



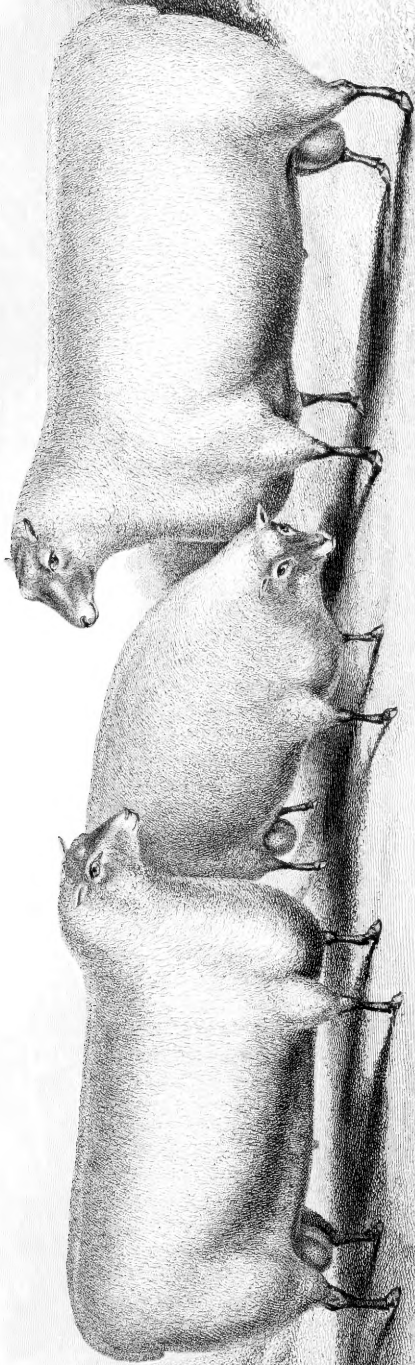








X



Three Southdown Rams

Joseph

1840

THE  
A G R I C U L T U R E  
AND  
RURAL ECONOMY  
OF  
FRANCE, BELGIUM, HOLLAND,  
AND  
SWITZERLAND;  
FROM PERSONAL OBSERVATION.

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BY  
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AND OF THE NATIONAL AGRICULTURAL SOCIETY OF THE UNITED STATES.

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“Without forage no cattle; without cattle no manure; without manure no crops.”  
FLEMISH PROVERB.

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BOSTON, MASS.:  
ARTHUR D. PHELPS, WASHINGTON STREET.

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## PREFACE.

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THIS treatise is respectfully commended to the candour of the reader. It was deemed a high eulogium when it was said of one on a memorable occasion, "She had done what she could." The author claims no higher merit than having, in the most anxious manner, exerted his humble talents, and availed himself of all the means within his reach, to accomplish his undertaking in a practical, useful, and acceptable manner.

In treating of some subjects, many minute details are omitted, because he was not willing to tax his readers' attention with things already perfectly familiar. In regard to any agricultural operation, or crop, or improvement, the most full, explicit, and practical directions are given, and every peculiar feature brought prominently forward. Many things are omitted because they are of doubtful utility, or of uncertain authority. His great object has been, not to publish theories, but to state facts; and the determined results of enlightened, exact, and conclusive experiments.

There is some miscellaneous matter in the book ; yet he claims for it, if it have any, the merit of being strictly and highly practical. Even the miscellaneous matter, he hopes, will not be found without its use ; and if it serve to establish some moral sentiment, incidentally suggested by the subject, or to relieve in any degree the monotony or tedium of what might otherwise be, to many readers, unattractive, he trusts that an attempt thus to mingle the “agreeable with the useful” will not be severely judged. The great art to which the work is devoted is every day acquiring new importance, in its connexion with the economical and moral condition of civilized society ; and he consoles himself with the reflection, that the labours of a good portion of a life not short, devoted to advance and elevate this great art, if they serve only to awaken the ambition, and stimulate the exertions of those more competent to the task, will not have been thrown away.

*London,*  
July, 1848.



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# CONTINENTAL AGRICULTURE

AND

## RURAL ECONOMY.

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### I. PRELIMINARY OBSERVATIONS.

AGRICULTURE is the first and most important of all arts. Though not more honourable nor more innocent than many other arts and professions, yet it is perfectly innocent, and is as honourable as any. That likewise may be said of it, which can be said of few others,—it is essential to human subsistence. We shall find few persons in the community who do not at once assent to this ; but often the assent is merely formal, and is not that deep and established conviction which should, much more than it does, prevail throughout the community ; and especially amongst those who, gifted either by talents or station, have most concern in moulding human destinies, and in adjusting the interests, and forming the condition of society.

The affecting and extraordinary events of the last two years should have their due influence upon every reflecting mind. In a single country, by the loss of a single crop, at least five hundred thousand persons have perished amidst the accumulated horrors of starvation, or the diseases engendered and aggravated by famine. Ireland has its millions of fertile acres untilled, and its millions of strong hands unem-

ployed. Had the agriculture of Ireland been what it should be, this terrible event—and one more terrible does not darken the pages of history—could not in all human probability have happened.

The essential character of the agricultural art is constantly pressing itself upon our attention. I have had from my childhood an inclination for rural pursuits. I have followed the plough many a day with a freedom and a buoyancy of spirit which seemed to have no counterpart but among the winged denizens of the air, who hovered around me, and with their thrilling notes cheered me on my way, and made the woods echo with their melody. I have cast the dry seed into the teeming earth, and watched its first bursting above the ground, and its gradual progress to maturity, recompensing every grateful attention bestowed upon it, until it poured its ripened treasures into my lap, with a grateful, and, I may add without presumption, a religious elevation of soul which no language could adequately express.

We may be told that agriculture is a purely material and sensual art, and does not deserve a place among the humane arts. To a mind material and sensual in all its habits, every thing becomes material and sensual in the lowest and most degrading sense of those terms. But its rational pursuit is not incompatible with high intellectual attainments and the most refined taste. Whatever occupies and absorbs the mind exclusively, is, of course, unfavourable to any great excellence in other pursuits. Agriculture, pursued as a mere branch of trade or commerce, or a mere instrument of wealth, will be found to have influences upon the mind, narrowing and restricting its operations and aspirations, corresponding with any other of the pursuits of mere avarice and acquisition, and which even those of the learned professions, when pursued wholly with such views, are sure to have. But when followed without exclusive views to mere gain or profit, it is far from being incompatible with a high state of intellectual

cultivation. Many of the sciences are the handmaids of agriculture, and serve as well as ennoble it. Its practical pursuit, though it occupies, yet it does not exhaust the mind; but, within certain limits, inspirits and invigorates all its faculties. A spiritual mind may spiritualize all its operations; a religious mind sees in its wonderful and curious processes and their marvellous results, many of the adorable miracles of a beneficent Providence. That a profound study of the agricultural art, and an intimate acquaintance and familiarity with its practical details, are not incompatible with a high degree of intellectual improvement and cultivation, we have too many living examples of this union to leave us to doubt; and the immortal names of Cicero, Bacon, and Washington, show, from their own assertions, that minds highly gifted of Heaven have found their richest pleasures in rural and agricultural occupations and pursuits; and in company with many others, in ancient and modern times, form a magnificent constellation of learning, genius, and taste, shedding their splendour upon this useful art.

When I hear this art spoken of with a sort of disdain, as wholly sensual and material, I would ask, What is there with which man has to do which is not material and sensual? All his organs of perception are material and sensual; all of that which he calls purely intellectual or spiritual, without the power of giving any intelligible definition of what he intends by it, is directly connected with, moved by, controlled by, and dependent upon his physical organization; and is vigorous as that is vigorous; healthy only as that is healthy; lives only by being well fed and well cared for. Even the pious clergy, who caution us so strongly against secular pursuits, and against seeking things earthly and temporal, without the labours of the husbandman, without beef and bread, without wool and silk, without milk and honey, since manna has ceased to come down from heaven by night, and the rock no longer pours forth its crystal

treasures at the touch of the prophet's wand, could give us neither their prayers nor their exhortations ; the pious hands could not be raised to Heaven for its benediction, and the eloquent lips would become dumb.

I believe the agricultural profession is highly favourable to good morals ; I shall not presume to say more so than any other ; but it will not be too much to say more so than many others. Perhaps it will be said, that the agricultural districts of England and other countries yield their full proportion of crime. I will not peremptorily deny what is often confidently asserted ; but I am not ready to concede to it until other proof than I have yet received is furnished. As far as my own personal observation and experience go, my conviction is the reverse of this. Two fruitful sources of crime are to be found in excited passions and in powerful temptations. Agricultural occupations, so far from exciting, tend to exhaust and allay the passions ; and the retirement and seclusion of the country present fewer temptations than the tumultuous life, the opportunities for vicious association, the disorderly hours, and the infinite variety of attractions and engagements of city life. Among, however, a degraded population, poor and half-fed, without education, without any interest in the soil, without friends to take an interest in their welfare, without any sentiment of the value of character, without self-respect, accustomed to pass their unoccupied time in drinking-houses and in degrading pleasures, and treated and lodged without distinction of sex, and without any regard to the common decencies of life, it is not surprising to find a nursery and hot-bed of crime, where it shoots up in startling luxuriance. My acquaintance with many of the villages and rural districts of England and Scotland satisfy me that the favourable moral influences which might be looked for from rural life and agricultural pursuits, are there found in full operation ; and under a system of more general and improved education, and especially under



institutions which would give those encouragements to labour which are the most powerful motives, as well as the proper rewards of industry and good conduct, these influences might be expected to be even more general.

Let me speak of a district or country with which I have been many years familiar<sup>1</sup>: it is a purely agricultural district; it contains nearly a million of inhabitants; its climate is cold and severe; its soil, with some exceptions, of moderate fertility, and requiring the brave and strong hand of toil to make it productive. It has public and free schools in every town and parish, and several seminaries of learning of a higher character, and where the branches of a useful and literary education are taught at an expense so moderate, that it is placed within the reach of persons even of the most humble means. It has every where places of religious worship of such a variety that every man may follow the dictates of his own conscience, where religious services are always maintained with intelligence and decorum, sustained wholly by voluntary contributions; and sects of the most discordant opinions live in perfect harmony, recognising in their mutual dependence the strongest grounds for mutual forbearance and kindness. Taken as a community, they are the best-informed people I have known; and they have numerous and well-chosen circulating libraries in almost every town. They have no connexion with any large market; and the produce which they have for sale, goes through intermediate hands to the great marts. They have few or no poor, and those only the emigrants who may stroll there from neighbouring provinces. The sobriety of the people is remarkable; they are every where a well-dressed people; their houses abound in all the substantial comforts and luxuries of life; and their hospitality is unbounded. They understand their rights and their duties, and have

<sup>1</sup> The state of Vermont, United States.

often distinguished themselves by an extraordinary bravery and manliness in their vindication and defence. No where is public order more maintained, or public peace better preserved; large portions of the inhabitants never bolt a door, nor fasten a window, at night; and in a village of some thousand inhabitants, I have known a garden stored with delicious fruit, with no other fence than one which served as a protection against cattle, as entirely secure from intrusion or plunder, as if it had been surrounded even with a prison-wall bristled with *chevaux de frize*. In this state crimes are comparatively rare; courts of penal justice have little occupation; the prisons are often without a tenant, and there has been scarcely a public execution for half a century. From such an example of a community almost exclusively agricultural, I have a right to claim for agricultural and rural life, all the beneficial moral and social influences to which its enthusiastic admirers pretend.

The present excited state of the civilized world ought more than ever to call the attention of philanthropic individuals and of governments to the immense importance of agriculture. I have been in France during the exciting scenes of a political revolution, in which I have seen very many thousands of workmen without the means of support from their labour, and large bodies of them actually dependent upon public charity for their daily bread. It is not the dangers to public liberty and order, growing out of such large unemployed and destitute multitudes, which so much disturb me, as the actual suffering to which they are exposed, and the melancholy future that lies before them. In London I have encountered, with an extreme depression of heart, thousands of squalid, ragged, miserable poor, without resource but from crime or charity. A distinguished manufacturer in one of the most industrious counties in England states that there are at least five hundred thousand operatives without employment, and many on the borders

of starvation: tradesmen and professional men will tell you that every trade and profession is overstocked; and one is daily saluted with the melancholy, not to say presumptuous exclamation, that there are too many people. This reminds one of the sad shipwreck of the French frigate, the *Alceste*, when many of the wretched survivors, who were floating upon a raft composed of fragments of the ship, deemed it necessary to their own safety, to drive by force a large portion of their suffering companions into the sea—a sad and horrible alternative!

It would be more than absurd in me to attempt to prescribe a remedy for evils upon which so many sagacious heads and philanthropic hearts have concentrated without success their powerful energies. But I will point out what I deem the true cause of this great evil, and leave to wiser minds to suggest a cure. One thing is certain; as matters go on, the evil must extend itself, and become every day more aggravated and terrible, unless some remedy is devised. The remedies for the wretched, or, if not wretched, the unfortunate condition of the labouring classes, which have been proposed in Paris by men whose good intentions I would not distrust, and which have been so fully and publicly discussed, are absurd, impracticable, and mischievous. The interference of government in limiting or fixing the hours of adult labour; in attempting to establish a rate of wages irrespective of the time employed; in proposing to equalize the wages of all trades, and determining the same rate for the skilled and the unskilled, the active and the indolent; the proposition to furnish the unemployed with work at the national expense, and to destroy private competition by the establishment of national workshops, are all of them attempts which are sure to defeat themselves, and which are as impracticable for the end which they propose, as to attempt to chain the wind, or to stop the flowing of the tide.—None of them touch the true cause of the evil.

Must we affirm, then, that there are too many people in the world ; and that thousands and millions are born into it for whom there is no place at the table of a beneficent Providence? Why, in France there are more than nineteen millions of untilled and unoccupied acres, and in England more than eight millions, all capable of yielding food and clothing to countless human beings ; and here and in other lands there are millions of acres, for the want of labour which might be applied, that produce not a moiety of what they might be made to produce. In ancient Rome, seven acres were the ordinary size of farms on which a family might be sustained. In Flanders, on a soil which was once sterile, but which human labour has made productive, two and a half acres will give ample support for a man and wife and three children, or what is considered equal to three grown-up men and a half ; and add to it three acres more, which this amount of labour is more than sufficient to cultivate, and you add a considerable surplus for other purposes.

The great cause, then, of the evils complained of, is, that the cultivation of the earth is deserted ; and that such innumerable multitudes pour into cities and towns, and, filling every profession and every mechanical art and trade, destroy each other by a competition in articles of which the demand is necessarily limited. There may be too many physicians, too many lawyers, and too many ministers, for them all to get a sufficient and an honest living : and too many hatters, and too many printers, and too many shopkeepers ; for, besides that these persons furnish more of a particular article or service than the community require, their work is in general only formal ; they *only* manufacture, they do not produce ; they do not, like the grower of bread and of clothing, create that which may be said to have a substantial and permanent value. For when was the time when there was too great an abundance of the materials—

I mean particularly of those which can be kept from year to year—for food and clothing, for human subsistence and comfort. As long as this state of things continues, there must be misery in the community; as the population increases, this misery must increase.

In cities, money becomes the standard of prosperity. Wages are paid in money; money is the instrument of subsistence, of gain, and of pleasure. Avarice, under these circumstances, becomes stimulated to excess, and often leads to crime. Men's happiness becomes dependent upon that which has no intrinsic, but only an arbitrary value,—a value which is always capricious and continually changing. If men could be induced to cultivate the earth, and, trained to the simple habits of laborious and rural life, be satisfied with what that affords them, if they would measure their prosperity and wealth, not by so many shining pieces of gold or silver, which they have hoarded in their closets, but by the produce of their labour in bread and clothing, and the various and innumerable simple luxuries of life, with which a kind Providence so often blesses the labours even of the most humble, how changed would be their condition! If they could be as well satisfied to breathe the fresh air of their native mountains and forests as the corrupt and pestilential atmosphere of crowded streets and confined dwellings, from which both sun and light are shut out; as well content to enjoy the simple and healthful sports of the country as the exciting and exhausting pleasures of city life; if their taste could be better satisfied to contemplate the verdant fields, waving with crops or enamelled with flowers, than carpeted and gilded halls; if they could be taught to prefer skies painted with clouds of brilliant hues, and studded with stars whose lustre never grows dim, to palaces blazing with artificial lustres and adorned with the far inferior magnificence of man's genius and taste; if, indeed, by any possible means, you could induce men and women, and, above all,

the young, to love the country ; if, in a word, you could keep them in the country by an attachment to its simple labours and recreations, and prevent their crowding cities to repletion, and thus destroying by competition the ordinary professions and trades which prevail there, where so many vigorous young men, and so many fair and blooming maidens rush in, like flies in a summer evening into a blazing taper, to find too often the grave of their health, hopes, happiness, and virtue, what an immense gain would be achieved for morals and for humanity !

But while matters continue otherwise, while such millions of acres remain unoccupied, while such thousands upon thousands crowd into the learned professions, and into the mechanical arts and trades, and fill cities to repletion, under the powerful stimulus of a vain ambition, an inordinate avarice, or a love of excitement, luxury, and pleasure as inordinate and unrestrained, we shall continue to complain of a superabundance of population ; and that superabundance, wherever the wave accumulates, will bring with it crime and misery. The decrees of Divine Providence cannot be violated with impunity. Every inordinate and unrestrained passion will yield its bitter fruits. Every infraction of the laws of man's moral constitution will be followed with its just and inevitable penalty.

To my mind, then, the great causes of the evils of which society, especially in the old countries of Europe, is every where complaining, are primarily those which are now pointed out,—an excessive crowding of the professions, trades, and mechanic arts, creating a most baneful competition, and an entirely false assumption, which every where fixes itself in men's minds, that pecuniary wealth is the true standard of prosperity. Competition, which, when excessive, is so hurtful and serious in the mechanic arts and trades, is, in agriculture, always a good. Under proper management the earth cannot be made to produce too much. It is a generally

received theory, that as yet there has been no surplus produce; that what is grown in one year is, upon an average, only sufficient for that year; and that one year's entire failure of the crops would cause the destruction of the human race. I shall not speculate upon this theory, which, possibly, may be well founded, but which Heaven forbid that it should be put soon to experiment. In some years there may be a surplus of some products, and then there may be a dearth of others. But I have never known too much grown: I have never known the great mass of mankind enjoying too much bread, or too much clothing, or too many of the substantial comforts of life. If they get the comforts, or their substantial necessities are supplied, then certainly we should desire that they should have the luxuries of life in addition,—above all, those simple luxuries which are the produce of their own honest labour, and to which that circumstance alone will always give a peculiar zest.

Can any thing be done to remedy or abate this great evil, and to turn aside this rushing current, which threatens to accumulate in such masses of frightful misery? This is a great inquiry for the philanthropist, and for all governments which have at heart the only proper object of government, that is, the welfare of the governed. The Divine Providence often punishes human cupidity and madness by its judgments; but war, disease, famine, and floods, which sweep away their tens and hundreds of thousands, are dreadful curatives. They seem only temporary in their operation. They lay waste instead of fertilizing. They make man's heart sink within him; and they leave behind them nothing consolatory or hopeful. No reflecting mind, at least no mind with any experience of human life, will suppose for a moment that any effectual remedy can be at once discovered or applied. It is only the madness, or enthusiasm, if the milder term is more fitting, of a French revolutionist, which dreams that the whole form and relations of society can be suddenly changed,

and that the next morning's sun shall rise upon a cloudless sky, bringing back the golden age, dispelling all the fogs and mists of night, drying up all the sources of human misery, and pouring out a flood of universal peace, plenty, and happiness.

While human weakness and passions remain what they are, no complete remedy is ever to be even hoped for. It does not yet appear that Heaven designed that man should realize an optimism in this world. To our humble views it seems to be the aim of Divine Providence, by the limitations, uncertainties, imperfections, and trials of this state, to stimulate a virtuous ambition, and to arouse the minds of the well-disposed to all possible exertion to ameliorate the condition of their fellow-men. There is one great encouragement to every philanthropic attempt. Little as any individual, or any combination of individuals, can effect, yet I believe truly that no benevolent exertion, however humble, ever failed to produce some good; and experience constantly shows that seed, which has been cast into the ground, may lie long concealed, may not show itself above the surface even during the life-time of those who planted it, to gladden their eyes, yet it may yield, though a late, an ample harvest.

Every one knows the power of public opinion, and how all the world are influenced by fashion, or what is called general sentiment. I have heard of a man who was asked, as is common on leaving church, "How he liked the preacher?" His honest reply was, that "he did not know; he had not heard any body say." This homely anecdote illustrates a striking element in the human character; and shows how much our judgments, and consequently our actions to a certain extent, depend upon the rank which most things hold in public estimation.

I wish to see an agricultural life, much more than it is, the choice of men of fortune, of influence, of talents, occupying



the higher positions in society; and this, not as mere *dilettanti* or amateurs, but as plain, active, practical husbandmen; men, not merely to come on deck in some fine sun-shiny day, to admire the ship with all her canvass filled, and all her streamers flying, as a beautiful object of art, and, in a spasm of poetical frenzy, to enjoy the deep green of the ocean, and its graceful undulations, and its ruffled waves; but who understand perfectly the art of navigation, who “know every rope in the ship,” the nature and stowage of the cargo, and the place and duties of every man in the company.

I have devoted weeks, and months, and years, in my humble way, to recommend this noble art, to vindicate its claims to the attention of those who have at heart their own and the welfare of the community, to show that it is a source, if not of large, yet of reasonable profits; that as an occupation it is as honourable as it is useful; that it conduces to health of body and peace of mind; that rural pleasures are, to a well-disciplined mind, among the last to cloy and exhaust it, and wholly pure and innocent; but especially, that a strictly agricultural life, under those reasonable limitations which apply to every other pursuit, is not incompatible with the pursuit of science and the cultivation of a refined taste; so that men of fortune, talents, and liberal education, who now sacrifice their fortunes in the idle pastimes and frivolities of city life, and their health and peace of mind in its feverish excitements, and the competitions of a diseased vanity and ambition, would find in the simple and hospitable habits of rural life, health and vigour of body and mind, and that independence of money and of time, and opportunities for general reading, or the prosecution of any favourite science, which it is almost impossible to find in the crowded haunts and the eternal and ever-varying round of city engagements and pleasures. The most gifted minds accomplish comparatively little, and fall far short of what might be hoped and expected. The most humble contributions may not be without avail in

affecting the mass of public opinion and sentiment. I am happy in thinking that I have sometimes struck a sympathetic chord in some generous minds ; and under any and every discouragement, I console myself with the perfect and serene consciousness of having laboured at a purpose wholly disinterested, innocent, and useful.

What governments should do in the case is a most important question. A great portion of the governments which have existed, have been little else than an unmitigated curse to mankind. The accumulation of wealth, the acquisition of territory, family aggrandisement, purposes of purely selfish ambition, the mere pomp and luxuries of life, military domination and despotism, have been almost the sole purposes aimed at by the governments of the world. The only legitimate purposes of government are the security and welfare of the governed ; but how little have these been regarded ! how often entirely overlooked ! Holding, as I do, all offensive war of every description, and under any pretext, as a crime against humanity and against God, one's heart bleeds at the recitals of history, which seem little else than recitals of bloody conquests and human slaughter, of wasted fields, of famishing millions, and of sacked and burning villages. If the millions and millions of labouring hands, of sacrificed lives, and of hardly-earned treasures, which have been worse than squandered upon these wicked objects, had been devoted to the subjugation and cultivation of the waste places of the earth, and, instead of attempts to destroy, society had devoted itself to attempts to save life, and to the production of food and the multiplication of the comforts and innocent luxuries of mankind, how different would have been the result !

What an extraordinary moral anomaly, if so it may be called, does France at this moment present ; a nation on the verge of bankruptcy burdened with excessive taxation, with an army of four hundred thousand men, and more than

nineteen millions of acres of unoccupied land, all susceptible of cultivation, and of feeding and clothing millions! Does Great Britain furnish no parallel to this monstrous fact? With an increasing national debt, whose payment is perfectly hopeless, a weight of taxation the subject of universal complaint, millions upon millions lavished upon her armies and navies; workhouses and prisons filled to repletion; thousands and hundreds of thousands upon the verge of starvation; and in the two great islands, resplendent with the brightest lights of civilization, more than thirteen millions of acres of unoccupied land, and even her cultivated soil, with an improved agriculture, capable of sustaining in plenty three times the number of those who now draw nourishment from her breast. What a singular conjuncture of circumstances!

Are not these monstrous facts; deeply distressing to philanthropy; deeply wounding to human pride? We may well ask, If in two of the most enlightened, the most civilized and the most polished nations which have ever existed, nothing better has been attained, or rather so much remains unaccomplished for human comfort; such a mass of human crime and misery remains unreached and unalleviated, have we not some reason to ask, what are the blessings, and what are the triumphs of civilization? We have a right to demand whether the true ends of government and society have been answered; whether it has really reached the limits of its power for good; and whether it has not yet to study the arts of peace and the public welfare. The expenses of fortifying Paris and of providing its armaments would have converted a whole department into a garden, teeming with the substantive comforts and luxuries of life. The enormous expenses of the wars, under the empire, of which now little remains but triumphal arches stained all over with human blood, and splendid monuments to the glory of one of the great butchers of the human species, would have converted the whole of France into a fruitful field; planted every where

schools, churches, colleges, and smiling villages; filled her every where with the industrial arts, and with monuments of taste; banished, under the blessing of Heaven, all want, where there was industry to collect, and frugality to use the products of nature's bounty; and put it in the power of every one of her thirty-six millions of people to sit down in peace and comfort under his own vine and fig-tree. The moneys expended in the naval armaments of Great Britain, in the preparation of munitions of war, in the support of her navies and armies in any year of her history, what would not they have done in subduing and making her waste lands productive! The sums expended for her defence of Ireland, for the repression of disorders, in a great measure consequent upon her wants and miseries, and the vast sums bestowed upon that wretched country in charity, the necessity of which springs directly and wholly from its neglected and wretched agriculture, what would not they have accomplished in draining her bogs, in enriching her meadows, in changing her mud hovels into comfortable cottages; in warding off the grim horrors of famine, and in raising millions of human beings, sunk, as I myself have witnessed, in a lower degradation than that in which it seemed possible that human life could be sustained, to the common level of humanity, and even to a high measure of comfort and civilization!

What then shall government do to remedy the dreadful evils under which civilized society is now groaning aloud; and one part of God's family is impiously complaining that He permits another portion, though with equal rights as themselves, to come into the world; and our cities, from an excessive competition or production in the pursuits of mechanical industry, or in the learned professions, are every where teeming with masses of misery and crime? I do not say that an extended and improved agriculture would prove the only remedy; nor that it would prove a certain remedy; but I believe it would prove effectual to a certain and large

degree ; and I demand to know what single remedy will prove more efficient. To whatever degree, be it more or less, to which it is extended, it increases national wealth ; it multiplies the means of subsistence ; it withdraws men from the competitions of trade and manufactures ; and, above all, it attaches men to the soil, and so far gives a pledge of order, loyalty, and patriotism.

The efforts of government, then, should be directed to give every possible facility and protection to this art or pursuit ; to render land accessible ; to break up those tenures under which, by various provisions, worthy only of a barbarous age, land is kept out of cultivation ; to alleviate, as much as possible, the burdens upon land ; to assist in all those great improvements, which are too vast for individual effort ; to diffuse agricultural knowledge ; to promote agricultural education ; to learn and translate the improvements and crops of other countries ; and by honours and premiums to encourage an emulation in the only art in which emulation is not only innocent and harmless, but always useful to all parties ; and thus to stimulate cultivation and improvement in every branch of this art and habits of domestic economy, by every practicable means. What governments can do on a large scale, landlords and proprietors may do perhaps more efficiently and successfully within their own domains. May they feel the great responsibility which their situation imposes on them ! If any one of the great nations of Europe would give but half the attention and half the expense to the improvement of its agriculture, which it now bestows upon its military preparations and improvements, we might expect an equal proficiency in the one art as in the other. Which should be preferred, whether it be better to save life or to destroy, I leave to the judgment of my readers.

It is now only a few months since I passed a day at Waterloo. I saw, waving with their luxuriant crops, the fields which had been enriched by torrents of human blood :

I stood upon the grassy mound under which tens of slaughtered thousands lay entombed. I have a profound reverence for that heroism which bares its bosom in defence of right, justice, and freedom ; but I have no respect for that tiger-ferocity which delights in human carnage, and that mad enthusiasm which follows, reckless of its own and of other lives, the phantom which men call military glory. The cannon's roar, the waving plumes, the burnished helmet, the bristling bayonets glittering in the sunshine, have no charms for me. I took in my hands a skull pierced by a ball, which the plough had recently turned up. I thought for a moment of the burning passions, the fiery hate, the thirst for revenge, for conquest, and for blood, which had filled and swelled in this little casket,—the noblest production of Divine power,—when death instantly demanded the account. Other associations rushed upon the mind. I thought of some once cheerful fireside made desolate ; of some aged mother robbed of her staff ; of a widow cast friendless upon the world ; of orphan children, and of weeping friends. And this, said I to myself, is military glory ; these are the trophies of war. I found the springs of feeling beginning to be deeply moved. I turned my eyes at once to other neighbouring fields of conquest which I had recently left. I had seen millions of acres, by an enterprise truly grand, a courage most heroic, a labour most indomitable, rescued from the sea, and its proud waves repelled ; barren sands converted into fruitful fields ; and where the ocean held its profitless sway, and the winds and waves and tempests were accustomed to spend their mingled and destructive violence, the calmness and security of rural life every where triumphant ; fields crowned with plenty, and speckled every where with rejoicing herds ; and cities and villages swarming with busy and happy thousands, and rich in all the arts and luxuries of civilized and refined life. I did not need to ask myself, what conquests are the most noble ?

I hope my kind reader will not deem these reflections misplaced, as preliminary to the somewhat dry task and the plain matters of fact to which I now invite him. One of the most distinguished agriculturists which England ever produced said, "that the best way of improving agriculture was to go abroad and see what other people were doing." I have been now some time in Great Britain and on the Continent, that I might see what other people were doing, and learn from personal observation the true state of the agriculture and the rural economy of the old world ; that I might present to the agricultural community in my own country and in other places matters of instruction and examples for imitation, if such were to be found ; or subjects of congratulation if their own improvements have already placed them in advance, and left them nothing to learn. A full survey of European agriculture is a task for many minds, for many years of observation, and for higher talents and acquirements than I could bring to the work. Yet I shall deem it no mean honour to contribute any useful service to so important an object. It will be understood that I enter the field only as a gleaner. It is said that the gleaners often bring home the heaviest and the ripest heads of grain, because these are the first to drop from the stalks. I shall be but too happy if the analogy should be found to hold in my case.

I shall begin with sketches of French agriculture, and these will be followed by, and sometimes intermingled with, sketches of Flemish and Swiss agriculture, and other observations which may have suggested themselves in the course of my tour. There may be found some deficiencies, because I mean to state nothing, unless otherwise declared, which has not been verified by personal observation ; but, on the other hand, there will be this advantage, that such statements rest upon a responsible authority. My great object will be to give almost exclusively information of a practical character ; but if occasionally there may appear some slight

digressions, my kind reader will regard them only as watering places on the journey, where the traveller loosens the reins and dismounts for a moment in a dry and dusty road, that he may renew his progress with more freshness and vigour,

## II. FRENCH AGRICULTURE.

The agriculture of France is its great and commanding interest. Its manufactures and commerce are considerable; but its manufactures are mainly concerned in the fabrication, and its commerce in the transportation and exchange, of the products of its own soil. I should have no difficulty in giving the statistical returns of the agriculture of France, but this comes only in a limited degree within my province; and a long table of mere numbers would convey little instruction to my readers. It is of great advantage to France, however, that it procures these returns regularly; and thus, as in the late scarcity of grain and in the failure of the potato crop, enabled the government to provide early, with a humane foresight, against the sufferings which were likely to follow. It is sufficient to say that France has nearly thirty-six millions of inhabitants; and that in ordinary seasons she is able, to a great extent, to feed her own people from her own soil.

## III. SOIL AND ASPECT.

The agriculture of a country of necessity corresponds to its climate, soil, and aspect. Besides these physical conditions, it depends upon many circumstances of a political or moral character, and others which may be termed accidental. The territory of France, stretching through nearly eight degrees of latitude, is susceptible of a great variety of



cultivation. On the eastern side it feels the cold influences of a range of mountains covered with perpetual snow ; on its western side its climate is softened by the vicinity of the broad Atlantic ; its northern portions gather humidity from the ocean which bounds it ; its southern portions enjoy the sunny influences of an early spring and an almost tropical summer, and of the vapours which rise from that most beautiful of all waters, the Mediterranean, which laves its shores. Its territory is traversed in various directions by several magnificent rivers, the Rhine, the Rhone, the Loire, the Garonne, the Seine ; and many minor tributaries, which, if they have not the magnitude of many of the rivers of the western world, afford nevertheless great facilities for inland navigation and transportation ; and, at the same time, present on their banks a large extent of alluvial land of the most productive quality.

While the soil of these alluvial lands is most excellent, the soil of the high grounds, as far as it has come under my observation, is of an inferior quality. It is in general strongly calcareous, with the lime or chalk forming almost the entire surface. In dry weather, such lands suffer from the drought, and in wet weather nothing can be more unpleasant to work. Large portions of land likewise are found composed almost wholly of a yellow ochry sand or gravel, mixed at the same time with an aluminous substance, and apparently highly charged with iron, which constitutes a soil very unfriendly to vegetation. Of soils purely aluminous or clayey I have met with few ; but there are many of a mixed character, with a loam of considerable thickness on the surface. These are capable of great improvement and productiveness. In some parts of the country, lime and gypsum (sulphate of lime) are abundant ; and marl of an unctuous and enriching quality is found in many places.

## IV. CROPS.

The common crops of France are wheat, rye, barley, oats, beans, and potatoes ; but its peculiar crops are, beets for sugar, grapes for wine, and silk. Leguminous crops or esculent vegetables, excepting to a comparatively small amount, for human food, are little cultivated ; oats and barley, it seemed to me, only to a limited extent ; buckwheat, in the poorer parts of the country, in a small measure ; and although the southern portions of France, or more than one-half of the kingdom, would produce Indian corn, it does not appear to be largely cultivated, and its value seems imperfectly appreciated. Hay, or grass for hay, cannot be said to be largely cultivated ; but there are extensive meadows, which are left in permanent grass. Of the grasses cultivated for feeding, lucerne (if it may be called a grass) and sainfoin occupy the first place. The former, when cut green, forms the principal food of the stock during the summer, and when dried makes also an excellent fodder. Vetches do not appear to be extensively cultivated, the preference being decidedly given to lucerne. Beans and lentiles are cultivated in some districts. Hemp, tobacco, and flax, are likewise grown ; but they cannot be considered as prominent crops. Cabbages are sometimes largely cultivated for stock ; turnips rarely ; and few fields of ruta-baga of any great extent, have ever met my eye. I have seen large crops of colza and rape, but they do not predominate. It must be understood that I make these observations with great diffidence. France is a large territory : different portions of it, in all their habits, differ much from other portions. It would require years to give a thorough and perfect account of its husbandry, instead of a brief and cursory examination, which is all that my limits admit of.

## V. THE FORESTS OF FRANCE.

In travelling through France one is constantly impressed with the immense tracts of land which are in forest. The forest connected with the palace at Fontainebleau, only about fifty miles from Paris, is said to contain 35,000 acres; the forest connected with the palace of Chambord, 20,000 acres. There are other forests in France of great extent, some of them being portions of the national domain, and many of them the property of individual proprietors. They are not, however, kept merely for show, or luxury, or sport. The heath or common lands, in France, which remain open and unproductive, are returned as 19,499,180 acres, or about one-seventh part of the whole surface of the kingdom. The fuel generally used in France is wood or charcoal. There are, it is said, large deposits of mineral coal in France; but they are not extensively worked, or are not easily accessible, though their value is beginning to be appreciated. Wood, therefore, is grown for fuel, and comes to market by means of the great rivers and canals in the form of wood or coal; so that these forests are regularly and gradually cut off for timber or fuel, and either re-planted or suffered to grow again from the old stumps. The law permits the proprietors to cut off their wood only once in eighteen years; and this under the control of a government inspector, who requires that it should be cut clean, leaving only such trees as may be valuable for ship-timber or for other purposes, which the government claims a right to take for its own uses at an equitable price. Under these excellent arrangements the supply of fuel is constantly kept good, and the price of wood has scarcely varied for a quarter of a century. In the cities, and in many parts of France, wood is always sold by the pound; and it is curious in Paris to see the immense arks of charcoal and wood which come down the Seine, and piles

of wood in the city, covering acres of ground, and on a level with the tops of the highest houses. The value of the timber in these immense forests is likewise great. Although throughout France the principal and almost universal material for building is stone, yet much timber and boards are wanted for floors and roofs, and various purposes; and many large proprietors think that they cannot make a better provision for their children than by planting forests, or preserving and cherishing such as they already have.

## VI. A FRENCH LANDSCAPE.

A French landscape is peculiar. A large portion of the territory is comparatively level, with few great inequalities. The appearance resembles that of some of the large prairies of the United States; for in a great portion of France fences of any kind are unknown. Here and there a large farmhouse, or what is called a *chateau* or castle, meets the eye, with its customary appendages: but the labouring people chiefly live in villages, which seem scattered about like islands, and are generally known by the spire of the church overtopping the cluster of houses. The French villages more resemble compact towns than country villages; the streets are ordinarily paved; the houses are placed directly upon the street; and though there are usually or frequently gardens attached to the houses, it is remarkable that there are no trees either for shade or ornament in the streets. Yet the great roads through the country, which are usually as straight as they can be made, furnishing a paved way in the centre, and two side paths which are unpaved, are commonly lined with trees on each side for many miles.

## VII. THE FRENCH PEASANTRY.

Excepting with the great farmers, where there are small buildings for the residence of the permanent labourers ordinarily in the court-yard, or immediate neighbourhood of the great house, the peasants generally live in the villages, and sometimes go long distances to their work. They rise early, and among their first duties are those of religion; their first visit being, in most cases, to the village church, which is open at all hours. I have often met them there in the morning, when it was scarcely light enough to see the way; and I have found crowds of them in the churches at night, after their return from labour, when, with only one or two lamps burning over the altar in the church, it has been so dark that the dress of persons could not be distinguished until you came within arm's length of them. It is the beauty of the Catholic religion, that, although it is in a degree social, it is at the same time individual and personal in its character; that although the ceremonials of the worship are of a splendid, and often gorgeous description, yet the worshipper seems regardless of every thing but his own particular part in the service, which he performs silently, and generally with an intensity and an abstractedness which are remarkable; and in churches whose splendour and magnificence it would require a brilliant pen to describe, I have seen labouring men in their frocks, and with their spades upon their shoulders, and market-women with their baskets upon their arms, go into the churches, and after performing their devotions, and evidently with no other object in their thoughts, go away to their labours.

In all parts of Europe the women are as much engaged in the labours of the field as the men, and perform indiscriminately the same kinds of labour. Having been much among the peasantry and the labouring classes both at home and abroad, I must in truth say, that a more civil, cleanly,

industrious, frugal, sober, or better dressed people than the French peasantry, for persons in their condition, in the parts of the country which I have visited, and especially the women, I have never known. The civility and courtesy, even of the most humble of them, are very striking. There is neither servility nor insolence among them ; their economy is most remarkable ; drunkenness is scarcely known ; their neatness, even when performing the dirtiest work, is quite exemplary ; cheerfulness, and an innocent hilarity, are predominant traits in their character. In these respects they furnish a striking contrast with a considerable portion of the Scotch agricultural labourers, who are dirty and squalid to an excess ; with many of the English, who are servile, broken-spirited, and severely straitened in their means of living ; with the poor Irish, who are half-clad, and in a half savage condition, and to whom truth and fidelity are ordinarily words without meaning ; and with the Italians, who, to raggedness and squalidness and proverbial indolence, add a strength of passion which brooks no injury, real or supposed, and inspires in a stranger a fearful sense of the insecurity of life.

The wages of the French peasantry are in general from a franc to a franc and a half per day to a man, that is, ten to fifteen pence, or twenty to thirty cents ; and to women about four-fifths of the former sum, or about eight pence or sixteen cents. In this case they ordinarily provide entirely for themselves. In harvest, however, or under extraordinary circumstances, they are provided for in addition to their wages. Coffee and tea are scarcely known among them. They drink no ardent spirits. Their usual drink is an acid wine not so strong as common cider, and this mixed with water ; they have meat but rarely ; occasionally fish ; but their general provision is soup, composed chiefly of vegetables and bread. Bread, both wheat and rye, is with them literally the staff of life. With all this they enjoy a ruddy health ; and the women are diligent to a proverb.

They seem unwilling to lose a moment's time. I have repeatedly seen them carrying heavy burdens upon their heads, and at the same time knitting as they went along.

### VIII. SIZE OF FARMS, AND DIVISION OF PROPERTY.

The size of farms in France has been a subject of much discussion. The right of primogeniture has ceased to exist there; and since the great revolution, the law has ordained that the land possessed by any one at his death should be equally divided among his children. This did not take place without a hard struggle against it on the part of the great proprietors, nor without many predictions of ruin to the agriculture of France, from the infinite subdivisions which the land was likely to undergo, and the small size to which farms were about to be reduced. The law, however, has been maintained, and, as far as I have been able to observe, with the happiest results to France<sup>1</sup>. It was predicted, that, under such an arrangement, no system of extensive agricultural improvement could be attempted; and that small proprietors being thus multiplied, and the labourers themselves becoming proprietors, the lands of the country

<sup>1</sup> In France the total number of taxed landed properties is stated, in 1835, to have been 10,896,682, and these were again divided into 123,360,338 separate pieces of land. It is supposed, however, that of heads of families occupying estates, which combine many of these smaller divisions, and which consequently become merely nominal partitions, there are about 5,000,000. Now, allowing an average of four to a family, it will be seen that there are 20,000,000 of people in France directly interested in the property of the soil. The number of proprietors of the soil in England, who hold landed property yielding a rent of 100*l.* sterling per year, is stated, at the same time, at 38,000; and the whole number of proprietors of the soil in England and Wales is rated at 200,000, and in the whole United Kingdom at 600,000. The extent of the United Kingdom is about two-thirds that of France.—*Statistique Générale de la France*, par Schnitzler, tom. iii. p. 11.

were destined to go into the hands of men without capital, too ignorant to understand or learn the best modes of cultivation; and without the power of applying, even if they knew, them.

These objections are not wholly without force; but as this subject possesses considerable interest for many persons, I hope to be excused for enlarging upon it. It happens with respect to many things which are deemed evils, or from which evil consequences seem likely to result, that there is a compensating or balancing power at work, which, if left free to operate, of itself corrects the irregularities, restores the equilibrium, and prevents the evils apprehended. If all France were to be cut up and divided into pieces of ground of the size of a table-cloth, as from the comments made upon this law by those who know nothing of its actual operation one would suppose was likely soon to be the case, we should expect a state of things extremely adverse to the national prosperity. But it must be remembered, that while the law requires an equal division of the land among his children at the death of a proprietor, it does not require that the land should remain thus divided. The appropriation of it is left optional with those who inherit it; and in this, as in other cases, they will be governed by their interests, their convenience, and other nameless circumstances by which human conduct is ordinarily influenced. A father dying and leaving several heirs, sons and daughters, it is scarcely probable that they will all wish to devote themselves to agriculture; and this too when the parts of such property growing out of this division would be, either of them, too small, under any circumstances, for the support of a family. The result is, as we should expect it would be in such case, that some one of the heirs purchases the rights of the others, and the farm remains in its integrity.

What, then, is the advantage of such a law? It is that it leaves this matter, as it should be left, to the choice of the



parties concerned ; and that it in fact prevents the too great accumulation of landed property in the hands of individuals. There can hardly be a greater evil, in countries where labour is abundant, and population presses hard upon the means of subsistence, than that immense tracts of land, which might be made productive, should be locked up in the hands of individuals who will neither use the land themselves, nor suffer it to be used by others. It seems a violation of natural right, justice, and humanity ; and there are many circumstances in the condition of society in the old world, which indicate that it must be modified or abandoned.

One of the first duties of society is to give to every man a perfect security in the enjoyment of the fruits of his own industry ; but it is equally the duty of society to secure to every man disposed to labour an opportunity, as far as possible, fully and effectually to exert that industry. The ends which governments ordinarily aim at for themselves, is the protection of property ; and almost all laws, being made by men of property, have this for their great object. But wealth is ordinarily quite able to take care of itself ; and the object of government should be to protect poverty, which constantly requires protection. The true wealth of a community is its labour, its productive labour. A man is not the richer for houses which he cannot occupy ; lands, which he cannot use ; money, that he cannot spend. He might own a continent in the moon, but what would that avail him ? He might die of starvation in the vaults of the Bank of England, or in the undisturbed possession of the richest of the mines of Peru. Labour is the great source and instrument of subsistence and wealth. Labour, therefore, honest labour, should be, under all circumstances, the great object of the protection and encouragement of every just government. Laws should be such as to secure to labour, as far as possible, an open field for exertion. Such is the tendency of the laws of France respecting the posthumous division of landed estates.

The laws of primogeniture, by which large landed estates go exclusively into the hands of the eldest son, and laws of mortmain, by which lands are for ever appropriated to particular uses, are laws of a different description. The law of primogeniture seems to many persons essentially unjust in the favoritism which it implies, among those who obviously have equal claims upon parental kindness and impartiality. The law of mortmain and perpetual devises, by which extensive landed estates are locked up and appropriated in perpetuity to particular uses, has met with many warm combatants. They ask, and with what reason I shall leave to the judgment of my readers, Was not the land given to man, that from it, by his labour, he might obtain a subsistence, which, in truth, can come from no other source? Now shall any man, or set of men, so monopolise and appropriate this land that it shall not be available to these objects? It would seem that the earth belongs to those who possess it; and that, when a man once quits it for ever, his rights in it should cease; yet society admits the remarkable fact, that men who died centuries ago, shall determine how the land at present shall be used and appropriated; or that it shall not be used nor appropriated at all.

It does not come within my province to enter upon matters of dispute, which, in a period full of questions and inquiries, seem to be assuming importance, and are becoming matters of private and public discussion. I am well aware of the necessity of giving as perfect a security as human society admits of to the rights of property; but these rights, it would seem, should be held in subserviency to a still higher right, and that is, the right to live. That which a man produces by his industry or toil, by his skill or genius, exerted without prejudice to the equal rights of another man, is his own; it is his exclusively, and it should be his in perpetuity; that is, the appropriation of it should be his, and should be uncontrolled excepting so far as to prevent its application to an

immoral object, to an object prejudicial to health or life, or to the public peace and welfare. But the appropriation of the soil itself to any object in perpetuity, the shutting it up from use, the prevention of its occupation for purposes of human comfort and subsistence, seems incompatible with those natural rights with which the Creator endowed man when he commanded him to till the earth, that he might from it obtain a subsistence. The laws in many of the states of the United States, when the property of a debtor is seized for the payment of his debts, very properly take care to leave him in the possession of the tools of his trade, that he may still provide for his own, and the subsistence of those dependent on him. A law which would rob him of his tools,—and while the community and his duty to himself and his family require that he should by his labour provide for himself and them, should virtually put it out of his power to exert that industry,—would be of the same character with that which, under any pretence or form, in the midst of hungry and starving thousands, excludes them from the use of that soil from which Heaven designed they should get their bread, and from which only it can be obtained. It is one of the great effects of the revolution which gave independence to the United States, and of the great French Revolution, that it broke up these restrictive laws, and in general left property in land to follow the usual course of other property; and, above all, made it universally attainable.

In the United States, where land is abundant, and where countless millions of acres must remain for countless years unoccupied, laws restraining the monopoly of land are far less necessary; but even in the United States they should have a care to guard against the perpetual appropriation of land for any objects whatever, whether under the plea of pious or of moral uses, as in fact a direct violation of the rights of every generation to judge for itself, and to judge

only for itself what shall or shall not be maintained; and secondly, as conferring a power which experience shows is liable to gross and injurious abuses.

A principal objection urged against this subdivision of land is, that it prevents any system of extensive improvement of the soil by the great processes of modern discovery,—draining and subsoiling. This argument has some force; but we may hope that in many cases the owners, seeing their own interests clearly concerned in such improvements, may combine their forces to effect them. In many of these small holdings, likewise, the cultivation being by the spade and not by the plough, the land will be trenched as a substitute for subsoiling, and an equal productiveness secured. Where such improvements are obviously demanded, and they might be too great for individual effort to accomplish, there seems no reason why the government itself should not undertake them, assessing the expense upon the different owners of the land in such forms as would be equitable, and made payable at such periods as would render its discharge easily practicable.

It is objected likewise that these small farmers, having no capital to apply in the cultivation of their lands, and being of a class not likely to be acquainted with modern improvements in husbandry, their agriculture will probably be of an inferior character. These objections must be allowed some weight; but then the holders of these small parcels are acting under the most powerful of all stimulants, that of their own immediate self-interest. They themselves being the owners of the soil, whatever improvements it receives, and whatever crops it produces, must accrue directly to their own benefit. The holding being small, it becomes the more important that it should be forced to the greatest extent, in order to meet their wants. This circumstance will prompt to the greatest exertions in procuring from every available source, and in saving their manure for the enriching of their

small farms. Labour and economy thus applied, may be said in themselves to constitute a valuable and active capital.

But in place of speculations let us revert to facts, and inquire how this system has actually worked in France. It has produced a great revolution in the tenure of property; but from the best inquiries I could make among the most intelligent and candid, I found a unanimous and emphatical acknowledgment of its beneficial results. In what may most properly be called the rural districts, that is, a district somewhat remote from large towns and villages, there are found farms in size from one hundred to five hundred, seven hundred, and a thousand acres and upwards; and so it seems likely to remain. The law, though it requires a division of the real estate among the heirs, does not make it compulsory to continue such division. The law in fact does little else in such situations than, so to say, to bring the land into the market, and leave it then to be disposed of according to the circumstances of time and place.

But in cases of partition we may suppose a farm of twelve hundred acres divided among four heirs; they would have farms of a respectable size; divided again it would leave farms of seventy-five acres each, which perhaps may be considered the average size of farms in New England, and exceeding the average size of Flemish farms. Even another division of the same number of parts might take place, and twenty acres would correspond with the size of many of the most productive farms in Belgium. Many persons in arguing against such an arrangement, proceed upon the supposition that the division is to be infinitesimal. But this is absurd; and, as I have already remarked, the evil of too great a subdivision has always a tendency to correct itself, and to stop where it would become positively mischievous. This is found to be the case, as I have remarked, in the strictly rural districts. But a person passing through the environs of large towns and cities will perceive that the division has proceeded

very far ; the fields often appear like patch-work, and are cut up into very small pieces. This is exactly as it should be. These pieces are owned by small gardeners, who supply the markets with fruit or vegetables, and who, on account of its limited extent, carry their cultivation to a high perfection, and often in the number, variety, and quantity of their crops on these small pieces of ground, astonish one by their success. Very often these pieces of land are owned by persons engaged in severe mechanical trades in the cities, who find health and needful recreation in their cultivation. One thing is quite certain in such cases—that no land thus situated will be left uncultivated ; and under the system of minute economy to which it is subjected, will unquestionably be rendered as productive as possible.

If we look at large farms in Great Britain,—I mean farms of hundreds of acres, with the exception of some of the best cultivated districts, such as the Lothians in Scotland, for example, or the counties of Northumberland, Lincoln, and Norfolk, and only some farms in these counties, we shall find that even these are by no means always fully cultivated ; and that, either for want of skill, or enterprise, or capital, large portions of them are wholly unproductive. This is far less frequently the case with small farms, for the simple reason that the owners cannot afford to neglect their land, and that the management is much more easy. It is to be added likewise, that in very small holdings of six, or ten, or twenty acres, the great expense of a team, and of costly implements is dispensed with. In some parts of England, though very rarely, but in many parts of the Continent, and especially in Switzerland, the small farmers use their milch-cows for work, thus getting a double advantage from them ; and a milch-cow, used tenderly, and treated liberally, may be worked from four to six hours a day without injury to her milk. This saving is a great circumstance. On large arable farms it may be calculated, that from a fourth to a third of the

produce must be counted for the support, and equipments, and cost of the teams. The saving of this expense is a great affair; and this is accomplished on small holdings where cows are kept, which pay the expense of their keeping by their labour and their calf; or where, as in many cases, the whole cultivation is performed by human instead of brute labour—by the spade instead of the plough. I believe, therefore, it will be found, that in a fair comparison, the small farms are in fact more productive than the large ones; that they are managed at less comparative expense, and, in proportion, leave more for human consumption.

If thus much may be said of the economical results, still more may be said of the beneficial moral influences of such a system. Of all the influences which operate to promote exertion, industry, and good conduct, none certainly is more powerful than the hope of bettering our condition; and I may add, without undertaking to give a reason for it, as an established truth, that nothing inspires more self-respect, as connected with a feeling of independence, than the possession of property, and especially the possession of a fixed property in house or land. This effect is constantly seen in the labouring classes among the French. They are extremely ambitious of getting a piece of land; and perhaps too much so, after once coming into possession, of extending their possessions. This stimulates them to industry, and induces the most rigid economy. The subdivision of property or of land in France renders this practicable, which, in other countries, where the right of entail prevails, or where property is held in large masses, and guarded with extreme jealousy, is out of the question. There is a wise foresight likewise in this matter in respect to the security of public order and the peace of the country. The persons of all others least likely to engage in projects of revolution certainly are those whose property must in every case be endangered by such revolution; whose possessions are fixed, and not transferable from one place to

another at pleasure. Their estates constitute the strongest pledge of their loyalty and patriotism. The more property is divided in a country, the more equally it is held, or rather, that it should be attainable by all on equal conditions, the greater security is there for the rights of property ; the more are concerned in the preservation of the public peace. The humblest agricultural labourer in France may look forward, by industry, sobriety, and economy, to become a proprietor and a holder in fee-simple of some portion of the soil which he cultivates. There is, therefore, the strongest inducement held out to good conduct ; and the beneficial influence of this condition of things upon the character of the French peasantry cannot be doubted.

Few things have struck me more forcibly than the difference in the condition of the agricultural population of France and that of Great Britain—a subject to which I have already referred. I have never seen a more healthy, a better-clad, or a happier population, than the French peasantry. Something may be ascribed to their naturally-cheerful temperament, and something to that extraordinary sobriety, which every where in a remarkable degree characterizes the French people ; but much more, I think, to the favourable condition in which this law, which renders attainable the possession of a freehold in the soil, places them.

I am extremely averse to making any unfavourable comparisons ; and I am quite aware that my judgment may be at fault ; but I shall offend no candid mind by the calm expression of my honest opinion. The very poor condition of a large portion of the English agricultural labouring population must be acknowledged. The acquisition of property is, in most cases, all but impossible. The great difficulty, where there is a family, is to subsist ; in sickness they have no resource but private charity or parish assistance ; and they have in most cases nothing to which they can look forward when the power to labour fails them, but the almshouse.



I believe there is an equal amount of philanthropy, and as strong a sense of justice and humanity among the English, as among any people ; but it is not to be expected that in any country where wealth constitutes the great and most enviable distinction, and where, by various circumstances, avarice is stimulated to the highest degree,—that the great mass of the community should be either philanthropic, or humane, or just. Wealth is almost every where, in what is called civilized, and too often miscalled Christian, life, the great instrument of power. Power is a dangerous possession, and always liable to abuse. The only security against this abuse is the division of power ; and to give the humbler classes the means of helping themselves.

