs.......	0	2		0	2½	„
Do.	80	88lbs.......	0	2½		0	3	„
Do.	88	96lbs.......	0	3		0	3¼	„
Do.	96	104lbs.......	0	3¼		0	3¾	„
Do.	104	112lbs.......	0	4		0	0	„
Calf Skins, light			1	6		3	0	each.
Ditto, full			5	6		6	0	„
Horse Hides			7	6		0	0	„
Polled Sheep			3	7		5	1	„
Kents and Half-breds............			3	2		4	0	„
Downs.........................			2	4		3	4	„

WOOL MARKETS.

BRITISH WOOL.

LEEDS, Nov. 23.—There has been a moderate amount of business done in combing wools this week. In prices we do not quote any alteration, except on deep stapled wools, which are rather higher. Clothing sorts are dull sale, and prices a shade lower.

LIVERPOOL, Nov. 24.

Scotch.—There is no improvement to note in the demand for laid Highland wool; white is also dull. For the best Cheviot and crossed wool there is a fair demand at our quotations.

	s.	d.		s.	d.
Laid Highland Wool, per 24lbs....	7	6	to	8	3
White Highland do................	9	6		10	0
Laid Crossed do...unwashed	9	0		11	0
Do. do....washed	10	0		12	9
Laid Cheviot do...unwashed	10	0		13	6
Do. do.. washed	14	0		18	6
White Cheviot do... do.	20	0		22	0

FOREIGN WOOL.

LEEDS, Nov. 23.—The foreign wool market remains without any apparent change since our last report.

An Account of the Total Quantities of Foreign Corn imported into the principal ports of Great Britain (viz., London, Liverpool, Hull, Newcastle, Bristol, Gloucester, Plymouth, Leith, Glasgow, Dundee, and Perth) in Forty Weeks ending Nov. 14th, 1849, since the 8th of February preceding (including the quantity of Wheat and Wheaten Flour loosed from bond on that day), and the amount that would be available for revenue, if the Tariff proposed by Lord John Russell in 1841 was levied on this supply.

	Quarters.	Tariff per qr.		Amount for Revenue.		
Total Importations from Feb. 8 to Nov. 7, 1849:		s.	d.	£	s.	d.
Wheat and Wheaten Flour...	3,836,463	8	0	1,534,585	4	0
Rye and Rye Meal	90,015	5	0	22,503	15	0
Barley and Barley Meal	816,408	4	6	183,691	16	0
Oats, Peas, and Beans.........	1,459,270	3	4	243,207	16	8
Imported during the week ending Nov. 14, 1849:						
Wheat and Wheaten Flour...	37,720	8	0	15,088	0	0
Rye and Rye Meal	875	5	0	218	15	0
Barley and Barley Meal	14,191	4	6	3,192	19	6
Oats, Peas, and Beans.........	25,952	3	4	4,325	6	8
Total	6,280,894	..		2,006,813	12	10

At the present rate of increase, the population of the United

END OF VOLUME XXXI.

Printed by Joseph Rogerson, 24, Norfolk-street, Strand, London.