In Great Britain, as I have already said, the rural labouring classes are placed in circumstances of hardship and disadvantage. It would be ordinarily quite idle for them to aspire to the ownership of land. Philanthropic and benevolent persons in various parts of the country have given them small allotments ; though some have endeavoured to limit these allotments to one-eighth of an acre, and many farmers have combined in denouncing the allotment system, and have refused to take leases where the labourers were to be allowed allotments. The beneficial effects of these allotments, both upon the comfort and morals of the labouring classes, have every where been acknowledged ; but under the best circumstances, the allotment system can never be a substitute for that by which the ownership of the land is itself attainable.

I will not contest the point that great improvements can only be expected to take place on large estates and with the help of large capital ; yet, on estates of a medium size, such as a hundred or even fifty acres ; these are, perhaps, more likely to take place than on estates of a much larger size, as being ordinarily more within the reach of most men—the majority of farmers being men of restricted capital. The

immense improvements in dyking and embankments, and in redeeming land from the sea, which have been made in Holland, and in Lincolnshire and Cambridgeshire, in England, could only have been effected by the union of large bodies of proprietors. No single fortune is any where competent to such enterprises.

I will not deny that under a system of large farms more produce may be for sale; and, in a commercial view, more money will be made, and larger fortunes accumulated. But I cannot agree that the wealth of a community, held as it ordinarily is held, is the standard of its prosperity. That undoubtedly is the happiest condition of society, where none are over-rich, and none extremely poor; where one is not continually offended by those striking contrasts of enormous wealth and extreme destitution, which some countries present. That condition of society is undoubtedly above all others to be preferred, where the power of bettering our condition, is, as far as possible, equally enjoyed by every man, and certainly not denied to any one; and where every possible encouragement and facility are given to the exertion of this power. It is often a great charity to help our neighbour; but the best and wisest of all forms, in which this charity can be exercised, is that, when a man helps his neighbour to help himself.

If we look at agriculture in a commercial view, and in this light English and Scotch agriculture is to be considered, its operation upon the condition of the labourers is often severe. I have found among the landlords and proprietors in England and Scotland, in a large proportion of cases, where they farmed their own estates, many examples of the most just and kind treatment, in paying their labourers liberal wages, in providing for them comfortable cottages, and in treating them in the kindest manner in seasons of sickness or in old age. But though there must be innumerable exceptions, this perhaps cannot be said of tenant farmers,

and especially occupiers of large farms, where, in proportion, much less labour is performed by human hands, than on farms of a smaller size. I shall do no injustice in saying that the great object of the tenant farmers, and this, perhaps, may grow out of their heavy rents, is to have their labour performed at the least possible expense. Beyond this, after the work is done, and the wages paid, they take only a slight interest in the welfare of their labourers, excepting to guard, by every possible means, however severe, against their coming upon the poor-rates. The condition of the working people in parts of Devonshire and Dorsetshire, as has been established by unquestionable evidence, is truly deplorable. I will only add, that if there exists a more wicked, inhuman, oppressive, and demoralizing system than that of the gang system in Norfolk county, of which I have given a full and unquestionable account in another place, where the cottages of the poor labourers have been removed from the large estates, and the people have been driven into a crowded village, and are wholly at the mercy of the farmer or the gang-master, I have yet to find it. In physical comforts, the condition of the slaves in the southern United States is a paradise in comparison with it. I have no hesitation in holding up such an atrocious system to public indignation. It is said these people are free to choose what they will do. That is to say, they may work upon the terms prescribed to them or they may die. This is the only freedom of choice left to them. There is no alternative or remedy. What freedom is this? What slavery is more galling? There is always a great outcry when workmen combine to raise, or to prevent the reduction of, their wages. Should there be no remedy against masters who combine to reduce or keep down the price of labour? The answer given in all such cases is that their rents are high and their taxes heavy; and therefore labour must be pressed down to the lowest possible point. They are in the power of their masters as much as

if they were their own property. The extreme exactions of avarice and the abuse of power follow of course. I shall not go farther upon this subject; but I have only to add, that such practices in any are most oppressive, unjust, and inhuman, and when farming cannot be pursued without involving such wrongs, a just and honest man will abandon it.

The condition of the French peasantry is wholly different from this; and their evident improvement is greatly owing to the law of which we have been speaking. The French labourer may not only be a holder, but a proprietor of land. This elevates him at once in the social scale, and inspires him with that self-respect, which is the most powerful element of virtue. The English agricultural labourer looks forward in despair; the French agricultural labourer is cheered by the buoyant hope of improving his condition. This stimulates to industry, frugality, and temperance. The French revolution abolished all feudal rights, and entirely changed the relation of master and servant. The French people, having once got a knowledge of their rights, are not likely soon to lose that knowledge. The recollection of the horrors of the first revolution, and the suddenness and entireness of the second, beyond all question exert a wholesome influence upon the government. That influence is likely to be continued. The government of France holds the only just relation which any government can sustain towards the people. They are not the masters, but the servants of the people; endowed with sovereignty, not for their own personal aggrandisement and power, but for the welfare of the people whom they govern; and any marked departure from this character will be sure to be early rectified by remedies strictly popular, and well understood in France, but too hazardous to be lightly provoked<sup>1</sup>.

<sup>1</sup> This passage was written some months before the Revolution of February, 1848. I have deemed it best not to alter this or the following accounts.

## IX. MEASURES OF THE GOVERNMENT FOR THE IMPROVEMENT OF AGRICULTURE.

The measures of the government for the advancement of agriculture have much to recommend them, if they are carried out in an intelligent and faithful manner.

1. DEPARTMENT OF AGRICULTURE.—In the first place, there is a department of agriculture, the secretary or minister of which, being one of the first men in the kingdom, is expected to look after this great interest ; to obtain statistical returns of agricultural produce from all parts of the kingdom ; to learn what is the condition of the art ; what improvements have been made ; what improvements are most required ; and what is the condition of the agricultural population.

2. STATISTICAL RETURNS.—The statistical returns of the produce of France have been recently completed, and show a work of immense industry and labour. It is obvious that such a work can present only an approach to exactness ; but even that is of great value ; and it will be found that some facts have been brought out, in respect to the average increase of the crops, which are in the highest degree encouraging. These returns have been obtained by a direct application to well-informed and confidential individuals, in different parts of the country, who have made their returns to the central bureau in Paris. A great variety of subjects have been embraced in them, such as the amount of land in cultivation ; the amount of land devoted to different crops ; the manure applied ; the quantity of seed employed, and the average yield. It extends, likewise, to the number of persons engaged in agriculture, and the number of domestic animals reared or kept in every department, with a great variety of agricultural and commercial information, sub-

sidiary to, and connected with the subject, of a very interesting character, and of equal utility. This magnificent work does the highest honour to the government, and to the persons employed in its execution.

3. INSPECTORS OF AGRICULTURAL DISTRICTS.—The next provision made by the government is the division of the kingdom into four agricultural districts, to each of which an intelligent and experienced agriculturist is appointed, as inspector or commissioner, whose duty it is to go through his district annually at least, observe carefully its condition, and report it to the government; and at the same time, in his journeyings, communicate every where advice and information, as he may see that they are needed. This is certainly an admirable mode of dispensing knowledge and exciting emulation <sup>1</sup>.

4. IMPORTATION OF IMPROVED STOCK.—The government likewise have imported from other countries some of the most valuable animals, such as bulls and stud-horses; and stationed them in different parts of the country, that the farmers may avail themselves of the advantages which they offer for the improvement of their stock. On account of the large demands made by government for horses for the cavalry, this becomes a matter of great importance. Whether the keeping of bulls would not be better left to private enterprise, is a question much debated. That which belongs to the public is seldom cared for like that which belongs to an individual; but the government have met this objection by disposing of their improved animals occasionally at public sales.

<sup>1</sup> At one time several persons were employed by the government to visit foreign countries for the purpose of seeing their improvements, gathering agricultural information, and bringing home such plants and seeds as were likely to be useful to the country. It is proposed by the provisional government to revive this excellent plan. March, 1848.

5. AGRICULTURAL AND VETERINARY SCHOOLS.—France has likewise several agricultural schools, established in different parts of the kingdom, of which I shall presently give an account, designed to furnish a complete scientific and practical education in agriculture. In addition to this they have veterinary schools, where comparative anatomy is thoroughly studied, and the diseases of all the domestic animals most carefully treated. These likewise may be supposed to grow in a great measure out of their army, where the medical treatment of their horses is obviously of great importance.

6. AGRICULTURAL SOCIETIES AND SHOW.—In various parts of the country agricultural societies are established, and assisted by the government, for the purpose of diffusing information; and these will, in all probability, extend themselves. A society in Paris, composed of some of the first men in the kingdom, meets regularly twice a month for the discussion of agricultural subjects, for the report of improvements, and, at the end of the season, for the bestowal of premiums. An agricultural show was undertaken the last year at Poissy, the Smithfield of France, where some excellent native, and some very good improved stock, though not to a large amount, was exhibited; and here I saw sheep of the very best, and most profitable kind, especially for such a country as the United States, where good mutton, and particularly fine wool, are in demand. These were pure Merinos of a very large size, well-proportioned and fat, and with fleeces of an excellent quality. I have never seen animals of the kind combining more valuable properties. It is intended that these shows, of which this was a first attempt, should be continued annually.

7. AN AGRICULTURAL CONGRESS.—Previous to this show, an Agricultural Congress, composed of more than 300 gentlemen interested in agriculture, and sent as deputies from

different parts of the country, had been sitting in Paris for a fortnight to discuss practical questions in agriculture, and likewise political questions bearing upon it; which was done with great ability. At Poissy, the Minister of Agriculture distributed premiums of large amount; and every circumstance indicated an active, an increased, and increasing attention to this great subject.

8. CONSERVATORY OF ARTS AND TRADES.—Paris is, in the next place, distinguished by its direct means of scientific instruction. It has what is called a Conservatory of Arts and Trades. This is, properly speaking, a school for the industrial and mechanical classes. Here is a complete collection of models or of examples of agricultural buildings and implements—to say nothing of other arts—not only of those in use in France, but specimens of the best of every description which are used in foreign countries. Here, under accomplished professors, courses of agricultural lectures, or rather of chemistry and mechanics as applied to agriculture, are regularly given, to which access is entirely gratuitous, the professors being supported by the government; so that here is presented to inquisitive minds the best means of learning the application of science to agriculture. Perhaps, in the science which involves the connexion of chemistry with agriculture, no country has made so great advances as France, as the labours of Chaptal, Boussingault, Payen, and other distinguished men decisively show. If agricultural chemistry could make men good farmers, the French should take precedence of all others. How far the facts conform to this supposition I shall leave to others to judge; because I have no wish to put my head into the lion's cage: though I am compelled to say in passing, that the best arable farming which I have ever seen, the cleanest, the most exact, apparently also the most productive and economical, is in countries where there is, technically so called, no science, and



implements only of the most ordinary description ; I mean Belgium, Holland, and Switzerland. I shall take occasion to remark upon this fact in another place.

9. SOCIETY FOR THE IMPROVEMENT OF WOOL.—Besides the Society of Agriculture, which meets in Paris twice every month, and is the centre of the correspondence of all the agricultural societies of the country, there is likewise a Society for the Improvement of Wool, who twice a year bestow valuable premiums upon persons who have made the greatest advances in the improvement of the fleeces of their flocks. This society has its public exhibitions of wool, and has undoubtedly accomplished much good.

## X. PARIS MARKETS.

1. CORN MARKET.—Paris concentrates much within itself that is extremely interesting to an agriculturist. Its markets are in the highest style of convenience, neatness, and abundance. The market for the sale of all kinds of grain is a circular stone building two stories in height, and 126 feet in diameter, surrounded by high galleries for the storage of flour, the unground grain being in the centre on the floor, and covered in by an iron roof of admirable architectural construction. The building is completely fire-proof. The grain is always brought to market in sacks, and the building, it is said, is capable of containing 10,000 sacks. There are to be found here wheat, rye, barley, oats, buckwheat, beans, peas, lentils, and vetches. Bureaus, or small offices, are ranged round the circle on the inside for the factors, or salesmen ; and, as in almost every other department of business in France, women are as much employed in the sale of grain as men ; and there can be no doubt they manage with admirable skill and address. Sharp trading

seems often the characteristic of the sex ; excepting only where the affections are concerned. The Corn Exchange is held here two or three times a week.

2. MEAT MARKETS.—The meat markets are of the neatest possible description ; but they are scattered about in shops. The beef in Paris, in point of fatness, is much inferior to the English ; yet it is of a fair quality. The mutton is likewise very inferior to the English. Some persons complain of the English beef and mutton, especially the Dishley mutton, as being much too fat, and therefore attended with great waste. Veal in France is not killed until it is full six months old, and is of the very finest description. The meat-shops in Paris are shut in by doors of iron grating, so as to admit a free circulation of air at night, with cloths covering the meat to ward off the dust ; and they are visited every morning by the police, and undergo a strict examination, so that, if there is any meat of a bad description, or which has remained on hand too long, it is at once condemned and seized. The butchers in Paris are licensed, and laid under heavy bonds to conform to the police regulations ; and the meats and other articles brought into Paris are subject to a duty, collected at the barriers, which goes towards the improvements of the city.

3. MARKETS FOR EGGS, BUTTER, CHEESE, VEGETABLES, FRUITS, POULTRY, FISH, &c.—The market of the Innocents<sup>1</sup>, as it is called, is one of the largest in Paris. This market is to undergo great alterations, and a very large sum is in reserve to build it upon the most extensive and magnificent plan. This market comprises not only the great fish market of Paris, but also the egg market, the butter and cheese markets, the potato market, the onion market, and the

<sup>1</sup> Being the site of an old convent or nunnery.

general vegetable and fruit markets. The sellers, with scarcely an exception, are women, very sharp, very busy, and of course very talkative. Looking down upon the whole area from the magnificent fountain in the centre, it would be difficult to find a more gay and animated scene. The fountains in Paris are one of its most remarkable features; and no principal market is to be found without its continually-flowing fountain.

The vegetables, butter, eggs, fish, and many other things, are always disposed of at auction early in the morning to the retail dealers. The vegetables in Paris are excellent. Carrots, and turnips, and onions, are not so large as in England and the markets of the United States, because the French deem the large-sized vegetables not so good for eating as the smaller-sized. It is remarkable likewise that there is hardly any season of the year when almost any description of vegetables may not be found in the markets of Paris; and in the middle of December green peas, asparagus, string beans, and strawberries, may be purchased in quantities, which shows the perfection to which the art of gardening is carried among them.

The fruits exposed in the markets of Paris are of a superior quality, pears especially, for which the French have long been celebrated. The St. Michael and the St. Germaine pears, which, in the United States, have almost wholly failed, from having, as has been supposed, completed their period, are here still in perfection, which would seem to contradict this theory, and leave some other cause to be discovered for the extraordinary failure of these excellent fruits. I have not been able to ascertain any thing in respect to the culture of any of these articles, which is not familiarly known to all cultivators.

4. MARKET FOR FORAGE.—I have spoken of the grain market in Paris; it has likewise its hay and forage mar-

kets, where extensive sheds for protection against the weather are furnished. These articles, as in England, are sold in small bundles of a fixed weight. I shall, perhaps, surprise some of my American readers if I inform them, that hay, in small packets or bundles, is often sold in Paris at the groceries. I refer to this fact for an opportunity of making a remark, which, hereafter, if it has not now, will have some importance in the United States; and that is, that where hay, for example, is bought in such small quantities, it is likely to be expended with an extreme economy. No observing American comes from the United States to Europe, without soon becoming convinced, that economy of living is no where so little understood as in his own country; and that for nothing are the Americans more distinguished, than for a reckless waste of the means of subsistence. The refuse of many a family, in the United States, even in moderate circumstances, would often support in comfort a poor family in Europe. When persons buy tea by the ounce, and wood by the pound, and hay by the handful, it is quite obvious that these articles will be expended with far more frugality, than where the store is less limited and seems inexhaustible. While meanness is contemptible, a rigid economy avoiding all waste, is a great virtue. The inhabitants of the United States enjoy an abundance for which they cannot be too grateful; but which is very little understood in Europe, where, with a large portion of the population, including many in the middle condition of life, it is a constant struggle to live, and to bring even their necessary expenditure within their restricted means; and where the constant inquiry is, not what they want, but what can they afford,—not what they will have, but what can they do without.

5. HORSE MARKET.—Paris, besides its grain and cattle markets, has likewise, weekly, its horse market, for the sale

of horses, mules, and asses, where immense numbers of every description are brought, and change hands; and where the morality is probably upon a par with that of the trade in horses in other parts of the world, of the green-spectacle character as exemplified in the Vicar of Wakefield.

6. FLOWER MARKETS.—The flower markets are another extraordinary feature in Paris. These are held at all seasons of the year, in three different parts of the city, twice a week, and in the most favourable season comprise a collection of flowers and plants as beautiful as the climate admits of. It is stated, on good authority, that occasionally there are exposed in a day, in Paris, for sale in these different markets, not less than 30,000 pots of flowers, the value of which is estimated at full 9000 dollars, or 1800*l.* sterling. With the strict notions of utility entertained by some persons, such facts may seem scarcely compatible; but, if we may judge that to be useful, which gives us a pure and perfectly innocent pleasure, certainly there is no luxury whatever which should be looked upon with more favour. There are distinct markets, held likewise at proper seasons, for the sale of trees, ornamental and fruit-trees, and flowering shrubs and plants, presenting an extraordinary and beautiful variety.

## XI. THE CULTURE OF FLOWERS.—BOTANY.

Perhaps I have already said in other places as much as my readers will bear with patience, of the cultivation of flowers. Yet I must crave a further indulgence. I must urge it on grounds of utility, on grounds of taste, and, above all, on moral grounds. My words will reach many dwellers in the country, who, amidst their daily severe labours and toils, are sighing for some relaxation, and some refreshment of the soul. They want something which shall relieve the dull monotony of

their daily toil; something which shall interest their cares, their thoughts, their imaginations, I will add, their affections. They require that which, so far from wasting, shall invigorate their strength. They require a pleasure which shall be inexpensive, and easily attainable, and innocent, and which, enjoyed to its utmost extent, so far from satiating and exhausting either the body or mind, shall not weary the former, and shall enlarge, recreate, and elevate the latter, and fill it with the purest delight. All this is at hand in the cultivation of flowers. The taste which leads to it is among the most pure and the most innocent which can be indulged, and where it does not interfere with imperative duties, is unexceptionable.

I cannot say that, as a science for study, botany is ordinarily presented in a form interesting to general readers. The general classification of plants, and the scientific distinctions which are made between them; the physiology of plants, so far as it is understood, which admits us at once into some of the most wonderful and beautiful secrets of nature; the different modes of culture which different plants require; their peculiar adaptation to various soils and climates, so strikingly as it displays the benevolent adaptations in the works of a wise and omniscient Providence; the acclimation of different plants, and the curious changes which, under such acclimation, they undergo, and by which, like many animals, they are brought from a savage into a domesticated state; the presence of certain plants in certain localities, found nowhere else, and where their presence would seem indispensable to render such places habitable to human beings; the economical uses of different plants for food, for clothing, for building, for mechanical purposes, for naval purposes, for fuel, for colouring, for light; the medical uses of different plants, so extensive as it is found to be in every pharmacopœia; the infinite variety of fruits not for subsistence merely, but for luxury: the uses of plants in the fine arts, for imitation, for

adornment, and for taste ; the chemical qualities or properties of plants in their particular uses, and in their general influences upon the atmosphere which we breathe, in the gases which they take in, and those which they exhale ; the control and influence which human sagacity and power have been able to exert over the vegetable world in acclimating plants, in propagating them, in fructifying and engrafting, and changing the different species ; all these matters directly involved in the science of botany, render it one of the most interesting of studies ; and, even in its present imperfect state, it is the business of years to master it. The extensive discoveries, likewise, which have been made of fossil plants, in particular geological formations, which, as compared with present existing species, lead to so many curious inductions in regard to the past condition of the earth, open to the mind many interesting subjects of inquiry. It is as obvious, likewise, that the establishment of a common scientific and technical language, by which the description of a plant, wherever found, shall be every where understood, and the plant, when met with, recognized, is of the highest importance. But botany, as it is commonly taught in schools, and as it appears in botanical works in general use, seems little else than a vocabulary of arbitrary and technical terms, in a language not generally understood, creates usually but little interest, and is of little practical utility. Within my limited knowledge, the botanical work is yet to be written, which shall present the subject in that natural, plain, instructive, familiar, comprehensive, elevated,—I hope I may add, without offence to science,—popular form, which would give to rural pursuits and recreations, and to the culture of ornamental as well as of useful plants, an interest, a utility, a delight, even to humble minds imperfectly educated, infinitely beyond what they are now found to have with many persons, in other respects of cultivated taste and enlarged knowledge.

But putting aside this view of the subject, in which it cannot be expected that the study of botany should become general or even frequent, the simple cultivation of flowers without any skill or knowledge in technical botany, can scarcely be too strongly enjoined upon the dwellers in the country. While I would urge it upon the wealthy proprietor, if there were occasion for it, I would with still more earnestness press it upon the small farmer, and even upon the cottager and the labourer, who, in the United States, if he will, may always have his house and his garden, humble as they may be, and, I may add, his acres, to devote, as he chooses, to purposes of utility and recreation.

No farmer, in my opinion, should be without his fruit and vegetable garden, to which he should be able to look for a large portion of the daily supplies of his table; for profit, as matter of economy, for health, comfort, and luxury; and a part of this, or a portion additional, should be devoted to the cultivation of flowers and plants for ornament. I do not mean that the great labours of a farm should be intermitted for the care of the garden, as some persons profess to fear that in such case it would be; but they may ordinarily go hand in hand together, and the one serve in truth to advance the other. France is not without such beautiful examples. On every well-regulated farm there should be hours of recreation, when at least the most severe and harassing labours of the farm should be for a while relaxed. I know that there are seasons of the year when such a remission could hardly be expected. But there are seasons when there is ample leisure; and in almost every household, and on almost every farm, there are what may be called supernumerary hands, women and children, to whom such cares would always be a welcome occupation, and a healthful pastime.

On grounds even of interest, a proprietor may find upon consideration, that he is essentially a gainer by every thing which improves the appearance of, or serves to embellish his



estate. This may be a small matter in England, where estates are held to keep; but it is worthy of much reflection in the United States, where almost all estates seem to be held to sell. There may be most expensive embellishments which should never be undertaken without being maturely considered; there may be embellishments in very bad taste, against which it would be difficult to prescribe any other remedy than that which improved education brings with it; there may be embellishments of a costly yet of a perishable nature, which certainly are not to be chosen; but embellishments planned in good taste, corresponding with the general character and uses of the property, greatly improve the value of an estate, far beyond their cost. Shade-trees, ornamental and flowering shrubs, are always easily attainable; and may be considered as permanent improvements, which give a real and durable value to an estate.

In speaking thus on this subject, among the great variety of tastes which I may be expected to encounter, I know there are many to whom I cannot look for sympathy. They, I hope, will at once turn these pages over, and leave them for persons who take an interest in these subjects. These rural embellishments are common in Europe; but they are not appreciated, or, if appreciated, they are not yet so general as they should be in the United States. I wish they might be universal.

1. THE FLORAL MAGNIFICENCE OF ENGLAND.—In England they prevail every where, and render the country extremely beautiful. There is not a country-house without its shade-trees, its ornamental hedge-rows, its shrubby avenues, its parterres of flowers, its trellises of vines of the most beautiful description; sometimes covering all the sides and the roofs of the houses with their thick matting of foliage, suspending their rich tresses over every door-way, climbing every corner, peeping into every window, and covering it with their graceful

drapery as a curtain, and hanging in thick masses of green and gold, intermingled often with flowers and fruit of the most exquisite richness and beauty from the edges of the roof, and from every angle and projection, where they can fix their grasp. I have seen nothing to surpass the admirable and charming diversity, and beauty, and richness, of these embellishments as I have found them all over England; not unfrequently at the residences of the lower classes as well as those of the rich and noble. I have found often the humble cottage of the humblest labourer adorned with vines of unsurpassed luxuriance; the sweet-briar exhaling its delicious odour under the windows, and roses, and geraniums, and syringas, and dahlias, disputing your passage to the door. These are the petted children of his industrious wife and daughters; and he looks at them with honest pride, and drinks in their odours with the sweeter relish, because they are trained by hands which disdain no useful labour; and can be enjoyed in all their fragrance and beauty without giving pain to a single human being. Better than all this, they are to every passing observer the outward and infallible indications of the industry, frugality, neatness, and good economy, which reign within.

Wherever circumstances admit of it, every considerable country-house in England has likewise its conservatory, in which, at least, the female part of the household shelter those objects of their care, which are too tender to bear exposure; and find recreation and keep alive the remembrance of the summer's glories and magnificence, when winter utters his hoarse voice without doors, and commands all that has life to retire before his sweeping and icy blast.

2. THE FLOWER GARDENS OF PARIS.—THE GARDEN OF PLANTS.—Paris is not only distinguished for its beautiful flower markets, but for its beautiful flower gardens, which may be said to be almost unrivalled. The Garden of Plants, so called in Paris, in extent, in number and variety of plants, in scientific

and instructive arrangement, in the perfect condition in which it is kept, and in the extent of its conservatories, is probably unequalled. It is not only completely adapted to botanical instruction, but likewise to public recreation, combining with these objects as perfect a Flora as science and taste, aided by the ready patronage of the government, have been able to collect and maintain. The most useful as well as the most ornamental plants may here be found and studied in all their aspects and varieties, and in all their habits and uses.

3. THE GARDENS OF THE PALACES.—There are magnificent flower gardens likewise connected with the national buildings or palaces in Paris and its vicinity, which, with a liberality that eminently characterizes the French in all their public establishments, are open to the public for study, for pleasure, and for recreation; and in pleasant weather are crowded with persons who appreciate and enjoy them. In most of these gardens, the scientific as well as the familiar name is attached to the plant, together with the class to which it belongs, and the country of which it is a native. The gardens attached to the palaces of Versailles and St. Cloud, and more distant at Fontainebleau, are among the great sights of France. They exhibit the most splendid triumphs of genius, skill, and taste, in rendering, as far as these can do it, the beauties of nature even more beautiful, the magnificence of nature even more magnificent; and seem, in their shady avenues and their green lawns, their superb trees and their flowers of superlative beauty, in their statues exhibiting the triumphs of the sculptor's art,—an art all but divine; and in their splendid fountains, combining, with the most extraordinary brilliancy, what is most exquisite in design and graceful in motion, to rival, if not to surpass, the splendid and poetical descriptions of the golden age.

4. RURAL EMBELLISHMENTS IN FRANCE, HOLLAND, BELGIUM, GERMANY, AND ITALY.—The country in France is very far from being as picturesque and beautiful as that of a great part of England. The deep verdure of England, owing to the constant humidity of its climate, and somewhat to the character of its soil, which is adapted to retain the moisture, is not to be looked for in France, where the soil is to a great extent calcareous, and where the droughts of summer are often long and severe. I have already remarked likewise that the villages in France wear by no means a rural aspect. But France is not without its beautiful country-houses and villas, presenting often, in their construction and adornment, examples of almost unsurpassed taste; and none of them without the charming embellishments of parks and gardens, lawns and fountains, shrubs and flowers. Some of the best farms which I have visited, farms of several hundred acres in extent, have not been without some of these delightful appendages.

In passing through Holland, among persons whom we are sometimes pleased to call the *stupid* Dutchmen—and, in my opinion, there was never a greater misnomer, as I shall presently show—one is charmed with the multitude of residences, ornamented in the highest degree with shrubs, and vines, and flowers of extreme beauty and luxuriance. At Brussels, at Leyden, at Utrecht, are botanical gardens, supported by public munificence, of great extent, and where no pains are spared to carry the culture of plants to the highest degree of perfection. At Antwerp, and at the Hague, there are public promenades, and gardens, and parks, laid out with trees, and shrubs, and flowers, with taste and liberality, kept in the neatest manner, and open constantly to the recreation and enjoyment of the public.

The environs of Frankfort on the Rhine may be pronounced a region of perfect enchantment. The whole city, certainly one of the cleanest and handsomest which I have seen, is

surrounded by a wide belt of large extent, and furnishing not only many walks, but drives for several carriages abreast, of trees and flowering shrubs, and flowering plants of the greatest variety, combining the richness and glory of the vegetable world as far as the climate admits of it. This charming promenade is opened always freely to the public for health, recreation, and delight. The public, thus freely admitted, never dream of defacing a statue, or disturbing a fountain, of breaking a shrub, or plucking a flower. Indeed, I can almost believe, that the richest fruit might hang there untouched—such is the sentiment of propriety in which these people have been trained, and the conviction deeply impressed upon their minds, that what is intended for the common and unrestricted enjoyment of all, should be protected by common consent. In Milan, and Turin, and Florence, and all the principal cities of continental Europe, as far as I have seen, the same taste for rural embellishments prevails, and the same liberality in opening these grounds and gardens to the free enjoyment of all. In the neighbourhood of Rome, a prince<sup>1</sup>, one of the rich men of the sovereignty, gives up his whole villa, comprising a large extent of the most richly ornamented and embellished grounds, to the free enjoyment of the public.

In England, with the exception of the magnificent parks of London, which, for their extent, and in some parts for their beauty, can scarcely be too much admired, these places are not open to the public. The splendid exhibitions of the botanical societies can be shared only at an expense quite beyond the means of the great mass of the community; and are thus arranged with an evident intention to exclude them. If the acquisition of money for the payment of premiums, to encourage emulation, be the object, this object would not be defeated by admitting the public on succeeding days or

<sup>1</sup> Prince Borghese.

on other occasions, freely or for a small fee. The squares in London, full as they are of beautiful shrubs and flowers, are nevertheless all kept under lock and key, and the public are wholly excluded. I must except from these remarks the magnificent grounds of the Duke of Devonshire at Chatsworth, to which access is free; the Arboretum at Derby, of which I have spoken in another work, and which the liberality of a spirited merchant has expressly consecrated to public use; the Royal Gardens at Kew, and the charming grounds at Hampton Court, near London, which are open to the public under proper restrictions. There may be many others, which have not come within my knowledge. A spirit is evidently growing up in England, which will presently show itself in the most ample provision for the gratification of the masses. This great people are not wanting in philanthropy; and though highly conservative in all their arrangements, and phlegmatic and slow in coming to their convictions, are sure to follow them, when they are once determined.

I am aware that most of these squares are private property; but it would be a noble charity, small to those who give, but great to those who receive it, to allow the poorer classes to enjoy them, at least at fixed times, and under proper restrictions. The admirable police of London would easily guard against any irregularity or nuisance; and, indeed, where people are accustomed to such indulgences, no person thinks of committing a trespass. I believe the English people have as high a sense of honour and justice as any people living, where confidence is reposed in them. It is for want of this confidence that persons are often led to do wrong. No better use can be made of wealth than to multiply the rational and innocent pleasures of the poorer classes, to improve their taste, and to elevate their characters. A philanthropic mind can find no higher gratification than in giving pleasure to others; and the indications of the

times strongly show that this use of wealth is becoming as necessary to its security as it is conducive to its true enjoyment.

I must add again, that the parks of London, including Kensington Gardens, for extent and beauty, are no where surpassed; and the neatness and order in which the grounds and walks are kept, is, in the highest degree, exemplary. The government likewise have opened a new park of large extent, Victoria Park, in a part of London where the poorest inhabitants reside, for their health and recreation; and are fast progressing in its embellishment and improvement. They have other plans for providing public grounds for the inhabitants, which are as creditable to the liberal views of the government, as they are serviceable to the health, and, I will add, to the moral improvement of the population.

But what are we to say in the United States, where, in a country in which the rapid acquisitions of wealth almost realize the fables of romance, and where old cities are becoming crowded, and cities and towns are fast multiplying, to be filled with the children of industry and toil, there is very little or no provision of this kind for the public health and recreation; or for the improvement of the public taste and education by ornamental and embellished gardens and grounds? This seems to me a cardinal omission; and it is not a little humiliating, that while, under monarchical and despotic governments, the most liberal provision is made for these objects, and the freest liberty accorded; yet in a republican country, where the people have all the power in their own hands, they will do nothing for themselves. It requires no great sagacity to foresee, that with our rapidly increasing population this improvidence, to use no stronger term, will be to be deeply deplored, and when those who come after us will learn how much more easy it would have been to prevent than to cure an evil or supply an omission.

This subject is one of great importance, and especially in

a country where institutions are in the progress of formation, which are to affect the destinies of unborn millions; and where no childish and slavish reverence for antiquity prevents the most independent inquiry into what is just, what is expedient, and what is useful. Too much pains cannot be taken, too much attention cannot be given, and scarcely too much expense incurred, in providing rational and wholesome pleasures and recreations for the poorer, and especially the labouring, classes of the community. The rich can always find for themselves the means of pleasure and enjoyment. If they do not exist near home they can seek them abroad; and they are often so crowded and surfeited with them that enjoyment itself becomes almost a toil. It is wholly different with the poor and the labouring classes. They are ordinarily fixed in their residence, and have little power of locomotion; their lives are commonly passed in almost unceasing labour; their residences in general in cities are in the compact and most crowded quarters, where ventilation is imperfect, and where the cheerful and invigorating light of the sun is often shut out, and where consequently strength is more rapidly exhausted; diseases are engendered; the comfort of living is not known; life itself is abridged; the decencies of life are forgotten or trampled upon; moral disease and crime follow in the rear of physical suffering and privation; and a gangrene appears upon the social body, spreading through all the circulations its disastrous influences. Every effort should be made, and all pains should be taken, that these labours may be relaxed; and that some innocent and wholesome recreation should be provided for these children of severe and almost unceasing toil. Public gardens, and shaded and ornamental grounds should be established, and every effort be made to render them accessible and attractive. These people are almost in danger of forgetting that there are green fields, and blue skies, and trees which offer a refreshing shade, and flowers which combine the most delicious perfumes with the



richest beauties of form and colouring, and warm suns, and glittering stars, and floating clouds of every form and hue, which, in their expansive folds, and in their brilliant and gorgeous colourings, seem the fit emblems of that abyss of glory, where the Divine Majesty has fixed his throne, and into which human presumption has not dared to penetrate. I would do all that can be done to bring these people "out of darkness into this marvellous light."

The recreations of the labouring and poorer classes, especially in cities, are generally of the lowest character. This is particularly the case in England, where large numbers of the labouring population, either in the town or its neighbourhood, give themselves up to gross excess. In many of the mechanical trades, the workmen, who are usually paid off on Saturday night, do not return to their employment until Tuesday morning, with their senses stupefied, and, usually, their earnings expended, and their families unprovided with bread. From what I have been able to observe, it is different in France. The public grounds and gardens, of the most beautiful description, are thrown open to the public, and, especially on Sunday afternoons, are crowded with well-dressed men, women, and children. At Versailles, at St. Cloud, in the Champs Elysées, and the Garden of Plants, the Garden of the Tuilleries, and of the Luxembourg, where not only these beautiful grounds, but the public galleries and palaces, are also open, I have seen several times, on a Sunday, thousands, tens of thousands, twenties of thousands, enjoying the walks, the flowers, the lawns, the shades, the fountains, the statues, the paintings, the most beautiful productions of ancient and of modern art. Here are persons of every grade in society, and thousands of blooming and happy children and young persons; but not a flower is ever plucked, not a twig broken, not a statue defaced, simply because every thing is put under the protection of their honour. Here is not the slightest irregularity

or want of perfectly good manners any where apparent ; no crowding, no shouting, no loud talking, no swearing, no drinking, and no drunkenness ; and the people at the close of the day retire quietly to their own homes, or mingle in the evening in some innocent festivity. This has always given me unaffected pleasure, and I do not know how, by these people, the Sunday afternoon can be more rationally spent.

It is obvious what a gain there must be to public morals, whenever we can draw men from pleasures of a low and purely sensual character, ruinous alike to health and morals, and utterly destructive of all self-respect, and give them a taste for pleasures of a purer, and, I may add, a spiritual and intellectual character. The pure and simple love of nature, so liable to become extinct amidst the harassing cares, and labours, and frivolities, and sensual indulgences of city life, is among the most wholesome sentiments which the mind can cherish. The love of the beautiful, of the curious, of the grand and sublime in nature, can never become injuriously excessive ; and as it is, in its own character, perfectly innocent, so we have reason to thank the Great Author of nature, that its resources, and the field of its application, are absolutely unbounded and inexhaustible.

For my own part, I look upon all these establishments as one great branch of public education. Men are not instructed merely by books and masters, by schools and set lessons, but by every thing which meets the eye and the ear, and especially all which meets the eye and the ear directly, without the intervention of any other agent. Few persons, in even the humblest condition of life, can range through a fine and extensive botanical garden, or through a museum of natural history in any of its forms, without gathering much useful instruction ; but especially without having their curiosity excited, some thirst for knowledge awakened and stimulated. This being once put upon the scent, will often

pursue the chase with interest and pleasure, and as often with eminent success. What is more gratifying to our self-love than any triumph in such case? and what pleasure is more innocent, more pure, and more intense oftentimes, than the pleasure, under such circumstances, of acquiring knowledge? Compare with such gratifications the purely sensual pleasures and low indulgences which engage a large portion of mankind, how infinitely do they transcend them! The one transient and perishable, always stimulating to excess, and that excess always pernicious, exhausting to the animal vigour, ruinous to health, and but too often the blighting, the degradation, and the ruin of the whole mind. Not so with the pleasures of refined taste, of intellectual progress and attainment. The more knowledge is acquired, the more the capacity and facilities of knowledge are increased. The more the mind is exercised, the stronger it becomes. The more the taste for intellectual pleasures is cultivated, the less likely is man to become the slave of his lower appetites and passions. Then, what a great gain will it always prove to the labouring classes, if labour can be something more than mere mechanical drudgery and toil! What a gain it must be, if, in the midst of almost unremitted labour, requiring only a mechanical dexterity, which practice soon renders easy, there are resources within to alleviate this monotony of toil, or rather to make us less sensible to it; and if, in the intervals of labour, the mind finds means of recreation, intellectual, alluring, delightful recreation, which draw it away from all painful reflections upon what most persons will consider the hardships of a life of constant toil!

I am most anxious that in cities and in the country much should be done—indeed, that every thing should be done which can be done—to educate and so to elevate the labouring classes. I want that they should be treated, not as too often they are treated, as mere animals and

machines, to be used and applied as we have the power and inclination to use and apply them ; but as beings who have minds as well as bodies—minds destined to be immortal ; and who should be rendered capable of self-direction. I cannot think that their duty would be less faithfully, because it would be more intelligently, performed. Whatever benefits the humbler classes must essentially benefit those above them. In agriculture we have learnt one great and important lesson, which seems destined to confer the greatest benefits upon the art, that when, as in subsoiling, the lower strata are loosened, their superabundant moisture drained off, and the air admitted, they become prepared to be mingled with the surface soil ; and thus the whole is enriched, and its productiveness greatly increased: so in society, just in proportion as the humbler classes are educated, improved, and elevated, the whole mass of society is enriched and benefited.

## XII. ABATTOIRS OR SLAUGHTERING HOUSES.

There are other establishments in Paris which are intimately connected with agriculture ; and among these the abattoirs or great slaughtering houses deserve to be considered. There are at least five of these large slaughtering establishments for cattle in Paris, just at the barriers of the city. No cattle are allowed to be driven through the streets of Paris unless it be very late at night, when the streets are empty ; and no person is allowed, under any circumstances, to slaughter cattle in the city. These abattoirs are enclosed by high stone walls, excepting at the entrance, where there is a handsome iron paling ; and the space covered by each of them embraces some acres. These are magnificent establishments. The enclosure of one of them, for example, and they are all built upon the same model, though not all of

Containing 367,657  
 or nearly 8/2 ac

equal size, is 645 feet in one direction, and 570 in the other. I shall take the liberty here of borrowing a detailed account of the arrangement of one of them which I have repeatedly visited. In front of it is a small promenade planted with ornamental trees; and the enclosure contains twenty-three piles of building. At the entrance are two pavilions containing the offices of those persons who have the management of the establishment. To the right and left of the central court, 438 feet in length by 291 in breadth, are four immense slaughter houses, separated by a road crossing the enclosure; they are each 141 feet long by 96 broad, and include respectively a flagged court, on each side of which are eight slaughter houses for the use of the butchers, by whom the keys are kept. Each slaughter house is lighted and ventilated from arcades in the front walls. Above are spacious attics for drying the skins and preparing the tallow; and, to preserve coolness, a considerable projection is given to the roofs. Behind these slaughter houses are two ranges of sheds containing sheep-pens, and at the extremities are stables for about 400 oxen. Each of these buildings contains a loft for forage. These masses of building form the sides of the court. At the end is a commodious watering-place and pens for cattle and sheep, besides two detached buildings, each traversed by a broad corridor which communicates with four melting houses, below which are cellars containing coolers. Beyond these, parallel with the outer wall, are two buildings raised on cellars, in which the skins are kept, and near them, in front of the entrance, is a double reservoir for water, 228 feet in length, built in solid masonry, and resting on arches, which form stands for carts. There is also a *Triperie*, or building for washing and boiling tripe and calves' feet.

Cattle and sheep, on coming to Paris, are immediately driven to one of the abattoirs, and there kept at the cost of

the butcher. The meat is taken to the shops in the city during the night. The slaughtering at one of the abattoirs, for example, may be estimated at a weekly average of 400 oxen, 300 cows, 600 calves, and 2000 sheep. The establishment is superintended by a resident inspector of police, and gives employment, independently of the butchers and their servants, to eighteen individuals with their families. Houses for the residence of the workmen and managers are within the court-yard, with handsome grass-plats, trees, and a fountain in the centre. This description gives, however, a very imperfect idea of these truly grand, convenient, and useful establishments. The buildings are all of stone, with roofs of brick-tile upon iron rafters, so as to be completely fire-proof; and the neatness is such that, excepting in the boiling houses, one is not in the smallest degree offended by any noisome odour. Every part of the animal is taken care of and turned to some use, and there is no waste of any kind whatever. The blood and waste manure are all received into cisterns, to be applied to some useful purpose; and an abundance of water always at command, enables them to keep the slaughtering places, which are neatly paved with flagging-stone, entirely clean. The whole is under the immediate direction of the city government: and there are so many checks, that there is scarcely a chance, as there is no motive, for fraud. The salesman finds his animals slaughtered in the neatest manner, and the proper returns accurately made. Such establishments are most important in their bearing upon public health; and I should most truly rejoice to see them taking the place of those private establishments in the neighbourhood of our large cities, and in England in the large cities themselves, which are odious in all their relations, and which often poison the atmosphere to a great extent. The public inspection of the establishment by disinterested parties prevents the sale of diseased meats,

which there cannot be a doubt is carried to a great extent, and with perfect recklessness, in many private establishments in some countries, where they are secure from observation. Such establishments as these abattoirs would be greatly for the satisfaction, if not the advantage, of the farmers of the United States, who, driving or sending their cattle to the market, must now, in most cases, resign them to the purchaser; and, without any opportunity of seeing them either slaughtered or weighed, must rely upon his honesty for a true return of the weight; a reliance not always of the surest kind.

It is curious to remark, in connexion with this subject, the slow progress of improvement, and the obstinacy with which persons adhere to old customs and usages, however objectionable. The abattoirs of Paris have now been established more than thirty years; and yet London, perfectly aware of their eminent advantages, and so distinguished for its social improvements, and claiming a monopoly of what are called the comforts of life, submits to the terrible nuisance of a crowded cattle market in the midst of its thickest population, to and from which cattle are driven at all times of day and night, to the great terror, and often at the peril of life and limb, of the passengers. Slaughter houses are to be found in all parts of the city, even the most fashionable, into which cattle are driven directly through the front doors and passages of handsome residences; the Newgate market is completely underlaid with subterranean slaughter houses of an odious description; the blood, and much of the animal refuse, so valuable in an agricultural point of view, passes into the common sewer, either to check the current and produce disease, or it goes on with other filth to poison the waters of the Thames: and in one of the largest and most populous streets in London, for some distance the side-walk is lined with slaughter houses, where the killing of the animals is open to every passer-by, and where the very gutters, as I

have often seen them, are red with blood. The London markets have very imperfect protection against the sale of diseased meats; and diseased animals in Smithfield meet with a quick disposal at a lower price to persons who in various forms disguise the meat, and impose it upon the humbler classes. Indeed, in all that concerns the cleanness, the preparation, and the economy of human food, and the pre-eminent neatness of those who sell as much as of the articles which they sell, the French—I speak particularly of the Parisians—are within my knowledge, excepting only the markets of Philadelphia, without a rival. They are, indeed, scarcely approached. No part of the animal is lost; every part which is capable of being converted into human food, is prepared for use; and even the cold meats, the fragments and remnants of the table, which are sold in the markets to the poor, are always presented in a clean and inoffensive manner<sup>1</sup>.

Besides these establishments for the slaughtering of cattle and sheep, there are abattoirs for the slaughtering of swine, distinct from these, but upon the same plan.

I have observed nothing particular in the mode of killing cattle in Paris; their heads are brought to a ring, and they are then stunned with an axe, and the throat is cut. I do not know that a mode of killing producing less suffering has as yet been devised; but I am not without hope that even this mode may be improved on. When we consider the vast amount of animal life which the wants and luxuries of man require to be daily taken, humanity is greatly concerned in the

<sup>1</sup> The Londoners, it seems, are just waking up to the utility and importance of establishing abattoirs in the neighbourhood of the city; though strange to say, they have suffered an admirable establishment of this kind at Islington, conveniently situated and excellently arranged, to lie useless and to go to decay.

Since the above was written, a project for the removal of the Smithfield Market has been defeated, and a public dinner been held to celebrate the triumph of the successful party. It ought to have been given in one of the subterranean slaughter houses of Newgate Market.



diminution of the suffering attending it. Since Divine Providence has recently revealed to man an inexpensive method of suspending sensibility, so that the most painful surgical operations are endured without suffering, and even without consciousness; and the first discovery has been succeeded by one as effectual, and even more simple and of more easy application, I see reason to hope that it may be applied to the lower classes of animals, to save them, in the cases referred to, the pangs of death; and thus an immense amount of animal suffering be prevented. If there are any who regard the subject with indifference, and look upon the suggestion as ridiculous or useless, I can only say that with such persons I have no sympathy whatever.

They have a practice in Paris which I have not seen any where else. When the skinning of the animal is commenced, a large bellows is inserted under the skin, by which it is inflated, and becomes much more easily separated from the flesh than by the ordinary process of skinning with the knife.

### XIII. THE FILTH OF PARIS.

There remains one establishment to be spoken of, directly connected with, and of great importance to, agriculture, as well as to comfort and health; but which, having no other than a disagreeable interest to many of my readers, I forewarn them at once to pass it over; though a French writer humorously observes, that "a book written upon assafœtida is in itself no more offensive than a book written upon roses." In some respects, the habits of the French, both in their houses and the streets, are execrable and abominable. No familiarity in any degree reconciles a delicate mind to them; and exposures are frequently witnessed in the public streets, which are absolutely brutal, and which in England (not in Scotland),

and in most parts of the United States, would be regarded as indictable. Yet Paris, in other respects, is an eminently clean city ; and even in these matters is evidently improving, and is, with the exception of Milan, Turin, and Genoa, vastly in advance of the Italian cities. Rome, Florence, and Naples can hardly be considered other than as three great public necessities, where the most sacred places are scarcely free from nuisances, which shock all decency and reverence ; and the old towns of Edinburgh, and Glasgow, and Dundee, may fairly claim an unenviable position in the same rank.

This subject considered in a philosophical and practical view, is of the first importance. It would be altogether a false, in truth, a mere affectation of delicacy, to hesitate to treat it as its importance demands. In all the arrangements of Divine Providence, nothing strikes the reflecting mind with more force than the beautiful circle of mutual dependence and reciprocity in which every thing proceeds ; so that the humble elements perform their part, and the most elevated and brilliant can do no more ; and the part of the former is as essential to the common well-being as that of the latter.

Look at a heap of manure, composed of every offensive substance which can be congregated together, reeking with detestable odours, and presenting a mixed mass of objects utterly disgusting to the touch, the smell, and the sight. Yet this is the food of the vegetable world ; containing all the elements of richness, nourishment, health, and beauty. All these, the plants know how to separate, to analyze, to digest, and appropriate, and with a skill distancing the sagacity of science, they will return it purified and sublimated in bread, and wine, and oil ; in flowers of exquisite colouring and beauty ; in perfumes the most odorous which nature's toilette can furnish ; in fruits luscious to the taste ; and, above all, in products indispensable to life, and full of health and strength. The farmer, standing in his barn-yard, knee-deep in its offensive accumulations, may proudly say, " Here is the source of

my wealth ; that which has fed my cattle shall now feed my crops ; that which has given fatness to my flocks shall now give fatness to my fields." A mysterious power is ever operating in every department of nature ; suffering nothing to fail of its use ; "gathering up the fragments, that nothing be lost ;" and providing for the various wants of the infinitely varied forms of life to which existence has been given, and from whom, if the Creator should, for one second, withdraw his guardian care, the whole must instantly perish.

The refuse of a city may be considered as of at least five different kinds ; first, the ordinary refuse of a house, such as fragments of vegetables, remains of food, bones, rags, and a thousand miscellaneous and nameless substances ; second, the remains of fuel, such as ashes and soot ; third, the refuse of different trades, workers in leather, workers in bone, workers in horn, soap-boilers, glue manufacturers, workers in hair and in wool, sugar refineries, and the innumerable other trades always to be found in the busy hive of a city ; fourthly, the dung of the domestic animals, cows and horses ; and lastly, human ordure or night-soil. I shall say little of some other substances which have been used for purposes of manure ; but it is well known that many grave-yards have been ransacked for the purpose of gathering up their mouldering relics, and that many hundreds of tons of human bones have been transported from the field of Waterloo to England for the purpose of enriching the cultivation. It cannot be denied in this case to be a more rational, humane, and, I will add, Christian use, than that to which they were put in the bloody arena, where they were first deposited.

In Paris every species of refuse is husbanded in the most careful manner. No refuse is allowed to be thrown into the streets after a very early hour in the morning, nor until after ten o'clock at night. This refuse consists of what may be called the house-dirt, and is laid in heaps in front of the houses near the gutters. A very numerous class of people,

called chiffonniers, consisting of as many women as men, with deep baskets on their backs, and a small stick with a hook at the end, carefully turn over every one of these heaps, selecting from them every article of bone, leather, iron, paper, and glass, which are thrown at once into their baskets, and being carried to their places of general deposit, are there again examined and assorted, and appropriated to any specific application for which they may be suited. These persons appear like a most degraded class; they inhabit particular quarters of the city, and the interior of their habitations is such as might be expected from their occupation. The profession descends in families from father to son, and from mother to daughter. They are a most industrious race of people; and many of them may be seen, even at midnight, with their lanterns, taking advantage of the first pickings, and anticipating the labours of the coming morning; and with the earliest dawn they are sure to be found at their tasks. No article of food escapes them; and they call the street their mother, because she often thus literally gives them bread. Though their occupation is necessarily dirty, yet they are almost always comfortably clad, and are never ragged. They never beg, and disdain to be considered objects of charity. They are licensed by the city authorities, for which some trifling sum is paid, and for which they must be recommended for their sobriety and good conduct. They have their particular districts assigned them, and are very careful to prevent all foreign intrusion.

The chiffonniers having done their work, next come the sweepers and collectors of dirt. Every inhabitant of Paris is required, under a penalty, to have the side-walk in front of his place of business or residence carefully swept every morning. The sweepers of the streets in Paris are almost universally women, who, with long twig or birch-brooms, sweep the streets thoroughly, and all the accumulations are taken in carts to be transported to the great places of deposit. The


women assist as much in loading the carts as the men. These women appear to work extremely hard, carrying always a long broom in their hands, and a shovel fastened to their backs, to be used as occasion may require. The gutters in Paris are washed out every morning by fountains which are placed in every street, and what these sweepers are not able to collect for the carts, they are careful to sweep into the drains leading into the common sewers. I have looked at these people and at the chiffonniers often with great interest ; and, filthy and disgusting as their occupation necessarily is, I have always felt in my heart a sincere respect for persons who, poor as they are, would be ashamed to beg ; and who, by the severest and most useful labour, are proud to obtain for themselves and their families, though a very humble, an honest living. All this refuse is transported to places appropriated for its deposit, where it remains until it is decomposed, and is then sold to the farmers for manure.

#### XIV. NIGHT-SOIL.—POUDRETTE.

The disposal of the night-soil in Paris is a different affair, and occupies a large class of persons. In the crowded parts of London and Paris such an appurtenance to a house as an open yard is not always to be looked for, and the houses are built in immediate contact with each other. The accommodations for the family are necessarily within doors. In England there are water-closets closing with a trap, and of most exemplary neatness. In Paris, with some exceptions, they are not water-closets, but mere cabinets ; and from habitual neglect, which seems too generally to prevail among the middle and lower classes, filling the house with a detestable odour. In many of the houses in the Scotch cities, and houses not always of an inferior description, will it be believed, there are no accom-

modations of this sort within or without doors. The refuse of the family used to be thrown from the windows at night, not always to the perfect safety of the unwary passenger, and is now commonly carried into the gutters in front of the houses, after ten o'clock at night, to be taken up by the night-carts in passing. Can it be surprising that fever and disease annually remove a large portion of the population of such places ?

In London this refuse passes off into the common sewer<sup>1</sup>, and from thence mixes with the water of the Thames. It is calculated that this refuse, which may be said to be worse than lost, would be sufficient to manure annually more than a million acres of land, if it could be applied. I have in another place referred to an association formed in London, with an enormous capital, for the purpose of applying the liquid portions of it ; but the progress as yet made does not warrant any public report. The passage of this fecal matter into the sewers does not remove all offence ; for in London the odour from the traps or ventilators of the sewers, which are necessarily frequent, is in warm weather disagreeable and odious. Though the habits of the English are eminently cleanly, yet, judging from the sanitary reports, the condition of things in some of the poorer districts of London, and in several of their manufacturing towns, is most objectionable and degrading<sup>2</sup>. Paris, in some respects, then, has the advantage

<sup>1</sup> The extent of these sewers may be judged of from the fact, that one day in London I saw a man emerging from an opening in Hay Street, near Berkeley Square, with a bunch of candles in his hand, who told me he had travelled seven miles under ground. The sewers are about five feet in height, and of a proportional width, being the segment of an oval with the bottom cut off, thus . This probably was an exaggeration ; but it must require a good deal of courage to have ventured even half that distance alone, although it is an undoubted fact, that there are many persons in the habit of daily exploring the sewers, where they sometimes find prizes of value. What an employment !

<sup>2</sup> The worst parts of Paris and the worst habits of Paris are, however, entirely distanced by some parts of London, eminently cleanly as it is in many

of London, and, indeed, of every city which I have been in, excepting the cities of Holland and Belgium—in that all this fecal matter is saved, and certainly with less offence in its removal than could have been supposed possible.

In general it is removed by what is called the atmospheric process. The cart is placed at the door in the street; a long leather hose is extended from the vault to the cart; and, the air being exhausted, the fecal matter in a semi-fluid state passes directly into the cart. The whole affair is managed, not absolutely without offence—for that at present seems impossible—but certainly without any offence which is avoidable. The men bring their working-dresses with them, so as never to appear in the streets otherwise than in decent attire. The vehicle in which this fecal matter is conveyed, is a very large, tight cask, or sometimes several tight casks: the horses, harnesses, and the whole equipment are of a neat and perfect description; and in most cases would never be detected by a stranger, if either he were not informed of their uses, or did not read the inscription of the objects to which they are devoted on some part of the

other parts. Hear what the philanthropic Lord Ashley has recently said in his place in parliament:—

“He should read a description of a court which he had witnessed himself. It was in such places that a large mass of the community dwelt. In one of these courts there were three privies to 300 persons; in another there were two to 200 people. This was a statement made by a medical man. In a place where these public privies existed, scenes of the most shocking character were of daily occurrence. It would scarcely be believed, that these public privies often stood opposite the doors of the houses; modesty and decency were almost altogether impossible.”—*Times* of June 7, 1848.

The “cabinets d’aisance sans odeur,” which are to be found in many parts of Paris, and which are always kept in the most cleanly condition, but which are often spoken of with sneers by strangers visiting Paris, are to be highly commended as useful and important public accommodations. An eminent medical gentleman once assured me, “that a very large portion of the worst maladies which he had to deal with, arose out of improper neglect in this matter, growing out of inconvenient arrangements or a false delicacy, which should be got rid of.”

vehicle. In no case is any offensive matter left in the streets, or permitted to escape from the carts, until it arrives at its place of deposit.

The carts arrive at their destination before, or as soon as day-light. This place is near one of the barriers of the city. The fecal matter is here suffered to run out upon an extensive piece of ground, flattened and made hard like the bottom of a brick-yard. Here it remains until the liquid portion runs off into an artificial basin, from whence as much as is wanted is taken for the purpose of extracting the sal-ammoniac. The rest escapes into the canal in the neighbourhood. The solid matter becoming dry is then broken up, turned over, re-broken; and this process goes on until it becomes so dry as to be easily reduced to powder, when it is laid up in heaps of which immense masses are accumulated. It is thus almost entirely deprived of odour, and may be handled without offence. In this condition it is sold to the farmers, who remove it either in open carts, or in bags or casks. I cannot say that this place (which occupies several acres of ground), or its neighbourhood, is without offence; but it is inhabited chiefly by persons who get their living by the operation; and to whom, therefore, the offence is not so great. After the first drying, when it forms a thick and hard crust, it is broken up by the plough, and afterwards by the harrow; and this operation is necessarily several times repeated. In the end it passes through a thorough sifting. As many women are employed here as men; and the labourers are principally of the lower order of Germans, whose industry and acquisitiveness are usually remarkable. A great many children are likewise employed; and the search after prizes of value is always animated. As to the healthiness of the occupation, its early processes are undoubtedly perilous both to health and life; and many a poor fellow perishes in the vaults, into which they are sometimes compelled to descend; but I found an overseer on the



spot, who said he had been constantly employed there for eighteen years, and had never suffered even a day's illness.

The municipal arrangements in Paris seem to me, in various matters, commendable. For effecting the process spoken of, so important and indispensable to health, comfort, and even life, there are three contractors, men of large capital, who take the whole enterprize of cleansing the city in this matter upon themselves. The city is divided into four districts. The contractors are laid under heavy bonds to provide horses, carts, and workmen ; never to remit the work excepting one night in seven, Sunday night, and they are paid so much by the cubic foot, by the owner of the house whose vaults they cleanse. They do not begin their work before eleven o'clock at night, and they must leave the city before day-light. The men are divided into parties of five ; and each man has his particular office, and is known among them by a distinct name. The corporal or overseer, constituting one of the five, directs the whole operation, and gives his aid as occasion may require. The man, whose duty it is to descend into the vault, always does it at the risk of his life, from suffocation. They are liable also to suffer from an inflammation of the eyes, which makes them blind for several days, in which they frequently weep blood, and which is attended with extreme suffering. The whole number of persons employed in these services in Paris, exceeds two hundred. They constitute a people by themselves, and the employment goes down from father to son. Their wages are from twenty to twenty-five francs a week, or from four to five dollars, or one pound sterling. A notice is given at the proper office, by the owner of a tenement, that his vault requires to be emptied, and the service is immediately attended to.

I have gone thus at large into these homely details for several reasons ; first, for their bearing upon agriculture ; for, perhaps, no manure is so valuable. We send ship after ship

into the Pacific Ocean, to bring home that for which we have a substitute equal, if not superior in efficacy, at our own doors. Secondly, because the information how the removal of this matter is performed in such a city as Paris, may be of use in other cities, where it is generally left to private enterprize, with very imperfect apparatus and preparations; and is often slovenly and offensively performed. I confess that, in the third place, I have been moved by some moral reasons, because I would lose no favourable opportunity of calling the attention of the richer and more favoured classes in society, to the condition of their more humble brethren in many departments of human industry, upon the results of whose labour they live; and who peril their lives, and pass their days and nights in the most humble, the most severe, and often the most odious and disgusting services, to secure the health and comfort of those elevated above them; and receive in the form of compensation for labours so perilous and offensive, that which serves only as a bare subsistence. It is said, that the wives and children of the men who perform the most dangerous part of these services, when their husbands and fathers leave home at night, show the same anxiety for their safe return, as if they were leaving upon some perilous voyage by sea.

Various methods have been tried for the purpose of disinfecting this substance; but, either from their inefficacy or the difficulty and expense of procuring them, are seldom used. Quick-lime thrown into the vaults is said to destroy the best parts of the manure; but, by many persons, however, it is greatly approved. Charcoal-dust, burnt tan, peat-ashes, the mud from the bottom of rivers or ditches burnt or dried in ovens, have all been used, as it is reported, with success; and may be recommended not only as disinfectants, but as useful additions.

The Parisian arrangements are far from being perfect. In London at present every thing of this sort is lost. In Paris

only the solid portion of the excrementitious matter is saved for manure, whereas there is no doubt that the urine is of far greater comparative value than the solid portions. Various attempts have been made to save this in such a form that it might be easily transported; and in London, manures are sold under the name of urates, which are only urine combined with plaster or gypsum: but the quantity of urine taken up in such cases is so small, compared with the weight or bulk of the article, that in this respect it is considered of little efficacy or value. Chemistry would perform an immense service for agriculture, if it could discover a means of combining this substance in some portable form, and in which its efficacy might be preserved. One of the circumstances constituting the great value of guano, and of the dung of birds, separate from the particular food on which they live, is that their excrements being voided under one form only, the element of urea is inseparably combined with the other matters.

I shall not trouble my readers at present further on this subject; in which I can only say I have been anxious to give no offence even to the most delicate mind, and must claim their indulgence if I have not succeeded. I shall now proceed to other topics.

## XV. AGRICULTURAL EDUCATION.

The subject of agricultural education has received much attention in France; that attention is increasing, and new institutions are growing up, to which the Government promptly lend their aid. The subject is of so much importance, that I deem it proper to give an enlarged account of the leading establishment for this object which have come under my notice.

What is intended by agricultural education should first be

determined: and I beg my readers to go with me in settling our notions on this subject.

There are in Europe, and I believe in the United States also, two strong parties in agriculture; the one, who are all for practice, and who disdain the aid of science; and the other party, who rely upon science, technically so called, to solve all the operations in agriculture, and to furnish theoretical principles upon which they may be conducted with confidence and certainty. These parties, like the ultras of all sects, are in general in bad humour with each other, for which there seems no just cause. By a better understanding of each other's views, they might co-operate to the essential interests of the object which they profess to seek.

What are the claims of practice? One would suppose from the observations of some men, that agriculture is a modern art, a recent discovery, in which every thing is to be learnt, and of which mankind have now, for the first time, to acquire the true principles. Such flippancy as this can only grow out of egregious ignorance or self-conceit. The agricultural art is coeval with the human race. It has always been practised, at least as far as human history extends. It may be pronounced the only universal art; and it has been matter of attention, inquiry, and experiment from the beginning and always. Nations, indeed, whom we are pleased to call semi-civilized, such as the Chinese, for example, have carried the art to a high degree of perfection, as is shown in their power of supporting an immense population on their own soil. The agriculture of every civilized country is the growth not of years but of centuries; and the peculiarities which mark the agriculture of different countries, may be traced to their peculiarities of soil or climate, and the local habits, customs, or necessities of their inhabitants. Experience is the sure foundation of knowledge and skill. That which has been suggested and confirmed by repeated trials,

and always with the same results, may be considered as established ; and, with or without any other reason, may be safely taken as the foundation of practice. The general practice of agriculture in all countries rests upon such grounds as these, upon successive trials, upon observations repeated over and over again, upon results which have been determined for years and centuries. It would be the height of folly to disregard these lessons. It is often said, by way of reproach, of the farming community, that they never depart from the established track, and that they do only as their fathers did before them. So far from considering this as a reproach, it should be regarded as evidence of the soundness and wisdom of their judgment. The presumption is always in favour of that which has been long pursued. It would be absurd to attempt the study of any art or science, without first ascertaining what is already known and determined. It would be folly to discard truths and principles which long experience has established ; and a still greater folly to exchange that which has been found to answer, for that which is as yet untried, and whose success or certainty is consequently matter of doubt. Experience is of all other teachers the most to be relied on in every practical art. It is wise to adhere to practices which our fathers adhered to, provided those practices were successful ; and it is ridiculous to assume, that practices which have prevailed for centuries have not always much to recommend them.

Then, on the other hand, to whatever respect long established practices may be entitled, it is extreme stupidity and bigotry to reject improvements which may offer themselves ; or to suppose that we have even approached perfection in any thing ; or to suffer any reverence for what has been done, sanctioned though it may be by the highest antiquity, to stand in the way of further progress.

Agriculture may be considered in two respects as a science ; first, as a science of facts ; and next, as a science of principles.

The practice of agriculture, wherever it is skilful and successful, though pursued, as it may be, by persons in other matters ignorant and uneducated, is founded upon the knowledge of a vast variety and mass of facts, which long practice, the practice of centuries, has ascertained, developed, and confirmed. These facts refer to the climate of a country, the nature of the soil or of different soils, the crops to be grown, the rotation of crops, the modes of culture, the application of manures, the care and uses of the crops, and a variety of other like matters. These constitute the science of agricultural practice. Now any man above the condition of a mere labourer, any man having any pretensions to the character of a farmer, must know these facts; and the more he knows of them, the more skilful and successful is his practice likely to be. He may gather them from reading, from conversation, from tradition, or from observing the practices of others. It would be extreme folly to reject these aids; and to suppose that they must all be gathered from his own practice and experience. The life of a single man is not long enough to establish all the practical truths relating to these matters, many of which can have been determined only after years of experience. This is agricultural science; and the more a man has of this knowledge—the more scientific he is in this respect, so much the more improved and productive is likely to be his agriculture. Let him gather this knowledge from any and every source, where it is likely to be found in an authoritative form; from books or from men, from observation at home and abroad. To refuse it, coming in any authentic form, is truly an evidence of incorrigible stupidity; and I have in my mind's eye many men, without any pretensions to literary education, who, from their practical familiarity with these subjects, and the vast amount of facts which they have accumulated, may be pronounced scientific agriculturists. We are accustomed to call them, by way of eminence, practical men; but their

practice grows out of and is regulated by their knowledge ; and is successful in proportion as it is suggested and directed by this knowledge.

But there is another kind of knowledge, which may be called, by way of distinction, the science of principles. The highest of all occupations, to which the human mind can devote itself, is to study "the causes of things." To an inquisitive mind, the regularity of certain effects and results, their constancy and uniformity, show that they are the subjects of certain general laws, established every where throughout the material creation. Such a mind desires to know to what extent these laws prevail ; how they operate ; by what circumstances they are affected ; and, above all, how far they may be controlled or directed by human agency, and turned to advantage. Of the great agents in nature, man is constantly availing himself ; and by these means has acquired a power, in respect to which, no human sagacity has been able to predict where it shall end. Fire, air, and water, are the handmaids of science, and wait to do her pleasure ; and more recently, electricity performs miracles at her bidding. Within a half century, a new science has sprung up, which, more than any other, professes to investigate the phenomena of the material world, and to dive into the nature of things. It has accomplished already an infinite amount for many of the arts. Why should not agriculture avail itself of what it has done, and can do ?

The intelligent farmer has many subjects of inquiry ; the nature of soils, and the differences of different soils, with their adaptation to different plants ; the nature of manures, and their comparative differences, with their various forms of application ; the nature of the products themselves, and their adaptation to the purposes for which they are used ; the breeding of animals, the fattening of animals, the improvement of races of animals and different species of vegetables ; the effects of light, heat, frost, rain, dew, and electricity upon

vegetation ; and innumerable other subjects connected directly with the culture of the earth, are important, and beyond all doubt directly practical matters of investigation, which it is the immediate province of science to examine, and, if possible, determine. Why should not the intelligent farmer seek to avail himself of this aid, and gratefully receive it? The mathematician may not be able to hold a plough, and yet he may be able, from principles of science, to direct the artist in the construction of that implement, so that it shall perform its work in the best manner, and at the least expense of time and power. The chemist may scarcely know one plant from another ; and yet, from the investigation of the properties of different substances, he may teach the farmer so to combine his manures, or his materials for manure, as to produce the greatest effect. The philosopher or astronomer may not know a single rope in a ship, he may not so much as know the stem from the stern ; and yet, without his laborious and abstruse calculations, the most skilful navigator would find himself entirely bewildered upon the trackless ocean. Science is often flippant and conceited, and holds in too little estimation the lessons of experience. Practice, on the other hand, with an obstinacy which seems almost incorrigible, often disdains the teachings of science, and shuts the door upon that light, which might make its path more clear, its progress more certain, and its results more successful. Here is a gross error on both sides. Science and practice should be friends to each other. The most scientific man, who has no knowledge of the practice of agriculture, in undertaking the management of a farm, is likely to fall into serious mistakes, and wholly to fail in his enterprise. The most successful practical farmer, who knows well *how* things should be done, as far as experience has settled that point, might derive a great advantage from understanding *why* they should be so done ; and such knowledge leads to a vast increase of his power. Will any man pretend that agriculture



has reached its maximum? Let us listen to one great fact, stated by an eminent French writer. The wheat now grown in France supplies with bread a population greater by one half than that in the reign of Louis XV.; yet it does not occupy a larger space of ground than it did at that time. Indeed, the actual extent of land under cultivation in wheat at the present time, is less by at least twenty-three per cent. than it was sixty or eighty years ago. So that the agriculture of that time, which occupied in wheat a surface a quarter or a third larger than what is occupied in the same cultivation at the present day, did not produce more than sufficient to supply a population ten or twelve millions less than what is supplied at the present time<sup>1</sup>. This shows an immense progress and improvement in agriculture; and if this is not to be credited to science, technically so called, it is to be ascribed at least to a more inquisitive and intelligent cultivation; that is to say, to the application of the mind to this great art. I desire only that the farmers should have their minds awake and open in the study of the great principles of the art by which they live; and that they should be willing to receive, from whatever source it may come, that light which is now carrying forward all the other practical arts of life—I will not say to perfection, for that may always remain beyond the reach of human power, but with a rapidity and success which have never been known before.

1. SCHOOL AT GRIGNON.—The principal establishment for agricultural education is at Grignon, about twenty miles from Paris. It consists of an estate of 474 hectares, or about 1200 acres, with a large dwelling-house upon it,—formerly, I believe, a royal seat,—and other necessary buildings, which have been erected since its endowment. It was ceded by the French king, Charles X., for a term of forty years, to a

<sup>1</sup> Vide *Statistique de Cereales de la France*, par M. A. Moreau de Jonnés.

society of gentlemen specially interested in agriculture, who have the management of the institution, and, by private subscription, have supplied the funds for conducting it<sup>1</sup>. The government are represented in the management of the estate. They provide all the instruction, by paying the salaries of the professors and superintendent; and they support some pupils. The pecuniary results for the last few years have been favourable; and all profits go to the support of free pupils, or to increasing and extending the benefits of the institution, which is capable of accommodating seventy pupils. The term of residence is fixed at two years, though it will be seen, from the course of instruction adopted, a much longer time is requisite to acquire a thorough education in the branches prescribed.

The institution at Grignon is designed to supply instruction both in the science and practice of agriculture, and the constitution and arrangement of the school seem admirably adapted to this end. The students in general are from that class in life who depend upon their own exertions for a livelihood. This is as it should be. In the United States we have no other class, and, from the present arrangements of property, are not likely to have. Long may this wise and happy arrangement continue! In a great portion of Europe, a large part of the community are little else than beasts of burden. As long as they live, they must carry upon their backs those who do not choose to maintain themselves. It is a pity they could not put their burden down, and make

<sup>1</sup> The sum raised by private subscription amounted to 300,000 francs, or about 60,000 dollars, or 12,000*l.* sterling. The rents paid to the government for the estate are the same as were paid by the farmers who previously held it. The substantial or permanent improvements upon the estate are estimated by a commissioner once in five years, and are to go, at the end of the lease, in acquittal of the rent. The money subscribed by individuals was given to the institution. On this capital, employed on the farm, an interest of sixteen per cent. has been realized, which goes, as above stated, to the benefit of the institution.

them "go themselves." Their doom, however, is fixed; and with the present distribution of political power, and the present moss-covered institutions respecting property, there is little chance of an alteration. In England and in France a class exists of which at present, in the free portion of the United States, we know nothing; and it may be some time before they are required. These are the persons who manage the estates of large proprietors; who in England are called bailiffs or stewards; in France, agricultural engineers. Grignon may be said to be particularly designed to educate this useful class. At the same time, there are among the pupils several who seek this education for the management of their own estates; and these agricultural engineers are themselves, without doubt, hoping presently to become proprietors. In the south of France, land is held generally under what is called the *mettayer* system, or what is known in the United States as taking land upon shares. After certain deductions, the half of the produce is returned to the proprietor as the rent of the land. In either case such education must be highly valuable. In the case of a tenant, that he may be able to obtain the best return from the land, and, in the case of the proprietor, that he may know what to require, and how properly to direct the management of his estate.

The term of residence at Grignon is fixed at two years; but the pupil remains three months after his studies are completed, in order to digest and draw up the entire management of an estate, and describe its details in every department.

The students are divided into classes denominated internals and externals, or resident and non-resident. The former reside entirely in the house, where they are lodged and boarded, and pay about 800 francs, or 32 pounds, or 160 dollars, per year. The externals, or non-residents, provide for themselves, or lodge at the houses of the neighbouring

farmers, and pay a very small amount for their instruction. This arrangement is particularly designed to benefit poor scholars. Both classes are equally subject to the general discipline and rules of the institution ; and are alike engaged in the same works and studies.

There are lectures every day in the week. At the commencement of each lecture, the professor examines the pupils on the subject of the preceding lecture ; and they are required often to take notes, and present a written report of the lecture. Besides the professors, there are two monitors, who have been educated at the school, who labour with the pupils in the fields. They are expected, and it is their duty, to question the pupils on the subjects which have been treated in the lectures ; to show their application ; to illustrate what may have been obscure ; and, in short, to leave nothing unexplained which is liable to misunderstanding or error. There are two public examinations annually, in which the scholars are subjected to a rigorous questioning in what they have been taught. If, at the end of two years, their conduct has been approved, and their examination is met successfully, they receive a diploma from the institution.

They are not only employed in the general work of the farm, but particular portions of land are assigned to individuals, which they manage as they please, and cultivate with their own hands ; they pay the rent and expenses of manure and team, and receive the product or its value from the institution. Certain of them are appointed in turn to take care of the different departments of the farm for a length of time—such as the hog establishment, the sheep establishment, the cattle, the horses, the implements, &c. &c. They have likewise adopted a practice, which seems much to be commended—that of employing workmen, shepherds, cow-herds, &c., from foreign countries ; as, for example, from Belgium and Switzerland, that they may in this way become acquainted with the best practices in those countries.

The time is thus divided and arranged among them :— they rise at four o'clock in summer, and at half-past four in winter. They go immediately into the stables to assist in the feeding, cleaning, and harnessing of the teams, and the general care of the live stock, according to their respective assignments. At half-past five they take a light breakfast ; at six o'clock they go into the halls of study, and here they remain until eleven o'clock ; at half-past six they attend a lecture, or course of instruction, which occupies them until eight o'clock ; at half-past eight they are occupied in reading or in making notes of the lectures which they have heard, and the monitors before spoken of are present to render them any assistance required ; at half-past nine o'clock there is another lecture or course of instruction for both sections, which occupies them until eleven, when they take their second or principal breakfast. From noon until five o'clock, the pupils are occupied in labour or practical operations. The professors, from time to time, take a section, and employ them in land-surveying, in drawing plans, and in levellings ; others are occupied in mineralogical or in botanical excursions, or in inspecting the management of forest lands ; others are occupied by their teacher in the practical management of farming implements, in the management of teams in the field, in sowing, and other general operations of husbandry, in a field devoted to these purposes ; and a section, to the number of twelve, are every day employed in the direct labours of the farm, in ploughing, digging, harrowing, &c. &c. They work in company with the best labourers, that they may observe and learn their modes of executing their work. They are required to be attentive to every operation that is performed ; and to present a full report of each day's work to the director-general.

At half-past five in winter, and at six in summer, they take their dinner. At seven o'clock in the evening they go again into the halls of study. From seven to half-past eight

o'clock there is another course of instruction, or a repetition of what they have had before. Until nine o'clock they are occupied in their journals, or in making notes of their lectures. At nine o'clock the sleeping rooms are lighted, and they retire for the night.

There are several distinct professorships. The Professor of Practical Agriculture gives two courses; the one written, the other oral; and, like the lecture of a clinical professor at the bed-side, it is given in the fields. This professor understands not only how a thing should be done, but how to do it; and he can put his hand to every form of agricultural labour, such as ploughing, harrowing, sowing, managing the teams, feeding the animals, handling every instrument of agriculture, buying, selling, &c. In the words of his commission, his object is at the same time to form the eye and the hand; to teach his pupil how to learn; to command, to direct, and to execute. To this end it was necessary to form a complete agricultural organization for practice, independent of the exercises attached to the departments of the other professors.

The farm is composed of

Arable land, about . . . . .	670 acres.
Land in wood and plantations . . . .	365 ,,
Irrigated meadows . . . . .	35 ,,
Gardens, including vegetable, botanical, fruit garden, orchards, mulberry plantations, osiers, and nurseries . .	28 ,,
Ponds and water-courses . . . . .	15 ,,
Roads and lands in pasture . . . . .	50 ,,
Occupied by buildings . . . . .	6 ,,

The animals on the farm include

Animals of draught or labour of different kinds . . . . .	18
Oxen for fattening . . . . .	20
Cows of different ages and races, and different crosses . . . . .	100

Sheep, embracing the different kinds .	1100
Swine establishment . . . . .	100

There are likewise on the establishment workshops or manufactories, if so they may be called,—

For the making of agricultural instruments ;

A threshing-house and machine for grain ;

A dairy room for the manufacture of different kinds of cheese and of butter ;

A magnanerie, or establishment for silk-worms ;

A stercorary for the manufacture of compost manures.

To all these various departments the attention of the students is closely called, and they are required to take some part in the labours connected with them.

Besides the farm belonging to the establishment, there is a field of one hundred acres devoted exclusively to the pupils, and principally to the culture of plants not grown on the farm. Here they make experiments in different preparations of the soil, and with different manures.

Every week two scholars, one of the second and one of the first year, are appointed to attend particularly to the general condition of the farm. Their business is to examine constantly the whole establishment ; the works that are going on in every department ; to look after the woods and the plantations ; the gardens ; the horses ; the fattening cattle ; the dairy ; the sheep-fold ; the swine ; and the hospital ; and to attend to the correspondence and the visitors. This service lasts a fortnight, and there is a change every week, taking care always that there shall be one scholar of the first and one of the second year associated. They attend to all the labours on the farm, and to all the communications between the principal director and inspectors and the labourers. In the veterinary or hospital department of the establishment, they assist the surgeon in all his visits and operations ; take notes of his prescriptions ; make up and attend to the administration of his medicines ; and observe

particularly the sanitary condition of the stables and buildings, where the live stock, sick or well, are kept.

On Saturday evening, each scholar, to whom this duty has been assigned, makes to his fellow-pupils a full verbal report of what has been done. This report is transcribed into a journal designed for that purpose; and thus a continued history of the entire management of the farm is kept up. The whole school is divided into sections or classes of twelve each: six of two and six of one year's standing; and these sections are constantly under the direction of the Professor of Practical Agriculture.

As the establishment at Grignon may be considered a model agricultural establishment, it may be useful to go more into detail in regard to the course of instruction pursued here.

Once a week there is an exercise, which embraces every thing relating to the management of the teams and the implements.

First, for example, in the different modes of executing any work, and using the utensils employed. The harness, the collar, the traces, and how attached, the shaft-horse or the cattle attached to the load, and the adjustment of the load to their backs; the yoke, the single yoke, the double yoke; the pack-saddle; the harnessing of a saddle-horse; the team for ploughing; the team for harrowing; the team for drawing loads; the team for waggons and for carriages with all their appurtenances: every one of these matters is to be practically understood, as well as the whole management of the team in action.

In ploughing, the turning the furrow, its inclination, its breadth and depth; the laying out of fields; the management of large and small fields; how to make the first furrow, and to finish the last furrow; to lay the land flat, to break it up in clods; to plough it at a certain angle, to lay the land in curved furrows: these are all considered, and



make part of the instruction given. The preparation, equipment, and use of every agricultural implement—such as ploughs, harrows, rollers, scarifiers, cultivators, sowing machines, trenching machines; the practice of sowing, the different modes of sowing, whether broadcast, by dibble, or in drills; the application of manure both as to time, mode, quantity, and preparation, and the composting of manures, are matters of inquiry and practice.

The cutting of grasses; the making of hay, and the construction of stacks; the harvesting of grain, by the scythe or by the sickle; appendages to the scythe, called commonly the cradle; and the grinding of scythes; the making of sheaves, and of shocks, or stacks; and the loading and the stowing away of grain, are matters to be understood.

A practical attention is required to every form of service on the farm; in the cow-house; the horse-stables; the fattening-stalls; the sheep-fold; the styes; the poultry-yard; the threshing-floor; the stercorary; and the store-houses for the produce of the farm of every description. The duties in this case embrace not merely the observation of how these things are done, but the actual doing of them until an expertness is acquired.

Leaving the practical department, we come now to the course of studies to be pursued.

For admission into the institution some previous education is demanded, and the candidate is subjected to an examination before the principal and one of the professors.

First, he is required to present an essay upon some subject assigned to him, that his knowledge of the French language and grammar may be ascertained.

It is necessary, next, that he should be well grounded in the four great rules of arithmetic; in fractions, vulgar and decimal; in the extraction of the roots; in the rules of proportion and progression; and in the system of measures adopted in France.

In geometry, he must be well acquainted with the general principles of straight lines and circles, and their various combinations; and with the general measurement of plane surfaces.

In natural philosophy, he must understand the general properties of bodies; and be acquainted with the uses of the barometer and thermometer.

Candidates for admission must bring with them certificates of good character and manners, and must be at least eighteen years old. They are rigidly held to an attendance upon all the courses of instruction at the institution; and have leave of absence only on the application of their parents or guardians.

The studies of the first year are begun with a course of mathematics. Geometry and trigonometry are made a particular subject of attention; embracing the study of straight lines, and circular or curved lines on the same plan; the admeasurement of surfaces; the use of the compass; the recording of measurements; the delineation of measurements; the surveying of open fields, of woods, of marshes, of ponds or lakes; comparison of ancient land measures with those in present use; the use of the square, the chain, and the compass; the elevation of plans; the construction of scales, and the ordinary divisions of landed properties.

The study of various plans in any form; solid measure; conic sections, their principal properties, and their practical application; the theory and practice of levelling; the method of projections and their application; cubic measure of different solids, of hewn stones, of rough stones; the measurement of loose or broken stones, of sand, of lands excavated, of ground filled in, of stacks, and of heaps of manure; the cubic measure of trees standing, and of felled trees, of beams, and every kind of carpenter's work, of firewood, of walls, arches, and ditches or dikes; the ascertaining of the capacity of carriages, waggons, carts, wheel-barrow,

pails, troughs, barrels and casks, basins or ponds, and different vessels in use, and of granaries and barns, and the determination of the weights of bodies. To all this is added a full course of trigonometry. They are accustomed likewise to the familiar use of the scale, of the square, of the compass, and of the compasses for delineation, and are often occupied in superficial and in profile drawing.

The next course of instruction embraces embankments, the force of earths and liquids, or their pressure, at rest or in motion.

The materials employed in masonry ; their uses and application in building—embracing stones, bricks, lime, sand, mortars, cements, plaster ; and all the various modes of building.

The laying of walls for foundations ; the erection of walls ; the supports requisite ; and the construction of passages, enclosures, and arches ; the different kinds of woods, their absolute and relative strength ; their duration, and the modes of preserving them ; every kind of carpenter's work ; the construction of floors, staircases, scaffoldings, and exterior supports ; the constructions of roofs, in timber, with thatch, rushes, shingles, tiles, slates, zinc, or bitumen ; the paving of roads, the formation of barn-floors, with clay or composition of bituminous substances which form a hard and enduring surface, are subjects of inquiry.

Next comes instruction in the blacksmith's shop, in the use of the forge, and the other implements of the trade ; and in the various applications of iron and steel, of copper, lead, and zinc.

They are instructed, likewise, in the manufacture and use of leather and cordage ; and in the various details of painting and glazing. The prices or cost likewise of all these different processes, are, as far as practicable, ascertained ; and the modes of estimating such work are explained.

The next course embraces the elements of natural philosophy ; and this includes chemistry, geology, and mineralogy.

First, the general properties of bodies, their divisibility, elasticity, and porosity or absorbent powers ; and the special influence of this last circumstance upon the character of an arable soil.

The following are all subjects of study : bodies in the mass ; the weight of bodies ; means of determining the density of bodies and their specific gravity ; the physical properties of the air ; of atmospheric pressure ; and of the construction and use of the barometer.

The study of hydrostatics ; the pressure of liquids in their reservoirs, and against dikes and embankments ; hydraulics ; capillary attraction ; the use of siphons and pumps.

The study of heat in all its various phenomena. Its effects upon solid and liquid bodies, and the changes which it makes in their condition ; the phenomena of fusion, ebullition, and evaporation ; of vapours ; of the hygrometer or measurer of moisture, and the utility of the instrument ; the conducting powers of bodies ; of metals in particular ; of free or radiating heat ; application of heat to furnaces or kilns ; laws of cold applied to bodies ; power of emitting and of absorbing cold ; measure of heat ; means of determining the mean temperature of any place ; influence of heat and cold upon vegetation ; means of preserving certain vegetables from frost ; construction and use of the thermometer.

Meteorology. Explication of the phenomena of dew ; of white frosts ; of clouds ; of rain ; of snow ; their various influences upon harvest, and the whole subject of climate.

Study of light. Progress of light in space ; laws of its reflection ; laws of its refraction ; action of light upon vegetation. The subject of vision. The polarization of light ; the explication of the rainbow, and other phenomena of light ; the prism.

Study of electricity. Conductors of electricity ; distribution of the electric fluid in nature ; power of the electric rods or points ; electricity developed by the contact of bodies ; of

galvanic piles ; their construction and uses. Atmospheric electricity ; its origin ; the formation of thunder clouds ; action of electricity upon vegetation ; of lightning ; of thunder ; of hail.

Chemistry. Simple bodies ; compound bodies ; difference between combination and mixture ; atomical attraction ; cohesion ; affinity ; what is intended by chemical agents. Explanation of the chemical nomenclature, and of chemical terms.

The study of simple bodies. Of oxygen ; its properties ; its action upon vegetation, and upon animal life. Nitrogen, sulphur, chlorine, carbon, hydrogen ; their action upon vegetable and animal substances ; their uses in veterinary medicine, and their influence upon vegetation.

The study of compound substances. Chemistry as applied to air and water ; their importance in agriculture ; their influence upon the action and life of plants and animals ; the acids,—the sulphuric, the nitric, the carbonic, the chloric ; the alkalis,—lime, soda, potassium, ammonia ; their application in various forms. The salts in chemistry, and their various applications and uses ; their importance as constituent parts of the soil, or as improvements.

The subject of marls and of earths, and of various substances deemed favourable to vegetation. Under the direction of the Professor of Chemistry, the students are taught to make analyses of different soils and marls.

To this is added a course of Mineralogy and Geology. This embraces the general properties of minerals ; the physical, chemical, and mechanical character of mineral substances the most common.

The study of the distinctive properties and situation of those mineral substances which are most extended over the globe, and which are the most in use ; such, especially, as the carbonate of lime ; comprehending stones for building, for the making of roads and walls, lime-stones, marbles, sulphate of

lime, or plaster of Paris ; and all the variety of mineral substances ordinarily found, and of use in agriculture or the arts.

A course of Geology follows this, embracing all the leading features of the science, with a special reference to all substances or conditions of the soil connected with agricultural improvement.

In this case, the professor makes frequent excursions with the pupils, that they may become familiarly acquainted with the subjects treated of in the lectures, and see them in their proper localities ; so that the great truths of geological science may be illustrated by direct and personal observation.

Next follows a course of instruction in horticulture, or gardening.

Of the soil ; the surface and the subsoil, and practical considerations relative to their culture and products.

Of the climate ; the temperature, the aspect and local condition of the land in reference to the products cultivated ; the amelioration of the soil, and the substances to be used for that object, with the modes of their application.

The various horticultural operations, and implements employed ; and manner in which they are to be executed. The employment of water in irrigation ; modes of enclosing by ditches or walls ; walls for the training of trees ; trellises and palings ; and of protections against the wind.

The different modes of multiplication ; sowing, engrafting by cuttings and by layers, and practical illustrations of these different processes. The culture of seed-bearing or grain-producing plants ; the choice of them ; their planting and management ; the harvesting and preservation of the crops.

Under this head comes the kitchen-garden, and the choice of the best esculent vegetables for consumption ; the nursery, and the complete management of trees from their first planting ; the fruit-garden, considered in all its details ; and the flower-garden.

The general results of gardening ; the employment of hand, or spade-labour ; the care, preservation, and consumption of the products, and their sale. The gardens at Grignon are upon a scale sufficient to supply all practical demonstrations.

The next division embraces the botanical garden. Here the whole science of botany is treated in its principles, and their practical application. The study of vegetable organization, with a full account of the prevailing systems and nomenclature of botany, and the classification of plants. Vegetable physiology, in all its branches, and vegetable anatomy ; comparison of plants in their native and cultivated states ; influence of cultivation in developing and improving plants ; the propagation of plants in their natural condition, or by artificial means ; the subject of rotation, or change of crops.

The practical application of these botanical instructions ; and especially in the examination of plants or vegetables which may be useful in an economical view.

The garden of the establishment embraces what is called a school of trees ; a school of plants for economical and commercial purposes ; and a school of plants for common use. These are all carefully classed and distinguished by their proper names. The pupils are accustomed to be led into the gardens by the professor, that his instructions may be fully exemplified and confirmed.

The next branch of science taught at the school is veterinary surgery and medicine. This embraces a course of anatomy and animal physiology. It comprehends a full description of all the animal organs ; and demonstrations are given from subjects, destroyed or obtained for that purpose. The functions of the different organs are likewise described ; the organs of digestion, respiration, circulation, and the organs connected with the continuance of the species.

Every part of the animal, external and internal, is shown, its name given, its uses explained; its situation in relation to the other organs; the good points, the faults or defects in an animal; the peculiarities of different races of animals, with the modes of discriminating among them.

The choice of animals intended for different services,—as in horses, for example, whether for the saddle, the race, the chase, the carriage, the road, the waggon, or the plough. Next, the treatment of the diseases of animals; the medicines in use; their preparation, and the mode of applying or employing them.

The next subject of instruction embraces a complete system of keeping farm accounts and journals, with the various books and forms necessary to every department.

From this the pupil proceeds to what is called rural legislation, embracing an account of all the laws which affect agricultural property or concerns.

I shall give a specimen of some of the topics treated of in this department.

The civil rights and duties of a French citizen, and the constitution of France.

Property, moveable or immoveable, or, as denominated with us, personal and real; of the divisions of property; of its use and its obligations.

Of commons; of laws relating to forests; of the rights of fishing in rivers; and of hunting.

The laws relating to rural police; to public health; to public security; to contagious or epidemic diseases.

The rights of passage of men or animals over the land of another; if any, and what.

Of crimes. Theft in the fields; breaking or destruction of the instruments of agriculture; throwing open enclosures; destruction or removal of bounds. Laying waste the crops by walking over them; inundation of fields by the stoppage of streams, or the erection of mills. Injury or breaking of



public roads and bridges. Poisoning, killing, or wounding animals.

The duties of country magistrates ; guards or justices of peace. Of courts of law.

Of contracts, general and specific. Contracts of sale and prohibitory conditions. Of leases of different sorts. Of hiring labour ; of the obligations of masters and servants. Of corporations, and the laws applicable to agricultural associations.

Of deeds, mortgages, bills of exchange, commissions, and powers of agency and attorney ; insurance against fire, hail, and other hazards. Of the proof of obligations ; written proof ; oral testimony ; presumptive evidence ; of oaths. Of legal proceedings ; of the seizure of property real or personal, and of bail.

The instruction proceeds under various courses, and I have so far given but a limited account of its comprehensiveness, and the variety of subjects which it embraces.

The study of the different kinds of soil, and of manures, with all their applications, and the improvements aimed at, take in a wide field. Under the head of soils there are the argillaceous, the calcareous, the siliceous, turf-lands, heathlands, volcanic soils, the various subsoils, loam, and humus.

Under the head of manures, come the excrements of animals, all fœcal matter, poudrette, urine ; the excrements of fowls ; guano ; noir animalisée ; the refuse of sugar-refineries ; the relics of animals ; oil-cakes ; the refuse of maltings ; tanners' -bark ; bones, hair, and horn ; aquatic plants ; green-dressings.

The application likewise of sand, clay, marl, lime, plaster, wood-ashes, turf-ashes, soot, salt ; the waste of various manufactures ; mud and street dirt.

The plants cultivated for bread ; wheat, rye, barley, oats, buck-wheat, millet, rice, and the modes of cultivating them.

For forage,—potatoes, beets, turnips, ruta-bagas, carrots, artichokes, parsnips, beans, cabbage.

Lucerne, lupins, sainfoin, common clover, trifolium incarnatum, vetches, peas, lentils, and plants for natural meadows and for pasturage.

To these are added, cobra, rape, poppy, mustard white and black, hemp, flax, cotton, madder, saffron, woad, hops, tobacco, chicory, teasles.

The weeds prejudicial to agriculture, and the insects which attack the plant while growing, or in the granary or barn.

The production of milk ; and, as already said, the making of butter and cheese.

The production of wool ; tests of its fineness ; classing of wools ; shearing of sheep ; weight of the fleece ; washing of wool before or after shearing ; and every particular in reference to the subject.

The fattening of beef, mutton, and pork. Choice of animals for this purpose ; nutritive properties of different kinds of food ; in what form to be given ; grains entire or ground ; roots cooked or raw, green or dry ; the value of the pulp of beet-root after the sugar is expressed ; refuse of the starch factories ; of the distillery ; of the brewery ; fattening by pasture or in stalls ; comparison of the live weight with that of the animal when slaughtered.

Care and management of the various kinds of domestic poultry.

Care and management of bees, with the construction of hives.

Care of silk-worms, and their entire management.

All these studies are pursued in the first year of the course ; and the time is so arranged as to afford the diligent pupil an opportunity of meeting his duties, though the period is obviously too limited for the course prescribed.

The second year enjoins the continuance and enlargement of these important studies ; the higher branches of mathe-

matics and natural philosophy; an extended knowledge of chemistry; and a thorough acquaintance with mechanics, when the scholars with their professor visit some of the principal machine-shops and factories in Paris, or its environs, in order to become practically acquainted with them.

The students are further instructed in the construction of farm-buildings of every description; in irrigation, in all its forms; in the drainage of lands; in the construction of roads; in every thing relating to farm implements; and in the construction of mills and presses.

As I have said, organic chemistry is largely pursued with the various manufactures to which it is applicable; and animal physiology and comparative anatomy are very fully taught.

These studies are followed by a course of what is called agricultural technology. This embraces the manufacture, if so it may be called, of lime, of cement, of bricks; the preparations of plaster; the making of coal by various processes; the making of starch; the making and purification of vegetable oils; the making of wines, of vinegar, of beer, of alcohol, of sugar from the beet-root, including all the improvements which have been introduced into this branch of manufacture; and the pupils, under the direction of the professor, are taken to see the various manufactories of these articles, so far as they are accessible in the vicinity.

The whole subject of forests, of nurseries, of fruit-trees, ornamental trees, trees for fuel, trees for mechanical purposes, are brought under the student's notice. This is a great subject in France, where wood has an extraordinary value; where immense extents of ground are devoted solely to the cultivation of trees; and where consequently it is most desirable to understand the proper kinds of wood to be selected for the purpose in view; the proper mode of forwarding the growth of the trees; and of removing them

without prejudice to their restoration. Under this head comes the culture of

Trees for fuel.

Trees for timber.

Trees for house and ship-building.

Trees for fruit, including all the varieties adapted to a particular climate.

Trees for their oily matter ; such as olives.

Trees for their bark ; to be used in tanning, and other purposes.

Trees for their resinous properties ; such as pines.

Osiers and willows for making baskets.

Mulberry-trees for the support of silk-worms.

Next to this comes the culture of vines, and the establishment and care of a vineyard—a subject of great importance in France.

I have already spoken of the veterinary course of instruction. This embraces the whole subject of the breeding and rearing of animals ; their training, shoeing, and harnessing, and entire management.

Under the head of farm-accounts, the establishment itself at Grignon is made an example ; the accounts of which are kept most accurately by some of the students, and open to the inspection of all.

A journal of every thing which is done upon the farm is made up every night ; and these accounts are fairly transferred into a large-book.

To this is added, a particular account of the labours performed, and the occupation of each workman on the farm.

Next, a cash-book, embracing payment and sales, which are adjusted every fortnight.

Next, an account with the house ; charging every article supplied or consumed.

Next, a specific account of each principal department of the farm ; such as the dairy, with all its expenses and returns ;

the pork-establishment ; the granary, &c. ; which are all balanced every month, so that the exact condition of the department may be known.

As the students are advanced, more general and enlarged views of the various subjects of inquiry are given ; such as,

The taking of a farm, and the cultivation or management to be adopted.

The influence of climate and soil.

The crops to be grown ; and the rotation of crops.

Agricultural improvements generally.

The devoting of land to pasturage ; to dairy husbandry ; to the raising of animals ; to the fattening of cattle ; to the growth of wool ; to the production of grain ; to the raising of plants for different manufacturing purposes ; or to such a mixed husbandry as may be suggested by the particular locality.

The use of capital in agriculture ; the mode of letting farms ; cash rents ; rents in kind ; rents in service ; laws regulating the rights and obligations of real estate ; the conveyance of real estate ; with the various forms of culture in large or in small possessions, or on farms of a medium size.

I have extended, perhaps beyond the patience of my reader, the account of the Agricultural School at Grignon, and yet have given an imperfect and abridged statement of the subject matters of instruction and study at this institution. The institution at Grignon may be considered as a model establishment ; and a thorough education in the various branches referred to, must be, to any young man, an important and invaluable acquisition.

The question comes up, Will such an education make men better farmers ? It must be their own fault if it does not. There may be some branches of the prescribed course, which may not appear to have a direct practical bearing ; but there is not one without its use ; if not directly, yet indirectly subservient to agricultural improvement ; and if not imme-

diately applicable to practice, yet intimately connected with the agricultural profession, adapted to increase its power, utility, and dignity, to elevate and adorn it.

The commonest workman may perform the servile labours upon a farm with far more skill and success than the most accomplished scholar. A plain, practical farmer, with little education, may better succeed in the management of an ordinary farm; he may obtain better crops; his animals may be better fatted; and he may have, at the end of the year, more money in his pocket, than another farmer with ten times his knowledge, but without his practical skill.

It is admitted likewise that many men of highly cultivated minds, and of what may be called enlarged knowledge in agricultural science, have failed in the practical management of farms; and the result of their operations has been loss and discouragement. It must be admitted, at the same time, that the dunces have as often failed. I believe there is no hope of success without some practical knowledge. Men of cultivated minds often fail from relying too much upon notions purely theoretical, and from a general and almost universal prejudice, without any just foundation, that, while other arts and sciences have made progress, agriculture has made little or no progress, and that the whole system of practical agriculture might be improved, or at once altered to advantage. This prejudice is obviously unreasonable, when we consider that years and centuries have been devoted to this art. But such persons do not fail half so often from their science, or even from agricultural theories, as they do from the want of a business talent, or what is commonly called tact. Some men almost always succeed in whatever they undertake, as far as success depends on themselves; some men almost always fail. This in general is called luck; but it arises from a peculiar natural gift; or, in the opposite case, from some natural deficiency. Education and practice will do much towards improving the faculty, and

somewhat towards compensating its deficiency, where such deficiency exists; but they can never wholly supply its place. It consists, as far as I have observed, in a sagacity which takes the future always into account with the present; in a sound and comprehensive judgment, which, for example, looking into a machine, sees all its various parts, with their various relations to each other, and their mutual checks and balances; in a fixedness of resolution, which, having determined its object, is not diverted from it but by the strongest reasons; and in an aptitude and facility of action or operation that takes advantage of every thing which it can beneficially use for its purposes; always floating with the current instead of struggling against it; spreading its sails to every even the gentlest favourable breeze; and conforming to the laws of nature, as far as they are ascertained, instead of attempting, with an ambition and self-conceit as idle as presumptuous, to contravene or to alter them. Minds, in other respects highly gifted and improved, often fail from the want of this tact. But, other circumstances being equal, how can any man who has any intelligence doubt that knowledge and study will prove as available in agriculture as in any other art or science?

It would seem idle to argue so obvious a point as this, were it not continually called in question; and continually demanded, What has science done for agriculture? It might be sufficient to ask in reply, What has ignorance or stupidity done for agriculture, or any thing else? All the improvements which are ever made depend upon two things,—inquiry and observation. The inquiry into facts, the observation of these facts, when ascertained, constitute science. In science, facts are all that are of any real value. The more inquiry is extended, the more observation becomes exact, so much is our power, and so much is the chance of success increased. The savage in his canoe, venturing out upon an untried sea without compass or chart, may, by mere chance, by favourable winds

and currents, reach his desired port ; but how inferior is his chance of success, compared with the almost certainty with which the experienced and instructed navigator ventures abroad, who brings all the aids and lights which art and science proffer him to direct his course ; and who, under their guidance, takes his aim daily ; measures his progress ; fortifies himself against accidents which may befall him ; and, with as much exactness as applies to any thing human, reaches his destined port ! It is often asked, What has chemistry done for agriculture ? It has given us theories of manures, and analyses of soils and of vegetables, which, to say the least, are highly curious and interesting ; and which, if experiment should verify them, may lead to important results ; it has taught us modes of applying some manures, by which their activity becomes more prompt, and their efficacy is increased ; it has led to the saving of many materials for manure which were before wasted. But admit that it has yet accomplished little in comparison of what was expected from it, or what it professed itself able to do ; perhaps too much was expected ; perhaps it professed an ability beyond what it possessed. But an intelligent mind will allow that it presents one of the most efficacious means of inquiring into and of determining many of the phenomena of agriculture, and may ultimately lead to valuable discoveries. It is true that the most eminent agricultural chemist of the day failed in his attempts to furnish a manure exactly adapted to the wants of every species of crop, and which should give out its nutriment in such measure, and at such time, and only in such measure and at such times as the crop required. It was a bold attempt, confidence in which bordered upon credulity, because he undertook to control and regulate forces and influences which are entirely beyond human reach. If my presumption may be excused in attempting to criticise the writings of this distinguished individual, to whom science



is under such great obligations, I must say that one great error seems to run through all his writings, which is, in supposing that vegetation is a purely mechanical and chemical process, which may be explained as any other mechanical or chemical process may be explained. It may be so; but the fact remains to be proved. When I see a hundred different plants, differing in form, flower, fruit, duration, and nutriment, some of the most wholesome, and some of the most poisonous qualities, upon the same square yard of land, each preserving perfectly the identity of its species, not in any respect commixing with others, and taking only the elements which belong to it, and only in the exact proportion which it requires, however simple it may prove to be when it is explained, as every thing is simple when thoroughly understood, it does not appear to me that the solution is yet approached by chemistry, or by any other science. Yet chemical science, from its searching nature, and from what it has already accomplished, seems, of all others, the science most likely to solve, if they ever are to be solved, these hidden secrets of nature. It is not, however, for the agriculturists of France to deny the value of chemistry, since they are indebted to chemistry for the discovery of sugar in the beet, and the means of extracting and fabricating it, which now forms with them so large and valuable an article of production and commerce.

It seems superfluous to add, that all improvements must come from the application of the mind to the subject. The more the mind is cultivated, the more is man's power over nature increased. One science helps another. The more a man knows of any one thing, the more likely he is to know others, and the more power he has of acquiring other knowledge. The course of education at Grignon is adapted to furnish the mind with knowledge of a highly practical character, which in the country there is constant occasion to apply. To a man of curious mind, resident in the country,

such an education may be said to make every object by which he is surrounded alive, and to multiply infinitely his resources of interest and pleasure. It will prevent that stupidity which the monotony and tranquil character of rural pursuits have often a tendency to bring upon the mind, and which is sometimes made an objection to them. It will prevent many low and purely animal pursuits, into which now, for want of mental occupation, men in such circumstances are liable to indulge; and it will contribute to elevate and adorn the pursuits of husbandry, and render it one of the most attractive, as all will admit it to be among the most useful, moral, and honourable professions.

2. VETERINARY SCHOOL AT ALFORT.—I must not, in this connexion, pass over the veterinary schools of France. There are three of these institutions in France, and they furnish all the advantages to be expected from such establishments. The three veterinary schools established by the government of France are at Alfort, Lyons, and Toulouse, and comprise 600 students. The average number of horses kept on them is 1332; viz. 838 stallions, 127 mares, 212 colts, 99 fillies, and 56 draft horses<sup>1</sup>. The one at Alfort is that which I have had the pleasure of inspecting.

This establishment is beautifully situated on the river Seine, near the village of Charenton, about six miles from Paris. The buildings for the different objects of the institution are spacious and well contrived, and the grounds sufficiently extensive and judiciously arranged. Like other governmental establishments in France which have come under my observation, the institution is upon a grand scale, and complete in all its parts. The government of France, in a liberal manner, avails itself of the talents of the most com-

<sup>1</sup> Statistical Report.

petent men in every department, and of all the advantages which science and art can afford; and it spares no expense in the perfect execution of whatever it undertakes. It adds to all this, as is every where to be seen, a refinement of taste in the arrangement of the most ordinary subjects, which increases the expense only in a small degree, which does not abstract at all from the solidity and substantial character of the work itself; but relieves that which would otherwise be monotonous, if not offensive, and renders often the plainest subjects attractive.

The school at Alfort is designed to furnish a complete course of instruction in veterinary medicine and surgery; embracing not horses only, but all the domestic animals. A student at his entrance must be well versed in the common branches of education; and a full course of instruction requires a residence of four years. The number of pupils is limited to three hundred. Of these, forty are entirely supported by the government. These are educated for the army; and are required not only to become versed in the science and practice of veterinary medicine and surgery, but likewise in the common business of a blacksmith's shop, as far as it is connected with farriery. Students can be admitted only by the nomination or with the consent of one of the great officers of government, the minister of commerce and agriculture. The expense of board and lodging is about fifteen pounds, or eighty dollars a year; the instruction is wholly gratuitous, the professors being supported by the government.

The establishment presents several hospitals or apartments for sick horses, cows, and dogs. There are means for controlling and regulating, as far as possible, the temperature of the rooms, and for producing a complete and healthy ventilation. There are stables where the patients may be kept entirely alone, when the case requires it; and there are preparations for giving them, as high as their bodies, a warm

bath, which, in cases of diseased limbs or joints, may be of great service. There is a large college with dormitories and dining rooms for the students; houses for the professors within the enclosure; rooms for operations upon animals, and for anatomical dissections; a room with a complete laboratory for a course of chemical lectures; a public lecture-room or theatre; and an extensive smithery, with several forges fitted up in the best possible manner. There are, likewise, several stands, contrived with some ingenuity, for confining the feet of horses, that students may make with security their first attempts at shoeing, or in which the limb, after it has been separated from its lawful owner, may be placed for the purpose of examination and experiment.

An extensive suite of apartments presents an admirable, and, indeed, an extraordinary museum both of natural and artificial anatomical preparations, exhibiting the natural and healthy state of the animal constitution; and, likewise, remarkable examples of diseased affections. The perfect examples of the anatomy of the horse, the cow, the sheep, the hog, and the dog; in which the muscular integuments, the nerves, the blood-vessels, and, indeed, all the parts, are separated and preserved, and exhibited, by the extraordinary skill of an eminent veterinary surgeon and artist now deceased, who occupied the anatomical chair of the institution, exhibit wonderful ingenuity in their dissection and preservation, and present an interesting and useful study, not to the medical students only, but to the most ordinary as well as the most profound philosophical observer. I have seen no exhibition of the kind of so remarkable a character.

The numerous examples of diseased affections, preserved, as far as possible, in their natural state, strongly attract observation, and make a powerful appeal to our humanity in showing how much these poor animals, who minister so essentially to our service and pleasures, must suffer without being able

to acquaint us with their sufferings ; and how often they are probably compelled to do duty, and driven to the hardest services by the whip or the spur, in circumstances in which a human being would not be able to stand up. A great number of calculi or stones, taken from the bladders of horses after death, are exhibited, of a large size, and, in some instances, of a very rough exterior, which must have excessively irritated and pained the sensitive parts with which they came in contact. One of these stones was larger than the head of an ordinary man, and weighed, as I was informed by the attendant, thirty-eight pounds. I am aware how severely this account may tax the belief of my readers, but I assure them there is no exaggeration, though I should have found great difficulty in believing the fact had I not seen the stone. It is scarcely possible to overrate the suffering which the poor animal must have endured under such an infliction<sup>1</sup>.

The department for sick dogs, containing boxes for those which require confinement, and chains for such as require to be kept in the open air, and a cooking apparatus and kitchen for the preparation of their food, was spacious, well-arranged, and contained a large number of patients. Any sick animals may be sent to the establishment, and their board is to be paid at a fixed rate of charges ; twelve sous or cents, or sixpence per day for a dog ; and fifty sous or cents, or twenty-five pence, for a horse, including medicine, advice, and attendance. In cases of epidemics or murrain prevailing in any of the districts of France, the best attendance and advice are sent from these schools to assist in the cure, and especially

<sup>1</sup> Facts of this nature strongly demonstrate the importance of pure water for our brute animals as well as for ourselves. Such diseases are most likely to occur in a country where the waters are strongly impregnated with lime. In Paris, where of all places which I have seen they appear least demanded by any excess of modesty, or even sense of common decency, it is said, that since the erection of public urinals along some of the principal streets, the diseases of gravel or stone in the human subject have greatly diminished.

to watch the symptoms and progress of the malady. In countries where large standing armies are maintained, and where of course there are large bodies of cavalry and artillery to be attended upon, as well as waggon-horses for carrying the supplies, the importance of veterinary surgery is vastly increased; but in countries where no standing armies exist, the number of horses kept for use or pleasure, and of other domestic animals, bears a much larger proportion to the number of human beings than we should be likely to infer without inquiry; and renders the profession highly important.

A large and select library belongs to the establishment, and a garden for the cultivation of medicinal plants, and likewise of the grasses employed in agriculture. A farm is likewise attached to the place, on which instruction is given in practical agriculture, and numbers of various kinds of animals are kept for the purpose of breeding the best, and illustrating the effects of crossing. Some selected animals of domestic and of the best foreign breeds, horses, bulls, cows, and sheep, are kept for this special object. On one occasion, when I visited the institution, there was a public sale of bulls of the improved short-horns, which had been raised upon the place; and of some bucks of the best breeds of England, the Leicester, the South-down, and others from a cross of the Leicester with a large-sized Merino. I saw at Grignon the cross also of the South-down with the Merino. These crosses presented examples of improved form, of large size, and of a great quantity of wool of a good, but not of a very fine, quality. These were the result of a first cross; how far it may be successfully continued is not determined. Attempts of this kind, to intermix breeds of a decidedly different constitutional character, as far as my inquiries have been extended, have not been satisfactory after a first cross. These animals belonged to the Government, and were sold, not with a view to profit, but to the general improvement of the breeds of France. In this excellent mode, the

Government provides, in respect to horses, cattle, and sheep, for the propagation through the kingdom of the most valuable races. The minimum price was fixed upon the animals as they were brought forward, and they went into the hands of those who made the highest advance, and who were required, under certain conditions, to keep them for the purposes of breeding<sup>1</sup>. Besides these sales, the best description of horses and neat cattle, studs, and bulls, owned by the Government, are at the service of the farmers upon the most liberal terms, for the improvement of their stock.

In England, the veterinary establishments are maintained by private subscription. Perhaps, in general, that which is left to private management under the stimulus of personal interest is better cared for than that which is wholly public property; but as in this establishment there is no want of liberality on the part of the Government, so there seems to be no want of fidelity and diligence in accomplishing its objects. The students are numerous, and the professors eminent for their scientific and practical acquirements.

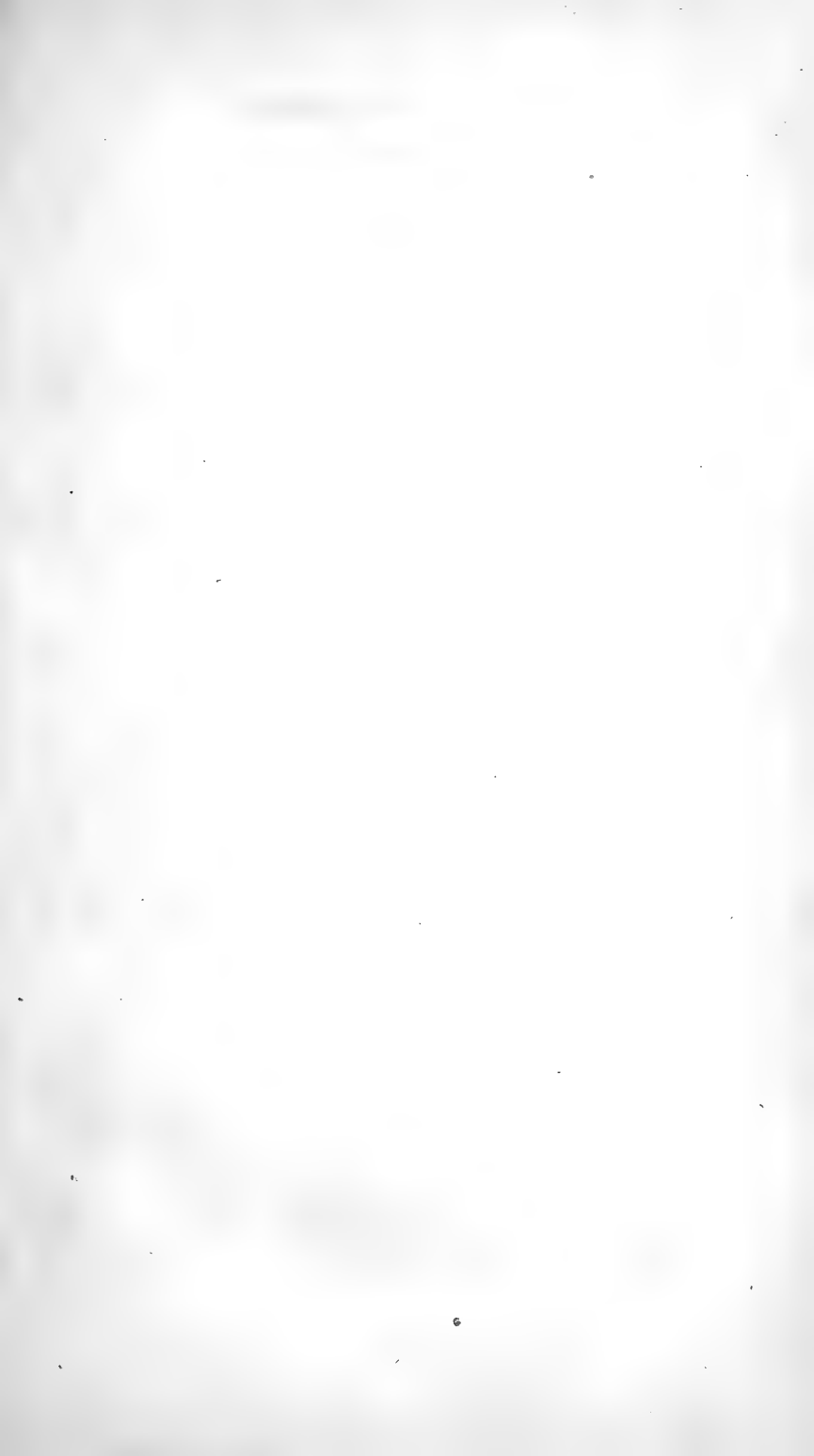
I have spoken in another place of the veterinary profession, and of what great respect a person is worthy, who, with talents suited to give him a high rank in any other department of medical science and practice, has the manliness and humanity to devote himself to this most humble and yet most benevolent service. The fable of Androcles extracting the thorn from the foot of the lion, is a beautiful lesson of disinterested and amply-requited kindness. The practitioner in these cases is not to expect any open expressions of gratitude; yet one can hardly doubt—indeed, in the canine race it is most evident,—that there may exist a deep sense of kindness where there is no power of acknowledgment; but such services are sure to find their best reward in a good man's own heart.

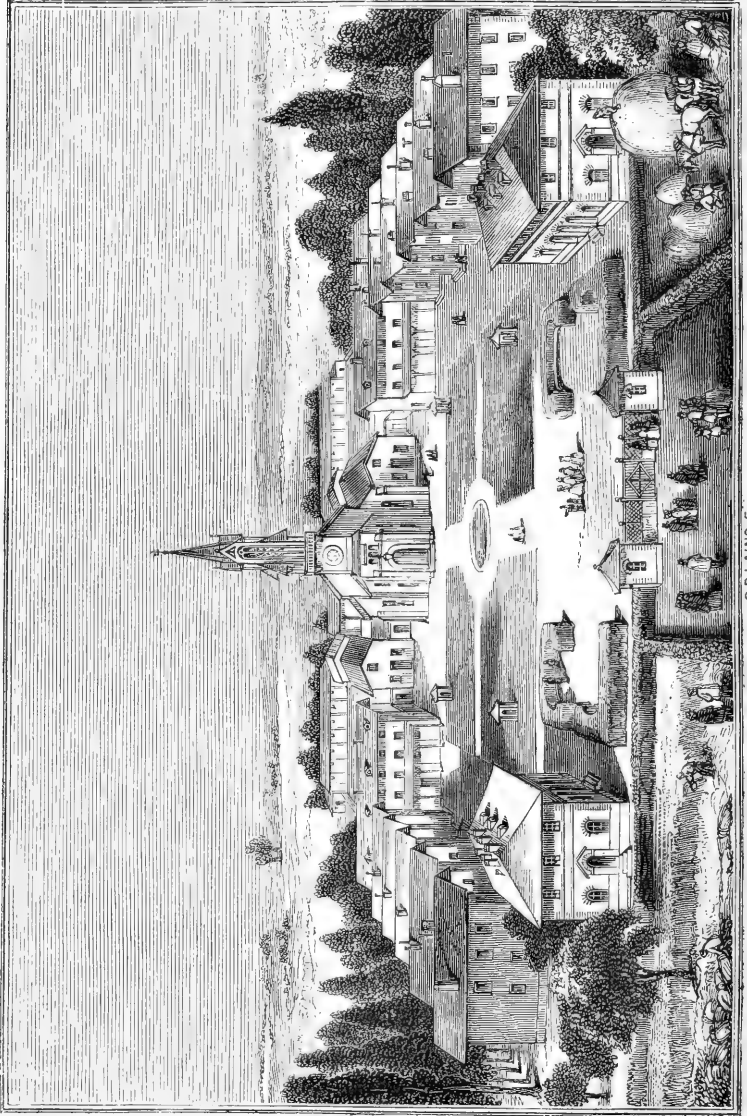
<sup>1</sup> The expense to the Government of supporting the three veterinary schools is said to be about 492,000 francs, or 100,000 dollars per annum.

I consider it a duty to lose no favourable occasion of protesting against all cruelty to dumb animals, and to speak for those who have no power to speak for themselves. In institutions of this kind, there may be danger of making experiments on living and sentient subjects, which are not demanded for the high purposes of science. Such experiments, as far as they are useless or wanton, or as far as experiments even of a most important nature are conducted with indifference to the suffering of the patients, or with the infliction of unnecessary pain, must be regarded as cruel and criminal. A dog was shown to us who had been inoculated, by way of experiment, with the virus of the hydrophobia. The lessons to be drawn from such an experiment may be highly important. It is a fact deserving notice, that a remedy against one of the most frightful and fatal epidemics to which mankind were ever subject—the small-pox—has been derived from one of the most humble, yet one of the most useful, of the domestic animals. Several applications have been made here with the sulphuric ether; and surgical operations have been performed upon patients under its influence, without any apparent suffering. This discovery seems an immense gain to humanity.

It is always with a degree of alarm that the unpractised look at the apparent indifference and insensibility to the pain and suffering of their patients, to which familiarity and practice seem to bring the most eminent operators in surgery; who, after a long practice, evidently acquire a relish for what appears to be the most painful part of their duty; seem to lose the consciousness that they are dealing with flesh and blood; and cut for the stone, or amputate a limb, with as much calmness as they would bore a hole in a log, or cut off a stick of wood. Perhaps this indifference is the very security of that steadiness of hand so essential to success. It must require a compassion or humanity of the highest order to preserve a delicate sensibility, and resolutely







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to avoid giving needless pain ; or, under the plea of advancing science, making useless and severe experiments upon animals, where life has only a pecuniary value, and where the wishes or feelings of the subjects of these operations cannot be consulted. Every wanton act of cruelty, or the infliction of unnecessary pain upon a dumb animal, is a crime ; involving at the same time the grossest meanness ; inasmuch as we have them wholly in our power, and know them to be incapable of resistance or complaint.

3. AGRICULTURAL COLONY AT METTRAY.—There are two other institutions for agricultural education in France, which I visited with great interest, and a notice of which will not, I hope, be unacceptable ; the one at Mettray, near Tours, about 150 miles, the other at Petit Bourg, about twenty miles, from Paris.

Let me say, in passing, that France abounds in philanthropic institutions. There are no public almshouses ; and I have met with comparatively few mendicants, excepting blind persons, persons incurably lame or deformed, and incapable of supporting themselves. I have been much impressed with the difference, in this respect, between France, and England, Scotland, and Belgium, which three countries, particularly in the cities, swarm with beggars ; and Ireland especially,—fated, wretched, degraded Ireland,—which is scarcely to be placed in comparison with any other country. This difference is, I think, in some degree owing to the industry, frugality, simple habits, and, above all, temperance of the French country people ; virtues in which they are excelled by no people whom I have known ; it seems to me only just to add, a general self-respect, which leads them to look upon mendicancy, and even the reception of charity, as disgraceful. I have no doubt, likewise, that the power of acquiring land conduces very much to industry and frugality.

Though there are in France no almshouses or poorhouses

established by law, as in Great Britain and the United States, it is not to be forgotten, that various parts of the country (and Paris especially) abound in them, there are hospitals for the reception of the sick, the impotent, the insane, the blind, the deaf and dumb, the old and decayed, those who have served their country in the army and navy, and others labouring under afflictive dispensations of Divine Providence.

I may go further, and say, that I believe, from my own observation, there is no country where more is dispensed in private charity ; and the poor themselves, as I have seen in many instances, seem always ready to share their pity with those who are poorer than themselves. I am told that this is the consequence of the prevalent religion, which places charity or alms-giving among its works of merit. I honour the religion, then, for the good which it does, and content myself with recommending to those who profess a different faith, to read again, at their leisure, the beautiful parable of the good Samaritan.

The colony at Mettray was founded in the spirit of the good Samaritan, which succours the wounded and forsaken traveller by the way-side, takes him home, and there nourishes and cherishes him. This establishment grew out of the compassion of two gentlemen of high rank and fortune, who were moved to essay what could be done for the rescue of unfortunate, condemned, and vagabond boys, to save them if possible from destruction, and give them the power of obtaining an honest living. It is not consistent with my plan, in this place, to go further into the account of the institution, than as a school of agriculture, though the directors propose three objects of instruction : to qualify their pupils for farmers, sailors, or soldiers. The discipline of the institution is military. They have a full-rigged ship of ample size in the yard, that boys designed for naval life may here take their first practical lessons ; and they have a well-

stocked farm of five hundred acres, which is under direction to be cultivated by the pupils. The institution is situated in a healthy part of the country, and near a large market-town. They employ an educated and experienced agriculturist as director of the farm. The first object is to render it productive, that it may go as far as it can be made to go towards defraying the expenses of the institution; the second, to instruct the boys in the best and most improved methods of husbandry. The institution had its foundation in private subscription, and though in its commencement it had many difficulties to struggle with, it has now a firm establishment<sup>1</sup>. Besides a farm, there are connected with the institution a large garden, an extensive nursery, and a manufactory for the fabrication of all the implements, carriages, &c., which are used on the farm. The boys are likewise employed in the making of the shoes, caps, clothes, and bedding, which are required, and many fancy articles which serve for sale, and give them occupation, when by any circumstances they are prevented from out-door labour. The number of pupils is at present 450. It is not intended to keep them after sixteen, but they are willing to receive them at the earliest convenient age. I saw several not more than six or seven years old. They live in families of forty or fifty, in separate houses, under the care of a respectable man and his wife, who give them their whole time. This seemed to me a most judicious provision. They have a guardian with them in the fields, who always works with them. Many of them have been condemned at courts of justice for some petty offence, and many of them, orphans and friendless, have been taken up in the streets in a condition of miserable vagabondage. The discipline of the institution is altogether

<sup>1</sup> The Vicomte de Courteilles gave a large estate, and M. De Metz, a distinguished philanthropist and a royal counsellor, besides sacrificing his high situation at court, lives among the children, and gives, the greatest of all charities, his whole time, his hand, his head, and heart, entirely to this object.

moral and paternal. Confinement, abstinence, solitude, and disgrace, constitute the chief punishments ; but there are no whips, nor blows, nor chains. It has been so far eminently successful. A boy, who had been early familiar with punishments and prisons, and now for some time a resident at Mettray, was asked, Why he did not run away from Mettray ? His memorable answer was, " Because there are no bolts nor bars to prevent me."

When one looks at the innumerable herds of children, turned, as it were, adrift in a great city, not merely tempted, but actually instructed, stimulated, and encouraged, in crime, and observes them gradually gathering in and borne onwards on the swift current with increasing rapidity to the precipice of destruction, until escape becomes almost impossible, how can we enough admire the combined courage, generosity, and disinterestedness, which plunges in that it may rescue some of these wretched victims from that frightful fate which seems all but inevitable ? I do not know a more beautiful, and scarcely a more touching, passage in the Holy Scriptures than that which represents the angels in Heaven as rejoicing over a repenting and rescued sinner. It is, indeed, a ministry worthy of the highest and holiest spirits, to which the Supreme Source of all goodness and benevolence has imparted any portion of his Divine nature.

If we look at this institution even in a more humble and practical view, as affording a good education in the mechanical and agricultural arts, its great utility cannot be doubted ; and much good seed will be sown here, which, under the blessing of God, is sure to return excellent and enduring fruits.

I should have said before, that there is connected with the institution a hospital which was a model of cleanliness, good ventilation, and careful attendance ; all the services of which were rendered by those indefatigable doers of good, the Sisters of Charity.

4. COLONY AT PETIT BOURG.—Another institution of a similar kind to that at Mettray, is about twenty miles from Paris, at a place called Petit Bourg. It was once a palace, built by a profligate king for a profligate woman, but now is converted into a school of charity,—certainly a better use. It is not designed for criminals or the condemned, but for vagabond children, fatherless, motherless, and friendless; and is to be regarded as a place for the prevention rather than the cure of crime. The farm contains about seventy acres; and though an expensive purchase, and a house much too magnificent for a pauper establishment, yet the large rooms in the house, and the various spacious appendages, have been easily converted to the useful purposes of the institution. The nearness to the capital, where the subscribers to the funds principally reside, and therefore can have constant access to it, and a quick market for the produce in fruit and vegetables, are compensating circumstances for the exorbitant cost of the land. No person is received over sixteen years of age, or kept beyond twenty-one. The cost of maintaining a pupil is twelve pounds sterling, sixty dollars; and they are paid for by individual subscribers, or out of the common funds. Seventy pupils are now maintained here; and the applications are far beyond their power of receiving. The children are trained to agriculture, to gardening in its various branches, and some of them to different trades, as tailors, shoemakers, capmakers, blacksmiths, and carpenters. The farming was of a kind to be immediately productive, and was well managed. The cows at this establishment, as, indeed, in most parts of the continent which I have visited, are soiled,—that is, fed in the stables constantly; and were of a superior description. There were two kinds which particularly attracted my attention, under the designation of Norman and Flemish. In appearance and promise I have seldom seen any superior. I could obtain no exact returns; but the Flemish was remarkable for size, and

stated to be equally remarkable for her product in milk and butter.

With a view to encourage their exertions, the pupils have a portion of their earnings put by at interest, for their benefit; and which they receive, if, at the close of their term, they leave the place with honour; but not if they are dismissed for faults or crimes, or if they leave irregularly, and without permission. I hope it will not be deemed out of place if I remark here in passing, that the discipline of the institution is intended to be wholly moral and paternal. Light penalties, which affect the mind, and which are designed to operate upon the self-respect of the offender, and to affect his character and standing, are found much more effectual than any corporal punishments. A public court, at which the master presides, is held among the pupils once a week, when the daily records of the institution are looked over. Here the deficient or guilty are called to account by their companions, and the penalties decreed. This, which may be called a court of honour, has proved signally effectual.

There are, besides Mettray and Petit Bourg, several other institutions on the same plan in different parts of France. They cannot be too strongly commended; and this seems a kind of philanthropy without fault. Let me add, with reverence, that if it were a mission worthy of a Celestial Messenger to seek and to save those who were perishing, what can be more a duty than, in our humble measure, to imitate a Divine example<sup>1</sup>.

<sup>1</sup> Some of my readers may be interested in the subjoined anecdote, which I received from the benevolent director of the establishment:—Among the rewards given at the institution, and those, extraordinary as it may seem, most coveted and deemed most honourable, are what are called tickets of favour. These only entitle the possessor to obtain some mitigation of punishment for an offending companion by bearing it himself. In one case, at the strong solicitation of the parents, a very unmanageable boy had been received into the institution. Silence is always strictly enjoined at meal times. This boy, after repeated admonitions, persisted in violating this rule, when a monitor took him



I have deemed it useful to go thus fully into the matter of agricultural education in France, as the subject attracts much attention in England and the United States. The provision made in France for this object is obviously of a most liberal character, and the arrangements are made with equal judgment and wisdom.

I pass now to other topics.

## XVI. CROPS.

The crops cultivated in France are the usual cereal grains, wheat, rye, barley, and oats; but what may be called the peculiar crops, yielding an immense pecuniary value, are wine, silk, and sugar.

1. WHEAT.—In gross amount, the wheat grown in France constitutes an immense crop. With the exception of Russia, from which no accurate statistical returns have been obtained, and in European Russia comparatively little wheat is grown, the bread used being chiefly of rye, it is stated, that more than half of the wheat grown in Europe is produced in

by the collar in order to remove him from the table. The boy instantly stabbed the monitor, so as to endanger his life. For this offence he was sentenced to some months' imprisonment and seclusion upon short allowance. After being some time confined, the boys solicited his release; the boy who had been wounded among the rest, and who had a right to claim a favour. After repeated refusals, the master at length consented, upon condition that the boy who had been wounded should take his place, and suffer out the time which remained to complete his sentence. This being agreed to, and the wounded boy taking the place and the penalties of the criminal, the culprit was appointed to the duty of attending upon him by carrying him his food. The confined boy finished the time to which the criminal had been sentenced. In the meanwhile the culprit, witnessing the sufferings of the boy whom he had injured, and his magnanimity in undertaking to suffer for him, and the kind and forgiving conduct of the whole school towards him, was so deeply affected by it, that it appeared to have worked an entire reformation of character, and he became and had continued for a long time one of the best boys in the school.

France. From the best statistical accounts that can be obtained, the wheat annually produced in the United Kingdom, England, Scotland, Ireland, is 111,081,320 bushels.

In France it is . . . . . 198,660,000 „

The amount of seed ordinarily sown to the acre is from two to three bushels. The return of crop for the seed sown is represented as, in the best districts, averaging 6·25 for one; in the least productive 5·40 for one; but the mean average return for the seed in the principal wheat-growing departments is reckoned at 6·07 for one. These accounts must be considered as uncertain. Any person having experience in the case, knows how difficult is even an approach to accuracy. My readers may be curious to know the calculations which have been made in regard to some other countries in this matter.

#### NORTH EUROPE.

Countries.	Year.	Increase for seed sown.
Sweden and Norway . . . . .	1838 . . . . .	4·50 for one.
Denmark . . . . .	1827 . . . . .	6 „
Russia, a good harvest . . . . .	1819 . . . . .	5 „
———, Province of Tambof . . . . .	1821 . . . . .	4·50 „
———, Provinces north of 50° latitude . . . . .	1821 . . . . .	3 „
Poland . . . . .	1826 . . . . .	8 „
England . . . . .	1830 . . . . .	9 „
Scotland . . . . .	1830 . . . . .	8 „
Ireland . . . . .	1825 . . . . .	10 „
Holland . . . . .	1828 . . . . .	7·50 „
Belgium . . . . .	1828 . . . . .	11 „
Bavaria . . . . .	1827 . . . . .	7 to 8 „
Prussia . . . . .	1817 . . . . .	6 „
Austria . . . . .	1812 . . . . .	7·05 „
Hungary . . . . .	1812 . . . . .	4 „

Switzerland, 1825, lands of an inferior quality, 3 ; of a good quality, 8 ; of the best quality, 12.

France, inferior lands, 3 ; best lands, 6.

## CENTRAL EUROPE.

Countries.	Year.	Increase for seed sown.
Spain . . . . .	1828 . . . . .	6 for one.
Portugal . . . . .	1786 . . . . .	10 „
Tuscany . . . . .	— . . . . .	10 „
Plains of Lucca . . . . .	— . . . . .	15 „
Piedmont. Plains of Marengo	— . . . . .	4 to 5 „
Bologna . . . . .	— . . . . .	15 „
Roman States. Pontine Marshes,	20 ; ordinary lands,	8.
Kingdom of Naples—best districts,	20 ; ordinary lands,	8.
Malta—the best lands,	38 to 64 ; ordinary lands,	22, 25, 30 <sup>1</sup> .

It is obvious how difficult it must be to arrive in this case at any thing like exactness. The quantity of seed employed on the same extent of land is very different in different countries, but the product cannot always bear the above proportions to the amount sown. That I may be understood, let us look at Malta, where a return of 64 for one is given for the best lands. Are we to infer that in such case, if two bushels were sown to an acre, the ordinary proportion in France, the product would be 128 bushels per acre? or, if three bushels were sown, as in the best cultivation in England, the crop would be 192 bushels? In Ancient Egypt, the return is represented as 100 for one ; in Byzantium, as 150 for one ; in Ancient Libya, as 300 for one. No certain conclusions can be founded upon such statements. The distinguished traveller, M. Humboldt, states the average product of wheat in Mexico as 25 to 30 for one, and this on

<sup>1</sup> Statistique des Cereales de la France, par M. A. Moreau de Jonnés. Paris, 1843.

table-land elevated 8000 feet above the sea ; and that, even on large farms, he found it 50 and 65 for one. In the Antilles he states the production of maize, or Indian corn, as 300 for one. But I have seen in several cases in New England, in the culture of Indian corn, a return of 400 for one ; that is to say, the hills being three feet apart each way, a peck of Indian corn would be sufficient seed for an acre. If 100 bushels of grain is in such case produced on an acre—and this sometimes happens—this is clearly a return of 400 for one.

Of the average yield of wheat in France it is not possible to form a conclusion on which entire reliance may be placed. Until a very large district can be taken, and the crops and land actually measured, no certainty can be attained ; and then of course it must vary much in different climates, or expositions in different seasons, and under different modes of culture. At present it is altogether matter of conjecture, and it would be difficult to find two men of independent judgment who would agree in the case. The average yield in England I have heard stated by men of political standing, claiming to be well informed on the subject, at not more than fifteen bushels per acre. An eminent agricultural writer placed it at eighteen bushels some years since ; men of sanguine temperament rate it at over thirty bushels. These evidently are wholly conjectural estimates. In France it is stated in the best districts to average twenty-two bushels. This rests upon similar authority. It would be of immense importance to any government to know the exact product grown in any county or district, or in the whole country ; and this might be obtained by compelling, on the part of the owner or cultivator, an actual return of his crop ; but it is of little use to found such returns on estimates purely conjectural. There is another point in respect to this cultivation which the agricultural societies might obtain, and which would be of great importance ; that is, first, the smallest yield ordinarily

obtained, and, next, the largest yield actually obtained, with a detailed history of the culture in each case; the causes of the inferiority in the former, and of the superiority in the latter, as far as they can be ascertained. Reluctant as most men are to state them, yet, as much benefit may be derived from a knowledge of the causes of failure as of success; and in the latter case, every one must see the importance of knowing what can be done, that every stimulus may be given to an emulation which in agriculture is always wholesome, and a great instrument of success. In England, fifty bushels per acre were reported to me, on the best authority, as the yield upon a large farm in a very favourable season. More than eighty bushels have been reported, upon what is deemed ample testimony, to the Royal Society of England, as the product of a single acre<sup>1</sup>. In France I have had, upon the best authority, reports of forty bushels, forty-four bushels, and seventy-two bushels. It is beyond all doubt that the crops in England have, within a few years, considerably increased; and, by the official returns in France, where much pains have been taken to render them accurate, it appears that within eighty years, while the population has increased in the proportion of twenty-one to thirty-three millions, the production of wheat has more than doubled; which shows an improvement in the comforts of the people. It is further stated, upon good authority, that the product of an acre of land is ordinarily double what it was three-fourths of a century ago; which shows a most gratifying improvement in the agriculture of the kingdom. It is an instructive fact, that the product of wheat in France has increased sixty-three per cent. since the close of Napoleon's wars—a

<sup>1</sup> It is almost impossible to get any exact return from an English tenant-farmer of his products, for the reason that he will give no occasion to his landlord to raise his rent. In countries where the amount produced is a subject of such great importance, and where the population is pressing so hard upon the supply, an accurate return of the yearly product should be induced by some pecuniary encouragement, or otherwise made compulsory.

fact which shows, in a most striking manner, the interruption which war brings into the useful arts of life, and the privations and wretchedness which are sure to follow in its train.

There have been in France, as every where else, discussions as to the origin of wheat, many persons maintaining that it is an inferior plant in its natural state, and that its present condition is the result of artificial cultivation. The speculation will do neither harm nor good. There is little reason for the supposition ; and it seems extraordinary that similar changes are never witnessed at the present day. It is certain that the wheat cultivated at the present time does not differ from that found in the pyramids of Egypt.

There are nearly thirty different kinds of wheat cultivated in France, including both autumn and spring varieties. In respect to this distinction, there is little doubt that, by a careful selection of the earliest ripe, after a time, the autumn may be converted into a spring wheat ; and the spring wheat being repeatedly sown in the autumn, would presently lose its properties of early ripening. It would be imprudent to prescribe any particular species for universal or for general use, as the different kinds are adapted to different localities, some being much earlier than others, and therefore, though yielding a less product, ripening before the droughts of summer, and escaping, in some degree, the dangers of blight ; and others being more susceptible to injury from frost. The white wheat of Flanders is a highly esteemed variety ; and is said to be the same as a wheat known in England by the names of the Eclipse wheat, the Wellington, and the Talavera. It is highly productive and beautiful, and is particularly suited to lands of the richest quality. The white wheat of Provence is pronounced the most excellent variety for the quality of its grain ; its straw is very tender, and therefore liable to be lodged ; and it is too delicate for a cold climate. The Lammas wheat is of an excellent quality ; early in its ripening ; it sheds its grain

easily in the field ; it therefore requires to be cut early. It is very susceptible to injury from cold. These are all winter wheats ; but what is called a spring wheat in Europe is a wheat which should be sown in February ; whereas, in the United States, that only is called a spring wheat which may be sown, with a surety of its ripening, in any part of March or April.

The Tuscan wheat, used in the manufacture of the celebrated and beautiful Leghorn bonnets, is a spring wheat, with very short heads, and produces little grain. The Victoria wheat, of a good quality, and brought to France from Columbia in South America, and represented as ripening in sixty days, was not found, in France, in advance of the common wheats of the country. I imported, some years since, a wheat from Spain, highly commended for its rapid growth and early maturity, but in these respects it showed no superiority over the kinds ordinarily cultivated in the country.

We are already, in the United States, in possession of many beautiful kinds of wheat. I can only add, if we could import a few of the French bakers to instruct us in the useful and important art of making bread, it might prove a signal advantage. I believe no where is so good bread to be found as in France ; and this, not in the cities only, but throughout the country ; even at the meanest village tavern you will ordinarily find bread of the best quality.

The Egyptian wheat, which I have seen growing several times in the United States, and which is known by its producing several heads upon the same stalk, is highly productive on rich land. Its flour, however, is not highly esteemed. It does not well bear the cold. It is liable to degenerate, and to produce, at last, only one head.

A large portion of the soil of France is unfavourable to wheat, from its excessive dryness. Though, beyond doubt, a soil partially calcareous is favourable to wheat, yet this quality in excess is unfavourable. The soil for wheat cannot

be too good, though it would seem as though there were exceptions to this remark in some of the rich alluvions of the West; but it may be made too rich by manure, and especially by manure applied in too green a state. It is in general the custom to apply the manure to the previous crop, though in many cases, and especially where liquid manure is attainable, it is applied immediately before the sowing of the crop. This was particularly the case in the instance which I have given, of seventy-two bushels being produced to an acre.

A naked fallow is sometimes resorted to in France, especially where the land abounds in weeds, and more particularly the squitch-grass<sup>1</sup>, which peculiarly infests the old lands in Europe. The quantity sometimes collected from land, in what are called even good farming districts, is surprisingly great, and would lead one to infer, in some cases, that it was the principal crop grown.

As to the crop which is deemed best to precede wheat, I shall give the opinions of the best farmers in one of the best cultivated districts in France. Where tobacco has grown, wheat succeeds to great advantage. The cultivation for tobacco is clean and careful, and the manuring abundant. Wheat follows hemp with equal success, because the cultivation of hemp is equally clean with that of tobacco, and it is even more strongly manured; but the straw of wheat which follows hemp is not so abundant as after tobacco. Wheat after cabbage yields less straw than after some other crops, but more grain<sup>2</sup>. Beans are by some farmers regarded as a crop propitious to wheat, but not so favourable as those crops to which I have referred; and by others it is believed to produce less grain, and that of an inferior quality. After Indian corn the wheat gives a good grain, but an inferior

<sup>1</sup> *Triticum repens*.

<sup>2</sup> "It is calculated that 120 sheaves of wheat grown after cabbages, will give more grain than 150 sheaves grown after tobacco."—Scherwz, "Culture D'Alsace."



amount of straw ; but in some localities it is represented as giving an equally good product in grain and straw. After lucerne, wheat is cultivated to great advantage ; the lucerne strikes a deep tap-root, which greatly enriches the ground when it is turned in. Wheat succeeds well after clover, if the clover is good ; if the clover is poor, the crop of wheat is likely to be inferior, which is in other words only saying, if the land is rich, the crop will be good ; if in poor condition, the result will correspond. Potatoes are generally condemned as a crop to precede wheat. In parts of France where wheat is grown every second year, potatoes are frequently the intermediate crop ; and then the wheat, as well as the potatoes, are manured. After turnips, wheat is stated to be richer in straw than in grain. The rotation differs in many places, sometimes wheat occurring every other year, and sometimes only twice in six years.

I cannot look upon these various statements with all the confidence which some persons place in them. A presumption is always in favour of the general and long continued practice of any country ; yet it is far from being an infallible test of what is good or best, because it is by no means certain to be the result of experiments carefully made, and as carefully noted. Two or three great points, however, seem to be fully settled ; that the land for wheat cannot be too deeply cultivated, nor too thoroughly manured, in the crop of the preceding year ; and that it cannot be too thoroughly cleaned. Mr. Coke of England, afterwards Lord Leicester, offered a large reward to any person who would discover a single weed among his crops, after their usual cleaning. The wheat plant sends out descending, as well as lateral roots. After land has been thus well prepared, it is not deemed best to plough more than two or three inches for the sowing of wheat. By many persons, in climates where the frost heaves the land deeply, it is deemed best to cover the seed of autumn-sown wheat by the plough. Where the land has

been ploughed in the autumn, it is advised only to harrow the land in the spring, and harrow in the seed upon land thus prepared, and press it closely with a roller. Land is frequently after being sown trodden by men, but better by sheep: a practice to which I have referred in my remarks upon English husbandry.

In England, certainly by all the best farmers, wheat is sown in drills with a machine. These machines are in general, like many of the agricultural implements of England, where they admit of being so, heavy, complicated, and expensive; but they do their work in an admirable manner; and many of them are contrived so as to sow the manure, when in a state of powder, at the same time as the seed. Many of the French farmers sow their wheat in drills, and by a machine, but not of a very improved character. In Switzerland I found drill machines, invented and made in the country, not expensive, which certainly performed their work well. Experiments have been made in France of planting wheat in hills, six inches or more apart, by a hoe; making the hole, and dropping several seeds in the hill, as Indian corn is often planted in the United States. There must be obviously a great saving of seed by this mode; and the result has been pronounced successful; but I have not been able to get full information. It was said to be by this mode that a crop of seventy-two bushels to the acre was produced. The crop, while growing, was manured with liquid manure, and was kept thoroughly clean. This resembles somewhat the mode of planting by a dibble in England. Such a mode would, at first sight, be strongly objected to in the United States, because of the labour which it would require. There is often a difficulty in the United States of procuring labour for any consideration; but other things being equal, a wise farmer would not ask simply, what the labour would cost, but whether the result would compensate the labour.

The quantity of seed sown to an acre is ordinarily two bushels, more frequently less than more. The quantity depends somewhat upon the nature of the soil, a larger quantity being sown upon inferior than upon good soils. Somewhat depends likewise upon the time of sowing. If sown early in September, the plants have a longer time to grow, and tiller more abundantly than if sowed later. Early in September is the time ordinarily recommended for sowing wheat, where the previous crop can be got off and the ground be made ready. In situations where the winter is severe, late sowing is strongly recommended, so that the wheat may make little or no progress before the early spring. In this way the crop is secured from the injury of the frost, which, when it destroys the young lateral roots, is extremely unfavourable if not destructive to the crop. The wheat crop does not suffer from the severity of the cold where it is uninterrupted, but from alternate freezings and thawings. When the ground is expanded by the frost, the small roots of the young plants are broken and mutilated, and the plants being often thrown out of the ground perish.

The diseases common to wheat in the United States are equally common in Europe, the smut, the rust, and the mildew. A remedy or rather preventive of the first, in almost all cases successful, is well known in the United States,—the washing wheat in brine, and sprinkling it with lime. Probably, the only advantage of the brine over simple water is, that its adhesive nature makes the lime stick to the seed. A solution of green copperas is equally effectual; and sometimes arsenic is used. The last is objectionable, from the danger of having the substance about the premises. The wheat may be prepared two or three days before sowing, but it must not be allowed to become heated. If laid in a heap upon the floor, it should be occasionally stirred.

The rust and the mildew seem mainly due to atmospheric causes. When the wheat is particularly forced by alternate

sunshine and rain, attended with extreme heat, when every species of vegetation is urged to the top of its speed, and especially where the land itself is very rich and the air stagnant or confined, it seems as if more sap were forced into the plant than it could dispose of, the vessels burst, and the plant in truth dies of repletion. My own experience and observation seem fully to confirm this theory. The blight of mildew is a different affection. The causes are not well ascertained, and the preventives equally undetermined. A distinguished German clergyman or pastor, and I may be allowed to add in passing, that to no profession has agriculture been more indebted for its improvements, after long and careful observation is of opinion, that three causes may produce it; the state of the atmosphere, when the plant is in a particular stage of its growth; an unfortunate choice of the time of sowing; or the particular condition of the soil. He has found that, in the same neighbourhood, the wheat in some fields has been badly affected, while in others it has escaped the mildew. This circumstance seems opposed to the atmospheric theory; yet in the same country, the state of the atmosphere may be different in different positions and aspects of the field. Every one must have experienced this in passing along a public road in an evening; without a thermometer we become sensible in different places to great variations of temperature. With us in New England late-sown peas seldom escape the mildew, or what is called the blue mould, which has seemed to me attributable to the heat of our autumnal mid-day sun, followed by the chilliness of our autumnal evenings and their abundant dews. The same theory may account for the facts which he mentions in regard to sowing. He has sown wheat in September, which has suffered slightly from mildew; in October, in the same year, which has suffered severely; in November, which has entirely escaped. The circumstances in these cases are not all given. It is, therefore, difficult to make up a judgment;

but one would infer that the late-sown wheat was carried beyond the susceptible season. The influence which the condition of the soil may have upon the health of the plant in this matter, or how far it may be affected by the manure employed, are points not determined. In one district in Alsace it is said the farmers find their wheat liable to suffer from mildew, when it follows clover which has been highly manured; but the manure customarily used in this case is the manure of hogs, to which some are disposed to attribute this result. Nothing seems more uncertain, or rather more imperfectly defined than agricultural facts, excepting it be agricultural theories. In order safely to deduce a valuable or practical truth from facts, the facts must be accurately and exactly determined and observed; but few men have this patience of observation. All the circumstances under which they occur, likewise, should be known and considered. Few men have the capacity to discover and comprehend them; and, in many cases, it must be confessed that, in our present state of knowledge, they are with difficulty ascertained. This disorder is clearly not propagated as smut is; and liming the seed has no effect in preventing it. This farmer is of the opinion that it does not depend upon the manure employed; at the same time he is in favour of turning in a crop of clover as manure for wheat, rather than to apply animal manure. Some persons confound the diseases of rust and mildew. The result is much the same, but the appearances are different; the crop being in both cases nearly ruined. In the case of rust, the wheat becomes suddenly attacked and the stalks covered with literally a red rust, the grain ceases to fill, and becomes shrivelled. In the case of mildew, the plants become covered with a whitish mould, and the stalks themselves become discoloured in various places, and turn black, as in a limb where mortification has taken place.

I have obtained no information as to what is called in the United States the Hessian fly, from the eggs having been

supposed to have been brought to the United States by the Hessian soldiers, who were the mercenaries of the British government in the American revolution. I cannot learn that it is known here. The grasshoppers, or, as they are here called, the locusts, become destructive to a wheat crop, when the grass fails in the fields. The grain-worm, of which I have given an account in my State Reports, and in other publications, does not appear to be known on the Continent, though they have heretofore suffered from it in England<sup>1</sup>. Such scourges seem often temporary or periodical.

I have spoken of the quantity and the preparation of the seed. It is said by some that shrunken seed, or seed imperfectly ripened, will germinate and serve for another crop as well as that which is perfectly sound. I believe it may be considered as an established axiom, that perfect seed is always to be preferred to that which has any defect. In many provinces new wheat is always preferred for sowing; but many experienced farmers advise to sow wheat which is a year old, as a security against smut; for though the crop may have been smutty, from which the seed in such case is taken, the smutted ears are said, in the course of the year, to lose their germinating power, and do not communicate the disease to those grains with which they come in contact. A farmer, however, can hardly excuse himself for neglecting to take the prescribed precautions against smut in the preparation of the seed, which have been usually found effectual;

<sup>1</sup> I believe there is an effectual remedy against this destructive insect, under whose ravages I have known the most promising crops completely ruined. The fly, from whose egg this insect or worm is generated, appears first at the time when the wheat is in flower. If at that time the growing crop is slightly sprinkled with newly slaked lime sown broad-cast over it, it will commonly save the crop. It will either prevent the fly depositing his egg, or by its causticity it will destroy it. The mode is of no importance compared with the result. The destruction of the crop is not evident until the time for harvest; and then, though the external appearance may be perfect, there will be found in the grain or kernel a small yellow worm or maggot which has completely destroyed it.

and it is obvious that if old seed is used in preference to new, a larger quantity is required to guard against the failure of such as have become effete. In some provinces, they deem it necessary to change their seed once in two or three years. But the reason given by some persons for this practice is, that the cultivation in these departments is slovenly and negligent, and so the wheat degenerates. I think experiments have fully demonstrated as applicable to all plants, that where the cultivation is good, and the kind itself good, we have only carefully to select from year to year the very best for seed, and there will be found no necessity for changing the seed ; and the crop itself will be likely continually to improve. In some cases, and especially where the cold is severe, and the winds are strong, it is advised to plough in the seed-wheat to the depth of about three inches. The best cultivators advise this always, especially where the lands are light ; but it is a slovenly mode, as practised by some, to sow it upon the stubble of a preceding crop, and merely harrow it in. If nothing else, the benefit arising from the decayed stubble or the clover, when turned under as manure, is thus almost wholly lost. Wheat which is to be sown on a clover stubble<sup>1</sup> is advised to be sown two or three weeks earlier than that which is sown after tobacco or hemp, that it may gain strength ; and it is the custom where wheat is sown after tobacco, to spread the stalks of the tobacco crop upon the field, where they remain until the spring, when they are removed. I do not know the advantage of this, unless as a protection against the cold.

Nothing is more prejudicial to the success of a wheat crop,

<sup>1</sup> Wheat manured by turning in a green vegetable crop, is supposed to have less strength, and is therefore more apt to become lodged, than that grown after a crop which has been manured with rich animal manure. The occasion of the stalk of wheat being tender, and the wheat therefore more liable to fall, is said to be owing to a deficiency of siliceous matter in the soil. But there are few soils where this deficiency exists. I give these opinions as opinions resting upon respectable authority, but without vouching for them.

than excess of wet ; either stagnant on the surface, or in the soil. I have as yet met with no cases of underdraining or subsoiling in France, but the value of this immense improvement will presently be understood. Where the soil is clayey and wet, wheat is sowed in beds or stitches, and the drains between them kept clear. Experiments have been made in some parts of France for the irrigation of wheat, and with success, where a porous soil or a sufficient drainage immediately carried off the water ; but of course it operated most injuriously where the soil or the surface retained too much wet.

The cultivation of spring wheat, unless the land is prepared in the autumn, is liable to many objections. The spring season is crowded with labours which must then be accomplished or not at all. Land ploughed in the autumn, which is, from its position or the nature of the soil, liable to retain the water of winter, is difficult to be worked even by the harrow in the spring, and in an unhealthy condition for being sowed. Spring wheat, though making an equally good flour, and for some purposes more esteemed than any other, seldom yields so abundant a crop as autumn-sown wheat.

In some instances, wheat is carefully weeded and cleaned in the spring ; but this, in examples under my observation, has not been executed by a machine, nor very perfectly done. Nothing can be more beautiful than the cultivation, in some parts of England and Scotland, where wheat is sown in perfectly straight lines by a machine, and then carefully cleaned by a horse-hoe. Though I have seen good crops of wheat in France, the cultivation in numerous cases was far from being clean. When the early-sown wheat is far advanced in the spring, it is sometimes mowed ; but this practice is not approved. It is sometimes fed down by sheep, and with great advantage ; but it is advised not to put horned cattle upon it. This feeding of the wheat should be done, however, only when the crop is very luxuriant, and before May.



The wheat is sometimes manured in the spring on the surface, where liquid manure is easily obtained. Ashes, wood ashes, either crude or leeches ashes, are applied to wheat with the greatest benefit. This is done in the spring when the wheat is harrowed. The harrowing of wheat in the spring, when it is a few inches in height, is practised and strongly commended by the best farmers. I have full confidence from experience in its utility. In England, where the wheat is cleaned and cultivated by a horse-hoe or scarifier, this is an effectual substitute; but where wheat is not cleaned by a machine, or where it is sown broad-cast, the practice of harrowing it with an iron-tooth harrow of considerable weight, and that two or three times, is strongly commended. This practice is said to have been suggested by accident to a common farmer, who, having sown clover upon his wheat in the spring, was afraid that in some cases the seed would not take, and ventured to harrow it in. He found to his surprise that the wheat which he had harrowed was much superior in the end to that which the harrow had not passed over. It is a general practice in some of the districts of France, to sow clover in the spring upon the wheat. This is a well-known practice in parts of New England, where it is sown upon the snow; and, I am sorry to add, sown in many cases in the chaff from the barn-floor, when, of course, a variety of weeds and worthless plants are sown with it. The dung of domestic birds, pigeons, or barn-door fowls, where it can be obtained, is sown with much advantage upon the growing wheat in the spring.

Where spring wheat is sown upon land ploughed in the autumn, which has not suffered from wetness, it is not necessary to replough it, but to put the seed in simply with a harrow and a roller. It has seemed to me that the European farmers sometimes labour their lands too much, as in turning in a clover or stubble crop or a grass sward, they take pains to break the sward, and bring all the

vegetable matter to the surface, to be burnt in some cases, or to be dried and exhaled in others, instead of leaving it to its natural decay under the soil, and its conversion into food for the growing crop. They are hardly aware of the amount of this vegetable matter, as demonstrated by an eminent farmer in New England, and a farmer who would be eminent any where, who found, by actual measurement and calculation, that the vegetable matter in a common closely-fed, field, or meadow, weighing the roots as well as the tops, amounted in an acre to full thirteen tons<sup>1</sup>:

The manures applied to wheat are a matter of great importance. Different wheats, or wheats grown in different localities, differ very much in their nutritious properties, or in the quantity of good bread which can be obtained from them. The valuable and nutritious qualities of wheat are supposed to depend on the proportionate quantity of gluten and albumen which it contains. This is ascribed by many persons to the nature of the soil in which it has grown, and to the kind of manure which has been applied to it. This theory is altogether probable, and perhaps sufficiently established to induce us to act in reference to it; and, therefore, to apply manures which are likely to contribute to the growing plant the elements required. But many other things may come into operation, such especially as the climate and temperature, and other influences which are as yet imperfectly understood by us. The quantity of flour yielded by different wheats varies considerably, as the millers well understand. A distinguished French chemist, in examining 21 different kinds of wheat, found that the average yield in flour was as 79 of farinaceous matter to 100 pounds of crude grain. But this flour differed very much in its constituents in different kinds of grain. In actual nutritious matter, the difference in different wheats was found to be as

<sup>1</sup> Mr. Phinney, of Lemington, Massachusetts.

fourteen to twenty-one. These were wheats grown in different countries, and different latitudes. If this difference depended wholly upon climate, it would of course be entirely beyond our control.

In wine countries, it is known that in different localities the same species of grape produces a wine of an altogether different quality and value from what it does in others. The kind of grape, the mode of culture, the degree of ripeness, the mode of making the wine, the age of the wine, and, doubtless in many cases, various artificial processes, affect to a degree the quality of the wine produced; but, beyond all this, there is something in the locality which is believed to determine its character. The celebrated wine, known as Constantia, is the product of a very limited territory at the Cape of Good Hope. In passing up the Rhine, there was pointed out to me the estate of Prince Metternich, where the celebrated Johannisberg wine is produced; and it is produced no where else; and from this circumstance its production is a source of immense profit. These facts seem to demonstrate the truth of the reply made always to my inquiries in relation to the subject, that there is something as yet unascertained, some peculiarity in the climate, aspect, or soil, from which the product derived its characteristic properties. The same or similar circumstances may operate upon the quality of wheat; and it is obvious, as far as they are strictly local, dependent upon the climate and aspect, or upon any peculiarities of the soil which do not exist any where else, or upon any causes as yet unascertained, they are beyond our reach.

But that the qualities of the wheat grown depend to a considerable degree upon the kind of manure employed, there can be no doubt. Some experiments in reference to this matter, made by a German farmer, may be interesting to my readers.

Wheats manured as underneath produced as below:—

	Gluten.	Starch.
1. With human urine . . . .	35·1	39·3
2. „ oxen's blood . . . .	34·2	41·3
3. „ human excrements . . . .	33·1	41·1
4. „ dung of sheep . . . .	22·9	42·8
5. „ „ goats . . . .	32·9	42·4
6. „ „ horses . . . .	13·7	61·6
7. „ „ pigeons . . . .	12·2	63·2
8. „ „ cows . . . .	12·0	62·3
9. Soil not manured . . . .	9·2	66·7 <sup>1</sup>

I am unable to say how far these experiments are to be depended on; and how far they have been confirmed by other experiments made with the same intention. Two things are quite remarkable in respect to them; the one is the different qualities of grain grown with manures of the greatest efficacy, and that grown without any manure, being a difference of nine and thirty-five; and the comparatively low result of pigeon's dung, which is generally rated very highly, and supposed to take its place with guano. The manner in which the animals whose manure was used for these experiments were fed, is a circumstance which may have materially affected the results: for the qualities of the manure of the same animals, under different courses of feeding, may be expected to be composed of different elements, and so to give different results; so complicated necessarily are all experiments of this kind.

The farmers in France are behind no others in what may be called, technically, agricultural science; and some of those eminent men, who are sometimes called farmers of the closet, have gone into the most exact and minute mathematical calculations as to the actual amount of certain mineral

<sup>1</sup> Cours D'Agriculture, par Gasparin.

elements, which are supposed essential to the growth of the crop, or of any particular crop; and next, as to the amount of these mineral substances, which any particular crop carries off in the straw, and in the grain. They then proceed to determine the exact amount of these substances, which must be restored to the soil in order to keep up its fertility. The first point is determined by analysing with great chemical exactness a portion of the soil; the second, by analysing a portion of the crop, of the straw, and the grain; and these premises being obtained, the third is of course matter of plain inference. These calculations are curious and ingenious, and if vegetation or the growth of plants were as simple an affair, and as well and as easily understood as many pretend that it is, these facts would have a most direct and immediately practical bearing. One of the most eminent of these calculators, however, himself admits that the application of these facts, or rather the rules deduced from them, is an operation difficult, delicate, and which only the most skilful persons can undertake<sup>1</sup>.

In the present very imperfect state of our knowledge of vegetation, I am free to express my conviction, that they will answer no other purpose than that of mere curiosity and amusement. In the analysis of a soil, for example, if we suppose that a cubic foot is taken, this may be a very inadequate representative of other parts of the field. If the soil is taken from the surface, or that part of the soil which is cultivated, yet there is the soil under this, into which the roots of the plant may extend themselves, and which may contain elements of which we are not apprised. In the chemical analysis of a soil, it is known, likewise, that much of the active portion, all the vegetable portion, is dissipated by heat, and no account is obtained of it but by the loss in weight. The analysis of a soil, likewise, though it may give

<sup>1</sup> Gasparin's Course of Agriculture, vol. iii. p. 405.

all its component parts, is sure to destroy their combination, and disturb the relations which they held to each other. There is another great omission in this case. Notwithstanding all the analyses which have been given of soils and products, where the amount of mineral elements removed have been most particularly determined, yet I have met with no instance of the analysis of a soil immediately after the removal of the crop; by which, on comparison with its condition at the time of sowing, the actual loss could be detected. This is a great desideratum, which we may hope will presently be supplied. The assumption of one most eminent agricultural chemist, that vegetation is nothing more than a simple chemical process, according as the science is now understood, is remarkable for its boldness; but the proof certainly is not at present complete. I think he might as well have said that animal life is purely a chemical process, as that vegetable life is such an one. That which proceeds with such perfect regularity, that of which we can understand so many of the rules and principles by which it is governed and directed, that which we can to so great a degree control and regulate by the observance and application of these rules, is a matter which, we may presume, is not absolutely beyond the reach of the human faculties, and which we may hope, in the progress of inquiry, will presently be understood; but when all the phenomena of vegetable life are considered, and even some of the most familiar, we find ourselves quite as much at a loss to comprehend the processes, as to understand, in respect to animal life, what first sets life in motion? how are the bones framed? how are the muscles packed? how is the wonderful machinery of accretion, digestion, circulation, and assimilation arranged and impelled? and how is it that, by ten thousand of what we call accidents, all this may be arrested or broken up, and the whole return to its original elements? The same remarks apply with equal force to vegetable as to animal life, and

how far we must go before we reach the final and the first Cause, no human sagacity has as yet approached a solution.

A great many exact calculations have been made in reference to the weight of straw compared with the weight of grain, and the weight of stubble, when wheat is reaped with a sickle, compared with the whole weight of grain and straw. These results must, in different cases, be so affected by the seasons and soil, by the amount of crop, by the time which the plant has had to mature itself in, by the height at which the grain is cut, and by the condition of the straw when dry, that it would be difficult to draw any practical rule from them. In ten different experiments made in reference to this point, which have been shown me, no two agree.

In respect to the manures proper for wheat, I shall say something in another place. Every one seems to acknowledge the value of potassium, the principle which is found in common wood ashes. This accords with the result of my own experience and observation; for when called upon, in the way of my official duty, to examine the modes of cultivation and manuring, in no less than thirty-six hundred experiments in the culture of wheat, I found that wherever ashes were used upon the field, their efficacy was emphatically commended. The chemical analysis of wheat, taking straw and grain together, gives only a small proportion of this principle in the whole mass, such as 2 parts in 300; but this seems evidently indispensable. Whether it is absolutely necessary in a certain proportion, as food of the plant, or whether it operates in preparing other matters in the soil to become food for it, I shall not presume even to give an opinion. I must submit to minds qualified by the high attainments of science, to follow out inquiries so subtle, and at the same time so curious.

I have occupied the attention of my readers a long time on the subject of the culture of wheat, because of its immense importance. In the United States we cannot be said as yet

to have known want ; but in the years 1812 and 1816 there was, throughout the whole of New England, an almost entire failure of the crop of Indian corn ; and it was not until such experience came upon us that many persons were fully sensible how much and how essentially this product entered into our daily wants. The wheat crop has become infinitely more important, for, with the exception of the slave states, I do not know a district of the country where it does not form by far the principal food of the population. But one has need to have lived in Europe through a famine to know the immense importance of any great and general article of subsistence ; and the suffering among the mass of the community, which follows even its scarcity, still more the miseries and horrors which its total loss brings upon them. It is a fact which, as long as human memory endures, will stand out in bold relief on the darkest pages of history, that, in the years 1846 and 1847, in a country not so large as New England, by the blight of a single crop, not less than 116,000 of human beings actually perished by the awful death of starvation, not to add the thousands, I may add safely the hundreds of thousands, who were swept away by diseases engendered by unwholesome or insufficient food ; and not to recur to the awful sufferings of the thousands and thousands who had strength enough to struggle through this trial, and in the midst of this dreadful shipwreck were just able to reach the shore.

With a rapidly increasing population in all parts of the civilized world, the production of bread is obviously the first object to be sought after, alike by the statesman and the peasant. I scarcely dare give the calculation of the immense amount which would be realized in any great country, by the single saving of a bushel to an acre, in the quantity of seed ordinarily sown<sup>1</sup>. The same result would follow if an addi-

<sup>1</sup> The annual amount of seed for wheat sown in France is estimated at 32,491,978 bushels. [If



tional bushel could be produced in the annual average yield of the wheat crop. Even this simple result would be an ample compensation for all the labours and expenses of all the agricultural societies now existing in the world, and the premiums by which, in any country, the Government have aimed to enlighten and stimulate production. I have not a doubt that, under an improved culture, not only may there be such an increase as to defray all additional expenses, but to add an average increase of five bushels to an acre. It is impossible to exaggerate the advantages which would result from such an improvement.

In looking back upon what I have written on the culture of wheat, it may not be without advantage to revert to some prominent points.

The soil in which wheat is grown to most advantage is a deep aluminous soil, but not so clayey as to prevent its being thoroughly cultivated. It requires, therefore, a good mixture of calcareous or siliceous matter. A soil of excessive lightness or looseness is not favourable to wheat, and a hard and impermeable soil equally uncongenial.

The soil cannot be too deeply cultivated for wheat. The roots of the wheat plant descend perpendicularly, and spread themselves laterally and broadly in search of food. It would be a mistake to plough too deeply for wheat at the time of its being sown; and it is always useful to roll or tread the

If we could suppose a third of this saved, the saving would amount to . . . . . 10,863,959 bushels per year.

Suppose an annual increase of the crops of five bushels per acre, this would give an increase of production of . . . . . 54,319,795 bushels.

Add this, under improved cultivation, to the amount of seed saved, and the result would be . . . . . 65,183,754 bushels.

I believe, under an improved agriculture, this is quite practicable. What economical object could be more worthy of the Government of a country than, by every means within its reach, to encourage such production?

soil after it is sown ; but it is desirable that it should find a deep mellow bed below ; and this is the case when it succeeds such plants as madder or tobacco, or especially where the soil has been deeply and thoroughly trenched.

Wetness is peculiarly unfriendly to wheat. Surface water, that remains long upon the land ; or wetness, which stagnates and remains long in the soil, are highly prejudicial to wheat. This gives the great value to the Deansten system of draining and subsoil-ploughing. The water which falls in such case soaks immediately into the ground and is carried off. Where there is no subsoil-ploughing, and where the soil is of a retentive nature, the laying up the soil in narrow, slightly rounded beds or stitches, so that the water may pass off at once by the intervals, is highly important.

Wheat land cannot be too clean, or be kept too clean from weeds ; and for this reason it should follow a crop which has been kept thoroughly weeded. The small kinds of clover may be advantageously sown with or upon wheat in the spring. This will not impede the growth of the wheat ; it in some measure serves to keep down weeds ; it protects the ground, in hot climates, from the great power of the sun, after the wheat has been cut ; it furnishes some food for stock, after the wheat has been harvested ; and it enriches the land greatly, when it comes to be ploughed in.

Wheat should be sown in drills four to six inches apart, or better dibbled, or sown in hills, which is not an excessive labour, where it is done by skilful and experienced hands. In any event, whether sown broad-cast or in drills, it should be cultivated, and the ground carefully stirred by the harrow or the scarifier.

Early sowing is strongly recommended in warm climates, so that the crop may come off before the extreme heats of summer ; but it is advised, in cold climates, to sow wheat quite late, that it may not make any, or but slight progress, so as to be exposed to the severe frosts of winter, but be

ready to show itself with the earliest spring. The climate of Great Britain is deemed peculiarly favourable to wheat, because of its equable temperature, and its humidity. The plant grows a longer time, and is longer in maturing itself. The harvest in England and Scotland comes off ordinarily a month later than in the United States, where the extreme heat of summer often renders the plant prematurely ripe. The wetness of the climate in the former, however, makes the harvest more precarious.

Of manures for wheat, it is ordinarily best that they should be given with the preceding crop. Green, or coarse manures from the stables, applied directly to wheat, are universally deemed objectionable. The effects of lime on the soil may be considered as threefold; first, in dividing a tenacious soil, and rendering it friable; second, in preparing the vegetable matter in the soil for the nutrition of the plant; and, in the third place, some portion of it may be taken up with advantage by the plant itself. The principle of potassium in the soil, in the form of common wood-ashes or otherwise, seems always highly beneficial, and almost indispensable. Liquid manure, urine diluted with water, is sometimes applied to the growing crop with great advantage. I have known also the water in which flax has been rotted applied with remarkable success.

The harvesting of wheat should take place rather early than late; that is, while there is a degree of greenness about it, rather than to wait until it becomes perfectly dry, as in such case much will be lost in shelling out. In the former case, it becomes ripe in the shock; and it seems well established that, when cut early, it makes better bread, and more is obtained from the same quantity of flour.

These are the great axioms which I have gathered in respect to the cultivation of wheat on the European continent. The importance of the subject will be a sufficient apology for my pursuing it at this length, though I may have

added little to the knowledge which exists in my own country; and though, in many parts of the United States, as I well know, the practice may be already highly improved. When all its various uses are considered, the ease of its cultivation, the great amount, under good and liberal culture, of its production, and the few accidents or maladies to which the crop is liable, and more than this, the amount which it returns in manure to the land, I know no plant or crop so valuable as that of Indian corn (maize), in countries where the climate admits of its ripening; but wheat has the universal pre-eminence in public estimation; its use in civilized countries is daily becoming more general, and is taking the place of all coarser grains; and, in a commercial view, as well as an article of subsistence and luxury, it will continue to occupy the highest place among the cereal grains.

2. SPELT.—There is cultivated in parts of France and in Flanders, an inferior kind of wheat, called spelt (in French *épeautre*<sup>1</sup>), which mainly differs from other wheat in that it retains the husk on the grain, until separated by a machine. It is in many places used for bread; and in nutritive matter, as far as chemical examination goes, it bears a proportion to wheat of thirty-nine to fifty. It is said to exhaust the soil much less than wheat, but this point is controverted by high authority. It will yield well on a poor soil, and for this it is often chosen; but it will afford, also, an ample compensation for good treatment. The straw is stiffer than that of wheat, and though harder, is preferred by cattle. It will bear to be cropped once or twice in its early growth for green forage, and is deemed excellent for this purpose. It endures the drought like rye, and will grow well upon lands which are too light and dry for wheat. The difference between the weight of the grain of spelt with its husk on, compared with wheat,

<sup>1</sup> *Triticum spelta*.

is as forty-two to seventy-six ; and the ordinary difference in price is as seventy-two to one hundred, allowing for the extra expense in hulling and grinding. Under very good cultivation it is stated to yield about thirty bushels to the acre, with the hull, or in the husk.

Of this grain there are two kinds ordinarily cultivated, the red and the white. Some of each kind are bearded, and some without beard ; and there is a spring and an autumn variety, although, by careful selection of the earliest ripe, the autumnal is without difficulty converted into the spring variety. It is said, likewise, that under a negligent culture, the beardless will become bearded, and that under a good culture and a rich soil, the bearded will lose its awns. The red variety is preferred, as more hardy, and suffering less from wet or cold, as giving a stronger and more abundant straw, being less subject to disease, and producing a better flour.

The quantity of seed required to an acre is double of that for wheat, because it is sown in the husk. A crop of hemp is sometimes taken from the land ; if this is got off early, turnips are then sown, and after the turnips, spelt. If the crop of potatoes are kept clean, spelt is sometimes sown after them ; in which case the land is not ploughed, but simply dragged or scarified, and the spelt merely harrowed in. If it is deemed necessary to manure the land in such case, the manure is spread on the potato ground, the seed then sown, and both thoroughly harrowed in.

With the husks adhering to the grain, spelt is said to furnish a substantial and excellent provender for horses. The straw being very strong, it is much sought after for the manufacture of hats. It is not a saleable grain in the markets, because wheat is generally preferred, and because the millers object to the grinding of it.

I have heard of a crop of ninety-four bushels to the acre, but I lack faith in results so extraordinary. In comparing

this with wheat, it is to be remembered that this was measured in the husk.

The proportions of spelt in the straw, without taking any account of the stubble, are given as follows :—

Grain-clean . . . . .	46·38
Husks . . . . .	15·05
Straw . . . . .	36·43
Loss . . . . .	2·14
	100·00

And 100 parts of the grain in the husk give as follows :—

Grain-clean . . . . .	72·96
Husks . . . . .	23·67
Loss . . . . .	3·37

These results can be considered only as approximations to exactness, as they must be affected by a variety of circumstances.

There is a smaller and inferior kind of spelt<sup>1</sup>, which is only cultivated where it is thought too poor even for rye or oats, but which yields very little. The flour of this grain is excellent for some domestic purposes, and it is thought to pay the little care and labour which it receives.

I have often remarked, that there are certain persons or classes in society occupying a humble and menial condition, whose services are indispensable, and of whose services all classes are always ready to avail themselves. Their services likewise are always tendered willingly, and with a demand only for the smallest compensation. We consider them as doomed to occupy the condition in which they are placed; and we never think, under any circumstances, by any pains-taking in their education, or any indulgence of those aspirations to

<sup>1</sup> *Triticum monococum*.

rise which we sometimes see kindling in them and almost as suddenly going out, like the sparks of an expiring fire, of raising them to a higher condition, or of placing them among their aristocratic superiors. This seems to me precisely the condition of spelt-wheat and of rye. They are in themselves most valuable grains, but we never think of giving them any but the hardest treatment. They make very fair returns in a poor soil, without manure, and with very negligent treatment. We pretend to think that they are adapted only to such soils, or such soils adapted to them ; but we do not take the pains to see what they would do, or what they would become under the best cultivation. I believe it is with plants as I believe it is with men, that in the works of the Creator, the law of progress is applicable to every living thing ; that the maximum of improvement, if improvement be not absolutely infinite, has yet in no case been reached ; that it is the great duty of life to see what can be done in this respect for ourselves and for others ; and that in the vegetable and the animal world, in the physical and the intellectual nature, we know as yet little of what culture and education may do for the most humble and the most despised.

I hope the kindness of my readers will pardon me if for a moment I extend these moral analogies. The more the cultivation of what is called the inferior grains is extended and improved, the more the wealth of the community is increased, the more are the means of subsistence and the comforts of the poor extended, and the more enlarged become our means of improving the culture of the superior grains. The superior classes in the community, who now too often look with jealousy upon the advancement, and, as they sometimes term them, the encroachments of the lower classes, in this respect commit a great error. In proportion to the improvement and elevation of the community around them, is their own condition improved. All intellectual and moral good is of a self-multiplying and reflective character. Would a farmer

take credit for leaving a large portion of his farm in a rude and neglected condition? It might place his improvements in a stronger light by contrast, but would it be a contrast in any respect to his advantage? Would it not be much more to his wealth, honour, pride, and happiness, to see every part of his domain presenting the brilliant indications of enlightened and improved culture? and would the improvements and productiveness of the inferior in any respect prejudice those of the better portions?

3. RYE.—Rye is very extensively cultivated in Europe—in Great Britain to a small extent; on the Continent, and especially in the northern portions, it forms a principal part of the bread of the people. In Germany, in Belgium, in the cold and mountainous districts of France, and in Russia, it is their main dependence. To the Flemish it has been a great source of wealth through their distilleries, not only in the liquor extracted from it, but in the number of swine and cattle supported and fatted in these distilleries, and the abundance of manure in this way produced. There is a debtor side to this amount in the Pandora's box of evils, which such a product always opens upon the community, in the crimes, and misery, and degradation, of which it is the fruitful source; but I shall leave this, as somewhat foreign from my subject, to the sober calculation of my readers<sup>1</sup>.

<sup>1</sup> The distilleries in Holland, under the imposts of the Government, and the heavy duties upon the introduction of their produce into France, have been almost entirely destroyed.

Each of these distilleries in the course of a year fatted 180 head of cattle. The amount of grain consumed at each of them was estimated at 276,765 bushels. These establishments, besides the powerful stimulus which they gave to cultivation, in the market which they afforded for the grain produced, furnished likewise the most abundant supplies of the richest manure.

There was this advantage also arising from them, that in case of scarcity or famine, the immense supplies of grain which they always had on hand, were diverted from the manufacture of gin to the supply of bread for the people. This was giving the loaf instead of the scorpion.



The bread from rye is not deemed so nutritious as that from wheat, but it is healthy and good; and a distinguished German maintains that it has a sovereign efficacy for persons whose nervous organization is exhausted or deranged by sedentary pursuits or intense application to study.

Rye succeeds even on a light and dry soil. A clayey, or wet, or calcareous soil is not congenial to it. It grows well even upon a sandy soil, where scarcely any other grain will succeed. There is no grain cultivated which yields so large an amount of straw; and this renders it valuable for litter and for the means of further enriching the soil. The straw is valuable for many other purposes; and particularly for thatching both houses and stacks of grain. In France, vast amounts are used in protecting their wine, when it is transported from one place to another, from the sun, and in covering other merchandise on its way to market. It is said that four crops of rye do not exhaust the soil so much as three of wheat; and, indeed, it has come within my own experience in the United States, that where rye has been cultivated for a considerable term of years successively on the same land, and early clover has been sown upon it in the spring, and ploughed in with the stubble in the autumn at the time of sowing for the next crop, the land, without any other application, has been in a course of gradual improvement, and the yield of rye continually increased. This is a common practice among the best Flemish farmers, and highly approved.

Of the rye cultivated, there is the winter and the spring rye, which differ from each other only in the time of sowing, excepting that the rye sowed in the autumn is more productive than that sowed in the spring, having a longer time to grow in. The rye, which I have described in another place as the St. John's-day rye, and which has been recently introduced into England, is known in France as the multi-caulis or many-stalked rye. It is sown in June, and will bear cutting two or three times for green forage, and yet

yield a good crop. It has the property of tillering or spreading from the root very abundantly, though it is maintained by some farmers that other kinds of rye, managed in the same way, would show the same properties; and the multicaulis rye sown late in the autumn loses this property. The grain of the multicaulis rye is not so saleable in the market as other rye, from its small size.

The general cultivation of rye is so well understood, that I need not enlarge upon it. The best farmers advise not to apply fresh barn-manure to the crop, but prefer that which is decomposed, or that it should follow a crop which has been well manured and cleaned. It does not succeed well on lands subject to fogs, and, therefore, they cultivate little of it directly in the neighbourhood of the Rhine. The straw is abundant, but the grain does not fill well.

The principal disease to which rye is subject is the ergot, in which the kernels of the grain become swollen, and form a black horny substance, well known among medical men as a powerful agent. This prevails much more in some years than in others; and when care is not taken to separate it from the grain before it is ground, which can be done by careful winnowing or sifting, it is productive of fatal disease, driving often to insanity, and producing mortification in the limbs. The spotted fever, a species of plague which prevailed in parts of New England with such a melancholy fatality in 1812, was attributed to the use of this diseased grain. In 1816 it was fatal in some parts of Germany; and it is said that in one case, where the soldiers in garrison were fed upon bread made from this diseased grain, a tenth part of them died.

The subject of harrowing rye in the spring, so urgently recommended in the cultivation of wheat, is a point contested by intelligent farmers, some strongly recommending, others as strongly opposing the practice. If the rye is far advanced, it certainly cannot be advisable; but the authority

by which the practice is enforced is so high and practical, that I should be strongly disposed to try it, where the condition of the rye admitted of it. The spring-rye yields a crop inferior, both in quantity and quality, to that which is sown in the autumn. I have spoken of the multi-caulis rye as a valuable forage when sown in June, and cut green. Its earliness in the spring would give it a value in the United States, but later in the season we have a substitute in Indian corn, altogether superior.

The ordinary weight of a bushel of rye is from fifty-five to fifty-seven pounds, and the proportion of grain to the straw and chaff is as 100 to 292. These proportions, however, must be obviously affected by the size of the plant, and the height at which it is cut. The culture of rye has seldom had half justice done to it. The colour of the product is, I believe, mainly dependent upon the nature of the soil in which it is grown. There is a prejudice against the black bread made in many parts of the country; but the white rye produces a bread scarcely differing in appearance from wheat, and of great sweetness. For feeding animals it is of much value; when cooked, one pound of rye is rated as equal to three pounds of hay; and I have a friend in France, who would be esteemed as one of the best farmers in any country, who keeps a large number of horses, and feeds his horses upon rye-bread, whenever the relative prices of hay and rye render it eligible.

4. BARLEY.—Barley is not largely cultivated in France, as wine forms the principal drink of the country. The use of beer, however, is said to be extending, and consequently the cultivation of barley.

There are said to be three kinds of barley, in reference to the season of sowing; winter barley sown in autumn, spring barley, which is advised to be sown as early as possible on the opening of the spring, and a kind which is sown still later,

under the name of summer barley. There is also another division into six-rowed barley and two-rowed barley, and these two kinds have their sub-varieties. There is a kind called the celestial barley, to which the husk is strongly attached; but which, when threshed, becomes what is called a naked barley, the husk falling off, and the grain itself being semi-transparent. It is a good bearer, but ripens late; and in general, the naked barleys, though cultivated for soups or for domestic uses, are not much sought after in the markets. There is another kind, called the coffee-barley, which is also a naked barley, the grain of which is stated to be as heavy as that of wheat, but the straw is not strong, and it is liable to be lodged. It is threshed with difficulty, and it is very subject to smut.

The kinds usually cultivated are the common six-rowed and the common-two rowed barley. This latter grain is extremely hardy, and was found cultivated in Lapland, as high as  $67^{\circ} 20'$  north. The winter barley is said to produce a much heavier crop than the spring-sown; and where the spring barley is sown, it is advised to get it in as early in March as possible. The quantity of seed employed is one-third more than that of wheat. In many rotations it follows wheat; and in such case it is strongly urged to turn under the stubble as soon as the wheat crop is removed. The neglect to do this for any length of time will be greatly to the disadvantage of the succeeding barley crop.

The soil for barley cannot be too rich or too well cultivated; and it should be kept as clean from weeds as possible. No plant is more rapid in its vegetation; and, therefore, if manure is applied to it, it should be in that decomposed state that it may be immediately available for the uses of the plant. This, of course, applies more to spring than to winter sown barley, which has a longer time to grow in. The soil for barley should not be a hard soil, or one apt to be baked by the sun, as the roots of the plant have a tendency to

spread themselves, and therefore demand a loose and friable soil. Barley is often taken after potatoes ; and, in that case, as soon as the potatoes are removed, the land is turned over with the plough, and in the spring it is again lightly ploughed, the barley sown, and covered with a harrow. Clover is sometimes sowed at the same time, and a light roller passed over it. For barley sowed in the autumn, it is not objectionable that the land should be moist ; but when sown in the spring, the land cannot be too warm and dry. If the land is clayey and cold, the barley is not sowed so early as in other cases.

The Flemish cultivation of this crop is extremely careful and liberal ; and no where are better crops to be found. The *polders* in Flanders are those lands which, by embankments, have been redeemed from the sea, or from the floods of the rivers, and then drained by cross ditches. These lands, being the alluvial deposits of uncounted years or centuries, are extremely rich ; and large crops of winter barley are grown upon them. Crops as good, however, according to the testimony of a distinguished farmer, are grown upon lighter lands, where they are carefully cultivated, and liberally manured. The brewers prefer the barley grown upon the light lands to that grown upon the heavier soils ; they find the skin of the grain finer, and the grain itself better filled. They prefer, likewise, the winter to the spring barley, because it weighs heavier. It gives, likewise, a larger product.

In the neighbourhood of Ghent, where one witnesses the perfection of agriculture, the mode of cultivating this crop is thus in the main detailed by an experienced agriculturist, to whom I have already referred<sup>1</sup>.

They plough the land twice ; they then lay it in beds of about five feet in width ; they then go upon the land with a cart of liquid manure, the horse walking in the furrows, and

<sup>1</sup> Van Aelbroeck's Agriculture of Flanders.

a good deal of the liquid of course falling in the furrows, between the beds; they then level the land with a harrow; they then spread upon the field ten or twelve two-horse loads of rotted manure to the acre, and sow the seed upon the manure; the next step is to clean out the furrows between the beds with a spade, spreading the soil taken out upon the seed, and at the same time covering the manure. The whole field is then trodden by foot, or by a roller drawn by men. The object of this is to retain the humidity in the soil, so that the seed may come up the better. When the seed is two or three inches high, it is then manured again, with a copious dressing of liquid manure, so that the field is in a condition to bear a crop of potatoes or of turnips the same year. Where the liquid manure is from the privies of the town, it is necessary to dilute it with water. The roots of barley, spreading upon the surface rather than descending deeply, it is not necessary to bury that or the manure deeply, although where barley is sown in the autumn, it is generally advised to plough it in with a light furrow. The crops in such cases are very large, averaging more than sixty bushels to the acre. The general cultivation in Flanders is most remarkable for its carefulness, its most abundant labour, and its liberal manuring. I do not know where I should go to find that which is superior to it; and, indeed, it would be difficult to produce its equal. The farmers of the United States would be startled at the amount of manual labour bestowed upon their lands by the Flemish. A redundant population gives them the means of doing this with great advantage.

It is well established that barley may succeed wheat, but wheat does not well follow barley. Turnips are often taken after barley, and a crop of rye after the turnips. Beans, likewise, follow with advantage a crop of barley.

5. OATS.—Oats can hardly be said to be largely cultivated.

in France. They are grown exclusively for the use of horses. This however is more in the north than in the south. The stimulating and exciting character of oats as feed for horses, renders them much more useful in a cold than in a warm climate. Oats are supposed generally to be adapted to almost all soils and climates ; but, like other products, they repay a careful and liberal cultivation. It is pretended by some persons, that a crop of oats ameliorates rather than exhausts the soil. This may be the case where oats are grown upon a turfy soil newly turned up ; that is to say, it may be the best crop by which to reduce such a soil into a condition for cultivation ; but that it otherwise enriches a soil can hardly be believed. It is the opinion, however, of many farmers, that sooner than any other crop, it avails itself of the nutritive parts of the soil, and reduces and extracts manure from ligneous matter contained in the soil, and that it will, better than any other crop, bear the application of coarse manure. I give these opinions, as I receive them, from good authority.

There are several varieties cultivated, divided by the French into white and black ; by the Flemish, into white, yellow, and black. The white oat is most congenial to a soil which is humid, the black to a dry soil. The black oat in comparison with the white is represented as worth an eighth more for use ; that is, it is more nutritive in the same weight, and its cultivation less exhausting to the soil.

The Hungarian oat, called sometimes the Tartarian oat, with all its panicles pendant on one side, is here found under two varieties, the white and the black. This species weighs heavier than the white, but not so heavy as the common black oat. It gives more grain and more straw than the common white oat, but it requires rich and strong land.

The potato oat is very little cultivated in France. Indeed, it can only succeed under a far better cultivation than is here bestowed upon the crop. The Siberian oat is of early

maturity ; the grains are yellow and very heavy, but the straw hard and coarse. The growth of this kind is so rapid, that it is said to have been cut when young for a green crop, and afterwards yielded a good grain crop.

There are two kinds of oats cultivated in France, known as winter and spring oats ; the former kind being sown in the autumn ; but this kind is only safe in parts of the country where the winters are mild, as oats are liable to be destroyed by severe frosts.

The best crops in France, rating thirty-three pounds to a bushel, give about forty-eight bushels to the acre, but a great portion of the crops give much less ; and the average crop is rated at about sixteen bushels per acre, which indicates very negligent cultivation ;—an eminent French cultivator calls it detestable, but it would not be civil in a stranger to use so harsh a term.

The value of oats, compared with hay, in nutritive matter, is rated at 100 to 175. It is strongly advised by the French farmers to use the oats without threshing, cutting up the grain and the straw together ; and by all means, to harvest the oats at so early a season that they may not shell out upon the ground ; as much is always lost in this way, when they are suffered to become perfectly ripe before cutting. The quantity sown to an acre is four bushels.

The Flemish farmers obtain very large crops of oats where their land is cultivated with a spade, or otherwise deeply cultivated. With them, the white oat weighs heavier by the bushel, but the yellow oat gives the largest crop, especially on their meadows. They cultivate their oats upon stitches, of a width greater or less according as the soil is wet or dry. They say that oats require not so much manure as barley by one-third ; but they prefer manure that is well-rotted, that the plant may be forced as rapidly as possible. When the plant is a fortnight old, they apply a dressing of liquid manure. Such cultivation is evidently expensive and labo-



rious ; but, as in almost all other cases, extra carefulness is compensated by extra product. Sometimes the liquid manuring is repeated, and even more than once. In planting, they are careful not to bury their seed too deeply, two inches being deemed ample.

The great evil to which the crop of oats is subject, is the smut ; but for this as yet no preventive has been discovered. The sowing of smutty seed is sure to produce it.

6. MESLIN, or MÉTEIL.—The French have a custom of cultivating what they call *méteil*, but what is called in English, meslin ; that is, a mixture of wheat and rye. The proportions are not very exactly determined. If the land is more favourable to wheat than rye, more of wheat is sown in the mixture than of rye, and the contrary. It yields a good crop when sown after wheat, when wheat following wheat would not be advisable. This culture is far from being universally approved in France ; but some eminent farmers maintain that the crop is more sure than any other ; that it is not easily lodged, and that neither the rye nor the wheat is so liable to rust or mildew as when cultivated alone. It sometimes happens, likewise, that the season is not favourable to one of the kinds of grain, when the other yields a crop. It follows potatoes to advantage. It is generally consumed on the farm, in preference to being sent to market ; and it makes a healthy bread.

7. MAIZE ; INDIAN CORN.—Indian corn (*Zea mays*), here often called Turkey wheat, for what reason I do not know, is cultivated to a considerable extent in the south, south-west, and south-east of France, and very much in various parts of Italy. In the richest soils in Italy it presented an extraordinary luxuriance, but nothing could be more slovenly than the cultivation of it, wherever I saw it.

The largest crops of which I could obtain information,

were eighty bushels to an acre ; but the ordinary yield was very much less than that, and indeed was quite small. The kinds cultivated were of the small yellow flint variety. The large kinds of gourd-seed corn grown in the southern states of the United States, or the kinds grown in the western states, an intermediate kind between the flint and the gourd seed, would find the climate and soil of southern Europe favourable, and might be introduced there to great advantage, if, in the present condition of society, they were capable of any great improvement. They are little accustomed to use it for bread, having no knowledge of the modes of mixing it with rye or wheat ; but they use it as a kind of mush or pudding, called polenta. The expense of making it into food among the peasants is strongly objected to, as consuming both fuel and time. It is said that Napoleon used to lament that a labouring man, whether mechanic or peasant, should be accustomed to have a fire in his house for cooking ; and the writer who records this fact, sympathizes strongly in this sentiment. That is to say, he would have all their food taken cold, and no time nor money expended in cooking.

I wonder if it never occurred to these men, what an improvement it would have been, if these labouring people, so troublesome and expensive as they are to be fed, and yet so useful and necessary as they are in growing all this bread, could have been turned out at night like the cattle after their yoke is taken off, to graze in the pasture. This would save bed and bedding, and house-rent, as well as food and cooking.

Such sentiments must sound rather harshly upon the ears of American farmers and labourers, who are accustomed, even in the humblest conditions, to sit down daily to a nicely spread table, covered with a variety and abundance of bread, meat, and vegetables, to which are often added tea, coffee, and beer. The diet of the labouring poor in Europe

is chiefly bread ; and this is almost always furnished by a professional baker. During my residence in Europe, I do not recollect a single instance where bread was made in the family. The want of fuel on the continent is a serious necessity. There are no labouring people who live in half the abundance of the labouring people of the United States.

I should extend my remarks much too far if I treated of many of the other smaller crops of the continent, which indeed present nothing remarkable ; and in treating of Flemish husbandry, I shall have occasion to speak of several valuable plants which are cultivated in common by the two countries.

8. BUCKWHEAT.—Buckwheat is grown very largely in poor soils in some parts of France, but it seems to be a mere shift to live ; and leaves only the regret, that land capable of a much better cultivation, should be thus appropriated.

9. MILLET.—Millet is cultivated to some extent in parts of France, but almost exclusively for forage, and, in this respect, deserves much more attention than it usually receives. I wish my countrymen were more impressed with the extraordinary value of this plant. I know few plants which make a more abundant return, or which, when it is well cured, give a more nutritious forage, or one more relished by stock. On the *intervale* lands of the River Loire, where the crops are occasionally destroyed by an inundation, a crop of millet is obtained after the floods have passed off. The crop, under such circumstances, cannot be expected to be large, but it is obtained where no other would be.

10. CLOVER.—The common large red clover, known in France as the Spanish clover, is cultivated to a considerable extent in parts of France. It has been a long time cultivated in the Netherlands or Low Countries, but was not an established

culture in France until about three quarters of a century ago. It is now considered as the foundation of good husbandry. Its foliage is abundant, and its large roots essentially enrich the land. It is sown in the spring, and its seed must not be buried deeply. The mode strongly recommended is to sow it on the wheat in the spring, immediately after the wheat is harrowed ; and then to roll the wheat with a light roller.

It comes in in a regular course of rotation, but it is not allowed to occupy the land more than one or two years ; and it is advised not to repeat it again under three years. Some English farmers object to its recurring even so often as this. The effects of plaster of Paris or gypsum sown upon it, either when the dew is upon it, or the air is humid, is as remarkable as in the United States, though beyond a certain amount it is of no avail. The efficiency or mode of operation of this extraordinary agent seems, as yet, wholly unexplained. The French farmers understand perfectly well the advantages of ploughing in a clover stubble as a preparation for grain of almost any kind : for lands which are not very rich, it is considered only as an aid, and not as a principal manure.

The small white clover, otherwise called the Dutch clover, constitutes an important element in the rich meadows and pastures of Holland. Clover is cultivated for its seed, in which case, the first crop is taken for forage, and the second for the seed. An eminent farmer speaks of his neighbours having refused to buy his clover-seed because his crop was small and thin ; but, according to his own experiments with this seed, it was preferable to seed from a crop of more luxuriant growth. The probability is, that it was more mature.

Another species of clover, cultivated to a considerable extent, is the *trifolium incarnatum*, or scarlet clover, of which I have spoken in another place. This appears with a deep red flower, of a conical form and of extraordinary beauty. It endures for one year only.

11. LUCERNE.—Lucerne is cultivated very extensively in France, and, indeed, may be considered as their great dependence for green fodder. It is a general opinion that no plant will, in this respect, yield a greater return. Indian corn will yield more green food, but a crop of lucerne may be got much earlier. Three things are important in the culture of it; one, that the soil on which it is sown should be rich; second, that it should be deep, good in the subsoil as in the surface soil; and third, that it should be kept clean from weeds. On my visit to an admirably managed farm, about twenty miles from Paris, where every thing indicated the most exact care and attention, and which might almost be cited as a model farm, the farmer informed me that his lucerne, which he cultivated largely, was usually cut three times, and gave him at the rate of fourteen tons to an hectare, made into hay. A French hectare is about two and a half acres, and this would be, therefore, a yield of more than five and a half tons to an acre. A dry season is particularly unfavourable to it. It requires a rich, but suffers from a wet soil.

Lucerne is sometimes sown among wheat or barley; but the most certain mode of securing it against weeds, is to plant it in narrow drills, and keep it clean by the hoc for a time, until it becomes well established. About eight pounds of seed, though this is deemed a large allowance, are sown to an acre. It will bear cutting three times a year, and will endure in the ground eight to ten years. It does not come to perfection the first year; and the circumstance of its being ordinarily continued in the ground for a term of years forms an objection to its culture, with those who wish to pursue a regular rotation of crops. Gypsum is applied to lucerne with the same success as to clover; and the best farmers advise to harrow it in the spring, and, indeed, after each cutting, excepting the last cutting in the autumn.

12. **SAINFOIN.**—Sainfoin is the next species of forage most largely cultivated in France. I have already spoken of it, but its value can scarcely be too highly appreciated. It is ordinarily cut only once a year, but in rare cases, twice. It forms a most excellent feed, especially for sheep; and the hay is of the best quality. It will endure for some years. They have had no success in cultivating sainfoin or lucerne in Flanders. The prejudice, to which I have referred, that it requires a calcareous soil, is, undoubtedly, not without some foundation.

I come now to speak of the great crops, which may be said to be almost peculiar to France; and if it be proper to estimate the agriculture of a country by the success of its peculiar crops, then the agriculture of France assumes a high rank. I refer in this case particularly to beet sugar, wine, silk, and oil and fruit from olives. These are in France immense products, and of high commercial value.

13. **BEETS. BEETS FOR SUGAR.**—The history of the introduction of the culture of beets into France for the manufacture of sugar, is well known. The presence of sugar in the beet-root, in an available quantity, was the discovery of a distinguished chemist; and it is among the great obligations under which that science, cultivated so successfully, and with such distinguished talent, has laid the French. The Emperor Napoleon being cut off by the nations at war with him from those supplies of this article, which the people had been accustomed to receive from their colonies, conceived the plan of their supplying this great necessity from within themselves. It was much ridiculed, but he was not a man to be turned aside from any great project by any minor considerations, where success was possible: his object, to a considerable degree, was accomplished. Since his time, the culture and manufacture have been immensely extended, and

it bids fair to prove one of the greatest boons that was ever bestowed on agriculture.

There are several kinds of beets cultivated, some of which have been cultivated for a long time. The common red or blood beet, ordinarily grown in gardens for the table, is a well known vegetable, not, I think, however, so highly appreciated in the United States as in England and on the Continent, where it is much eaten. I have known this cultivated with great success for cattle, adding largely to the product of cows in milk. This species, however, is never used for sugar.

The next is a very large kind, growing almost entirely out of the ground, of a pink colour and white flesh, known commonly as the scarcity beet, or mangel wurzel, attaining often a large size, and valuable for cattle. There are one or two other kinds, of a yellowish flesh, growing largely out of the ground, and which are considered even more nutritious for stock than the mangel wurzel.

The beet employed for sugar is called the Silesian beet, with a whitish skin and white flesh, but the most valuable kinds have a green neck and yellowish tint on the top. This is full as valuable for the feeding of animals as any of the others, and is decidedly the beet selected for its sugar properties. I have before me the chemical analysis of the properties of the beet-root, but I am unable to derive from them a single practical inference. It may be hoped, that chemistry will presently tell us what particular soil is best fitted to its growth, and what manure it peculiarly demands; but this service it has not yet performed. It grows best in a deep, rich, aluminous soil, not a sandy soil, not a calcareous soil, which is unfriendly to it; and it is particularly desirable that the soil should not be liable to suffer by excessive drought, so that vegetation is arrested. It will bear to be well manured, but it is not an extraordinary exhauster of the soil. It returns indeed a large amount of enriching matter to the soil in its abundant leaves.

The land should be well prepared, by being deeply dug or ploughed, and thoroughly manured, and the beets may be either sown, or planted in rows, of about twenty-seven inches apart, and the plants in the row about fourteen inches asunder. A great advantage comes from growing the plants in a nursery bed, and transplanting them. This gives a longer season for the preparation of the land, and the increase of labour in transplanting is compensated by the increased facility of keeping the cultivation clean. The largest crop of which I have obtained any information, was about forty-nine tons to an acre, and this was a case in which they had been transplanted. The ordinary crop does not exceed, and in many cases it falls short of, twenty-nine tons. The amount of seed required for an acre is not large, and every single seed produces four plants. A large proportion of the beet-root is water, and it is generally estimated that twenty pounds of hay are equal to one hundred pounds of crude beet. In transplanting, it is recommended, instead of doubling it up, to break off the lower end of the tap-root, and to plant it with a picker or a dibble.

In the culture of the beet, many persons have been in the habit of plucking the lower leaves for their stock, maintaining that the growth of the plant was not injured by this abrasion. Experiments fully establish the contrary. An experiment made in Belgium shows, that where beets, from which the leaves were not plucked, produced 925 baskets of roots, an equal part of the field, having been plucked once, produced 839 ; and another portion, which had been twice plucked in a season, produced only 539. The form in which this experiment is stated is not exact, as a basket itself is an uncertain measure, and the degree to which the plucking extended is not stated, but it seems decisive. The leaves, at the harvesting of the crop, furnish a large amount of forage. If left on the ground, they are reputed highly beneficial as manure, still more so if consumed by animals ; and cases are reported in which they have been closely packed away, where the air



was effectually excluded, and have yielded a valuable forage for the winter.

That, exclusive of their sugar properties, they constitute a valuable green fodder for cows in milk, and fattening cattle, strongly recommends them to cultivation. They have this great advantage over turnips, that they give no disagreeable taste to the milk; and that when in the spring, turnips have become corky, and potatoes sprout abundantly, and seem to lose in a great degree their nutritious properties, the beet preserves its freshness, even into June.

It is not within my province to go into the subject of the manufacture of sugar, farther than as it is connected with agriculture. The greatest profits are realized where an individual unites in himself the character of cultivator and manufacturer. The pulp that remains, after the sugar is expressed, is employed in the fattening of cattle and sheep. An eminent farmer, whose cultivation was of the finest description, and who manufactured a large amount of sugar, informed me, that he estimated his pulp, for the feeding of cattle and sheep, as constituting seven-twentieths of the whole value of the crop. It was in June, in that most beautiful agricultural country, French Flanders, when I visited him; and he was then using, and had large reservoirs of, the pulp from the manufacture of the preceding autumn. This he kept sweet and good in large vats, covered with sods and earth so as completely to exclude the air, and guard against a change of temperature. In his case, the beets were not rasped, but cut into small and thin slices by a machine, and then exposed to a hydrostatic pressure. Nothing could be finer than the samples of sugar which he showed me; and I admired, with great pleasure, the high condition of his sheep and cattle fed upon the pulp. He informed me that he obtained six per cent. of sugar from his beets. The chemists say that the beet contains twelve per cent. of saccharine matter, but the amount obtained does not ordinarily exceed five per cent. Whether

this proceeds from the imperfection of the manufacture, farther inquiries may determine. In general, the farmers are not manufacturers, but sell their crude product to the large manufacturers in their vicinity. In such case, they usually make arrangements to receive back a portion of the expressed pulp. If otherwise, it would clearly be an exhausting process. It is mentioned, that the pulp constitutes a third of the weight of the crop. One hundred pounds of raw sugar gives seventy-five pounds of refined sugar, though it is stated that, by a recent discovered process, the sugar is bleached without being refined.

The gentleman to whom I have referred above, states that the manufacture of beet-sugar is at present a highly lucrative operation. At first, when the ports were closed to foreign sugars, prices were such, that even with imperfect modes of manufacture, the business yielded a large profit. Afterwards, when the sugar of the French West India colonies came into competition with it in the open market, the colonists found the competition too severe, and thinking themselves on the verge of ruin, they cried to the government for help and protection. The colonies of France were regarded as so important to its commerce and its navy, that the government laid a heavy impost upon domestic sugar. I believe governments never intermeddle directly in the control of human industry without doing somebody a harm; and excepting where allowed in some qualified cases as the rewards of inventive genius or skill, or as a security to the beneficial uses of capital, which otherwise could not be brought into use, monopolies of every kind combine all the elements of injustice. The effect of this impost was at once to ruin a large portion of the manufacturers of domestic sugar, and arrest the progress of a cultivation destined to exert the most beneficial influence upon the general interests of agriculture. The fixtures and establishments in different parts of the country fell into other hands, at a ruinous sacrifice to their original proprietors. The West India proprietors be-

came more clamorous, for avarice was never yet satisfied with any concession, and the impost was still more increased. The elasticity of skill and genius have defied the pressure. Improved modes of manufacture have been discovered, by which more sugar is obtained from the same amount of the raw material, and obtained at a cheaper rate ; and in spite of the heavy imposts the manufacture is highly profitable, especially to those persons who bought already made to their hands the old manufacturing establishments.

In 1842, the production of beet-sugar in France reached the enormous amount of 67,717,685 lbs. It had in some years, as it must evidently vary with the seasons, been even more than this ; and there is no reason to suppose that it has decreased. In some parts of the country I have seen several factories of recent erection. When the value of the leaves and the pulp for the fattening of animals is added to this actual creation of wealth out of the earth ; when the wages received by the innumerable persons employed in the culture of the plant, and the fabrication and refinement of the sugar, are also taken into view ; when the admirable preparation which this culture makes for the succeeding crops ; when its beneficial influences upon the commerce of the country are considered ; and when especially the whole is regarded as the product of healthy, well-requited, and free labour, and without even the smallest expense or hazard to human life or comfort, it is impossible to exaggerate the value of this great and increasing product.

A highly distinguished agriculturist in France, perhaps as competent as any man to speak on this subject, has recently given to the public a statement in regard to it, which must attract particular attention. I shall give his statement nearly in his own words. A hectare (about two and a half acres) produces in the Isle of Bourbon about 76,000 kilograms (a kilogram is about two pounds and a fifth of a pound) of cane, which will give 9200 kilograms of sugar, and which costs in

labour 2500 francs. A hectare of beet-root produces 40,000 kilograms of roots, which will produce 2400 kilograms of sugar, and the expense of the culture of which costs 354 francs. The cost of the cane sugar in this case is 27 centimes, and of the beet-sugar 14 centimes only, per kilogram<sup>1</sup>. These are extraordinary statements, and will be looked at by the political economist and the philanthropist with great interest. There are few of the northern states of Europe, or of the United States, which might not produce their own sugar; and when we take into account the value of this product, even in its remains after the sugar is extracted, for the fattening of cattle and sheep, and of course for the enrichment of the land for succeeding crops, its important bearing upon agricultural improvement cannot be exaggerated.

The production of beet-sugar is not by any means confined to France. Large amounts are produced in Belgium, where I found most extensive manufactories, and in several parts of Germany; but in none of these countries is industry in any form unrestricted; and a man hardly dares to be successful in any enterprise, at least to proclaim his success, lest the government by some impost or taxation should endeavour to avail itself of his success for its own advantages. It is thus that every where industry is checked and hampered, and enterprise scarcely rises from the ground, but is seen fluttering along upon one wing.

14. SILK.—Silk is another large product in France, giving a humble but honest living to thousands and hundreds of

<sup>1</sup> “According to M. Peligot, the average amount of sugar in beets is twelve per cent.; but by extraction they obtain only about five per cent. The cane contains about eighteen per cent. of saccharine matter, but they get only about seven and a half. The expense of cultivating an hectare of beets, according to Dombasle, is 354 francs. An hectare of cane, which produces 2200 kilograms of sugar in the Isle of Bourbon, and only 2000 in French Guiana, demands the labour of twelve negroes, the annual expense of each of whom is 250 francs, according to M. Labran.”—Commission of Inquiry in 1840.

thousands. Its production is greatly on the increase ; and the last year is reported to have nearly doubled itself.

I know nothing so remarkable in all its pecuniary and useful results as the product of this humble insect, the silk-worm, whose whole term of being is limited to five weeks. Nothing is to be compared with it in the perfection and beauty of the fabrications of which it supplies the material and basis. What man, woman, or child's dress in any civilized community is not in some measure indebted to the labours of this humble insect ? and its bearing in a commercial view is an immense affair. In its pecuniary results, with the exception of the article of bread, few things come in competition with it.

It is not merely the value of the product as it comes from the insect which gives it importance, but the extraordinary amount of industry and commerce which his humble labours set in motion. In France, as in other old and populous countries, every branch of industry is divided and minutely subdivided. There is in the first place the grower of the mulberry-trees, who does not always connect with this pursuit the production of silk ; but the leaves of his trees are sold in the market as any other forage would be. To him succeeds the grower, or, as he is commonly called, the educator of the silk-worms, who hatches, feeds, and manages the worms until their task is completed, and the cocoons are ready for the market. He is succeeded by the filator, or winder, of the silk from the cocoons, who prepares the crude or raw silk for the manufacturer. Here another and numerous class of operatives is set in motion ; the spinner, the weaver, the dyer, the pattern-former, the machinist, and the master manufacturer, from whose hands it proceeds next into the hands of the wholesale dealer, and thence into the hands of the retail dealer, to say nothing of the various forms which it afterwards assumes under the agency of modists, dress-makers, furniture-makers, hat-makers, and the almost count-

less operations and transformations which it has to pass through in the various objects and forms of which it constitutes a part. Indeed, it would be difficult to name any single article which plays a more important part in an industrial, economical, and commercial view.

The earliest production of silk is attributed to the Chinese, but the particular date of its origin is lost in the obscurity of remote history. There are many other worms which, in the curious transformations through which they pass, involve themselves, preparatory to their emerging into a new form of being, in a cocoon formed of the finest tissue. But it is the silk-worm, or, as he is sometimes called, the mulberry-worm, alone which furnishes a material of sufficient firmness to be converted into cloth.

The production of silk in France is now carried to a great extent. Four years ago it was estimated at 1,200,000 kilograms, or about 2,240,000 pounds of raw silk per annum. The last year it was reported to have doubled itself, but, if this should be an exaggerated statement, the production may yet be set down as having vastly increased ; and, in a peaceful condition of the country, is likely still more to extend itself. It affords the means of living to many persons, who must otherwise be without resource. In many parts of this culture, the hands of children avail as much as those of men and women, and thus the industry of whole families is set in motion.

The silk-culture has generally been considered as limited to a hot climate, and some have maintained that it belonged exclusively to countries in which the vine could be successfully cultivated. The silk made in temperate climates, and even in the mountainous parts of hot countries, where the temperature is moderate, is esteemed better than that produced in very hot countries. It is difficult to prescribe the exact limits of this production. The mulberry will grow in very high latitudes ; but in such cases, it is liable to be

killed by the severe frosts of winter ; and it is indispensable that the season should be long enough, after the first defoliation, for the mulberry-tree to renew and perfect its leaves. The worms require a mild and temperate climate ; for though they have been grown or reared in rooms where the temperature is, properly speaking, artificial, yet the expense and trouble attending such arrangements are a serious abatement of the profits, added to the difficulties of managing such a temperature, and the risks to the lives and health of the worms. It is important to make every effort to keep down the expenses of the culture.

The mulberry may be considered as the only proper food of the silk-worm. Various substitutes have been proposed by the Chinese and others, but wholly without success. The worms may be induced to eat, and may be kept alive upon other substances, but they will make no silk. The Chinese have moistened the leaves, and sprinkled them with powdered rice, chicory, and peas, and with the powder of the dried mulberry leaves, so that the worms, in getting at the leaves, were compelled to eat of the powder, but it has been without advantage.

The mulberry is not a tree of difficult cultivation ; but, like most other things, it makes a full compensation for particular care and attention. It will grow upon a poor, but it will flourish only on a good soil, inclined to sand, and not humid or heavy. It is advised to train these trees with an open head, that the foliage may be accessible to light and air, and not to feed from them until they are full three years old. The leaves must not be taken from them more than once in a year, and it is desirable to forward the first defoliation, so that the second growth of leaves may become quite matured. Mulberry-trees are set out as ornamental trees by the sides of roads, and in the neighbourhood of houses ; or, where the business is pursued on an extensive scale, they are planted in rows at a few yards' distance, as is customary with our apple

orchards. In many parts of Italy, in Lombardy and Tuscany, the vines are trained to hang in graceful festoons from one tree to another; and when the rich clusters of grapes are seen among the green foliage, it would be difficult to find any thing of the kind more beautiful. An hectare of arable or meadow land in France, may be valued at 2000 to 5000 francs, or say, 400 to 1000 dollars; an hectare of mulberry-trees in the same locality would, in such case, be valued at 5000 to 12,000 francs, or from 1000 to 2400 dollars. It is calculated that an hectare (about two and a half acres) of mulberry-trees, in full bearing, will produce sufficient foliage to supply the wants of the worms produced by ten ounces of eggs. This would give a product of about 22,000 pounds of leaves.

The mulberry may be propagated by sowing the seed, by grafting, or by layers; the two latter modes are of course the only certain modes of securing the best kinds. The principal kinds propagated in France are four; but they differ somewhat in their product, as the experiments of one of the first cultivators of silk in France, with whom I have the pleasure of an acquaintance, seem to show. What appears to be wanted in a mulberry leaf (excepting for the worms in their first age) is a leaf of a good deal of thickness and weight. The four principal mulberry-trees cultivated in France are:—

Le mûrier rose, or the rose-leaved mulberry.

Le mûrier multicaule, or the multicaulis, well known in the United States.

Le mûrier Moretti, a mulberry, which takes its name from a physician who first produced it.

Le mûrier sauvageon, or wild mulberry, which is our common white mulberry.

The multicaulis is condemned in France in the strongest manner. It is of very easy cultivation; it yields a great deal of foliage; it produces a fair quantity of silk; but it is considered too watery, and to create disease among the worms.



One of the most eminent silk-culturists in France denounced it to me in no measured terms. The rose mulberry is upon the whole pronounced superior to all others. Its leaves have too much thickness and strength for the worms in their first age; but in such case it is necessary to select the youngest and most tender leaves, and to moisten them with water. The leaves of the common wild mulberry are complained of, as fading rapidly after being gathered, and becoming too soon unfit for use. The time for hatching the worms should correspond as nearly as possible with the condition of the leaves, taking care that the leaves should be considerably advanced, as the consumption of them in too young a state is necessarily wasteful. Experiments have been made to test the comparative value of the different mulberry leaves in the production of silk—I refer to its quality and quantity; but though conducted with much care, they do not appear to lead to any important practical results.

The difference in the worms deserves attention, some producing a large, and others a smaller, cocoon; and some giving consequently a larger return in silk than others. This difference is considerable, some producing from a certain weight of cocoons ten or twelve per cent., and others eighteen per cent. of silk. The great division of races is, into those which produce a white, and those which produce a yellow, cocoon. It is said that different races of the worm are suited to different climates, either hot or temperate; and the results are always more or less affected by the mode of feeding and the care bestowed upon them.

The principal of the white races of worms is called the Sina, and this species produces a very fine and beautiful silk. This species was imported from China almost a century since; and its excellence has been maintained, and indeed it is represented to be much improved by care and selection. The silk of this species of worm is employed for making the very finest of the white silk fabrics. Ten to twelve pounds of the

cocoons produce one pound of silk. The cocoons are cylindrical, round at the ends, with a depression or cincture round the middle.

The principal of the yellow races is the Turin. This is known in Italy by several different names. The form of the cocoon is cylindrical, with a deep indenture or cincture round the middle, the ends are round, and the colour is a beautiful yellow. They are esteemed as among the best cocoons known, and furnish a very strong silk.

The Cora is another celebrated race, which is reported to have been the result of a cross between two of the most beautiful and rich of the yellow races, the Turin and the Loudun. This species yields a large return of silk in proportion to the weight of the cocoons; the cocoons are much sought after, and sell at a higher price than any of the common kinds. As my limits allow me only to refer to the best kinds, I shall not enumerate others, of which there are several sorts, more or less esteemed in different localities.

The ordinary life of a silk-worm embraces five ages, or four important changes. There is a species called the three-change worms; but this peculiarity is considered as the result of a diseased constitution, and the product is comparatively worthless. The worms, by extraordinary feeding, may be forced to finish their feeding in some cases in eighteen days; but this at the expense of a great deal of trouble, and generally at the risk of disease. Their feeding is in some cases extended to fifty days; but this is always owing to scanty and illiberal feeding, and the product is sure to be inferior. The period most to be desired, in which to complete their feeding, is twenty-eight or thirty days. This is supposed to depend somewhat upon the peculiar constitution of the race of worms which are fed, but more upon the feeding and management. It is earnestly pressed upon the cultivators to commence the hatching of the eggs as early in the season as the condition of the mulberry leaves will allow it to be done

with a certainty of a supply of food. The hatching of the eggs should be artificially forced, in order, as far as possible, to be contemporaneous, as where it is left to take place naturally, there will be a difference in the time of hatching among the worms of several days, which is an inconvenience to be anxiously avoided. It is recommended in the three first ages to cut the leaves fine, and for the very young worms in the first stage, they should be sifted. In order to success, the worms must not be neglected by day or night. In the first age they require twelve feedings in the twenty-four hours ; in the fourth age, eight or ten ; in the fifth age, seven or eight. The feedings should, in fact, be multiplied as much as possible ; as where, with a view of saving time or labour, the food of three or four times is given at once, the worms become disgusted, and lose their appetite ; a great deal of forage is lost ; and bad results are likely to follow. As overfeeding is injurious, so is fasting equally injurious. In order to ensure success, no neglect must be tolerated. Cleanliness in every department is especially important. The worms must not be crowded. They must likewise be occasionally assorted, placing together those whose progress and condition are most nearly alike ; and especially removing at once the feeble and diseased. The best preparation for their mounting, when their cocoon is to be formed, may be termed a small twig broom, inverted and placed so that the upper part may be spread between the shelves on which the worms are fed. The cocoons after they are completed, reserving those only which are designed for the continuance of the race, are placed for the destruction of the chrysalis in steam, as being the most certain and effectual mode. The cocoons being completed, and the poor tenant of this silken abode strangled in his own habitation, now pass into other hands for the winding of the silk.

In many parts of Europe, among those who cultivate the silk-worm upon a small scale, some vacant room in the house is occupied for the worms, and very often some vacant barn

or building is used for this purpose at a season of the year when it is not occupied for other purposes. Where silk is cultivated on an extensive scale, a building is erected for the special purpose of raising the worms, called a magnanerie. The size of this building is of course to be proportioned to the quantity of worms to be raised; and the quantity of worms to be raised must be proportioned to the amount of food to be obtained. Great losses are sometimes incurred by a miscalculation in respect either to the forage or the worms. It is of great moment not to err on the side of too little provision for the feed of the worms, who in their last age consume with almost incredible voracity. Few things are more prejudicial to success than a deficiency of food, or subjecting the worms to fasting.

The magnanerie must in the first place supply ample room for the worms: they must not be crowded. It requires a separate room for the hatching of the worms and their feeding during the first age. It must be furnished with sufficient means for heating the apartments in which they are kept. It must have the means of complete ventilation, without bringing draughts of cold air directly upon them. It must be capable of being closed or opened at pleasure, in order to regulate the temperature, which is of great moment. It must be light also, and be capable of being lighted in the evening; for they like the light, and if success is looked for they are not to be neglected either by day or night.

It has been supposed that the silk-worms are injuriously affected by noise; but this is now deemed an error, as no organs of hearing have been discovered. They are injuriously affected by noxious odours, and this must be guarded against. They are likewise much affected by changes of temperature, and especially by a close and confined atmosphere. The former may to a certain extent be regulated by artificial means, and the latter by ventilation. The tables on which the worms are placed, may be made of canvass on an endless roller, and the worms being induced by fresh leaves to rise

upon a netting made of twine set in a frame, may be lifted up, and by turning the canvass, the litter may be easily removed, and the worms replaced. The legs of the tables on which the worms are fed, should be set in water, so as to prevent the access of ants, which are destructive to them; and every pains must be taken to keep off birds, rats, and mice, which have no hesitation in destroying these industrious creatures.

There are several serious diseases to which the worms are subject, and some of a fatal character. They are supposed in general to owe their origin to neglect, to insufficient or irregular feeding, to want of ventilation, to neglect of cleanliness, or to too much crowding. The disease called the *muscardine* is of all others the most dreaded, as it is contagious and generally fatal. The causes of it have not yet been ascertained, and no effectual remedy has been discovered. If it is not caused by neglect, yet the only hope of preventing it is by the most attentive and exemplary care. Where it has once prevailed, it is liable to re-appear; and in such places it is advised as the only certain preventive to suspend for a time the raising of the worms. It shows itself at all ages of the worms. A large premium has been offered by the Agricultural Society of France for the discovery of an effectual remedy or preventive; but as yet without success. The worms are often injuriously affected by thunder-storms or a highly electrical atmosphere; but no human skill affords any protection against this.

Many experiments have been made to get two crops of worms and silk in a season; but by the most experienced feeders such attempts are entirely disapproved. I shall not attempt any calculation of expenses or profits, these must so vary in different places from the difference in the cost of labour and of land. First, it may be said of the silk culture that the principal labour which it requires occurs at a season when other agricultural operations are not of a pressing cha-

racter, and the season is one of comparative leisure. In the next place, the farm-buildings, which may be occupied where the climate admits of it as a magnanerie, are likely to be vacant, preparatory to receiving the crops. Next, the trees being once planted and matured, and the magnanerie established, they require but little care to preserve them in condition, and a large portion of the expense is incurred. In the last place, the work is of a character to give healthful, useful, and interesting employment to the younger and female parts of a family, whose expenses are sure to go on, but whose labour, for want of some such occupation, might otherwise be lost. The article when produced is imperishable, and at present may be considered as sure of a market.

I have only noted the outlines of the subject. I must not go more into detail; but the whole process is simple and intelligible, and the details are easily attainable. There is no extraordinary ingenuity in the apparatus or machines connected either with the management of the worms or the unwinding of the cocoons; but I found with Mr. Robinet, of Paris, who has distinguished himself by his attention to this subject, a small and ingenious machine for testing the strength of the raw silk. There was a graduated index at the back of the machine; a strong pressure was made on two threads of the silk suspended from the top of the index, and the degree of pressure or tension required to break the thread indicated of course its actual strength.

I can hardly quit this subject without calling upon my readers to admire with me the wonderful products of this humble animal. The pecuniary value of the product is enormous; its utility is unquestioned and universal; the amount of industry which it sets in motion is immense; and the splendour and beauty of the fabrications, of which it forms the *materiel*, are unsurpassed.

15. THE VINE.—The next great agricultural product of

France is that of the vine. The whole extent of land cultivated in vines in France by the last returns was 4,929,950 acres ; and there is reason to believe that this amount has been considerably increased since those returns were obtained. The total value of the vine crop in France, reckoning seven gallons of wine as required to supply one gallon of brandy, is estimated at 59,059,150 francs, or, in round numbers, 11,811,830 dollars, or 2,362,366*l.* sterling. It is supposed that six-tenths of the wine produced are consumed in France ; the remainder forms the subject of a lucrative commerce.

In a moral view, one would at first be inclined to dread the effects of such a production upon the habits of the people. It would not be true to say there is no drunkenness in France ; but, account for it as we will, temperance is pre-eminently the characteristic of the French people, and I believe them to be without question the most sober of all civilized countries. In the rural districts, wine is the ordinary drink ; but this is not in itself a strong wine, and is almost invariably diluted with water. Much complaint has been made that such immense tracts of land are devoted to the production of wine instead of bread ; but, in many of the bread-growing countries, a far larger proportion in value of the product has been devoted to the manufacture of a drink far more intoxicating, and much more fatal to peace, public order, domestic happiness, and all good morals, than the mild and ordinary wines of France ; which, when unadulterated, are the pure juice of the grape, and have not the strength of common cider. I was in the vine-growing countries in the season of the vintage, when wine in the greatest abundance was free to all, but there was no more excess than at any other season. We could hardly expect these laborious people, whose chief solid subsistence is bread, to limit themselves to water, and we could not but feel grateful that God had given them so innocent and delicious a beverage to cheer and sustain them

under their toil. It is not the use but the abuse of these gifts of Heaven, which constitutes the criminality, and converts them into a fatal poison.

Various attempts have been made in different periods to limit the cultivation of the vine. In one case, after a severe scarcity, one of the Roman monarchs ordered the whole of the vines in certain provinces to be destroyed, and more than half the vines in other provinces; and several kings of France have prohibited the occupation of land beyond a certain amount in the culture of the vine, that the people might be compelled to the cultivation of bread. Such interference on the part of governments in private concerns, and such arbitrary measures, seldom effect the desired end. The culture of the bread-grains, is, unquestionably, always of the first importance; but arrangements of this kind are generally much better left to private interest than to public control. The principal objection to the culture of the vine is, that it is in no respect subsidiary to any other crop; that it occupies the land permanently, without permitting any other crop; and that the vines require much manuring, though they do not always get it, without furnishing the materials for producing any manure. Some persons have ploughed or dug in the cuttings and waste parts of the vine, and it is said with extraordinary success, but the practice is not much extended.

The vines are ordinarily raised from cuttings in a nursery, and transplanted at one year old, generally in rows about four feet asunder each way; but farther when it is intended to plough between them. Generally the land is dug with a spade; the old wood cut away in the spring, and the new trimmed, leaving three buds only. They are then staked, and trained to these stakes, which are from four to five feet in height. At the harvest they are gathered with great adroitness, the clusters being cut with a knife or scissors, and carried to the pressing-house in casks or carts.



The whole process, afterwards, resembles precisely the manufacture of cider, excepting that I saw no straw used in laying up what is called the cheese, the stems of the vines supplying the place of straw, in giving compactness to the heap; and that there is no breaking or crushing of the grapes as of the apples, before they are put under the press. The juice, as it comes from the grape, is always white, but it is coloured by leaving the stems and skins of the grapes in the vat with the liquor twenty-four hours after it is expressed. The after-management of the wine, where it is kept pure, consists in straining, and different drawings off and bottling, very much like the management of the best cider; above all things, watching over the casks to preserve them from must or any offensive substance.

The different kinds of wine take their names from the different countries or vineyards in which they are produced. I cannot persuade myself that the grape itself has not much to do with the quality of the wine; but the constant reply to my inquiries was, that the character of the wine depended mainly upon the particular locality in which it was grown, upon some peculiarity in the aspect, or some unknown quality of the soil. I have no doubt the particular quality of the grape has its full share, and other circumstances besides those which I have enumerated. The adulteration of wines, their mixture, and their fabrication out of materials wholly foreign from the grape, are carried on, undoubtedly, to a great extent; especially in the cities, as, indeed, in what country are not such adulterations more or less prevalent, as the condition of the market may render them profitable?

In France the appearance of a vineyard presents nothing very picturesque, though in the season of harvest it is extremely rich, as I have travelled for miles and miles through vineyards loaded with this delicious fruit. The fields in France are very rarely separated by fences or ditches; but many facts have come to my knowledge, and some within my own personal

observation, which convinced me that no where are the rights of property more scrupulously respected. In Italy especially, in the fertile plains of Lombardy, the vines are trained from tree to tree, sometimes covering a whole tree with their thick and umbrageous foliage; and the purple clusters of the fruit, hanging over the tree in the richest abundance, remind one of some of the earliest temptations to which our frail race are said to have been subjected.

In passing up the Rhine, after entering upon the highlands, the base of which the waves of this magnificent river have swept for so many ages, one is absolutely struck with amazement at the examples of industry, labour, and enterprise which every where present themselves, in the cultivation of the vine, wherever a favourable aspect presents itself. The steepest acclivities are walled up in successive steps or zigzag lines, from the bottom to the top of very high hills, so as to create or obtain some little flat surface for the planting of the vines, and to prevent the washing of the dirt from their roots. Where there is no soil, soil has been transported on the shoulders of men and women in baskets, for no horse or mule could possibly ascend many of these heights; and where there has been no other method of securing the soil and the vine, these baskets full of soil have been placed, and there remain, that the plant may have a footing. The manure, too, to supply these vines, must be carried up, and the produce must all be brought down upon human shoulders. The labour performed here seems almost incredible. The German wines bear a high price, and these situations produce those of the best quality. The celebrated Johannisberg wine is grown upon the banks of the Rhine, at a magnificent place owned by the distinguished Prince Metternich, and is said to be a source of great profit. The delighted traveller has the opportunity of at least feasting his eyes on this beautiful vineyard, and this rich and picturesque country.

A vineyard, if well cared for, will last an indefinite number of years. The worst wines grown in France are represented to be the most profitable, as they pay either none, or the lightest duties, and being sold at a cheap rate, they never want consumers.

16. OLIVES.—The cultivation of the olive-tree, both for comfits or pickles, and for the oil obtained from the fruit, is considerably extended in France, and still more in Southern Italy. The extent of land appropriated to the growth of the olive in France is stated to be about 303,000 acres. The culture is limited to the southern portions of France, as the tree does not endure any considerable degree of cold. The money value of the product in France is estimated at 22,776,398 francs, or 4,555,279 dollars, for sale; and the value of that which is consumed is reckoned at 23,102,841 francs, or 4,620,568 dollars, or 1,835,169*l.* sterling. This is a great product for a permanent article. The oil-cakes left after the expression of the oil are considered as very valuable for cattle, and their value defrays some portion of the expense of expressing the oil.

The olive groves or orchards in Southern Italy are very extensive. Looking out from the high grounds in the neighbourhood of Florence upon the enchanting valley of the Arno, it appears like an almost uninterrupted grove of olives as far as the eye can reach. It is difficult to conceive of a richer, more beautiful, or more picturesque landscape than is here spread before the eye; combining a charmingly varied surface, with cities crowning the summits, and white palaces glittering among the richest foliage, the river winding its gentle and silver stream through the whole length of the valley, amidst forests and fields of the deepest and most luxuriant vegetation.

The olive-trees are of long endurance. I was shown some orchards to which tradition ascribes an age of eight hundred

years ; the condition, however, either from age or neglect, was not flourishing. More than a hundred different kinds of olive-trees are mentioned in France, differing in the quality of their product, and in their adaptation to different soils and temperature. New varieties are occasionally produced by sowing the seed in nurseries. The trees are planted in squares in the fields, at the distance of five or six yards apart, more or less, according as the soil is dry or humid, nearer to each other in the former case than in the latter. The trees should be well manured either with stable manure or compost ; it is advised to dig round the trees every spring and autumn. The field should be cultivated, taking care to guard against injury to the roots, with the plough ; and, if grain is sown, the portion near the roots of the trees should be dug in while green, and before the grain is formed.

The great enemies of the olive-trees are the cold and certain insects. The severe cold in 1820 and 1836 destroyed a great many trees in France. Many insects infest the trees, which sometimes prove destructive, against which remedies are prescribed like those employed against the insects which infest the apple-trees. How far it might be successful to introduce the cultivation of the olive-tree into the southern states of the United States, I must, after the above account, leave the parties interested to judge.

The fig was growing freely in Italy in the open air, and by the road side.

## XVII. GENERAL VIEWS OF FRENCH AGRICULTURE.

I have now gone over the principal crops produced in France, with the exception of some which will come under review in treating of the husbandry of Flanders, where these crops are grown with more skill and success than in France.

I think my readers will have reached a conclusion to which I early arrived, which is, that the agriculture or husbandry of France is a subject of much greater importance, and conducted with much more skill than is generally thought. There are several subjects connected with it upon which I shall speak hereafter. In many parts, I may add in large parts of the country, the cultivation is inferior, negligent, and extremely discreditable. France, however, is not the only country to which these remarks apply ; but it must be said of France, that in some of their principal crops, those to which their climate is adapted, to which they have been habituated, and which they have found to yield the largest profit, no persons have advanced further than they. I instance only the production of beet-sugar, which must be taken in connexion with the residue or refuse of the manufacture, furnishing so rich and useful an aliment for cattle and sheep. This production is enormous, and constantly increasing ; next, the production of silk, which furnishes so valuable and simple a resource for the poor, and which, followed out in its various ramifications, will be found to set so many thousands, nay hundreds of thousands, of industrious hands in motion ; and lastly, its production of wine, so important an article of domestic consumption, and so large an article of commerce. I am not of opinion that perfection has been reached in either of these articles of culture,—for to what that is human does that term perfection, in any but the most qualified sense, apply?—but certainly the culture of these articles is pursued with the most exemplary diligence and enterprise ; I may add, with as much diligence, and enterprise, and success, as are applied in any cultivation in any country.

I shall be told, I dare say, that these productions are not bread, and that they are not articles of necessity, but of mere luxury, which man can do without. But they are the means of procuring bread ; and an acre of silk, or an acre of

sugar, or an acre of wine, will ordinarily procure more bread than an acre of wheat.

I am in the strongest sense of the term a utilitarian; but I hold in utter contempt the narrow notions of utility entertained by a large portion of mankind. We have it upon the highest authority, "that man shall not live by bread alone." If we desire to know what man can do without, how little is absolutely necessary to his being, and to the continuance of the race upon the cheapest terms possible, it is only necessary to go to ill-fated Ireland, and find whole families subsisting, growing, and extending themselves upon potatoes and water, with a flock of straw spread upon the bare ground for the whole litter to nestle in, and half naked, and covered only with a few rags that can scarcely by any art be persuaded to stay on. I have never seen human nature in so low a state of degradation. I have been in the tents of the wandering gipsies; I have seen the wigwams of the savages of America;—but these tents and these wigwams are almost palaces compared with the mud-hovel of an Irishman.

That is useful which is conducive to our subsistence, to our health, to our comfort, to our improvement, to our luxury, and to our pleasure and enjoyment. A man on Robinson Crusoe's island would be very foolish to cultivate sugar, or silk, or wine, if by doing so he could get no bread; but if by these, as articles of easy exchange, he could procure bread, or whatever else might be necessary or conducive to his subsistence and comfort, and in such cultivation could turn his labour to better account, could in fact procure more bread than he could by the direct application of his labour to the growing of wheat, who can doubt what course he should adopt?

It is frivolous to talk of that only as useful which alone is necessary to our subsistence, or to the supply of the ordinary wants of life. The pleasures of the taste are worth something. Even the most humble being, above the condition of

a savage, prefers to cook his meat to eating it raw; and if by any means our food can be rendered more palatable as well as nutritious without injury to the health, we should gratefully avail ourselves of the power to do it. The pleasures of the eye, with the various associations connected with them, are among the most refined which we can indulge. Articles of elegance and of pure luxury are articles of utility, and so are all that contribute to the pleasures of a refined taste, and the comforts, the innocent gratifications, and the beauty of life. In proportion as human desires and wants are multiplied, labour is encouraged, and human genius is stimulated. There is no hope of raising any people above the condition of savages, or of the humble animals with which they consort, whose ambition is satisfied with potatoes and water.

The philanthropic mind, in the rapid progress of human art, is delighted to see what are called the luxuries of life extending themselves. What has hitherto been the exclusive property of the rich, we should be happy to see become the universal and easily-attainable property of the poor. It is not many years since, a pair of silk hose was considered a present fit to be made to a queen, and a silken robe was a treasure hardly to be aspired to even by princes. I have seen immense improvements already made in the dress of the humbler classes, those by whose labour the luxuries of the rich are supplied; and I should be glad to see every poor Irish or Scotch peasant girl, who are now so often seen in their natural hose soiled and torn, able to wear stockings which even queen Elizabeth might have envied, and going to their churches in silks and satins, which should dazzle the eye by their lustre, and give delight by the beauty and exquisite taste of their fabric. Machinery is now everywhere lending its wonderful creative powers and facilities in multiplying the most useful and beautiful fabrics, and it is delightful to see generally the humbler classes so much better clothed,

and their houses so much better furnished than they were even within the memory of many persons now living. Every advance and improvement of this description promotes care, caution, and cleanliness. Cleanliness of person has a direct affinity with purity and refinement of mind and taste. Whatever conduces to this refinement, conduces to self-respect ; and self-respect will be found ever one of the great elements and instruments of virtue.

### XVIII. FARM NEAR VERSAILLES.

I shall hereafter recur to the subject of the agriculture of France ; but I may in this place say, that I have met examples of farming in France, which for excellence of culture and arrangement, and the success of the farming, are no where within my knowledge exceeded. A farm in the neighbourhood of Versailles, with the intelligent proprietor of which I had the pleasure of an intimate acquaintance, in its excellent management may be considered as a model farm. It consists of about 700 acres. The husbandry is of a mixed kind ; a large milking stock is kept on the farm, which though not reared on the farm, are very carefully selected ; and kept and fed in well-arranged and capacious stables, where the best arrangements by gutters and cisterns are made for collecting and saving all the liquid as well as all the solid manure. Abundant crops of lucerne are grown both for green feeding and hay, and likewise of sainfoin. Good crops of wheat are likewise raised, and of cobza. Carrots are cultivated extensively for the stock ; and potatoes especially for the manufacture of starch. This manufacture, very simple in its character, constitutes a large object of attention ; and what with the potatoes grown upon the place, and those which are purchased, more than one hundred thousand bushels are used in this manufacture in the course of the



year. The refuse water or liquor from this fabrication is first collected in tanks or open reservoirs, where it makes a considerable deposit from the matter still floating in it. The liquid portions are conveyed by small channels or canals on to the grass-fields, which are thus irrigated, and the solid portions are taken out and spread. The effect of this manure is extremely beneficial, and it scarcely differs in strength from the best animal or stable manure.

### XIX. FARM ACCOUNTS.

At no place have I seen a more complete system of farm accounts than at this farm. The books are kept with the greatest accuracy ; so that the result is seen at once, and any specific loss or gain is traced to its proper source. Through the kindness of the owner, I was enabled to procure a form of these accounts. I subjoin it, thinking I can give few things of the kind more valuable to my readers. The great and almost universal fault of farmers is, that through ignorance or neglect they can hardly be said to keep any accounts ; sometimes merely a few memoranda in an interleaved almanack, or a few chalks behind the door ; or if they keep books, they are often confused, are seldom balanced, and the farmer never arrives at a result upon which he can rely. Often under these circumstances he finds himself gradually declining into hopeless bankruptcy, without being able to ascertain the most active and certain causes. The ship is filling, but he cannot detect the leak, nor consequently the means of stopping it. He may call all hands to work day and night at the pumps, but with little hope of saving the vessel until the fatal inlet is discovered, and that may prove too late.

Under the system adopted by this excellent farmer, an account is kept with every crop, with the stable, the cow-house,

the sheep-fold, the poultry-yard, the labourers, and the farmhouse. Each is regularly charged with every item on the debit-side, and credited with every return which it makes. The whole is then brought into a general *résumé*; an account of stock is taken; and the books balanced once a year with the accuracy of a banker's clerk.

Take for example his Winter	In other columns are ar-
Wheat: it is charged with	ranged
Ploughing, harrowing, and rolling.	The extent of the land in wheat.
Manures.	Product in grain and in straw.
Seed.	Product by the acre.
Reaping, and binding, and stacking.	Value of the grain and of the straw.
Threshing, measuring, and storing.	Total value of the product.
Transporting and marketing.	Value per acre.
Rent of land.	Profit of the cultivation,
Total of expenses.	or
Expense per acre.	Loss.

The account of each crop is kept in this form in a book ruled in separate columns for this purpose. The history of the crop, such as the time of sowing and of reaping, is given at the bottom of the page; and the average yield of the crop for the ten preceding years.

The account of the Stable is kept in this form:

Expenses.	Credits to the Stable.
Feeding of the horses.	Labours upon the Farm—Plough-
Utensils and furniture for the stables.	ing, &c.
Equipages—Harnesses, saddlery.	— Upon the road.
Carriages.	Manure.
Farriery.	---
Waggoners and Ostlers—Wages and	Profit or loss.
expenses on the road.	
Board of waggoners and ostlers.	
Extraordinary expenses.	

The expenses of the Sheep-fold are kept as follows. The account opens with the 1st of July, and finishes with the 30th of June:—

Account is taken of the number of  
 Flocks.  
 Sheep.  
 Lambs.  
 Rams.

A second column gives the account of purchases; and another of sales, during the year.

A fourth column gives the number of flocks, sheep, lambs, and rams, at the end of the year.

The next chapter embraces the several items of expense, such as—

Cost of feed.	Other columns give the estimated value of the flock at the beginning and close of the year.
Medicines or drugs.	
Driving and folding.	
Hurdles, troughs, &c.	
Transporting and expenses of marketing.	
Shepherds—their wages.	- Returns from the sale of sheep.
"          " board.	"          " wool and skins.
Straw for litter.	"          the value of manure.
Total of expenses.	"          the benefit from folding.
	Profit or loss.

The account of the Cow or Milk establishment is kept in the same form:—

Keeping of the cows.	Number of cows, and their value at the beginning of the year.
Cost of cows.	Expense of cows purchased.
Care of them.	Number of calves.
Utensils.	Returns from milk or butter sold.
Expense of the sale of milk.	" from calves.
Litter for the stables.	Value of manure.

The Poultry-yard, embracing also the Pigs, is brought under a similar supervision, and the accounts of the whole year, in expenses and returns, are carefully preserved and adjusted.

The account of Manures is likewise kept:—thus,

Manures purchased.	Loading and unloading.	Compost heaps.
Transportation of manure.	Spreading.	Folding.
Straw for litter.	Oil-cakes purchased.	

The general expenses of the Farm are then brought into the account :—

Overseers and their travelling expenses.	Wood and cutting fuel.
Bookkeeper, stationery, and postage.	Measuring ground.
Wages and clothing for the servants.	Mole and rat catcher.
Journeyings, hunting, dogs.	Workmen, by the day or task.
Time of horse for service of the family.	Expense of waggons and farriery.
Insurance against fire and hail.	Saddlery and harness.
Taxes.	Bedding and linen.
Utensils and furniture.	Painter, glazier, carpenter, blacksmith, ironmonger.

The specific expenses of the household are next brought into account :—

Kitchen expenses.	Beer.
Cellar.	Products of the farm consumed, such as milk and cream, eggs, poultry, mutton, pork, potatoes, fruits and vegetables, butter, and cheese.
Eatables.	Presents to servants.
Groceries.	New Year's and Christmas gifts.
Butcher.	Care and medicine in sickness.
Baker.	
Wood and charcoal.	
Household and kitchen furniture.	

Miscellaneous expenses follow :—

For the poor, charitable gifts.	Meat, bread, wood, medicine, boarding, clothing, fruits and vegetables.
Education of poor children.	

Expenses :—

Civic charges at the mayory.	For a public engine and carriage to protect against fire.
To the police-officers, or country watch.	

I have thus given the items of accounts kept on this excellently-managed estate, not so much to recommend the precise form in which they are kept, as to show their particularity and exactness. The great value of this extreme precision is, that the owner is at once enabled to discover what are the particular sources or occasions of expense, and to determine, if it should be necessary or expedient, what he may at once retrench or forego. The keeping of such accounts requires time and care, and, perhaps, in this case, they may be too much extended. But a careful and orderly arrangement, together with punctuality and exactness, so that the work may never get into confusion or arrears, will overcome much

of the difficulty. The satisfaction and advantages arising from it, will be a full compensation for the labour and expense which it may require. I cannot understand why on a large farm a bookkeeper should not be kept as much as in any shop or other trading concern. A French farmer or proprietor might often obtain the most ample assistance from his wife, or his daughters: for it must be said, to the great credit of the French women, that they are expert in such matters. They have great cleverness in business affairs; and there was scarcely a shop or warehouse in Paris without its female bookkeeper or accountant. I met with a young lady at a friend's house, and I was told there were innumerable cases like it, who was the principal manager or salesman at a large wholesale lace establishment, where goods to the value of hundreds of thousands were disposed of in the course of the year, and who received an annual salary of 200*l.* sterling, or more than a thousand dollars. The highest confidence was reposed not only in her integrity but in her accuracy and skill; and in private society I can answer for it that her mind was highly cultivated, and her manners agreeable and elegant. I hope I may be excused for saying that it is delightful to find an elegant young woman something else than a mere fashionable plaything or toy.

I only add, that I have the results of the accounts of this farm from 1816 to 1846, thirty years; that the receipts vary considerably as products and prices vary; but that, in not more than three years in the thirty, was there any loss, and in the other cases a fair and reasonable gain.

## XX. AGRICULTURE OF BELGIUM AND HOLLAND.

I pass now to the agriculture of Belgium or Flanders. My remarks will embrace the whole of the Low Countries,

Holland as well as Flanders. Though they differ in many particulars, yet they may be considered together. I entered these beautiful countries, beautiful in the eye of an agriculturist from the richness of their crops, and the perfection of their cultivation, in the month of June ; and I confess my expectations, excited as they were, were more than answered.

## XXI. THE SOIL.

A great portion of these countries may be considered as alluvial ; much of it formed from the recession of the sea and the elevation of the land ; much by the gradual encroachments of the land upon the sea, as where, by the meeting of the tides with the streams of some of the great rivers, which here, by various channels, find their passage into the sea, a sand bank is formed, and presently, by successive deposits of mud brought down by the streams, an island or outstretching point is produced, which is gradually raised above the level of the tides ; and, lastly, by the actual embankment by dykes of immense tracts, which still remain many feet below the level of the sea ; and which form extensive basins or enclosures of almost unsurpassed fertility.

## XXII. THE DYKES AND POLDERS.

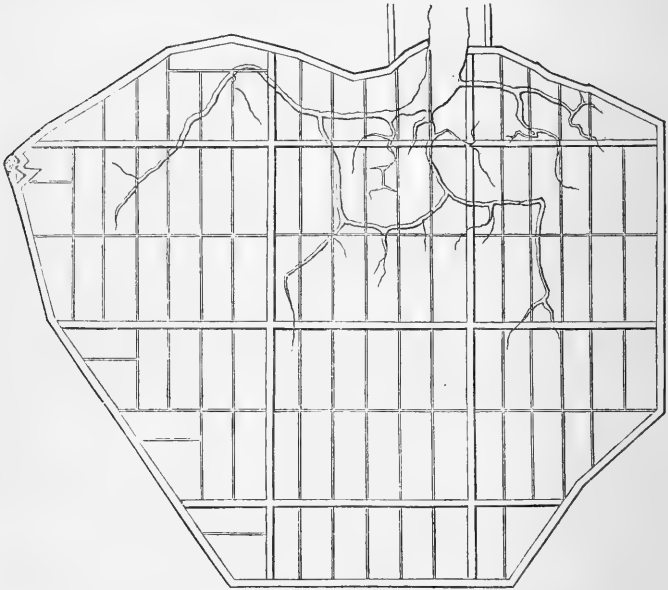
The extent and magnitude of these embankments is matter of inexpressible surprise ; and one is compelled to ask, where and who are the men of such unconquerable and gigantic enterprise as to raise these extraordinary mounds ; thus to defy the ocean ; and thus to effect conquests, than which none more brave, illustrious, or beneficent, are recorded

in history, and compared with which, military conquests seem to deserve only the execration of mankind.

The external dykes are from 125 to 150 feet in width at the bottom, with spacious roads on the top of them ; and in several cases the water requires to be lifted twice before it is thrown into the sea. These immense tracts of land, which have been thus redeemed from the sea, are denominated polders. These polders are said to average more than eleven hundred acres each ; and that 436 polders, embracing an extent of 475,000 acres, are kept dry by 815 mills. The water to be removed is of course the fresh water from rain, or the water from springs, and some, doubtless, from the infiltration of the sea. The work of one mill is required to keep six hundred acres sufficiently free from water. The whole amount of this poldered or redeemed land in Holland is represented to exceed five millions of acres, an amount to be redeemed from the sea scarcely within the limits of credibility. But the original erection of these dykes is not the whole amount of labour which they demand,—a demand which knows no interruption nor cessation. It is said, upon competent authority, that had the original dyke at Walcheren been made of solid copper, it would have cost less than it has cost in its formation and repairs.

I present here a sketch of the polder of Snaerskerke, given by Radcliffe from the government survey. This polder contains about 1300 acres, and was drained by order of Napoleon. “The creek, with its minor branches, by which the tide overspread nearly the entire surface, is traced, to point out its original state ; but that has now given way to the regular divisions and arrangements marked by the parallel lines, which describe the present circumstances and appearance. The facility of this improvement is so obvious, that it is only surprising it should have remained so long unexecuted ; the banks of more ancient polders, which nearly surrounded this, having rendered it unnecessary to do more than to shut

out the sea at one point of influx, about 1450 feet in extent." Let us look next at the pecuniary result of this improvement. "The land which has been reclaimed by it was let for a sheep-pasture, at 25*l.* sterling, or about 125 dollars, and was thrown up by the farmer as untenable. Upon being dried by this summary improvement, the lots, of which there are one hundred, of thirteen acres each, were sold by auction at an average of 291*l.* 13*s.* 4*d.* each, or about 1458 dollars, and would now bring nearly double that sum<sup>1</sup>."



SKETCH OF THE POLDER OF SNAERSKERKE.

A great work of this same kind is now going on, which is no other than to drain the Harlaem Lake, and lay the bottom dry for cultivation. This great work has been some time in progress by means of powerful steam-engines, and

<sup>1</sup> Radcliffe's Flanders.



when completed will lay dry about 50,000 acres<sup>1</sup>. The extent proposed to be drained is said to be seventy miles square. Another tract which has been laid bare contains 18,000 acres. It is impossible to contemplate these mighty and beneficent achievements but with the most profound admiration. But if an immense labour and expense have been devoted to their creation, a corresponding vigilance, a vigilance most laborious, indefatigable, and unceasing is required to maintain them. The inhabitants of this great country sleep always in the immediate neighbourhood of an enemy's camp, and are exposed to irruptions and invasions, against which all human power may be unavailing. The recollection of the floods, which have occasionally broken away these barriers, and swept the country, is perfectly terrific. In the course of thirteen centuries<sup>2</sup> no less than 190 great floods are said to have occurred in Holland ; so that a destructive inundation may be said to have occurred as often as once in seven years, and the years so late as 1808 and 1825 were marked by great floods. In 1230, 100,000 persons are reported to have perished, with cattle innumerable. In 1410, 20,000 persons were drowned ; and in 1570 an equal number. In 1717, the flood is reported to have destroyed 12,000 men, 6000 houses, and 80,000 cattle. The sea has been known, in some cases, to have risen eight feet above the dykes. These events are certainly among the most tremendous in history ; and evince the extraordinary courage and perseverance of a people, who again repel the merciless invader, and bravely plant themselves directly upon the recovered field.

This temerity finds a counterpart in those cities which I

<sup>1</sup> It is stated, that in order to exhaust the lake, 3000 millions of tons of water must be raised ; and in order to keep it dry, 54,000,000 of tons must be raised annually ; and sometimes 20,000,000 of this in one or two months. What a gigantic project !

<sup>2</sup> From 516 to 1825.

visited, crowded with a busy, gay, and reckless population, which have their foundation at the foot of mountains, still pouring out their immense volumes of flame, and rolling down their sides their resistless torrents of liquid fire, upon the crust scarcely cold, which has suddenly buried cities teeming with life and resounding with the noise of business, or the shouts of pleasure, in the very hour of their living burial.

### XXIII. THE WATER MACHINERY OR MILLS.

These countries have to exercise a double guard ; the first against the irruption of the ocean, and the second against the overflowing of the great rivers, which, fed by streams from mountains covered with eternal snows, here divide into many branches on their way to the ocean ; and likewise from the rain which falls, and has no way of escape but as it is pumped up and turned off into the rivers or the sea. In some cases, six, eight, and ten feet of water have been removed ; it is stated “ that in one case, a depth of more than thirteen feet required to be removed on land more than eight feet below the high water of the river into which it was necessary it should be discharged. It was raised into a reservoir, and let into the river at low water. The water required to be raised by successive lifts twenty-two feet, not an uncommon lift in Holland.” The machines by which this water is raised are windmills, made with extraordinary care and expense, and presenting to the unaccustomed eye a peculiar but not displeasing appearance. I counted more than two hundred in sight at one time, and was told that more than four hundred might be seen. These are variously constructed, some of them with a spiral screw working in a box to which the screw was exactly fitted, and by which large amounts of water were forced up without any heavy pressure upon the machinery. In other cases, the water was lifted

with a simple paddle-wheel working in a common trough. It is stated that one mill will free 600 acres from water ; but it is obvious that this must depend upon various circumstances, such as the quantity of water to be removed, and the kind of machinery employed. The most constant vigilance is required to take advantage of all the wind that blows. To give some idea of the expense of these operations, a mill is said to cost from 8000 to 14000 dollars, or from 1600*l.* to 2800*l.* sterling, and its operation costs 300 dollars or 60*l.* sterling a year. Many of the persons who have the care of these mills live in them with their families.

These are all windmills. Steam-engines would probably be as little expensive, and more under command. Most of these mills were erected before the use of steam in this way was known ; but a reason given for preferring wind to steam is, that, as Holland has no coal, in the event of war she might be without fuel, and consequently unable to work steam-engines, the disastrous consequences of which it is not necessary to dwell upon.

Such are the mighty works, as well indeed they may be called so, which arrest the admiration of the visitor to this reclaimed and fertile region, so marked by the most extraordinary enterprise. They inspire a profound sentiment of the hardihood and enterprise, the courage and indefatigable perseverance of the people who undertook, achieved, and have maintained them.

#### XXIV. FLEMISH AGRICULTURE.

The agriculture of Flanders is chiefly arable. To give a detailed account of its various crops and their culture, would be to compose a large work ; and I shall therefore limit myself to noticing those peculiarities in their practice by which their cultivation is distinguished, with such remarks upon

particular crops as seem interesting and useful. Flanders itself is to some extent a redeemed country ; and they have also their polders and embankments, canals and dykes.

I begin by saying that the agriculture of Flanders is superior to that of any country which I have visited. I do not say that in England, Scotland, France, and Switzerland, I have not seen single farms as well cultivated as any I have seen in Flanders ; certainly in the Lothians in Scotland, in Northumberland, in Norfolk, in Lincolnshire, in Bedfordshire, in Berkshire, in Cambridgeshire, in Staffordshire, and in other places, I could single out particular farms and considerable districts where the cultivation is carried to a high degree of perfection and productiveness ; but taking into view the large portion of Flanders which I visited, for neatness, exactness, and thoroughness of cultivation, for the evenness and magnificence of the crops, for the propriety and exactness of the rotation, for the economy and excellent modes of applying their manures, and for the obvious and distinguished improvements made in the soils, this country seems unsurpassed. It is not a little humiliating that this has been done by a people comparatively without education, with no pretensions whatever to what is called agricultural science, and with few implements, and those far from being the most improved. To say, however, that they are without education and agricultural science, is a great misnomer. They have the surest of all science, that which grows out of long experience, and which comes from the application of the mind, sharpened by necessity, to whatever is passing within its own province, and avails itself of all the lessons which that experience suggests. I am far from thinking that with them the ultimatum of improvement has been reached. I should regret to find any where, in any science or art, the door of inquiry closed ; but at present they may congratulate themselves with having reached a degree of improvement, which many other countries, with superior advantages in other respects,

have not as yet approached. Though their implements have been imperfect, there is yet an obvious reason why they have been effectual. The great agricultural instrument in Flanders is a spade. We are contriving all kinds of implements which shall lessen human labour. We want all sorts of machines which shall, if possible, do the work of or by themselves. We want that they should be impelled by wind or by steam, or by brute force ; and we would be glad, as far as possible, to dispense with the necessity of personal superintendence. The Flemish farmers reluct at no personal superintendence or toil ; and even an inferior implement, with a thinking and directing mind at the end of it, may be more efficient than many a more complicated or better contrived machine, which is expected almost to make its own way.

## XXV. THE SOIL ; AND SIZE OF FARMS.

The soils of Flanders are generally inferior ; but they illustrate the Latin proverb, that persevering labour overcomes all difficulties. In many instances, the farmers plant themselves upon an almost hopeless blowing sand, which would seem to defy all vegetation. They will begin by planting oats, or rye, and broom ; the oats or rye are used for forage, and so are the tops of the broom, which remains in the ground three years, and is then ploughed in to form and enrich the soil ; and when by degrees they can advance so far as to grow turnips or clover, so as to feed a cow, the way of success is open. In such case, all manure, solid and liquid of every kind, is saved with care, and the whole redoubles itself ; and after a time is witnessed the conversion of this arid sand into a productive soil.

The size of farms in Flanders is small, in many cases not exceeding fifty acres ; often less than this, and not more than six or seven acres. The amount produced, upon even the

smallest holdings is remarkable, and presents an advantageous, and often an instructive contrast with the product of large farms.

## XXVI. THE CULTIVATION OF THE SOIL, TRENCHING, PLOUGHING, MANURING.

1. The first characteristic of Flemish husbandry is their deep cultivation. In some cases this is done by the spade, in others by the plough, and sometimes conjointly by the plough and spade. The land is gradually trenched to the depth of twenty inches or more. The land for grain being laid out in stitches, six or seven feet wide, in the intervals a deep trench or ditch is dug, say of a foot in width. The next year, in cultivating this same land, a foot in width will be taken from the side of this stitch and thrown into the ditch or open space, widening, of course, the next bed to the extent to which it is cut off from the other; filling up the trench of the preceding year, and forming a new trench. This is repeated year after year, until, according to the width of the stitch or bed, the whole ground is gone over to the depth of a double spading. At the same time, as the successive crops have followed each other, the ground has been carefully improved by manure, until a fine rich and mellow bed of soil is formed. This operation resembles subsoiling, with this difference, that the work is more thoroughly and carefully done with a spade than it can ever be with a plough. A deep soil, where properly enriched, is obviously most favourable to vegetation. The air itself is a great enricher of the ground; water, another great element of fertility, passes through a well cultivated soil, leaving its fertilizing influences, without becoming stagnant, and so injuring the soil. All plants do not equally require deepness of soil, yet even the plants which appear most superficial often extend the fine tendrils of their roots in search of food

much farther than the eye can follow, or than is generally supposed. A French farmer states that he has found the roots from a plant of wheat extending five feet. All tap-rooted plants, such as clover or carrots, frequent crops in Flanders, of course demand a deep culture.

The first object then of the Flemish farmer, is to get a deep and friable soil, well enriched, and, as far as possible, equally enriched throughout. This is done with great pains-taking, and the whole resembles the most beautiful garden cultivation. Even where it is ploughed, the trenches at the sides of the field, and between the beds, are cleaned out by a spade; what is taken out is laid carefully upon the beds; and the whole executed with a neatness and exactness the most particular, and perfectly delightful to the eye.

2. SUBSOILING.—They have a peculiar mode of working their land in many cases, of which their best farmers think very highly, and which is well deserving of notice. Immediately after the plough has opened the furrow, workmen follow with a spade, and take out from the bottom of the furrow large spadefuls of earth, laying them up upon the turned land. Here they remain in lumps until they are reduced to fineness by the warmth and air, and spread themselves upon the soil. They have an opinion that this is equal to a good manuring. The next furrow slice of course falls into these holes, and to some extent there is a complete inversion of the surface-soil. This does not answer, however, where the land is clayey, or strong and adhesive, as, in that case, water would collect and remain in the holes made under the furrow with the spade. The object of the Flemish farmer is to have the ground thoroughly enriched and friable; and to give, as far as possible, a quick passage for the water which falls upon it, and free admission to the air.

3. DRAINING.—Nothing can surpass the pains-taking of the

Flemish farmer in the preparation of his soil, as the basis of all his efforts, and that on which he rests his hopes of success. I have already said, that with a view to get rid of surface-water, he carefully lays his ground in stitches or beds, narrow or wide, in proportion to the quantity of water, which, from the situation of the land, may require to be disposed of. If the land is made wet by springs, he takes pains to cut off the springs by transverse ditches. These he fills with brush, or wooden boughs, and upon these he lays stones, and then covers with earth, and thus conveys the water into an open side ditch. This is a primitive mode of draining, and not the best which could be chosen; but after the wood has decayed, the channel being once formed, it is likely to be kept open for a length of time, by the force of the running water. If the wetness of the land proceeds from its low and sunken position, or from springs which cannot be cut off, it becomes necessary then to cut it up by open ditches, which are made at distances varying according to the nature of the land to be drained, and into which the water becomes collected. This takes up a considerable portion of the surface, but the compensation is found by the dryness and availability of the other portions, by which method only these could be secured. This is the universal practice upon the polders, and these principal ditches are often of sufficient width to proceed upon in boats, in order to take off the produce to the outer edge of the polder, where it can be removed in carts.

4. MIXING THE SOIL.—If the soil upon which he proposes to operate be composed, as often happens, of different strata of earth, as, for example, of mould, next of a layer of clay, and next of sand, he is careful, by a deep trenching, thoroughly to stir, and by degrees to intermix and enrich the whole. In truth, every effort is made to produce a deep, friable, rich bed for their operations; and by such means soils, which appear at first almost worthless, are made pro-



ductive. Many soils, which in their original condition were sterile and comparatively worthless, now take rank with the most fertile.

I do not pretend in this case to enter into the question of expense and compensation. In order to determine the expediency of such improvements, in any situation, the value of land and of the produce must be taken into the account, as well as the cost of labour and manure; but my sole object is to state what has been done; and to show from that what skill, industry, and perseverance may accomplish.

There are few situations in which substantial and judicious improvements upon land do not afford a full return; and the more substantial and thorough, the more ample the compensation. In a country so thickly populated as Flanders, and with labour so abundant, it is important that every rod of land should be made productive. From what is effected under circumstances almost hopeless, and upon soils absolutely barren, it would encourage the expectation that much more than has already been accomplished may be done with even those soils which are now considered best cultivated; and with respect to the greater portion of lands under cultivation, even in districts which are considered most advanced, I believe their produce might, in many cases, be increased one-half.

What is done in Flanders by trenching, is now done in Great Britain by subsoiling. By this the lower strata are loosened, the sun and air admitted to exercise their fertilizing influences upon them, and they are thus gradually intermixed with the upper soil. There is this great improvement in the English method, that the land is first drained by underground drains, which remove the superabundant wetness, without occupying any of the surface.

5. ROTATION OF CROPS.—Another great feature of Flemish

husbandry is that of a regular rotation of crops. This is exact, and observed with strictness.

It has been maintained by some persons, that the excrementitious matter rejected by some plants poisons the soil for plants of the same kind to succeed them, until after an interval, when this exuded matter becomes consumed, dissolved, or changed. By others it is supposed that each plant demands for its nutrition particular ingredients or elements in the soil ; which, being consumed, the same kind of plant will not flourish or succeed in the same soil until a further supply of the same material is furnished, which may be done artificially, or which will take place naturally, when the ground is suffered to repose a certain length of time, or other crops of a different character, and not requiring the elements so consumed, are cultivated. The latter seems to be the established theory. But whatever be the true solution of the necessity of an alternation or change of crops, the Flemish husbandmen have long understood such necessity, and experience has taught them what crops should succeed each other, and how frequently the same crop may be cultivated successfully on the same land.

What this rotation shall be, must depend on a variety of circumstances. An intelligent farmer will be likely to inquire first, to what crops is the soil best adapted, because of this he is likely to get the largest product ; what crop is most required for his own use or for the market ; what crop is likely least to exhaust the soil ; what crop is he best able to manure. In short, a great variety of inquiries growing out of the nature and particular condition of the soil, which will determine the course of crops to be adopted by the farmer, having in view that which he can obtain with the largest profit, the least expense, and the smallest injury to the land. What are called green crops, with the exception of potatoes, which enter largely into human food, such as carrots and turnips, are grown mainly with a view to the manure,

which they furnish by the animals fed upon them. The farm is divided into several portions, and on these different portions, distinct rotations are proceeding regularly, the aim of the farmer being to have a variety of crops growing at the same time. In this way he provides best for the supply of his family; having a variety of articles to dispose of, he runs less risk in the fluctuations and caprices of the markets; and he is enabled the better to husband and apply his manures.

I shall here give some examples of these rotations of crops, not as furnishing a rule for other places, which may differ very much in various circumstances, but simply as illustrating the practice of these careful husbandmen.

On a soil of a good quality, and on which wheat may be cultivated, the following rotation is sometimes observed:

1. Potatoes.
2. Wheat, with turnips sowed upon the stubble after the harvest.
3. Oats and clover.
4. Clover.
5. Rye, with turnips sowed upon the stubble after the harvest.
6. In grass, to remain as long as it is profitable.

The farm in a case like this, will be divided into as many portions as there are distinct crops, so that all will be growing on the same farm at the same time.

The following rotation is sometimes had:—

- |                     |              |
|---------------------|--------------|
| 1. Wheat.           | 5. Clover.   |
| 2. Rye and turnips. | 6. Rape.     |
| 3. Oats.            | 7. Potatoes. |
| 4. Flax.            |              |

On a very strong soil the following rotation is given:—

1. Potatoes, 2. wheat, 3. beans, 4. rye, 5. wheat, 6. clover,
7. turnips, 8. flax, 9. wheat, 10. oats, 11. fallow, 12. tobacco,
13. rye, 14. oats.

The following rotation is adopted upon a stiff soil :—

1. Potatoes, with twenty tons of dung per acre.
2. Wheat, with three and a half tons and fifty barrels of urine.
3. Flax, with twelve tons of dung, fifty barrels of urine, and five cwt. rape cake.
4. Clover, with twenty barrels of wood ashes.
5. Rye, with eight tons of dung, and fifty barrels of urine.
6. Oats, with fifty barrels of urine.
7. Buckwheat, without manure.

On a rich loam the following rotation is pursued :—

1. Turnips, carrots, chicory.
2. Oats and clover seed.
3. Clover.
4. Wheat.
5. Flax.
6. Wheat.
7. Beans.
8. Wheat.
9. Potatoes.
10. Wheat.
11. Oats.

Wheat occurs in this rotation four times in eleven years. Clover, which occurs twice, is to be considered as the only enriching crop. Manure is applied, however, the first, third, fourth, seventh, and ninth years. The cultivation is most careful, and no weeds are spared.

I have given these different rotations from Van Aelbroeck's account of Flemish husbandry, and from the same practical work I subjoin three tables illustrative of the same subject, and which will have an interest with the curious reader.

I.—TABLE OF ROTATIONS IN A POOR SANDY SOIL.

First Year.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Tenth.
			Buckwheat.	Carrots.	Potatoes.	Barley and Turnips.	Flax and Carrots.		
			Oats.	Clover.	Barley and Turnips.	Potatoes.	Rye and Turnips.		
Flax and Carrots.	Rye and Turnips.	Rye and Turnips.	Potatoes, Peas, and Carrots.	Oats, Rye.	Clover.	Rye or Barley and Turnips.	Ditto Oats and Potatoes.	Flax and Carrots.	Rye and Turnips.
			Spurrey and Turnips.	Buckwheat.	Potatoes.	Oats.	Flax and Carrots.		
Flax.	Rye.	Clover.	Rye and Turnips.	Rye and Turnips.	Oats or Buckwheat.	Potatoes.	Rye and Turnips.	Flax.	Clover.
						Carrots.	Rye and Turnips.		
Flax and Clover.	Clover.	Oats, or Spurrey, or Peas.	Rye and Turnips.	Rye and Turnips.	Buckwheat, or Potatoes, or Carrots.	Barley and Turnips.	Oats.	Rye and Turnips.	Flax.
						Rye and Turnips.	Rye and Turnips.	Flax.	
						Rye and Turnips.	Rye and Turnips.	Flax.	

II.—TABLE OF ROTATIONS FOR THE RICHEST KIND OF LIGHT SOIL.

First Year.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Tenth.
Flax and Clover <sup>1</sup> , or Carrots.	Wheat.	Rye and Turnips.	Rye or Barley and Turnips.	Potatoes.	Wheat.	Rye and Turnips.	Flax.	Clover.	
	Oats.	Rye and Carrots, or Barley and Turnips.	Potatoes.	Wheat.	Rye or Barley and Turnips.	Oats.	Flax and Carrots.	Rye.	Clover.
	Barley and Turnips.	Rye and Carrots.	Potatoes.	Wheat.	Rye and Turnips.	Flax and Turnips, or Oats.	Flax.	Clover.	
							Oats.	Clover.	

<sup>1</sup> If clover is sown with the flax, it is cut in the second year, and another year is added to the rotation; but it is more usual to sow carrots with the flax, and sow oats or barley the second year.

III.—TABLE OF ROTATIONS FOR A GOOD CLAY OR STRONG LOAM.

First Year.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Tenth.
		Oats.	Carrots or Barley and Turnips.	Wheat.	Rye and Turnips.	Potatoes.	Wheat.	Rye and Turnips.	Flax.
	Clover.	Barley and Turnips.	Rape and Carrots or Beans.	Wheat.	Wheat.	Rye and Turnips.	Potatoes.	Rape and Carrots.	Flax.
	Wheat.	Barley	Beans.	Wheat.	Rye and Turnips.	Potatoes.	Rye and Turnips, Wheat.	Oats or Flax. Rye or Barley and Turnips.	Flax.
Flax.		or Rye and Turnips.	Oats and Clover or Potatoes.	Clover, Rape, and Turnips.	Wheat.	Rye and Turnips.	Flax.	Oats or Flax.	
	Rape and Turnips.	Wheat.	Rye and Turnips.	Oats.	Clover.	Wheat.	Rye or Barley and Turnips.	Oats or Flax.	

It may not be easy to point out in every instance the principles on which these rotations are founded. With the Flemish farmers they are the result of long experience and observation. Perhaps they might often be changed to advantage. I have known, for example, in some parts of the United States, flax cultivated to great advantage every fourth year; and in some parts of England wheat grown every second year. But in each case the land was highly manured, and in the former case the land was comparatively a new and unexhausted soil. My object in going into this subject was not to prescribe a particular course, but to illustrate a great principle of Flemish husbandry, which will be found equally applicable to every situation. The necessity of a rotation of crops seems fully established. The kind of rotation to be followed must be determined by the peculiar circumstances of each locality, remembering only, that two crops of a similar character must not immediately succeed each other; that the occasional intervention of a cleansing crop—that is, a crop which requires thorough weeding—is indispensable; and that those crops which are to be consumed on the farm serve a double purpose, in addition to the animals which they sustain, they supply the manure which is demanded. The necessity of naked fallows—that is, of leaving the land wholly unoccupied with any crop, that it might recruit itself, and the weeds be exterminated by repeated ploughings—is no longer acknowledged; and cleansing crops, which are manured, may be substituted, greatly to the farmer's advantage.

6. MANURING.—The next great feature in the Flemish husbandry lies in their system of manuring. In the first place, they manure their land abundantly. In one of the rotations to which I have referred (p. 214), the first six crops were each of them liberally manured. The seventh, which completed the course, which was buckwheat, was without

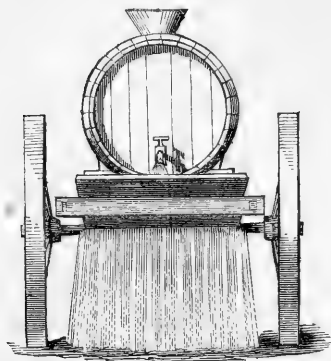


manure. In the next rotation (p. 214), where the rotation extended to eleven crops, five of them were manured. That the manuring was of a liberal character, is seen in the application of sometimes twenty tons of manure to the acre, and sometimes twelve tons, with the addition of fifty barrels of urine. Indeed, the first object of a Flemish farmer is to increase his stock of manure ; to this end he suffers nothing which can be converted into manure to be lost or wasted ; and besides that which he makes from his savings and his domestic animals, he is always ready to purchase manure, where it can be found accessible, the various canals in the country furnishing great facilities for its conveyance. Perhaps there is only one point in which he is often deficient, and that is, in not raising sufficient green food for the support of cattle, with a view to increasing his manure.

7. LIQUID MANURE.—It is not merely in manuring liberally that Flemish husbandry is remarkable, but in the particular mode of applying this manure. The great object of the Flemish farmer is to apply it in a condition to be immediately taken up by the plants. Coarse and long manure he ploughs under in the autumn, that it may be in a condition to serve the crop which is to be sown in the spring. Or, if to be applied in the spring, he so works it over and prepares it, that it is in a condition at once to serve the plant. But the distinguishing circumstance in Flemish husbandry is in the application of liquid manure, both to the land before the sowing, and likewise to the growing crop. In such case the growing crop immediately receives it ; receives it at a time when, perhaps, the manure first applied has begun to lose somewhat of its efficacy ; and in a form that its efficacy is felt at once.

The difficulty of applying this liquid manure to the crops on the land is often considered an objection to its use ; and there is, with many persons, a fastidiousness in regard to the

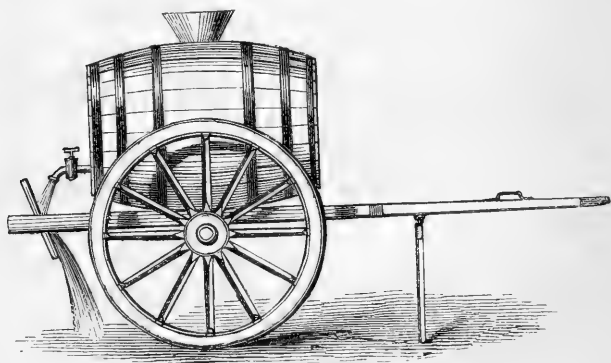
use of it, which is quite absurd, and leads to the sacrifice of the most valuable and efficacious manure which is at the command of the husbandman. In some cases it is turned into the small ditches or furrows between the beds or stitches, and then with a spade thrown on to the beds with some of the soil by which it has been absorbed. In this case a light plough is sometimes passed through these intervals or small ditches, between the beds, so as to loosen the earth by which the liquid has been absorbed. But most commonly



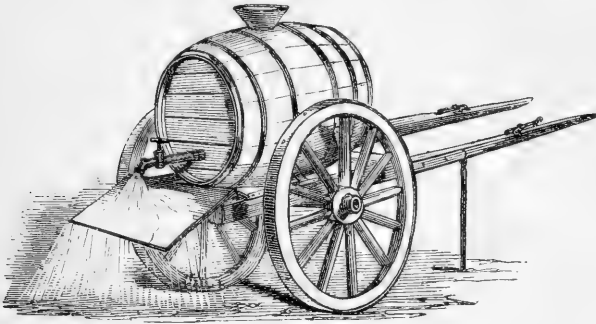
it is applied directly, by means of a cask constructed for that purpose, resembling the vehicles used for watering the streets of cities.

In the subjoined diagram the liquid from the cask falls into a trough placed horizontally, and pierced with holes, by which means it is very equally distributed.

In other cases, where the liquid is too thick to be distributed through these holes, it is, in passing out, made to strike against a plank or board, by which means it is scattered evenly upon the ground. Thus:—



In my opinion, if the liquid was made to fall upon a plank which should be placed behind, at a slight inclination, it would be more effectually spread. Thus:—



In case of small farms to which this manure is to be applied, and where the cultivator has only his own labour of which to avail himself, he adopts a method of distributing this manure, of which the subjoined cut will give an idea; but which, I can easily suppose, may not be agreeable to persons not accustomed to it. The Flemings, however, reluctant at no labour by which their objects may be obtained.

In some cases it is transported into the field by means of a wheelbarrow, with the cask containing the liquid suspended between the shafts. There are acknowledged inconveniences attending its application; but many of them are purely ideal, and the extraordinary value of the manure, when thus applied, is an ample compensation for any extraordinary labour or expense, which its saving or its distribution may cost.



8. CLEANNESS OF CULTIVATION.—Another feature in the

Flemish husbandry is the cleanness of their cultivation. They spare no pains in the eradication of every weed. They have, in this matter, much to contend with. An old country under a highly manured cultivation is liable always to be much infested with weeds, and especially with the squitch grass (*triticum repens*), which is their chief trouble. What cannot be accomplished by the plough, or the harrow, or the hoe, is done by hand; and occasional recourse is had to a naked fallow. In such case a fallow crop, that is, a cleansing crop,—a crop, the cultivation of which would effectually destroy the weeds, would be more eligible. The old doctrine, that the land absolutely required rest, with a view to the recruiting of its powers, is now exploded. With ample manuring, and a rotation or change of crops, its occupation may be unremitted.

Such are some of the principal means by which the Flemish husbandry has been carried to a degree of perfection unsurpassed, it might be invidious to say unequalled; and which exhibits the beautiful and substantial triumphs of art, labour, and indefatigable perseverance. To talk of such agriculture as not being scientific is absurd, for it is grounded upon the most exact observation of facts and experiments, continued and repeated through a long series of years. So far, then, it is scientific agriculture, as growing out of principles well ascertained and established. I am far from thinking that it is all that it can yet be rendered. It is not without its imperfections, and I believe that even a higher productiveness may be reached.

## XXVII. MANURES.

I proceed to the subject of manures, as it presents itself in Continental husbandry. The Flemish call manure “the god of agriculture.” Of its importance not a word need be said; and the Flemish, in the pains they take in its accumulation

and use, evince the estimation in which they hold it. Manure is indeed the foundation of all good husbandry.

1. MINERAL MANURES.—Manures divide themselves popularly into three kinds, mineral, vegetable, and animal. Of mineral manures, such as lime, gypsum, and marl, the use seems well understood, but, within my observation, they are not applied to so great a proportional extent as in England and Scotland. Lime, or the carbonate of lime, is employed upon lands which are clayey, cold, and heavy; and in such case it answers a double purpose, to divide the soil and render it light and friable; and secondly, to warm the soil. That plants take up some portion of lime from the soil is established; but this is so small an element in their composition, that few soils are found deficient in the necessary quantity. That it should be applied to the land in a caustic or warm state seems likewise an established point. Some of the Flemish farmers advise to the mixture of lime with earth, and to its application in that form; but this seems only an increase of labour without any obvious advantage. Others advise to the mixture of lime with heaps of vegetable matter, so as to reduce it; but, in such case, it is likely to destroy some of the most valuable parts of the manure. The efficacy of a dressing of lime is considered by the Flemings to endure three years; but this must obviously depend upon the quantity applied. Thirty bushels of unslacked lime after being slacked is considered by some farmers a proper application; while others advise the application of thirty bushels each year for three years in succession.

I have met with the frequent application of marl to light lands, and to the surface of peat-lands, where it soon forms a productive soil. The application of gypsum can scarcely be said to be general. It is sometimes applied in the ground to the seed of potatoes in the planting, in which case it is generally admitted to improve the quality of the potato;

and it is applied also by being sown broad-cast upon young clover; in this latter case, ordinarily with success. The philosophy of its operation is still obscure. It is difficult to say why it fails; but it is not less difficult to say why it succeeds. It will sometimes be useful, and at other times without effect, in the same locality. This I have myself experienced. A very competent farmer in the United States gives it as his opinion, and the result of his experience, that it sometimes failed of its effects from being too coarsely ground, but that it always succeeded when reduced to an impalpable powder.

Much has been said of the value and efficacy of sea salt as a manure, and in France great complaints have been made of the heavy duty, which in fact prevented its use in this way. A distinguished French farmer and experimenter, who has devoted much time and expense to this subject, and has furnished most exact accounts of his experiments and observations, has come fully to the conclusion that it is of no use whatever as a manure, and equally useless in the fattening of animals. These conclusions are different from the popular notions, which seem always entitled to some respect; but they are fully borne out by the experiments, repeated and varied, of this indefatigable inquirer.

2. VEGETABLE MANURES. — Of vegetable manures I have only to say, that buckwheat and clover are often turned in by the plough, and with acknowledged advantage. The Flemish make a point of collecting every species of vegetable refuse which they can find, all vegetable matter growing upon the sides of the roads and that which is found in the canals. They are careful likewise to plough in their stubbles, excepting where there is another crop on the ground, such as clover or carrots, which are sometimes sown among the grain soon after the crop is harvested.

Under this head may likewise be placed ashes, of which

the Flemish make great use. A large part of the fuel consumed in Holland is peat or turf, and the Dutch ashes are highly valued as dressing for clover. These ashes are imported from Holland into Flanders in large quantities in boats, and always find purchasers. They are applied as a top dressing to dry meadows, as well as to clover and likewise to flax. It is not well determined on what their particular efficacy depends. I subjoin from Radcliffe's Flanders an analysis of them, made however many years ago, when chemistry was far from its present improved state.

Siliceous earth . . . . .	32
Sulphate of lime (gypsum) .	12
Sulphate and muriate of soda	6
Carbonate of lime . . . . .	40
Oxide of iron . . . . .	3
Loss . . . . .	7
	100

The ashes of sea-coal or mineral coal are likewise used as a manure, but they are deemed very inferior to the Dutch ashes properly so called. Heath lands are sometimes lightly skimmed, and the heath burnt for the sake of the ashes; but if it is intended to cultivate the land or to plant it for trees, it is deemed hurtful to remove the ashes of the surface. Wood ashes and the ashes from the soap boilers are likewise most carefully saved and applied. Wood ashes are not easily obtained, because of their extensive use in the arts. The ashes from the soap boilers are much esteemed by the Flemish for strong and moist lands, and have a value from their containing a considerable quantity of lime. The refuse from the bleacheries, which contains a large quantity of soap, is more valued for dry and light lands; both of these manures are greatly esteemed for clover and for dry meadows. Their effects are understood to last for three years, and they are more efficacious the second than the first year.

The cakes from the colza or rape, which remain after the oil has been expressed, are very much used for manure ; in which case they are thrown into the urine cistern, and applied thus mixed. They are supposed very much to increase the efficacy of this liquid manure. Within a few years however, as I learnt at Courtray, these cakes have been used with advantage for the feeding of cows and swine.

In some parts of France and Belgium the stalks of the colza are ploughed in for manure, and sometimes burnt upon the ground, reliance being placed upon the efficacy of the ashes ; and in some of the wine countries, the cuttings of the vines are dug in for manure, it is said, with singular efficacy. It is thus that that which has been taken from the earth for the growth of a plant, is returned to it as a principal element in the growth of the same kind of plant which is to follow.

Soot is likewise used as a top dressing with great advantage, and is considered twice as valuable as ashes. It is applied to the young clover and to garden vegetables ; and is estimated highly for its power in destroying insects. Under good management, every article capable of being converted into vegetable food, or of enriching the earth, should be saved as manure.

I have already spoken of the use of the drainings of the factory where potatoes were converted into starch : their effects upon grass-land were most remarkable. I have in another place spoken likewise of the use of the water in which flax has been rotted. I have seen the most beneficial results from it ; but I am not aware of its use in Flanders.

This water is conveyed from the starch factory into a basin or excavation, where, after remaining a short time, it makes a considerable deposit. This deposit is taken out and spread upon the land, or thrown into and mixed in compost ; and the water is drained off, and conveyed upon the field by small ditches or rills.



3. ANIMAL MANURES.—The great reliance for manure, however, every where is upon animal manure, the excrements of animals, and animal substances. One of the most obvious deficiencies in French husbandry is a deficiency in manure. They are not accustomed to folding sheep upon their lands, as is common in British husbandry. They grow very little of esculent vegetable food for their live stock, such as turnips and carrots; and their cattle are kept in the winter often very hardly upon straw. In summer their cattle are much in the pastures, overlooked by a herdsman or a child, so that the manure is scattered. There is an exception to this in districts where beets are grown for sugar, and the refuse of which is applied to the feeding of animals. It would be wrong for me to pass upon the French in this respect too sweeping a condemnation, for I have found on some French farms the best possible provision for collecting and saving the manure, both in a solid and a liquid state.

I have already spoken of the pains taken in Paris for converting the night-soil into poudrette. In this way the liquid, and therefore the most valuable parts of the manure, are lost; but then in London, and many other large cities, all this valuable material is lost, both solid and liquid, whereas in Paris a large amount is saved and brought into a portable condition, and conveyed in this form without difficulty long distances into the country. This is an immense gain to agriculture. There is likewise a manufacture of manure called *animaliée noir*, which consists in boiling down the flesh of animals, such as horses for example, or animals which have died of disease and are unfit for food; and after it is boiled, baking it in an oven, when it is brought into a state easily to be reduced to powder. There is a manufacture of this same kind of manure in London; but, strange to say, the product is exported to France. The refuse of the sugar refineries, that is, the animal charcoal, or ashes of burnt bones used in cleansing the sugar, is highly esteemed as a manure;

but it is advised by the Flemish farmers to mix it with their liquid manures in the urine vault. This manure is much employed in France. Its chief value is on heath and moist lands. It does no good on rich, highly cultivated land. It is spread broadcast for grass, and its effects are surprising. It is applied to wheat land at the time of the sowing of the seed: it is deemed much preferable to apply it in the autumn rather than in the spring. It is applied in France at the rate of four hectolitres to an acre, which would be at the rate of more than eleven bushels.

The Swiss, likewise, are remarkable for their care of their manures. The heap is usually placed in front of the house, a slight excavation being made for it so as to form a basin into which the liquids are drained. The long manure is laid at the sides, and doubled in with the greatest care, and no little skill, so as to form a neat and compact pile in a square or oblong form. This seemed to be almost a universal practice; and the neatness and exactness with which it is laid up are quite remarkable. The manure from the stables and the refuse of the house is deposited daily upon it; and the drainings which run down to one end of the basin in which the manure heap is placed, are often pumped or dipped up, and returned upon the pile. The odour of the heap directly by the door and under the windows of the house cannot be agreeable; but the extreme neatness with which it is formed, and the cleanliness and care which mark ordinarily every thing about the premises, do much to redeem its offensiveness.

In their economy of manures, in their modes of applying them, in their extraordinary liberality in the use of them, the palm must be conceded to the Flemish over all other people. The best Flemish farmers advise against the general mixing of manures. Their doctrine is, that as different animals demand different species of food, as well on account of their habits or constitution as on account of their taste, so different plants and different soils require specific and

peculiar manures. I shall not discuss the question how far manure is to be considered as the food of plants. It is enough for us to know that manures are indispensable to their growth, and that different manures are very different in their various properties and effects. The manure of the horse is a powerful and warm manure, and considered as best suited to lands which are cold and moist. It operates quickly; it lightens the soil; but its effects pass off sooner than those of many other manures. The manure of horned animals is deemed more substantial, slower in its operation, and more durable in its effects. The Flemish farmers say, that where a second crop is raised upon the ground, the effects of this manure are more apparent in the second than in the preceding crop. It is obvious, however, that the quality of the manure must depend very much on the kind of food upon which the animals are fed. The simplest experiment made with the original and most common of all chemical instruments, the human nose, will at once determine the superior efficacy of the manure of animals highly fed with esculent vegetables and grain or meal over that of animals fed upon straw only. The manure of swine is considered by the Flemish as of very little comparative value, and where used, in order to produce as much effect, they advise to employ full double the quantity which they would use of cow manure. My own experience has led me to rely upon the dung of swine as among the strongest of manures; and the low estimate which the Flemish farmers place upon it must come from the hogs among them being fed mainly upon grass; and from what I have seen, both in Belgium and France, being very poorly kept at the best. The swill pail, which is found at the kitchen door in the United States full of butter-milk and whey intermixed with cooked vegetables, broken pieces of meat and bread, is, alas! not to be found at many cottage or farm-house doors on the European Continent. The whey and the butter-milk are wanted for the

table ; and it would be a species of sacrilege to give meat, which a large portion of the labouring people seldom or never taste, or bread to the swine. The dung of swine is, however, in the best cases, to be considered as a cold manure, and not easily brought into a state of active fermentation.

The dung of sheep is every where highly esteemed. It is active and powerful ; and upon light and moist lands they rate two loads of the dung of sheep as fully equal to three of the manure of other brute animals. It is much used with the oat crop ; but it is not advised for flax, as being apt to force it to a premature ripeness. Valuable, however, as is the manure of sheep, I have seen on the Continent no instance of the excellent practice of folding sheep, which prevails so generally in England and Scotland. In the *bergerie*, or sheep-house, where their sheep are brought at night, they are careful to spread an abundance of litter, which is generally removed twice a year, in the spring and autumn. They begin with a simple layer, which the feet of the sheep soon reduce to fineness, and so proceed layer by layer to a depth of three or four feet, which thus becomes throughout its whole thickness thoroughly impregnated with urine.

In some cases where the farmer does not find it convenient to purchase or own a flock of sheep, he receives one to keep or board for another person. In this case he furnishes straw for their litter in the stables on his own account ; and he furnishes what hay, or grain, or pulse, they may consume at the expense of their owner, at the current prices, or such prices as may be agreed upon ; and he boards and lodges the shepherd with his two dogs, who has the care of the flock, at about fifty-four dollars, or eleven pounds sterling, a year. He does this for the sake of disposing of his produce and of the manure. In the Lothians, Scotland, I found several instances in which the crops of turnips, or *ruta-baga*, were disposed of in the field to persons bringing sheep from the interior, to be consumed where they grew. Where practicable, this arrange-

ment is excellent. The Flemish are of opinion that a hundred sheep, well fed, will give in a well-littered stable or bergerie from fifty to sixty loads of manure of more value than eighty or ninety loads of any other stable or barn manure.

I have already spoken of the supply of manure obtained by the Flemish from the numerous distilleries which existed in Belgium, by the immense number of animals which were fed and fattened on the refuse grains of those distilleries. But these supplies are almost entirely cut off.

Another species of manure, much valued on the Continent, and especially among those careful husbandmen, the Flemish, is that of pigeons and barn-door fowls. The superior efficacy of these excrements over most other manures is acknowledged. The excrements of birds are voided only in one form, and may therefore be supposed to possess the greater strength. This manure is saved in Flanders with the greatest care. Contracts are often made with persons who keep pigeons for their manure. A hundred francs, or twenty dollars, is sometimes paid for the manure of six hundred pigeons. The manure goes under the name of columbine. The saving of this species of manure requires particular care. It is advised to spread the floors of pigeon-houses and poultry-houses with fine sand, that this manure may be thoroughly intermixed with it, and a fermentation be prevented. If no care is taken of it, it is wasted, or it becomes full of maggots and vermin, which infest the birds. Sometimes it is applied mixed with water, but oftener in the form of powder. The dung of pigeons is considered more powerful than that of barn-door fowls; but the reason is not ascertained. The dung of geese is not so much valued as either, perhaps for the reason that they feed on grass. The birds, whose excrements form the guano, feed wholly upon fish.

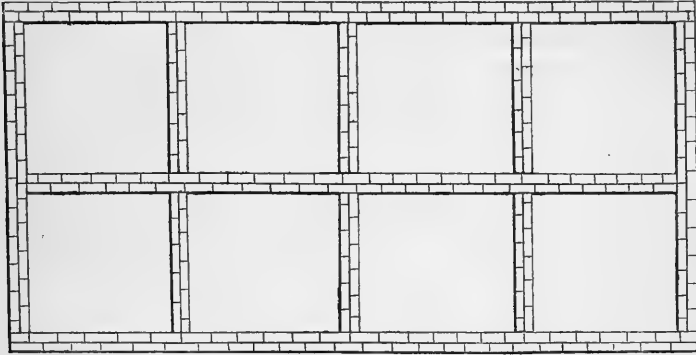
Guano has been used to some extent in France, but its use is much discouraged by the extraordinary adulterations which

have taken place in it. These adulterations, according to chemical analysis, have amounted to ninety per cent. Where it has been used, its fertilizing powers have been acknowledged; but the French farmers whom I have met with have not considered it superior in efficacy to poudrette, or dried night-soil. On a visit to a French farmer, about twenty miles from Paris, the state of whose farm would have been creditable in any country, and was certainly inferior to that of few farms which I have visited; he informed me that he had made trial of stable manure, of guano, and of poudrette; and that he found the guano powerful, that the stable manure produced the largest growth, and that the poudrette produced the best grain. It is obvious that we want many more details and circumstances to form any strong conclusion from this experiment. In all cases, however, among the French, which came under my notice, I found a strong approval of guano, but the preference given to poudrette. More experience may result in a different verdict.

4. LIQUID MANURES, AND MEANS OF SAVING THEM.—The preparations for saving the liquid manure, which are universal in Flanders, and which are occasionally met with both in France and Switzerland, deserve the most particular mention. There is good reason to believe, that, if it could be saved and applied with equal ease, the liquid manure of an animal is of more value than the solid excrements. The Flemish farmers suffer nothing of this sort to be lost; and it is stated that in Ghent the servants receive a compensation for saving the waste waters of the house.

On a Flemish farm there is always a urine cistern, usually adjoining the stable or cow-house. A gutter or trough behind the cattle or the horses conveys all the liquids into this cistern, which is placed outside, rather than immediately under the cattle, that it may be accessible both for the removal and the mixture of other matters. This cistern is

sometimes twenty feet in length, twelve in breadth, and six in depth. It is built of bricks, and the bottom laid in cement, so as to be water-tight. It is sometimes divided into two great compartments, and sometimes into several, as in the subjoined diagram.



These different compartments are designed to preserve the liquid of different ages separately. Each compartment is accurately gauged, and there is a fixed scale in each compartment, or in the cistern, where it is not separated, by which, from the height of the liquid, the quantity is easily determined. This is necessary for two purposes; first, in case of the sale of the manure, and second, in its application to the soil; in both which instances it may be important to know the quantity. In addition to the saving of the urine, the stables are frequently washed with water, and this likewise runs into the common receptacle. It is deemed best not to apply the urine until it has some age, and has passed through a degree of fermentation.

In order to increase their stock of manure, the farmers purchase large quantities of manure, such as the emptyings of privies in the cities; and these are carried in boats prepared for the purpose, on the different canals, to the farms which are accessible; and many of these farms have places of deposit, or cisterns for the reception of this manure, directly

upon the borders of a canal, that there may be little trouble in discharging the load. This is a double good to the cities and the country: to the former, in getting rid of their impurities, and preventing the diseases which they might engender; to the latter, in enriching their lands. In many cases these places are used as deposits for the use of manure merchants or dealers, who collect large amounts, and dispose of it in such quantities as may be needed to the neighbouring farmers, who buy according to their means or necessities. It is sold by the barrel or tun, and is measured by the scale in the tank, or the vessel in which it is removed. Sometimes the cisterns are covered in with brick, arched, and emptied by means of a pump; in other cases they are emptied by means of dippers and buckets; and it is important that they should be accessible, so that the sediment may be removed as it may collect. Sometimes the cistern is a mere round well sunk in the ground, and emptied by a pump. But the form is of little importance, provided it be secure and convenient, compared with the matter of saving all this refuse, the importance of which I have already most urgently insisted upon. To the great credit as well as to the great gain of the Flemish farmers, nothing of this kind is ever wasted; and the cleanliness of the Dutch towns and cities is certainly not surpassed, and scarcely equalled by any others.

A good deal of stress is laid upon having the cistern outside of, and detached from the stable, that the fumes from it may not injure the air of the stable, to the prejudice of the health of the cattle, or those who tend them; and likewise on having different compartments in the cistern, that the liquid may have obtained a certain age before it is applied. They are in the habit, likewise, of mixing rape cakes, or the cakes which remain after the oil has been expressed from the rape-seed, with the urine, which in this way forms a most efficacious manure. These cakes weigh generally about half a pound, and are sold by the hundred or thousand. The amount



of this manure applied to the land is often very large; liberal and ample manuring being one of the great principles of Flemish farming.

5. COMPOST HEAPS.—The Flemish have, likewise, a mode of preparing a compost heap, which is greatly approved among them. They collect the scrapings of ditches, the vegetable matter which is floating in them, heath, bushes, stalks of vegetables, and any waste vegetable matter which they can gather; with this they mix a certain quantity of earth or soil, and then add quick-lime in about the proportion to the heap of one-tenth or one-fifteenth. This heap is several times shovelled and cut up with a spade, until it is in a state of sufficient fineness to be applied to the field. In the Pays de Waes, a district of country between Ghent and Antwerp, the cultivation of which is not surpassed in any part of the country, perhaps not in the world,—for I can hardly think of any culture more exact, more clean, or more beautiful, or any crops more luxuriant than I saw here,—the practice of the farmers is to place this heap near the side of the field intended to be cultivated, and then to pour upon it a copious sprinkling from the cisterns; the heap is then shovelled over, and the whole thoroughly intermixed; in which case it becomes an excellent manure to be applied before sowing.

6. JAUFFRET'S MANURE.—The preparation of Jauffret, which has had much celebrity in France, deserves notice here. I have seen one similar applied, and with success, as far as the object aimed at was concerned, in the United States. The object of this invention was to find some means by which straw, brush, ferns, heaths, broom, and other woody substances, might be speedily brought into a state of decomposition, so that the mixture might be applied to the land. He supposes it possible to supply nutriment to the land in this way, without the aid of animals. He advises, therefore,

to collect a heap of materials composed of vegetable matter, such as straw, ferns, heath, broom, turf, bushes, small branches of trees, stalks, &c. ; and when this heap is made, the articles being intermixed and pressed together, you are then to prepare near it a liquid of the following materials :—

100 parts of fœcal matter and urine.

25 „ soot from the chimney.

200 „ gypsum in powder.

30 „ unslacked lime.

10 „ unleeched wood ashes.

A small quantity of salt.

„ refined saltpetre.

25 parts of the drainage of a manure heap, or of liquid fœcal matter.

These matters are to be mixed in a place near the heap, with water enough to make a quantity of liquor sufficient to water this heap, and, in a few days, produce such a state of heat and fermentation as will reduce and wholly decompose it. The plaster or gypsum must be applied by slow degrees and in small quantities ; otherwise, it would become hard. Near the heap, which should be placed on a piece of ground slightly inclined, should be a basin or hole to receive the drainings of the heap, that they may be returned upon it. The washings or applications of the liquid must be repeated, and holes occasionally made in the heap to receive it. In a favourable temperature, it is stated that a fermentation will commence in forty-eight hours, and that in twelve or fifteen days the whole matter will be so reduced as to be in a condition to apply to the land to be ploughed in with advantage.

I am not able to give with great accuracy the various proportions of ingredients which are prescribed ; but this general statement will be sufficient for practical purposes, understanding only that there must be a sufficient quantity of the liquid thoroughly to impregnate or saturate the heap.

Several other mixtures have been prescribed by different individuals, which produce the same effect ; the only question is that of cost. I do not deem it necessary further to refer to them, as they have been given in various forms to the public. Any cheap process, indeed, by which such crude materials can be decomposed must be valuable, especially when the articles themselves, of which the application is composed, are of an active and enriching nature. In general such prescriptions are looked upon as a species of quackery ; but Jauffret's method has been much approved in France.

7. GENERAL REMARKS ON MANURES.—I have heard from some farmers who claimed to be highly practical and intelligent, great distrust expressed of the value of liquid manure. They have applied to their lands, with comparatively small effect, the drainings of their dung-heap ; but, as a capital Swiss farmer observed to me, the drainage of a manure heap and the contents of a urine cistern are very different matters. The former is, of course, in strength and efficacy very inferior to the latter.

The Flemish farmers, in the application of their manures, aim at two objects : the one to have their manure in a form, in which it can be immediately taken up by the plant ; the other to apply it at a time when it is directly needed. In a liquid form it is, of course, most accessible to the demands of the plant, and they apply it at the time of sowing ; and to some crops repeatedly afterwards, when they are in a growing state, and the effects of the first application are exhausted. They are, likewise, most liberal and indefatigable in the application of their solid manures, not limiting them to the surface, but mixing them with the whole soil by thorough and deep trenching. Deep cultivation, liberal and thorough manuring, a careful and well-tried rotation of crops, and a thoroughly clean cultivation, may be said, indeed, to constitute the great principles of their agriculture,—an agriculture for which

it is not easy to find a parallel. Their carefulness in saving every thing which is in itself or which can be converted into manure, and the extraordinary value which they place upon liquid manure, are most exemplary, and worthy of imitation.

## XXVIII. CROPS.

I have already treated fully of many of the crops cultivated on the Continent, but there remain some few others in the culture of which the Flemish distinguish themselves, to which I shall refer.

1. COLZA is a plant cultivated largely in parts of France, but very extensively in Flanders, where it may be considered as a standard crop, the culture of which is carried to great perfection. It is a species of the cabbage family, and is cultivated for the oil which is expressed from the seed. It occupies the ground nearly a year, being sown in July or August, or transplanted in September or October, and gathered the ensuing July. The product of a good crop in seed is estimated at thirty bushels. It is considered a great exhauster of the soil, but it returns in its refuse much of what it receives. The stalks are often converted into manure, and are frequently used as fuel in cooking food for cattle, and in heating ovens. The land on which it flourishes best is a strong rich soil rather inclined to sand, yet argillaceous, moderately humid, and with a deep fertile bed. It must be well drained, so as to allow of no standing water upon it, and it must be well manured. The best preparation is a green sward, or a clover ley broken up; it often, however, follows rye or barley. It is important that the cultivation should be thoroughly clean. When sown on stubble, the stubble is first to be thoroughly harrowed or ploughed to the depth of two or three inches, and then, the weeds being

cleared from the land and the manure spread upon it, the whole is to be turned over by the plough to a good depth.

The seed may be sown broadcast, or it may be sown in drills: in the latter case it is more easily kept clean; or the plants may be grown in a nursery, and transplanted. In case of transplanting, the crop is usually much better, and the oil made from it of a superior quality; but the labour and expense are considerably increased. When sown broadcast it is sown very thin, and cleared out so as to leave the plants about one foot apart. When sown in drills, the drills are more than a foot apart. When transplanted, the plants should first be grown in an ample seed bed, and set out at the distance of a foot from each other in double rows, the intervals between the double rows being eighteen inches. The land is ordinarily laid in stitches on which four or six rows may be planted; the land in the intervals dug out with a spade, and laid on the bed in the autumn, and in the spring this dirt levelled, the soil gathered up round the plants, and the whole kept thoroughly clean.

In December, when the ground is frozen, it is sometimes watered with liquid manure from the urine cistern in which the rape cakes have been dissolved; and this manuring is sometimes repeated in the spring to the great advantage of the crop. This liquid manure is sometimes applied most beneficially immediately before sowing the crop. Wood ashes are likewise recommended as a manure; and some farmers in Germany, when the plant presents four or six leaves, give it a dressing of plaster or gypsum. Marl on light soils is likewise extremely beneficial; this is carried on to the land in a season favourable to this work, and then spread and distributed by a harrow.

The seed is often sown broadcast; but it is very prejudicial to the crop to sow it too thickly. There are three different modes of transplanting the crop; first, by a spade, when the workman makes the hole by plunging the spade

into the ground to its full depth, when, pressing it from himself, children, who work with him, place two plants in the hole ; then with drawing the spade the earth falls back upon the plants, and a pressure of the foot between them finishes the operation. Or a dibble or planter may be used, which makes two holes, into which the plants are placed, and the earth closed up by hand ; or a furrow may be struck with a plough, and the plants laid along in the furrow on the side of the furrow slice, and a second passing of the plough will throw the dirt directly on the roots of these plants, there being a workman to follow the plough to relieve plants, which have been too much covered, or to cover those which have received too little dirt upon them, and to set up those which have fallen down.

The plants, which are grown in a nursery bed, should have plenty of room ; and soot is recommended as an excellent manure for them, as well as for the field after they have been transplanted. The plants, which are designed to be set out, are sometimes kept out of ground five or six days. The design of this is to check vegetation, so that they may not advance too rapidly before the winter, lest the severe frosts should injure them. It is not considered indispensable to manure the field upon which the crop is to be planted, if it is in a good state, or if the previous crop has been manured, though the crop will bear the usual relation to the richness of the land.

The crop follows rye or wheat with advantage, or clover ; but in the case of rye or wheat, the stubble is to be thoroughly cleaned. The crop is to be hoed during its growth, and earth drawn round the plants. The plant has dangerous enemies in flies and bugs which attack it. Against the flies a dusting of quick-lime is sometimes of use ; but the bugs are with difficulty dislodged, unless by a frost. The frosts, however, when they occur nightly with warm days, are injurious to the plant ; much less, however, when the frosts are

followed by fogs. It is the habit of small farmers to pluck a portion of the leaves as food for their stock ; but this is attended by a diminution of the product.

The harvesting of the crop is a business requiring much care. It must be gathered before it is completely ripe. In good weather it can be laid in small heaps and dried, and then shelled out on cloths upon the field ; or it may be stored in a barn after it has become sufficiently dry. In wet weather it may be heaped up with layers of straw between the layers of colza, until a return of good weather. If suffered to become too dry, it is liable to lose much by shelling out. In cutting with a sickle, the workman is cautioned against taking too many stalks in his hand at one time, as more likely by so doing to shake out the seed.

I have already spoken of the value of the cakes as manure, though they have been much used of late for feeding stock, which they informed me at Courtray was a modern practice. The clean cultivation of colza, and the ample manuring, serve eminently to prepare the land for wheat.

2. NAVETTE.—A smaller kind of colza, called navette, is cultivated where the land is too light for the larger kinds. It is cultivated for the same purpose, though the produce is seldom more than two-thirds that of the other. Its produce is considered more valuable, and sells for a higher price. It is sown broadcast ; and requires the land to be well cultivated and manured. The navette, a rape of summer, is sown in the spring, and ripens its seed in September. This kind is much sown in parts of England, as feed for sheep ; but is seldom suffered to go to seed. It produces a healthy feed for sheep, and in good land a most productive vegetation. It sometimes, as I have observed in another place, affects badly the ears of sheep. The navette, a rape that is sown in autumn, has the advantage of bearing the frost well ; and is much benefited by being harrowed in the spring.

3. POPPY.—The poppy is largely cultivated in Flanders ; but I have no recollection of seeing it any where else, though it often appears as a weed in fields of grain, both wheat and oats. It is cultivated for its oil, which, when properly managed, is much esteemed. It is grown in small quantities in gardens for medical purposes as a narcotic ; in which case the heads with a piece of the stalk are cut off before their maturity, and hung up to dry, and the opium extracted by the druggists.

The poppy cultivated is of two kinds, the white and purple. The latter kind produces the larger quantity of oil ; the former the best quality. There is another difference ; the head of one kind being much more open than that of the other ; and the former kind is almost exclusively cultivated in Flanders. The soil required for the poppy should be strong and mellow, and, as far as may be, protected from cold. It should be well cleaned from weeds. Though ordinarily sown broadcast, it would be preferable to sow the seed in drills, that it may be easily hoed. The plants should be left about a foot apart. It succeeds well to grain, and especially to hemp ; in which case the manuring is not required to be repeated. It is especially recommended to follow potatoes, where the ground has been well cultivated and kept clean. When it is intended that the poppy should succeed potatoes, the potatoes should be well manured. When it follows any of the grains, several loads of manure should be given to the land for the crop. This manure may be applied in the autumn or spring ; but in either case it must be ploughed or harrowed, and thoroughly mixed with the soil. There is danger of sowing the seed too thickly, and therefore it is advised to mix the seed before sowing with one portion of earth and two portions of sawdust. As soon as the plants appear, they are to be weeded and cleaned with great care ; and when a foot in height, to be hoed and slightly earthed up.

The gathering of the seed of the poppy is to be done by



hand, and at different times. As soon as the heads have acquired a degree of ripeness, they are to be carefully shaken over a basket or bag, so as to save the first loose seeds. This is afterwards to be repeated before the general harvest, when the whole is to be gathered by cutting off the heads. The shelling of the seed is afterwards done by hand; for if done by a flail, the seed is cleaned with difficulty; and the pieces of the stalk, which then become intermixed with the seed, give an offensive taste to the oil. The seed may be preserved a long time, but requires to be aired. The oil of the poppy is used both for food and light, and is considered a fifth more valuable than that of the colza. The cakes, remaining after the expression of the oil, are valuable for the fattening of swine; and the stalks for fuel. The ashes, which remain after burning it, are of the best kind for manure. If the seed be pressed in a mill used for the colza or other oil, the greatest attention must be paid to cleaning it. The oil expressed in cold weather is much superior in quality to that obtained in warm weather, and the two must not be mixed. The great enemies of the poppy are the field-mice, which eat off the stalks while in a green state, and then destroy the heads. The birds likewise plunder a great deal of the seed.

4. CAMELINE.—Another plant, called *Cameline*<sup>1</sup>, is cultivated, when, for example, the colza fails, as it ripens its seed in three months. The oil is not so valuable as the colza, as it has a bad smell. The plant is not extensively cultivated; but it succeeds well in sandy and inferior land. The stalks of the plant are used for brooms, and some persons cultivate it for this object.

5. WHITE MUSTARD.—The white mustard is sometimes cul-

<sup>1</sup> *Myagrum Sativum*.

tivated both for the medicinal qualities of its seed and the oil expressed from it, which, though useful for many purposes, is not suitable for human food. The great objection to the cultivation of this class of plants is, that it fills the ground with seed which germinates in succeeding years, and is with difficulty eradicated. It is sometimes subject to mildew or rust. It ripens in about fifteen or sixteen weeks. It is liable to be lodged; but this does not ordinarily injure the seed. The plant is eaten as a salad; and it is given to cattle as a change of food, when their appetites become capricious, and require to be quickened.

6. FLAX.—Flax is a great crop in many of the northern countries of Europe. It has been largely cultivated in Flanders, both for its fibre and oil. It has been for a long period an important article of commerce, and probably in no country has its culture been carried to such perfection. The value of the crop, and the extraordinary difference in the value of different qualities, amounting in some cases to full one hundred per cent., show the attention it demands, and how liberally it recompenses extraordinary care.

Flax will grow on various soils, but is not indifferent to the character of the soil on which it is cultivated. It requires a rich sandy loam, and one thoroughly manured. It is advisable, however, with the exceptions to which I shall refer, that the soil should be enriched by previous manuring, rather than in the year of its being sowed. The Flemish farmers make flax a crop in their regular rotation, occurring one in seven or eight years; and the manuring of their previous crops has reference to the flax crop, which is to succeed.

There are generally stated to be two kinds of flax. The difference does not appear so great, however, but that they may occasionally run into each other. There is a kind which runs up on a single stalk, which is generally preferred, on

account of its producing a finer fibre ; there is another, of a coarser kind, which branches out at the top, like a tree. They make a distinction in Flanders, likewise, between the plants which bear a close, and those which produce an open or gaping capsule or seed-vessel, the latter being preferred. Experiments have been made in Germany with seed brought from South Italy. The seeds were beautiful, and brilliant, and large, yet the plant attained a comparatively small height.

The Flemish farmers approve of changing their seed frequently. It is said that a crop from seed which has been twice sown in Belgium is inferior in quantity, owing to this circumstance. I am an unbeliever in the deterioration of any plant on account of continuing the seed, where proper pains are taken to get, by selection and care, the best seed only from that plant. The seed preferred in Flanders is the seed brought from Riga. There are other places, however, from which seed is brought, the fibre produced from which is said to be finer than that from Riga.

The seed to be chosen should be heavy and brilliant, of a gold colour, or a clear brown, and especially clean. It may be tried in water ; and if much of it floats upon the surface, it is owing to the imperfection of the seed. It may be tried by throwing some little into the fire, to determine its oily properties ; and it may be laid upon a wet blanket or cloth, to determine its germinative powers. Seed which is black, or seed which has been much heated, is wholly unfit for sowing.

The ground for flax cannot be prepared with too much care. A very fine crop of flax is often obtained on grass land, recently turned over, and this even without manure. The land in this case is carefully ploughed, rolled, lightly harrowed, and then sowed, and the seed lightly harrowed or brushed in. The crop which precedes flax is often oats or rye, but especially potatoes. The land, if in stubble or in potatoes, is

carefully ploughed in the autumn, and then twice again in the spring ; and it requires to be most thoroughly cleaned, and kept clean of weeds.

It is commonly sown thickly. Thick sowing tends to render the stalks fine and straight, without branching. One hundred and sixty pounds of seed is the usual allowance to an acre, which seems a large quantity. The land is sometimes manured in the year in which it is sown. In this case it is ploughed early, say in March, and thoroughly wrought, and then rolled smooth and hard. The land is then manured with thirty bushels per acre of peat ashes from Holland, or what is called Dutch ashes, and with a good dressing of liquid manure from the urine cistern, in which the cakes of colza have been dissolved ; and this is mixed, likewise, with some manure from the privies. This makes a strong dressing ; the land is then harrowed ; the seed sown, and lightly brushed in with a bush-harrow, as there is always danger of covering the seed too deeply. Horse manure must not be used for this crop. The effect of marl used as a manure for flax is to injure the colour. Pigeons' dung, or what is called columbine, and which includes also the manure of the poultry yard, is pronounced an excellent manure. It is plain that these manures do not favour the production of weeds, as is commonly the case with barn-yard manure, and consequently is much to be preferred. In the neighbourhood of Courtray, where much the best flax is grown, they use great quantities of the liquid manure, with the rape cakes freely intermixed. A thousand gallons of this liquid manure, with a thousand rape cakes dissolved in it, are sometimes applied to an acre. Besides other crops, flax is said to follow to great advantage a crop of hemp, which is always highly manured, and kept perfectly clean. The dung of sheep is much valued for the flax crop ; and especially where sheep have been folded on the land. The general opinion is, that high manuring produces a coarse flax ; light manuring produces a flax of a

fine fibre. It requires a deep culture, as the roots are supposed to penetrate to a depth equal to half the height, and the flax root has been traced much farther than this.

The best flax is produced at Courtray; and it is said that the same pains or manuring will not produce nearly as good in other places: this seems to imply some unascertained quality in the soil, peculiarly favourable to its growth.

The time of sowing flax must be somewhat regulated by the climate or position of the place. It is sown in March, and sometimes as late as May. The earlier sowing is advised, though in the countries of a high northern latitude the rapidity of vegetation compensates to a degree for the shortness of the season. Ordinarily in fifteen days after the sowing of the seed the field will require to be weeded. This cannot be too thoroughly performed, and is done by women and children, on their knees, working against the wind, that it may raise the plants which have been pressed down.

Flax is often liable to be lodged, especially if the growth be rapid. Great pains are sometimes taken to prevent this, by placing stakes in line in different parts of the field, and laying poles or bars along upon them, which serve to keep the plant from falling over.

If flax of an extraordinary fineness is required, it is pulled before the perfect ripening of the seed; the superior fineness of the fibre is considered as a compensation for the loss of the seed. But if otherwise, an early is preferred to a late gathering; as the longer it is left to stand, the coarser and harder becomes the fibre. The seed is generally taken off by an iron-teeth comb, made for the purpose, as soon as the flax is harvested; or the whole is stowed away in a barn, to be taken off at pleasure. When the flax is stowed away in a barn, and the seed not taken off until the succeeding winter or spring, it acquires a ripeness which gives it a superior value. After the seed is taken off, the flax is set up in the field in a sort of windrow, the roots upon the ground, and the tops

inclined to each other, until it is sufficiently dried to be placed away in a barn, or stacked with the roots out, or steeped, preparatory to being dressed for the market. The bright and beautiful silvery colour of the flax is of great importance, and so is the fineness of the fibre; and all pains are directed to secure these objects.

There are several modes of steeping, or what is termed rotting the flax, that is, destroying the bark of the plant so as to clean the fibre. It is sometimes dew-rotted, that is, left upon the grass, being occasionally turned; it is sometimes rotted in stagnant water; it is sometimes rotted in running water. In Flanders there are persons who are employed as regular steepers of flax; and when the farmer sells his crop of flax before it is dressed to the merchant or manufacturer, these persons dress and prepare it for the market. The inhabitants of Courtray steep their flax in the water of the river Lys, drawing off to the side in an artificial basin, of sufficient depth and width, water sufficient for their purpose. The flax is set upright, with the roots downwards, in a sort of hurdle or basket, and it is with great pains retained in its upright position, as being necessary to prevent its becoming discoloured. They are careful to keep the roots at least a foot from the ground, or bottom of the pool. In many cases, instead of water being drawn from the river into a pool or basin, the flax is placed upright in hurdles to prevent its floating away, directly in the running stream, with planks and weights in all cases to keep it under the water, as the tops are longer in becoming macerated than the bottoms; and where they are not sufficiently rotted, a considerable loss is experienced. In this case, of course, fresh water is continually supplied to the flax; and the process is completed sooner or later, according to the temperature of the weather. Great skill is required to determine the precise time when the process is finished, and the flax removed from the water, as a few hours are said in such case to make an important

difference in the colour of the flax. This must be matter of experience rather than of written instruction. In other cases, a pool or cistern of water is formed in a field, in which the flax is immersed, fixed upright, and the bottoms of the plants not touching the bottom of the cistern; and so arranged, that this water can be drawn off and replenished with clean water. It is said that in this way the cleaned flax has more weight than in any other, amounting it is said over some methods employed to ten per cent. This method was at one time considered a valuable discovery in Flanders. It is clearly important in all cases that the water should have no foreign substance in it, which would be likely to give a colouring to the flax. I have already mentioned the value of the water in which flax has been steeped as a manure to land, having seen the most beneficial effects from it. I am informed that a method has been adopted for getting the bark off the flax by steaming the plant, in which case the whole is accomplished in seventy hours, but I am not sufficiently informed to speak of it with confidence. The flax being thus rotted, the remaining operations through which it passes are well understood. The operations of heckling and swingling flax, which were formerly performed wholly by hand, are now performed by machinery moved either by steam or water; but it does not enter into my plan to describe these machines.

The seed of flax is of great importance in Flanders for the manufacture of oil. About seven bushels of seed are rated as the ordinary yield from an acre of land. This seems a very small product. The seed, when first taken from the stalks, is carefully dried and kept in sacks, until it is beyond the danger of being heated. The cakes from the pressed flax seed are highly valued for the fattening of cattle; and the seed itself being converted into jelly, is capable of being used in this way to great advantage. Indeed, as far as my own

experience goes, I know no single article superior to it for cattle or for sheep.

In Flanders they sometimes sow clover or carrots among the flax, from which they get a crop after that is removed. This should not be done in any event until after the first weeding of the flax. The practice is generally approved. That it is to a degree prejudicial to the flax crop, there can be little doubt; but whether the profits of the clover or the carrots would more than compensate the lessening of the crop of flax, is a matter upon which there exists a diversity of judgment, and, in different cases, undoubtedly a diversity of results.

7. HEMP.—The cultivation of hemp prevails to a considerable extent in Flanders, and is expensive in the preparation of the land, and the quantity of manure required. The value of the crop is considerable: the land being well cultivated and highly manured, is in a condition for two or three successive crops of grain.

The soil required for hemp is a strong, rich, moist loam, a deep alluvion; and it needs to be deeply cultivated and liberally manured. It is not unusual to plough it eight to ten inches deep, or to trench it with a spade a foot deep or more; and it should be finely divided and tilled. It is ploughed in the autumn, and then again twice in the spring; but it must not be wrought when it is wet, which indeed may be laid down as a universal rule. A sandy clay loam may be considered as best adapted to this culture. It likes a warm exposure and low ground. It succeeds well after clover or potatoes; and in some places it comes as often on the same ground as every second or third year.

The manure which best suits hemp, is horse or sheep manure. If the manure is coarse and strawy, it is ploughed in, and often by the first ploughing in the autumn; but if



well rotted, it is applied in the spring, and near or at the time of sowing. It requires a warm manure; though the manure of cows, when about a third part is added of night-soil, or manure from the urine cistern, is an excellent application. The manure of pigeons and poultry, ashes, and the cleaning of streets, are much valued. To give a rapid growth to the plant, the manure must be in a condition, that is, well rotted or short, to be immediately taken up by the plant; and with respect to hemp, there is little danger from the seeds of weeds in the manure, as the luxuriant growth of the hemp will overpower them.

The seed is sown ordinarily about the middle, or within the last fortnight of May, and sometimes not until June. The seed requires to be watched against the birds; for even after it has made its appearance above ground, they will pull up the plants and take the seed. The plants are to be thinned out to a distance of three or four inches; but if the land be very rich, to a greater or double that distance. If it is desired to grow a fine hemp for twine, the sowing should be thick; if for large ropes and cables, it may be sowed more sparingly.

The gathering of the hemp is made ordinarily at two different times. There will be found in the field what are called the male and the female plants. Both in Belgium and in France, by a misnomer, the plant bearing the seed is called the male plant, and the plant bearing the flowers for the impregnation of the flowers upon the seed-bearing plant is called the male hemp. It is of no great importance by what term they are designated, provided the difference is understood. The plants which do not bear seed are to be pulled from the field some weeks before the seed-bearing plants; they at that time will give a fine fibre, but if left until the ripening of the seed, they become of little or no value. The time for pulling them is when the flowers of the non-seed-bearing plants have been long enough unfolded

to shed their pollen upon the male plants, and the top of the stalk becomes of a yellow colour, and the part towards the root is bleached. The ripeness of the seed-bearing plants is determined by the maturity of the seed, and the fading colour of the stem. The hemp, being pulled, is tied in small bundles; and, after being sufficiently dried by being set up in the sun, the seed is beaten or combed off, and the plant is prepared for steeping or rotting. The hemp pulled first requires not more than eight or ten days for rotting; the last pulled, which is drawn of course when the weather has become colder, is sometimes kept in the water two months; and it is well for it to remain until the water freezes. The mode of steeping does not differ much from that of flax, excepting that it is not deemed necessary to set it upright in the water, and that it is done in a pool or basin instead of the river. The colour of the fibre of hemp is obviously of little importance compared with that of flax, though some of the finest of hemp is sometimes mixed with flax for the making of coarse linens.

Hemp, too, like flax, is sometimes dew-rotted upon the ground, where it is thinly spread out, and occasionally turned. That which is dew-rotted has a superior whiteness and fineness of fibre to that which is steeped, but is not so durable. This dew-rotted hemp is therefore preferred for twine, and the other kind for cables and strong cordage. The early pulled hemp should not be rotted upon the grass, but upon stubble; and it is believed by some farmers, that where it is spread upon a rye-stubble to be dew-rotted, it acquires a whiteness above that by any other process. The seed-bearing hemp, when dew-rotted upon grass, must be spread so thinly that one stalk should scarcely touch another.

The farmers of one of the best cultivated districts in Flanders, the Pays de Waes, are averse to planting hemp, because of the great quantity of manure which it requires; but, with the addition of a moderate manuring, they get excellent

wheat after it, and sometimes carrots are sowed after hemp, and a superb crop of flax is taken from the same ground after the carrots. Two great advantages are said to come from the cultivation of hemp; the weeds are stifled, and the leaves, which fall from the stalks, serve to enrich the land.

The quantity of seed sowed to an acre is about half a bushel; and it is advisable to sow it in narrow beds, that when the non-seed-bearing stalks are pulled, the seed-bearing stalks may not be interfered with. Sometimes a crop of rye or wheat is sown among the hemp plants, while standing, and the extraction of the non-seed-bearing plant serves to cover it. This saves a ploughing.

At the harvest, the plant is usually drawn by the roots, though sometimes cut with a sickle or a knife, and laid on the ground to be dried. The hemp is said to be of a superior quality if thoroughly dried before it is put in the steep. The ends of the seed-bearing hemp are sometimes beaten over the edges of the head of an open barrel, as the seed which comes off in this way most easily is, of course, the most ripe, and the best for sowing. The seed which first comes off in this case is taken for this purpose.

The roots of the hemp before dew-rotting are cut off with a hatchet, and used for fuel. In pulling hemp, it is important so far to select the stalks as to bring together those which are of the same length to be tied up in the same bundle. The hemp, after being steeped, must be thoroughly dried; and this is done in some parts of Germany by a kiln of simple construction for that purpose, which saves much time. The hemp, after being dried, is broken by a machine formed by one heavy stone rolling over another, which breaks the bark; and sometimes by mallets, and then the bark is picked off by the hand; a slow process, and prejudicial to the health of the labourers from the dust which fills the room where this is done.

The produce of an acre of hemp is ordinarily about 350lbs., and of the seed from thirty to thirty-five bushels.

There are several other crops cultivated extensively in Flanders ; but my object is not so much to give a specific and detailed account of the mode of cultivation of these crops as the general features of the cultivation. Tobacco and hops are grown to a considerable extent ; and likewise several plants valuable for their colouring or dyeing properties, such as Woad or Pastel, Weld, and Madder.

8. TOBACCO.—Tobacco is cultivated as an article of large consumption and of commerce. It is quite remarkable that a plant so odious and offensive as this, in no respect conducive to health, and in most cases positively injurious, and so nauseous and repugnant to an unaccustomed taste until habit has overcome this repugnance, should have acquired such a hold, that it has become with a large portion of mankind almost a necessary of life. There is no hope of a reformation in this respect, and the use is constantly extending itself.

There are two kinds of tobacco cultivated in Flanders ; that of Virginia and that of Turkey ; the former is esteemed greatly superior to the latter.

It has its place in the rotation of many farmers, occurring sometimes once in four, and sometimes twice in seven years. It will grow well upon most soils, excepting a heavy clay or a dry sand, or a wet soil ; but it requires laborious cultivation and abundant manuring. The crop is stated to be 4000 lbs. ; but this much exceeds the amount grown to an acre under the best cultivation which I have known in the United States ; 2000 lbs. would, I think, be considered there a large crop, though I have known an average crop of 2700 lbs. grown on several acres under circumstances peculiarly favourable.

The soil is ploughed, and the manure ploughed in, in the

autumn, and again ploughed and laboured in the spring. The manures used are cow and pigs' manure, and likewise the manure of sheep, which is deemed peculiarly favourable. Malt-dust from the breweries is much valued ; and very large dressings of rape cake, sometimes in powder and sometimes dissolved in the urine cistern, are extensively used. If fœcal matter is mixed with this, it is essentially improved for this object. The manure of horses, even the urine of horses, is objectionable, as giving a bad taste to the tobacco. What worse taste can be given to it than its ordinary taste, it would be difficult to imagine.

The seed is first sown in a nursery-bed, in a warm and sheltered exposure, in March ; the nursery-bed should be well-wrought and manured ; and, in case of danger of frost, the young plants require some protection either of bushes or of straw. The transplanting is usually made with a dibble in June, when the young plants have acquired a growth of six leaves. They are set out in rows two feet apart, and in the row the plants are fourteen inches apart. In about fourteen days the plants require to be hoed, and the plantation to be kept clean of weeds. When the plants have acquired a height of ten or twelve leaves, they are then, as it is sometimes termed, stopped,—that is, the top-shoot is pinched off, so as to prevent its rising any higher ; and all side shoots are broken off, so as to leave only one stalk. In this way the sap of the plant is thrown wholly into the leaves. The tobacco-plant is subject to be injured by frosts, especially in low grounds ; and is likewise liable to rust, under which the leaves perish and fall to the ground. This depending, as is supposed, upon a bad exposure or a bad condition of the soil, as yet unascertained, no remedy has been discovered. I have not been able to learn that the tobacco-worm, so well known in the United States, and so destructive unless means are taken to remove it, is known in Europe. This is a large green caterpillar, found under the leaves ; and sometimes a

large drove of turkeys is sent into the plantation, who pick them off and regale themselves upon them. This is the nearest approach within my knowledge to the use of this weed among the inferior animals ; the worms eat the tobacco ; the turkies eat the worms.

When the leaves begin to turn yellow, the harvest begins ; they are picked off by hand close to the stalk, and, after a little exposure to the sun, are then tied up in bands and hung up under cover for perfect drying. When taken off they are sorted into three qualities : the first into the large leaves ; the second composed of the leaves next in size ; and the last of the leaves which have grown nearest the ground.

9. HOPS.—I know of nothing peculiar in the culture and management of hops in Flanders, excepting the production of sixteen hundred pounds of dried hops to an acre, which is a very large yield. They are careful not to have the plantations of too large an extent, as it would prevent a free circulation of air ; and they manure the ground most liberally with liquid manures. The hops are planted in hills six feet apart each way ; and four plants to each hill. A trench is dug round the hill, which is filled with decomposed manure, and in some small measure earthed up. The usual operations of trimming and poling them follow. As no crop of hops is taken the first year, the intervals are occupied by cabbages and other plants.

A method has been recently invented and patented in England for drying or curing hops, by which it is stated that at least fifty per cent. of the fuel ordinarily used will be saved, and a much larger amount of the essential oil of the hops, the lupulin, will be retained in them. The furnace or kiln for drying them is of a peculiar construction ; and the air used for drying them is made to pass over sulphuric acid or quick-lime, by which it is divested of its watery properties, and comes in upon the hops in a dry and decomposed state.

The apparatus is deemed simple enough, and not extraordinarily expensive. The hops dried in this way have, it is stated, brought twenty-five per cent. more in the market than those cured by other methods. I have seen the plans for constructing the apparatus, but further experiments may be desired to determine its advantages. It is said to be applicable to other agricultural purposes, such as malting, and even the drying of hay, so as to expedite the process, and at the same time retain the rich juices of the herbage. It is difficult to conceive that it should be useful in this way upon any large scale. Most patent inventions, however, like patent medicines, are catholicons.

There are cultivated in Flanders, in France, and in Italy, several plants for the purpose of dyeing or colouring, such as woad, which is used for a blue dye, weld for yellow, and madder for red. I was once asked, what bearing had the colour of the trousers of a soldier of the French army, which are red, upon agriculture. The answer is obvious, so infinitely diversified and innumerable are the circumstances which affect the various relations and interests of social life.

10. Madder<sup>1</sup>.—Madder is one of the most important of all the plants used in dyeing, and is cultivated at great expense. It is two years, and sometimes three, before the crop is gathered. There are two kinds cultivated; the one with a quadrangular, the other with an hexagonal stem. The former is the most productive; the latter produces madder of the best quality.

The soil required for its production should be deep and rich; a clayey soil will produce good madder, but its working is difficult; a soil, therefore, in which sand enough prevails with the clay to render it friable, is that which is to be chosen. It must be deeply cultivated, as the roots, which constitute the value of the crop, run down very far. A

<sup>1</sup> *Rubia Tinctorum Sativa.*

plough will scarcely go deep enough, and the land should be trenched with a spade to the depth of at least three feet. Manure should be ploughed in and dug in until the whole bed becomes most thoroughly enriched. It is advised to plough in the solid manure in the autumn, and in the spring to apply liquid manure, urine and fœcal matter intermixed. Cow manure and stable manure are also applied with advantage; and the land should especially be rich from former cultivation, and from having been thoroughly cleaned of weeds. The manure should not only pervade the surface, but be buried deeply, that the roots may not want for nourishment as they go down.

Madder should be sowed in a nursery-bed in a garden, and the seed of the last year should be used, as seed of more than a year old germinates at a very late period after planting. It is well to lay the ground in beds three feet wide, to receive two rows of plants; or in five feet beds, to receive four rows of plants. The plants are to be set in line, a foot apart, and the rows at an equal distance. The intervals between the beds are to be shovelled out, and the ground kept loose by a spade until the second year, when the roots of the plants extend into the intervals, in which case they must not be disturbed; they must then be kept clean, but not dug. Holes may be made for setting the plants, either with a hoe or a spade; they must be taken from the nursery-bed, and immediately set out, and not allowed to get dry or withered in the air; they may be dipped in water when transplanted, and great care must be taken to prevent their being injured, and to place them fairly in the ground, bringing the earth and pressing it carefully down around them. Liquid manure may be applied with great advantage in the intervals between the beds. After the planting, it is well to water the plants; and they are to be kept clean, and the intervals kept loose by a narrow hoe or spade: the sprouts thrown out at the sides of the main stem may be bent down



and covered with earth, so as to force the growth of the root. In the autumn the plants should have a slight covering of strawy manure.

The madder which is not taken up until the third year produces much more, and of a better quality, than that which is gathered the second year; but the increased expense and rent of the land are seldom compensated by the increased product.

The harvesting is a work of much labour. The roots, which in a well-prepared soil extend to a great depth, must be taken up with much care, and without injury. Sometimes a plough is passed along the line, and then the work is finished by the spade, but generally it is wholly done by the spade; the intervals between the beds being dug out to the depth of two feet, and the plants carefully displaced and taken out by means of forks or narrow hoes. The plants lie upon the ground three or four days, in small heaps, in order to become dry, and in case of rain are covered with straw. They are then carefully housed, and afterwards dried in a kiln for the market. The excellent condition in which, under such cultivation, the land is left for other crops, is a considerable indemnity for the expense and trouble bestowed upon the crop of madder. The rich polders, or redeemed meadows, both in Holland and Flanders, are favourite spots for the cultivation of this crop.

11. WOAD<sup>1</sup>.—This plant grows wild in various places, but is cultivated for its blue dye. Where indigo is not attainable, it takes its place; and where indigo is attainable, it is found advantageous to mix a portion of woad with indigo. The use of indigo, however, much interferes with the cultivation of woad. It is sown both in the autumn and spring. That which is sown in the autumn has the advantage of giving a

<sup>1</sup> *Isatis Tinctoria.*

larger crop of leaves, and of sooner getting out of the way of insects. The leaves constitute the value of the crop, and these are gathered sometimes thrice in a season, the first gathering being much the best. It requires a rich soil ; and the particular kind of soil is not so important as that it should be deep, to admit of the free descent of the tap-root of the plant. Rich alluvions, which have been well drained, are particularly favourable to it. The land should be manured as well as for wheat ; and, above all, it should be kept thoroughly clean. It succeeds well after grain or after potatoes. It may be sown in drills, or it may be grown in a nursery, and transplanted. The plants require to be from a foot to a foot and a half apart. The leaves are gathered when they begin to droop, and turn slightly yellow ; they must be kept free from dirt, and when laid away must be guarded against heat or fermentation. They are sometimes washed, to get rid of any dirt which may adhere to them ; and a dry time must be taken for gathering.

After being gathered, they are crushed in a mill, resembling a tanner's bark-mill ; they are then made into heaps, where they undergo a fermentation, great pains being taken to close any cracks which may appear in the crust of the heap : after this they are rolled into balls, twice as large as a man's fist, and are then pressed into the form of bricks ; and thus are ready for the market. The profits of such cultivation must depend upon the state of trade, and the price of indigo. I found this plant cultivated extensively in one part of Lincolnshire, where a large mill had been recently erected for its preparation. The best woad is grown in the south of France, where it is largely cultivated.

12. WELD.—The weld is cultivated for its yellow colour. It is a plant which grows wild in many places, and the smaller kind is known in the gardens as mignonette. It

<sup>1</sup> *Reseda luteola*

requires a soil dry, calcareous, and well cultivated. It will grow well upon a sandy clay loam. Upon a very rich soil the stems will be proportionally strong and large, but the colouring matter not so good; upon a poor soil it will not pay the expenses of cultivation; a soil of medium fertility is to be preferred. It should be sown very early in the spring, and the ground should be well cultivated in the previous autumn. It does not require manure when sown upon a soil previously well cultivated and clean. The seed must be covered as lightly as possible, and it is best sowed in line. It will require to be carefully weeded; and when the leaves begin to turn yellow, it should be gathered. In a sandy soil it may be pulled with the roots; in a clay soil, where the dirt would adhere to the roots, it should be reaped close to the ground with a sickle. The plants which are designed for seed should be allowed to remain until the seed is perfectly matured. Fresh seed is greatly preferred to seed more than one year old, which often fails to come up; and when sown, on account of the smallness of the seed, it is recommended to mix it with some fine sand. The plants when gathered are to be dried in the sun, and then tied up in small bundles, so overlaying them, that the tops of the plants shall be turned in upon each other, and the roots project at each end of the sheaf. They must then be put away in an airy and dry place, and are ready for sale. It may be cultivated on the same land once in eight years.

13. CARROTS.—I must not quit the crops common in Flanders, without referring to the culture of the white carrot, which is vastly more productive than other sorts. This is sometimes sowed among rye or wheat, or colza or flax, after the last cleaning, and a small crop is obtained in this way, but often at the expense of the crop among which it is sown. When sowed as a separate crop, they speak of twenty tons to an acre, or eight hundred bushels. They require a com-

paratively light and dry soil ; they bear high manuring and deep cultivation ; and are considered a profitable crop.

I shall take the liberty of repeating here what I have said in another place. The land, after being fully prepared by manuring and fine tilth, should remain until the first crop of weeds comes up, and should be lightly ploughed, in order to destroy these. Furrows should then be made upon the field, into which the manure should be placed, and then a back furrow slice turned each way upon this open furrow, so as to form a ridge directly over the manure. These ridges should be twenty or twenty-seven inches apart. On the top of these ridges, which should be smoothed off carefully, the carrot seed should be sowed in double rows ten inches apart, and as straightly as possible. The carrot seed should be sprouted in wet sand, before sowing, and should early be weeded. The land may then be ploughed between the rows, and kept clean with a hoe. They must be thinned out in the row to about six inches asunder. When ready to be taken up, by running a plough directly by the side of the row of carrots, they are gathered with little trouble.

I have now gone through the principal crops grown in continental husbandry, and though not undertaking to give a full detail of the culture, yet I have given all the peculiarities which distinguish any mode of culture, and those general rules and principles which are universally applicable.

## XXIX. IMPLEMENTS OF HUSBANDRY.

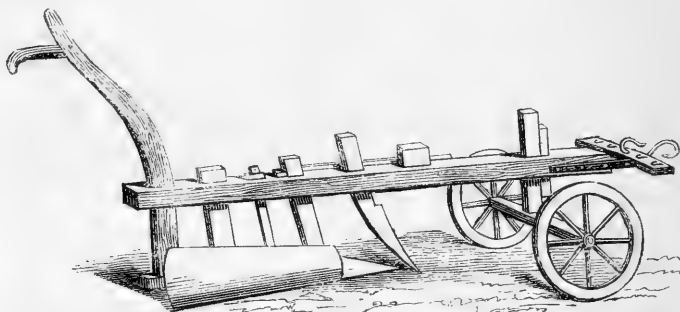
In Paris at the Conservatory of Arts and Trades, at Brussels, at Utrecht, I found extensive collections of agricultural implements and models of agricultural tools and machinery. These embraced many of the most improved implements to be found in England or the United States. It may excite a smile of surprise with an Englishman, that I speak of the

United States in this connexion. But I have seen nothing on the Continent or in Great Britain equal to the collections of agricultural implements which are to be found, for example, in Boston, United States. The English implements are usually clumsy, heavy, and inordinately expensive. In treating of British Husbandry, I have given an account of some of the best of them. They at least answer the purposes of the ingenious mechanics, who understand very well when they have got their pail under a cow with a full udder, and how in the most agreeable manner to abstract the gold from the pockets of enthusiastic agricultural amateurs. Like the Flemish cows, they are carefully fed, not to say flattered, while being milked; and finding tools and implements for every operation, and adapted to all possible shades of difference in the manner of performing it, imagine they have only to purchase the tool to have the operation accomplished. In general they are compelled to learn that it is not so much the tool, as the man who holds it, upon which they are to rely for the proper execution of the work. Of this the Flemings are a striking example; for it is impossible to find agricultural operations better executed, and with fewer and more simple implements.

I found, as far as simple inspection could determine it, in my humble judgment, the best plough I have ever seen in the Museum at Brussels; but I regret that I could get no information as to its name or maker. It was a light plough, designed for common field work with two horses. It is difficult to describe it. The share was long and thin, broad enough to cut completely the bottom of the furrow slice; and the mould-board was almost the segment of a circle, or rather shaped like the back of the hand with the fingers closed tightly, raising the furrow slice at the most natural and easiest angle, and all friction or pressure ceasing after it once became sufficiently inverted to fall by its own weight. I was not able to obtain either a model or a drawing.

Two ploughs are much celebrated in Flanders, one called

the Walloon plough with wheels to the beam, of which I subjoin a sketch, and which is much used for ploughing deep in heavy lands. It is used with two, three, or four horses, according to the nature of the soil, or the depth to which it is desired to go.

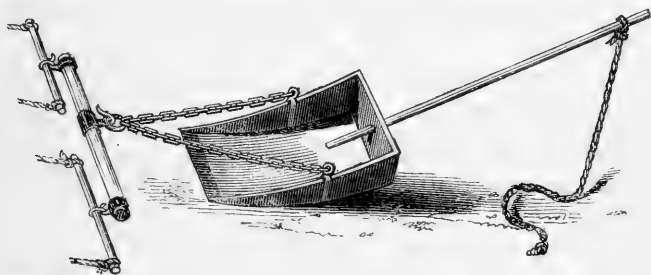


The other is of a lighter description, and is much esteemed as the Dutch plough. It is introduced into France, and there most highly approved. For light lands it is used with one horse, but ordinarily with two. What I have sometimes seen called the Dutch plough has had the mould-board so curved, or rather almost concave, as to offer great resistance; and rather to press the dirt as if with the hollow of the hand, than to turn it over. The common Flemish plough is undoubtedly an excellent implement. It has a shoe or regulator attached to the beam in front, by which the depth of the furrow is regulated. A plate of it is subjoined. The Flemings value it not only for raising and inverting the land, but for pulverizing it at the same time.



In the harrows and rollers used in Flanders I saw nothing peculiar. They have bush harrows, and harrows with teeth of iron and of wood.

The instrument, which is deemed peculiarly Flemish, is the *mouldebart*, of which I annex a plate. It is designed for the speedy removal of earth, when it is not required to transport it to a great distance. The horses or oxen are attached to this implement which immediately dips itself full of dirt, and when full, the handles are then pressed down that it may slide easily over the ground. When it reaches the place of deposit, the handles are raised, and it empties itself; and the string, which is constantly held by the workman who guides it, is designed to pull it back after it is emptied. It is thus prepared to take up another load. It is a most useful instrument, and effects a great deal of work with a small expense of labour in a short time. It has been used many years in the United States, and is there called an ox-shovel.



The plough which I saw frequently used in Italy was without a mould-board, and its share resembled the bowl of an inverted teaspoon, only more flat. It simply stirred the ground, but did not invert it.

The spade is an instrument much used among the small farmers of Flanders; and in the best cultivated districts, such as the Pays de Waes, they deem it necessary once in five or six years to trench their land completely to the depth of fifteen or seventeen inches with the spade.

I saw nothing in the carts, waggons, or vehicles in use on

the Continent in any way to recommend them either to English or American farmers. Nothing, however, can be more complete than the fitting out of a Flemish or Dutch farmer's team. The equipments in France and Italy are in general wretched in the extreme. In Italy and in Switzerland, oxen and cows are principally used for draft. In Italy the breed of cattle is extremely beautiful in appearance. In Italy, oxen are often brought out upon the roads to assist in dragging the coaches up their steep hills. They ordinarily draw by the horns or forehead ; but where a yoke is used over the neck, I have found a basket of stones hung at the centre to keep it down, that it might not impede the breathing of the cattle. Instead of bows, there were ropes round the necks of the cattle.

The Dutch collar for draft horses has been the subject of much improvement, and the horses used in the Belgian artillery are said to have derived an immense advantage from its improved character. The first object has been to avoid, as much as possible, a horizontal draft, and, therefore, the point of attaching the chain or trace is placed high on the collar, so that it may not affect the breathing of the animal ; the second, to avoid galling the neck of the horse, and for this reason the collars are made open to buckle at the top, by which means they can be better adjusted to the neck of the animal. Great stress, and I believe very justly, is laid upon having the collars made so as to open at one end at pleasure.

### XXX. SPADE HUSBANDRY.

An implement which has accomplished an immense amount in some parts of continental Europe, is the spade ; and when we reflect upon the actual amount of labour effected by this simple tool, managed by the human hand alone, the elevations which have been levelled, the canals which



have been dug, and the mighty embankments which have been raised, one is filled with astonishment at the great effects which are brought about by the most simple means, and at the vast results of combined and persevering labour.

A great amount of land is cultivated by the spade in Belgium, Holland, France, and Germany. Indeed, vast extents of land, especially in the vine-growing districts, on the steep acclivities and on the summits of high hills which are cultivated, are entirely inaccessible to horses or cattle. The ground is tilled by the spade; the manure is carried up, and the produce is brought down on the backs of men or women. It is stated in a statistical work, now in the course of publication in France, that not less than forty millions of acres in that country are cultivated by the spade. This strikes me as an over-statement; yet the amount is, doubtless, very considerable. In Flanders the cultivation is mixed, with the spade and the plough; the land for grain crops is wrought with the plough and laid in beds or stitches, and the intervals are dug out with the spade, and the seed sown on the beds is covered with the dirt thrown out of these intervals. This is all done with the greatest care, and this is the occasion of the extreme neatness and exactness which appears in their cultivation.

In the case of very small farms of a few acres, all the work is executed by the spade or the hoe. It may interest my readers to see the calculation made by the late Rev. Mr. Rham, a gentleman highly esteemed for his agricultural knowledge, and his zeal in agricultural improvements, as to the amount of produce which may be obtained "from fifteen Ghent acres of light land and moderate fertility, which should be cultivated by the spade, with the help of a horse and cart; and will maintain four milch cows, and a heifer; a horse, two or three hogs, and a couple of young pigs; sending to market, or consuming in the family, the following produce, deducting seed:—

- 90 bushels of wheat.  
 90 „ rye.  
 30 „ buckwheat.  
 100 „ oats, leaving 20 bushels for the horse.  
 An acre of flax.  
 60 bushels of rape seed.  
 8 cwt. of butter, from four cows.  
 2 fat hogs.  
 A heifer and two calves, sold annually.”

This is an extraordinary amount, and yet I have no doubt it may be realized.

I am not about to enter into a comparison of spade husbandry with that carried on by the plough, and the help of brute labour ; but there are many cases in which, owing to the superabundance, and consequent cheapness of human labour, it may present a fortunate alternative. It is stated to require the labour of a man sixteen days to dig an acre, and thirty-two days to trench it, which would be going two spits deep. Labour in Flanders is about ten pence, or twenty cents a day, without feed, which would render it much less expensive than ploughing.

In cultivating land with brute labour, it is to be remembered that on few small farms can a team be kept constantly at labour ; but the expense of the keep goes on whether the team labours or not. The cultivation by a spade is much more thorough than by a plough ; much less seed is required, and much better crops are produced. A bushel and a quarter of wheat to an acre is ample, because every seed is carefully covered, and thus secured from the birds, and buried only at such a depth that it rises easily. The cultivation is much cleaner from weeds, and the manure is more thoroughly intermixed with the soil. The land is made friable, and the deep cultivation gives the roots of the plant ample opportunity to expand themselves. The beneficial effects of a good trenching will continue for five or six years.

How far it may be expedient to adopt it on any large scale, must depend on a variety of obvious circumstances, which in different situations must greatly vary. The expense of keeping such teams of horses as are kept in England, and in many parts of the Continent—I speak particularly as to their consumption of food—to say nothing of their equipments and deterioration in value, is enormous. It seems the great drawback in England to a farmer's prosperity. What might be accomplished where a superabundance of human labour exists, what should be done with a starving population around you, anxious to be employed, and willing to work, are for the consideration of those who find themselves placed in these painful circumstances. Such is the sad condition of many parts of the European continent. The example of a Flemish farmer supporting himself, and wife, and three children, keeping a cow, and fattening a hog, upon the produce of two and a half acres of land; and selling, for various purposes, the produce of three and a half other acres, he being able, with the help of his wife and children, to cultivate well the whole six acres, and to have a great deal of time left for other purposes, is, I am assured, often to be found in Belgium, and strikingly illustrates the success of quiet and patient industry, joined to temperance and economy.

### XXXI. LIVE STOCK.

In respect to the live stock of the Continent, a traveller perceives at once that, with the exception of horses, little attention has been paid to the improvement of the different breeds. Perhaps I should except sheep likewise, as I shall presently show. In this respect England distances all other countries within my observation; and has displayed a skill, perseverance, enterprise, and success, which are admirable; and which, in enormous prices, have been liberally compen-

sated. A thousand guineas for a bull, six hundred guineas for a cow, or three hundred guineas a year for the service of a ram, ring in one's ears like music from the regions of romance. The symmetry of proportion, and the extraordinary degree of fatness to which some animals are forced, as may be seen particularly at the Smithfield Christmas show, in London, and the extreme beauty of the improved stock of England, are most remarkable. Aptitude to fatten, early maturity, and great weight of carcase, in proportion to the age, and the amount or cost of the food required, are points of great value in any race of animals which are designed for food. But beauty, either of form or colour, has only an imaginary value, and no necessary connexion with its product, either in beef or milk; and the extreme obesity of many prize animals is often obtained at an expense to the farmer or amateur much beyond any price which the animal is likely to command in the market. Early maturity is a point of great importance; for, excepting where animals are kept for labour, animals kept a day beyond their readiness for a fair market, are almost always kept at a loss. The secret of profit is in general in a quick exchange. I have known a farmer to weigh repeatedly two fattening oxen of fine thrift, and size, and extreme fatness, and he discovered that, for a whole month before they were sent to market, they had not gained a single pound. They appear to have reached their acmè, beyond which they could not be forced. It is a curious fact in regard to the human animal, that in a condition of health no change of diet and no abundance of diet ever carries him beyond a certain point; so that every adult man has what he terms his own weight, which does not vary for years. Whether an analogy to this fact is to be found in the inferior animals, would, as far as it is possible to be ascertained, be a curious and useful inquiry. Ordinarily, I admit, not always, animals consume in proportion to their size. I believe it will be found, in general, that two small, or medium-sized

animals, of good constitution and thrift, pay the farmer better, in proportion to the amount of food consumed, than one large animal, which would give an equal or superior weight. The English farmers generally consider the small Highland cattle the most profitable for fattening. We know certainly that the milking properties of cows do not always bear a proportion to their size. The two best cows which I have known—one making  $19\frac{1}{4}$ lbs. of butter in a week, and more than 480lbs. in a year; and the other having produced more than 20lbs. in a week—were two medium-sized cows of the North Devonshire breed; and it seems an established prejudice, if so it must be called, that fatness, and the abundant secretion of milk, in the same animal, at the same time, are to a degree incompatible with each other.

1. OXEN AND COWS.—I saw some very large oxen from Normandy in a fat condition on exhibition at Poissy. The cattle, however, most admired on that occasion were a cross of the improved Durham short-horn with some of the best breeds of the country.

The cows, as met with ordinarily in France, are inferior. They show in the early part of the season the effects of bad keeping in winter, and appear scarcely to recover from it during the season. The cows, at several private establishments which I visited, were admirable for their milking properties, but of no particular race; though at Grignon, at Petit-Bourg, and generally, I found the Swiss cows held in high estimation. The Dutch cows have been a long time celebrated for their abundance of milk, which does not surprise one in looking at the rich polders in which in summer they are fed, and where they are often seen covered with a cloth as a protection against both the dampness and the cold. Being unacquainted with the Dutch language, I found it difficult to get as particular information as I desired. Radcliffe, in his book on Flanders, says, that “they are fair milkers;

but in this respect nothing remarkable, the average quantity, excepting in the grass districts, where it is *infinitely* greater, being computed at about seven quarts each cow in the twenty-four hours, through summer and winter." I quote this passage for two reasons ; first, to show how loosely many people speak and write on such subjects, for one is wholly at a loss to know how much a product *infinitely* greater than seven quarts may be supposed to be ; and next, to say that an average yield of seven quarts per day winter and summer is a very great yield, and is seldom equalled. There is another report of a farmer at the Hague, furnished to Sir John Sinclair, where the milk establishment of forty cows produced only about three quarts per day to each cow throughout the year.

The produce of a Dutch cow is rated at about 80 lbs. of butter, and 180 lbs. of whole-milk cheese, in a year, which certainly is not an extraordinarily large amount. They are generally of a black and white colour. In some cases they are milked three times in a day. In the greater part of Flanders I found them soiled upon clover or vetches, but principally clover ; in Holland, they remain in the pasture all summer, where they are milked ; but in winter they make a part of the family, and, in truth, live in the common eating-room of the family, it being a part of the main house.

The Swiss cows, as far as they have come under my observation, are to be considered of two kinds ; the cows ordinarily kept on the common farms, and the mountain cows. The cows I found at Hofwyl are, from appearance and the accounts I received of them, the very finest of their kind. They are large, but not tall ; broad in the back, full and square behind ; fine boned, and with large udders, giving great quantities of milk. It is difficult, especially at any distance of time, and when innumerable objects are passing before the mind, to compare two objects, unless they are present ; but I think I have never seen finer animals of the

kind. The race is known as the Cimenthal; and undoubtedly great pains have been taken in their selection and management.

I am at a loss to state the amount of milk given, or butter produced by these cows, because I do not know the capacity of the Swiss *measure*; but they are evidently deep milkers, and as well as I could understand they give from sixteen to twenty-eight quarts of milk per day, and about two hundred pounds of butter by the year. These cows were reported to me to weigh from 700 to 1200 lbs.; they were exceedingly broad and round; short and fine in the leg; in high condition, and extremely well covered; and in their whole appearance excelled by none which I have seen. I saw many of these fine animals for sale in the cattle-market at Berne.

There is another kind in Switzerland, which may be called the mountain cow, because I found them principally in the most hilly districts of the country. These were a small-sized animal of beautiful form, small limbs, exceedingly light of foot, evidently fitted to climb hills and precipices, and with eyes as bright as those of a gazelle, and not unlike a deer in their movements. These cows did not promise much in milk.

In Italy, where oxen are much used for draft, the breed of cattle is principally of a dingy white, of a medium size, and keeping in fair condition, but with no particular quality to recommend them. Oxen and cows seemed to be worked indiscriminately, sometimes singly, and often yoked together. In most cases they draw by a band of some kind, which brings the point of draft upon the forehead at the foot of the horns. All their yokes and trappings are of the most ordinary and singular character, and seem to carry one back to the very infancy of the arts. Indeed, in Italy nothing, as far as I saw, could be more awkward than all arrangements of this sort, excepting in parts of Ireland, where hay is car-

ried to market tied, or rather gathered, into two large bundles, and swung across the back of a donkey.

2. GOATS.—In Switzerland, I found in the mountainous districts large herds of goats, who are brought down from the mountains at night to be milked, and sent away again at daylight in the morning. Many small families kept one goat in their stables to supply the family with milk. They give about one pint of very rich and delicious milk each per day ; sometimes more. Among the mountaineers of Ireland, near the lakes of Killarney, I found many families keeping goats for their milk ; one family having as many as thirty. These were kept for the comfort and luxury of travellers, who visited these wild and picturesque regions. They are kept at a small expense, and were it not for their wandering and mischievous propensities, a milch goat would be a treasure in the family of a poor man. They might easily be fed by the waste vegetables of a poor man's garden or his frugal table ; though in most of the poor families in Europe there are other mouths who claim first to be satisfied, and leave little waste of any kind. The milk of goats is rich, and is often recommended to invalids by high medical authority.

3. ASSES.—Of all beasts of burden or draft in Europe, asses are, perhaps, the most common. Mules are bred and used largely in Spain, as I am informed ; and I found them in the mountainous parts of Switzerland for the use of travellers in places and passes where carriages cannot be used, and where sureness of foot is particularly desired. But asses are every where common, and, for the purposes to which they are applied, are certainly most serviceable animals. They are in general of a small size, and cost from one to two pounds, or from five to ten dollars ; their keep is of the hardest description, and they live to a great age. One was used constantly at Carisbrooke Castle, in the Isle of Wight, for drawing



water from a very deep well seventy years, and he was replaced by another, who, when I was there, had been employed for many years. This most useful race of animals presents an example of the humiliating truth, that real substantial merit does not always find its place in this world ; that grateful and kind treatment does not always follow the services rendered ; that abuse of power is too common a fault ; and that exterior appearance and address are a surer passport to favour than solid and useful qualities. I cannot say, however, that this is without exception, for I found in some cases in Manchester, in England, among the Irish, the donkey living in the same room with the rest of the family, and sharing in their comforts, such as they were. Whether this was to be considered as an advance upon the usual companionship of an Irish cabin, I shall not determine. It shows at least an amiable trait of character to acknowledge our obligations, and quite in the equality and fraternity style of the times.

4. HORSES.—The Flemish horses have long been celebrated, and most deservedly so, as I have seen for their purpose no horses superior. In France and the Low Countries, horses exclusively are used for agricultural labour. In Flanders, two horses are allowed to fifty acres of land. In many cases the farms are accessible by canals, and manures are brought and produce carried away in boats, which, of course, on still waters are navigated at a small expense. The Flemish horses are of a medium size, compact, active, strong, and extremely well equipped ; these farmers being very proud of their teams, as indeed they well may be. Add to this, they are groomed with extraordinary care. In my journey from Antwerp to Rotterdam by diligence, it is hardly possible to praise the horses too much, for their beauty, speed, and equipments.

The French work horses are admirable, and surprised me by their excellence. I refer particularly to a breed called

the Picheron, bred in the interior of France, and used in the diligences and the omnibuses in Paris. The horses generally employed in these cases are unaltered, which clearly does not improve their temper or manners; they are rather under than over size; they are not groomed with much nicety, nor harnessed with any show; they are, however, kept in good condition, and almost exclusively for work; they are small-boned, well filled out, and extremely compact; their usual travelling gait, according to my experience, with immense loads, is from six to seven miles an hour: in the mail coaches in France, the rate of travelling is ten to twelve miles an hour; and no where are there more punctuality and despatch. The Flemish cart-horse, and the breed of French horses to which I have referred, would in my opinion prove a most valuable acquisition to the United States. The Flemish horse is slow in his movements; the French horse extremely active and vigorous; their ordinary height is fifteen and a half hands.

The mode of keeping horses differs much in different places. They are almost universally soiled in summer upon green food, either clover, vetches, or lucerne. I have already mentioned the case of a large contractor for conveying the mails, who was accustomed, besides straw and hay, to give rye bread in certain quantities, whenever the price of oats or other forage or provender made it upon a fair calculation expedient. For the health of the horses he much approved this food. His stock exceeded four hundred horses: oats are almost always deemed an expensive article; but the best farmers recommend to give them in the straw cut up. Carrots are much valued in Flanders for horses; and considerable quantities of beans are grown in France for horses, and given in a bruised or half-ground form. The Flemish give their horses what is called a white drink, that is, water mixed with some portion of rye or buck-wheat meal; and sometimes oil-cake is dissolved in it.

In some parts of Flanders, the allowance for a horse is in winter fifteen pounds of hay, ten pounds of straw, and seven pounds of oats per day. In summer, clover is given instead of hay and straw, seven pounds of oats, and their water whitened with rye-meal. In another district, in winter, about six quarts of oats, thirty-five pounds of hay, or in place of fifteen pounds of hay, about seventy pounds or a bushel of carrots. In summer, seven quarts of oats; eighty pounds of green clover are given. Instead of the oats, about four quarts of bruised beans are given. The Flemish are always anxious to have their horses in the best possible working condition. Excepting only the white drink, the keeping of the French horses does not materially differ from that of the Flemish. The advantages of cutting and mixing food for horses are universally acknowledged, on the score of economy to the farmer, and of utility to the animal fed.

5. SWINE.—The swine are almost every where on the Continent, as far as I saw them, miserable; lank, lean, gaunt, and, if they have not a good point about them, they certainly have other points in great profusion. If it was a herd of such swine as one meets with continually in France and on the Continent, which were on one occasion driven into the sea and there perished, the owners certainly could have had little ground of complaint. At Grignon I saw some of the improved breeds of England introduced, and it is to be hoped that they will extend themselves; at present the race seems under a curse.

6. SHEEP.—I shall say little of the sheep of the Continent. The sheep seen on the rich meadows in Holland are of a large size, with long coarse wool and a heavy fleece. The Saxony sheep are well known for the fineness of their wool, their small size, and their tenderness of constitution. I have already said that I found some excellent results at

Grignon and Alfort from crossing the Merino with the South-Down, but sufficient time has not been had to decide whether it may be persevered in with advantage ; a point by no means determined.

The pure Merino sheep, which were exhibited at Poissy from the farm of Mr. Gilbert, near Grignon, and originally of the stock at Rambouillet, were, beyond all comparison, the finest of the kind I have ever seen ; and, I believe, of the very best kind of sheep, for the United States, which could be raised. They would weigh full twenty pounds a quarter when dressed ; their wool is of a fine quality, and their fleeces extremely large and heavy. An intelligent American farmer who was with me at one time when I saw them, and on whose opinion, from his having been a great wool-grower, I should place much reliance, perfectly coincided with me in my impressions of the merits of these extraordinarily beautiful sheep. They are not so large or fat for mutton sheep as the Leicester or South-Down of England, in which country mutton, being a favourite food, is much more an object of demand than in the United States, but they are sufficiently large for mutton, and the superior fineness of their wool gives them a peculiar value. There exists with some persons a prejudice against Merino mutton, but it is entirely without reason.

## XXXII. DAIRIES.

Holland and portions of Flanders are largely devoted to the grazing of cattle, and to the making of butter and cheese. The Dutch butter is much celebrated ; it is strongly salted and neatly packed, and may be shipped to advantage. Cheese is largely manufactured in Holland. The Dutch cheeses are well known. They are professedly made of whole milk, but I must be permitted to distrust this cer-

tainty in respect to those which I have tasted. They are made in the form of cannon-balls, weighing about seven pounds each. They are an article of extensive commerce, and are sent to market as early as they can be got ready. They are exported largely both to France and England. The taste of them is good, but in richness they are very inferior to the best English cheeses.

The Dutch dairy-rooms are models of neatness. The French denominate this quality by an expressive word, propriety; and, in the case of the Dutch farmers, it seems impossible it should be exceeded. Their vessels, pans, tubs, presses, shelves, dippers, every thing, in short, connected with the dairy is marked by a cleanness which seems perfect, and they are bright with excessive brightness. The town of Broeck has been long celebrated for its cleanness, and here not a horse ever comes; the streets or passages to the houses are paved with bricks, or with rounded stones from the sea-shore; and a well-dressed lady might almost sit down in the streets without soiling her robes. The neatness of these places is proverbial. I cannot say that I have not seen it equalled in some private examples; and the sect of the United Brethren, otherwise called the Shakers, in the United States, are quite as much distinguished in their houses and settlements for their excessive cleanness; but it is clearly impossible in this respect "to beat the Dutch;" and this most comfortable, agreeable, I will add beautiful, habit of the Dutch, is no where surpassed.

The French butter, as found in the markets of Paris, seems the perfection of this article. It is generally sold entirely fresh, and that of the first quality is delicious. It is found fresh in the markets in winter as well as in summer, and is coloured with the juice of the carrot. The French offer for sale fifty-three different kinds of cheese. Having tasted of but few, it would be presumptuous in me to characterize the whole. The cream cheese is excellent. The Neuf-

chatel, which is merely the curd fresh and slightly pressed, is much esteemed. The Rochefort resembles the Stilton, and often equals it. These are deemed the best. I could learn nothing either in Holland or France peculiar either in making the cheese, or in the curing or use of the rennet. The Swiss cheese, called the Gruyere, is manufactured both in France and Switzerland, is much esteemed by many persons, but its flavour is excessively strong and not agreeable. I cannot, however, decide for the tastes of other persons. The celebrated Parmesan cheese, which commands every where the highest price, is made in a limited district in Italy. The mode of making it is kept a secret. It is of a light green colour, and delicious flavour. A distinguished farmer in Switzerland informed me that they had repeatedly endeavoured to imitate it, but without success; that the agricultural societies had offered large premiums for this object; and that they had actually sent persons into the district where it is made, but they were unable to get the information. It is conjectured to depend mainly upon the nature of the feed which the cows obtain. The current opinion, that it is composed of a portion of asses milk, is considered by the best informed persons as without foundation.

I have gone so fully into the subject of dairying in my observations upon English husbandry, that I shall not extend them. In Holland, the cows are generally pastured and milked in the field. In Flanders, in parts where good pasturage does not abound, they are soiled, and in one of the best districts half an acre of clover to a cow is considered ample for the summer. In winter they have hay, straw, carrots, turnips, or potatoes, in such proportions as a judicious feeder will see to be necessary. But there prevails universally in Flanders a practice of giving the cows a mixture of rye-meal, or the meal of buck-wheat with water. This is considered as most indispensable, and, no doubt, contributes essentially to increase the milk. In general, the Flemish

farmers prefer a mixture of food both for their cows and their fattening cattle, cutting up straw, hay, turnips, and carrots together.

There are modes of management in the Swiss dairies which are well worthy of notice. Where it is desired to avail themselves of the feed upon the mountains, a herd of cows is driven there in the summer; and some persons, men in the cases which I found, go with them, carrying their provision with them; and, occupying a building which is only habitable in summer, tend the cows, and make the cheese. They carry little else than bread with them, and for this they have occasionally to descend the mountain, which, with the return, is no slight task; but bread and butter-milk form their principal and almost sole diet.

In another case, in a small village consisting, it may be, of fifty or a hundred families, I found an arrangement certainly peculiar, but which seemed excellent, and capable of being adopted to advantage in many other situations. Some of the villagers kept one only, some two or three cows. A man and his wife, skilled in making cheese, were employed, in a suitable building, with all the necessary fixtures, to make the cheese for the village. The milk was carried to the place for making the cheese, morning and evening, and there measured and receipted for. Of the whey, each one, when he carried his milk, got his proportion in return. The cheese was sold on joint account; and, after deducting expenses, the proceeds were divided according to each one's contributions. This arrangement was excellent; first, for those who kept only one or two cows, and who could not, under the circumstances, make cheese but to a disadvantage; second, it saved the difficulty and trouble of a dairy-maid in the family—a class of persons who are always difficult to be procured; and, third, it assured the good quality of the cheese, by its being made by a person of known and acknowledged skill.

## XXXIII. FARM-HOUSES.

A Dutch farm-house is a remarkable object. They are seen scattered and alone at considerable distances from each other, over their extensive meadows, generally surrounded by a few trees. At a distance they appear like enormous barns. They are generally square, covering a large extent of ground, of one story in height, and with a roof rising to at least twice the height of the body of the house, gathering in from the four sides of the house, and terminating in a central point at the top, like an Egyptian pyramid. This roof is entirely devoted to the storage of grain and hay. The lower part of the house comprehends a dwelling for the family, sleeping rooms, and a parlour or drawing-room, which is never used but upon great occasions, such as the death or marriage of some one in the family, and a kitchen, adjoining which is the keeping-room of the family. Adjoining this kitchen, in truth making a part of it, are the cow-stalls; and adjoining this a room for the storage of the cheese, for the milk, the churns, the press, the tubs, and other dairy utensils, which, whether of wood or of brass, are kept in the most polished condition. The cow-stalls are so constructed that two cows occupy one stall together, tied by chains, with their heads to the walls, and behind them is a deep trench or drain, into which all the solid and liquid manure is received. The solid is immediately conveyed away to the heap outside the door, and the liquid is drained into a covered cistern at the side of the stable, on the outside of the house.

Into this cistern flow likewise all the slops of the house and of the dairy, and the drain is kept constantly clean by water. In summer the cows are kept and milked in the pasture; the stalls are then most thoroughly scoured and cleaned out, and either carpeted or sanded; and exhibit the same perfect neatness as the rest of the apartment in which



the family live. In all cases, both in Holland and Flanders, the cow-stalls, while occupied by the cows, are frequently washed with water, which, besides the purpose of cleanliness, serves to increase the contents of the urine cistern ; and over every stall is a cord suspended, by which the tail of the cow is tied when milked, to prevent her slapping the face of the milker, or throwing any dirt into the pail. Indeed, the neatness of all their arrangements is perfect. The farmer and labourers have their clean shoes or slippers at the door, where they always exchange their out-door shoes on entering, that they may bring no dirt into the house. The contrast between a Dutch farm-house and an Irish cabin or wigwam, is most remarkable.

The Swiss farm-house differs entirely from the Dutch. It is a somewhat stately erection, generally of two stories and high roof, with a piazza in front of the second story, to which there is access from the outside by steps. The lower story, or ground floor, is occupied by the live stock ; and the second floor by the family. This spirit of fraternization and equality, which appears both among the Dutch and the Swiss, in regard to those useful animals upon whom their living and wealth depend, is certainly an amiable trait of character ; and is much more harmless in its operation, if we may judge from the results in the two cases, than when applied to human society. The neatness of several of the Swiss farm-houses which I visited, if not so remarkable as that of the Dutch, is really exemplary. My readers will excuse me, I trust, for giving a small example of extreme frugality. In going into one of the farm-houses in Switzerland, I observed a considerable parcel of egg-shells laid together upon a shelf, as if to be kept. Upon inquiry, I found that the good housewife saved these for the hens to eat in winter, that they might have them when the ground should be covered with snow, and they could get no lime from the ground, to form the shells of their eggs.

## XXXIV. SWISS FARMING.

The farming in Switzerland varies very much in different cantons or districts. The soil varies, and the rugged aspect and broken and mountainous character of the country give a variety to their cultivation and modes of life, which at once impress a visiter. The habits and appearance of the population certainly differ much in different parts; and I was told that I could immediately distinguish a Protestant from a Catholic canton by the superior industry, economy, good management, and prosperity of the former over the latter. I believe there is something in this; but it is by no means so marked or decisive as I was assured. I am not conscious of any religious prejudices whatever, holding religion itself as a very different affair from the forms which it assumes, believing that there may be true religion under any and every form of expression, and, indeed, often where there is no outward form; and desirous to regard all the forms under which the religious sentiment is expressed with all the indulgence with which I ask that my own should be regarded. But the numberless saints' days, festivals and fasts, the keeping of which is made obligatory in Catholic countries, abstract materially from the time which would otherwise be devoted to labour; and it is certainly true that that liberal education and freedom of thought, which would prompt to enterprise, experiment, and improvement, as much in the agricultural as in any other art, is not so common in Catholic as in Protestant countries.

There are large portions of Switzerland wholly devoted to pasturage, and which, from their inaccessibility to the plough, can be applied to no other purpose. In these cases, where cows could not go, goats find their way. But wherever the plough or the spade can be used they are diligently employed, and this activity is stimulated in many parts of the

country by a dire struggle to procure a subsistence under circumstances most inauspicious and severe. In parts of Switzerland, the melting of the snow on small patches of ground is hastened by throwing small fragments of slate-stone upon it, such, I may say, is the necessary impatience to get at the ground seasonably to put the seed in for a crop.

In some parts the country is open, and fields of considerable extent are under admirable cultivation ; in other places, the smallest nook, the least patch by a running stream, and the most secluded valley, will be husbanded with the greatest care. The valley of Chamouni, enclosed by lofty mountains covered with the snows of untold centuries, and running at the very foot of Mont Blanc, the sublime monarch of these Alpine heights, was green and beautiful, waving with crops of grain ; and when I was there, covered with merry hay-makers. I may add, that these haymakers were almost all of them stout and active women, whom I saw mowing as well as making, raking, and loading hay. They were very cheerful, and seemed to enjoy ruddy health. The fields were certainly well mowed. Many of the out-door employments to which women are accustomed on the Continent are highly objectionable ; mowing seems to me too hard for their strength ; but I really can see no objection to their performance of many of the kinds of labour which are required on a farm. It may not contribute to preserve their beauty, though this is wholly a matter of personal taste ; but it will assist to preserve their health, and give them muscular energy and vigour. The long and dreadful wars of Europe, which made such demands upon the men in order to fill the ranks of the army, compelled the women, in the absence of their husbands, sons, and brothers, to do the work of the fields ; and the practice is, and is likely to be, continued. I have met with several of my countrymen abroad speaking with some surprise of women performing the labours of men on the Continent, as though such a practice did not prevail in their own

country. But in all the slave states, do not the women work indiscriminately as the men? Ah! but then *they* are negroes; this puts them into another category, and complexion appears to bring their humanity into question. In the arable districts of Switzerland I was told that the farms consisted usually of fifty acres, and many of these farms gave the strongest indications of independence and comfort. The farms in Switzerland are divided by fences; and, with the exception of the loftiest heights, it may be said that a Swiss very much resembles a New England landscape.

### XXXV. HOFWYL. IRRIGATION.

I visited in Switzerland the celebrated establishment of the late Mr. De Fellenberg, at Hofwyl, near Berne, for education. No school is better known; and it is believed that none ever better deserved public esteem and confidence. It does not come within my province to speak of it in this place as a literary institution; but as a farm it may be considered as a model well worth studying. I have already spoken of the cows at this place, of which there were sixty, the superiors to which, in condition and produce, have not come within my view.

The most remarkable improvement which I witnessed in this place was in irrigation. The land irrigated was in the shape of a bowl or basin, of which one side was wanting. The water, after turning a flour mill, was brought a considerable distance in a race way on a bank, and then was carried round through successive rivulets formed round the sides of this semicircle or amphitheatre, watering the intervals between these gutters or trenches, and afterwards spreading itself over an extensive piece of flat land; thus, at pleasure, watering one hundred and fifty acres of land. Nothing which I have seen could be better managed; and the success of the

improvement has been a valuable compensation for any expense which has been incurred. The land is kept continually in grass, and the water is let on several times in a season. It was deemed inexpedient to keep the water on more than half a day at a time.

I shall find no more suitable place than this to mention the irrigation in the neighbourhood of Milan. This is a level and most fertile country. A good deal of rice is cultivated in its neighbourhood. The fields have their trenches and cross ditches and embankments made with great care. The water is brought from a neighbouring lake, and these fields are irrigated at pleasure. Where there are facilities for it, or where even they can be formed within any reasonable expense, there are no more successful improvements than irrigation. Even simple pure water is of great fertilising power; still more when it brings with it the washings of cultivated fields, or other enriching matters, which it may collect in its course. A diversity of opinion prevails as to the length of time during which water may be allowed to remain on the land. The passage of the water over the land is preferred to having it remain stagnant; and an irrigation of a few hours' duration is generally considered more eligible than a longer continuance.

The farm at Hofwyl presents all the improvements which modern art and skill could bring to it; with the most improved implements in use. Indeed, it may be considered as a model farm. A considerable number of the pupils were lads, who pay the expenses of their education and living by their labour. There were sixty cows on the farm, of which I have already spoken. The number of pupils at this institution, which has heretofore been very great, furnished the best possible market for the abundant produce of the farm.

## XXXVI. AGRICULTURAL SCHOOL AT HOFWYL.

The literary institution is now suspended, but the present proprietor, Mr. Fellenberg, has established an agricultural school in the neighbourhood, with which is connected a farm of some hundred acres for experiments, instruction, and use. The fixtures and arrangements, the stock and implements, are of the most improved and best description. It is intended to embrace both theory and practice; accomplished teachers in every branch will be furnished, and the course of instruction will be as complete as at Grignon, of which I have already given a full account. The term of study is fixed at three years, but the second and third year the pupils will be paid for some portion of their labour. I have seen few situations, which, in respect to health and comfort, and the means of agricultural improvement, promise better.

The Swiss farming may be considered under two great divisions, that of mountain and low-land. The markets of several large towns in Switzerland which I visited, certainly abounded in fine vegetables and fruits; but these must have come from the more favoured districts. The condition of the mountaineers in the most wild and inhospitable districts of the country must be excessively severe and hard.

The general appearance of the population, however, wherever I saw them, was creditable. There could evidently be no want of industry among them, though in the purely pastoral districts there seemed little occasions for labour beyond the climbing their acclivities and tending their flocks. One can comprehend much of the Swiss history, when visiting regions so little accessible, so desolate, so wild, and so full of peril to life. Persons accustomed to dwell in such places, quite remote from observation and beyond all restraints, enjoy the freedom of their own eagles and their own

chamois goat ; and it is quite easy to understand with what reluctance such free and brave spirits would submit to any restraints upon their liberty.

### XXXVII. LODI'S BENEVOLENT ESTABLISHMENT.

I found one humble establishment of a philanthropic character, of which I deem it my duty to take notice. In a quiet and secluded village in the canton of Berne, I went with some friends to visit a humble peasant by the name of Lodi. He was a man of powerful intellect, and extraordinary decision of character. His resolution once fixed, he was not easily turned aside from its execution. His mind from his childhood was profoundly impressed with a strong sense of religious duty, and his heart was warm with sympathy and benevolence for his fellow-men. He had received the advantages of a good common education, and had done much towards improving himself. He had a very small patrimony left to him ; he married early, and had one child. He found in his wife a mind and resolution congenial with his own. Looking with pity upon many orphan and forsaken or neglected children about them, he determined to do what he could towards rescuing some of these unfortunate children, from the almost certain ruin which menaced them ; and his wife and himself agreed to receive as many of them as would be given to them for this purpose, and as he could possibly support by their united exertions. When I visited them, they had eighteen under their care, whom, in fact, they had adopted, for he made no difference between their treatment and that of his own child ; and they were all taught to look upon him and his wife as their parents, and themselves as brothers and sisters. They lived with them, and worked with them as their own children. He devoted a certain portion of every day to giving them a useful moral and religious education, and the rest of the time was given to work on the

land. Industry and useful labour, economy, frugality, contentment, universal kindness and love, mutual affection and forbearance, and the fear of God and a humble and entire reliance upon his providence, formed the great principles which governed the whole household; and which presented themselves strongly illustrated in the examples of the father and mother of this household. This was exclusively an agricultural establishment, the girls and boys being taught and accustomed to all the labours and duties of their condition. He had had many difficulties to struggle with in feeding and clothing so large a family; and in the scarcity of 1846, from the perishing of the potato, it was a most difficult effort to get through, and he then received some slight aid from abroad. At first his views were suspected, and he was treated with distrust and ill-humour by the villagers. But he had conquered every hostile prejudice; his disinterestedness and philanthropy are universally acknowledged; his children are examples to all, of good conduct and improvement; his neighbours feel happy to render him some aid, and he is known every where as the good father of the village. This is an eminent example of the noblest philanthropy; of immense good being accomplished by the most limited and humble means; and of what may be done by heroic self-sacrifice, by noble and generous purposes, by indomitable resolution, and unslacking perseverance. I saw his school, and witnessed his parental deportment among his family; I sat down at his frugal board, and partook of his simple meal of bread and cheese and wine, and I felt myself in the presence of the true nobility of human nature, and that no monarch in Europe had power to confer upon me a higher honour. It is not difficult to be charitable on a grand scale; it is not difficult for a rich man to give away his superfluous thousands to any splendid charity, especially when he can use them no longer; but to devote one's life to the poor, to be willing to share in their poverty, to take the stray lambs



of the flock into one's bosom, and to make the orphans, the outcast, the houseless, your own children, and give them in the midst of poverty a useful education, and to qualify them for the business of life, to be useful and respectable, is an enterprise of the noblest character, conferring immortal honour on him who undertakes it.

### XXXVIII. INSTITUTION FOR RECLAIMING VICIOUS CHILDREN.

In the neighbourhood of Berne, likewise, I visited another philanthropic institution, in which I was much interested. A few persons had contributed the means of purchasing a valuable and suitable estate for the purpose of establishing an agricultural school for vagabond boys, or those who have been convicted at the courts of law ; and who, after suffering the legal penalties of their crimes, and being released from prison without character, without friends, without a home, or the means of procuring an honest living, seem to have no alternative other than that of returning to their former course of idleness, beggary, and crime. This undertaking is thus far eminently successful ; they having found an individual of high intellectual and moral attainments, and of indomitable resolution and great disinterestedness, who devotes himself to the reclamation and education of these poor and wretched children. About sixty individuals are now under his care. The farm is well cultivated, and chiefly by hand and spade labour. The most remarkable features about the establishment are the absence of all peculiar dress or external badges by which the boys should be distinguished ; and of all fences or bars by which the escape of the boys might be prevented. The boys are divided into parties of ten or twelve, who work together under the direction of a foreman. The whole discipline of the institution is moral ;

and their punishments for irregularities, idleness, or other faults, are of a kind much more to affect the mind and conscience of the pupils than their bodies.

### XXXIX.    CONDITION OF THE POOR AND LABOURING CLASSES.

Europe abounds with philanthropic institutions ; and there exists a large demand for them. In Switzerland a society has been formed in the agricultural districts, under the patronage of the government, "for the public good," intending especially, under this comprehensive designation, to embrace all means or measures which may relieve, benefit, or improve the character and condition of the poorer and labouring classes.

The condition of these classes in Europe, in general, strongly claims the interest of benevolent minds. Their wages are small ; their toil in general hard ; their food scanty and mean ; and their comforts extremely few. It is one of the monstrous anomalies in the disposition of wealth, that those by whose toil it is created receive the smallest portion of it ; and, in the midst of a plenty growing out of their sweat and labour, they are often crippled by want, and perish with starvation.

Philanthropic minds are now actively at work to discover a cure, or at least a mitigation, of this injustice ; but it is much more easy to complain of an evil, than to point out a remedy. The Swiss are proposing to give up all the public lands, and individuals with large possessions are offering to relinquish portions of their estates, that land may be given or furnished, on certain reasonable conditions, to the labouring poor, who are found to be rapidly increasing among them ; and who, in the mountainous districts, in some parts of the country, are as miserable as the poor Irish. I saw,

occasionally, on the Continent, cases of extreme destitution ; and, in those places which had been visited the previous year with the potato disease, I saw much and extreme poverty ; yet, I confess, I saw nothing on the Continent to equal the degradation, the squalidness, and wretchedness of the Irish, even before that sweeping calamity, which has consigned so many thousands of them to the grave.

The French have recently proposed violent remedies for these acknowledged evils. The visionary and mad among them have demanded the perfect equalization of property, which, if carried out to its full extent, would result only in universal injustice and pillage. The scheme is as vain and impracticable, as to reduce the Alps of Switzerland to a level with the low countries of Holland and Belgium. The inequalities in the condition of men do not constitute the great evils which are complained of. A poor man is not in a worse condition because his neighbour is rich, unless the rich man abuses his power to injure him ; nor are the poor necessarily the poorer, except by comparison, for the riches of the community in which they live. As far as wealth is a stimulant to industry, and an instrument of good, it becomes a universal blessing. The insane, the blind, the deaf and dumb, the maimed, the sick, the old and decayed, the fatherless and friendless children, and, indeed, all who, by the dispensations of Divine Providence, are deprived of the power of helping and sustaining themselves, should be helped and sustained by the community. But what is to be done for the able-bodied labourers, who are not unwilling to work, but who have no opportunity of exerting their power ? This is a great question, and involves immense difficulties in the present organization of society.

I see no grounds to hope for any immediate, speedy, or effectual remedy for the evils which exist. I am not looking for an early millennium. The wealth of the world is every where increasing at a rapid rate, and almost beyond the

dreams of avarice. The poverty of the world seems increasing, especially in the old world, in a corresponding ratio. As wealth increases, the value of money is diminished ; but as the wages of labour do not increase as the value of money diminishes, and the prices of the articles of human subsistence increase ; and as the value of labour is continually diminished by the increase of labourers, and the augmentation of the population goes on rapidly in a state of general peace, the condition of the labouring classes becomes the more straitened, and the great evil of unemployed, though willing labour, is augmented.

One of the first duties of the state should be, not to give labour, but, as far as can be, to secure to every one willing to work, an opportunity of exerting his powers ; and, as far as is consistent with the general good, and prejudicial to no just rights of any, to do this in any way or form to which his inclinations may lead him, or to which his talents may be adapted. Monopolies of every description, excepting so far as they may be given as premiums to inventive genius, are to be condemned. The monopoly of land in the old world is a serious evil. The traveller passes over miles and miles of unoccupied and unimproved land, capable of sustaining its thousands and its millions in comfort ; and on the borders of these immense tracts finds thousands of human beings suffering and perishing, for the want of an opportunity of procuring their living out of this land, from which they are excluded. This tract belongs to the crown ; that tract belongs to the church ; these immense domains are held by some powerful individual, who chooses to keep it in its present state for his game preserves ; another large tract is devoted to some object, which, if it had its value centuries ago, has now ceased to be of use. Is there any reason why this land should not be made available to the support of perishing thousands, whose voluntary labour would make it so available ? In feudal times the powerful baron or lord took care of his vassals, and regarded himself as to a

degree bound to provide for them from the estate, which they cultivated and protected. Things in this respect are changed; now the holders of large estates, who seem every where actuated exclusively by a commercial spirit, feel no farther bound to their labourers, than to manage their estate in the least expensive mode possible, to take every advantage of the competition in the labour market, and get their work performed as cheaply as possible; and then, having got their labour accomplished, and having paid their labourers, in money, the miserable pittance promised, dismiss them without any farther concern for them. This grows out of the modern refinements of political economy, which measures all good and all values by a pecuniary standard. A state of South Carolina slavery, as far as the physical comforts of the labourer are concerned, has many advantages over this.

All expectations of any great changes or improvements in the institutions of society are, in my humble opinion, vain. There is not wisdom enough, nor virtue enough, to effect, or, if effected, to maintain them. Ambition, the love of power, avarice, vanity, and pride, those mighty passions, which sway the heart, and whose power increases in correspondence with the means of indulgence, impose insurmountable impediments to the progress and influence of the true principles of Christian equality, equity, and kindness. Men without power fancy they should not abuse it, if acquired; but the possession soon contradicts this promise. Poor men persuade themselves, if they were rich, their wealth would be used only to do good, and make others happy; but the acquisition of wealth too often dries up all the springs of sympathy and kindness, and stimulates inordinately the thirst for farther acquisition.

Violent revolutions present remedies full of terror and alarm; sometimes only open new sources of wretchedness, and are but the change of one tyranny for another, and that even more severe and terrible. We may hope something

from advancing and extended education. This education may improve and enlighten public opinion; and, in the present wide and constantly-extending influence of the press, public opinion seems to present the strongest barrier against the abuse of power, and to be the great exciter to justice and to philanthropic exertion. In proportion as public sentiment is strong, and based upon and controlled by the principles of Christian equity, alas! so little understood, we may hope for some substantial amelioration in the condition of society; but this seems at present distant and uncertain.

One is consoled in this case by looking at the amount of good which may be effected by such men as the Swiss peasant whom I have described. Suppose him successful in rescuing from wretchedness, and in forming to habits of industry, frugality, and good conduct, only the eighteen children, whom, like an affectionate shepherd, he has taken like lambs in his arms. Imagine these children going out into the world to multiply the good which he has done, and to spread its influences through the various ramifications of society. What a rich harvest will arise, and be the precursor of other and richer harvests from the small seed sown by this disinterested and noble, but poor and humble peasant.

I fear my readers will think me straying from my proper duty, and I have, therefore, cut short these reflections. I could not pardon myself if I could look at the condition of the labouring classes in the old world without the deepest concern. At present, the farmers of the United States have the greatest reason to congratulate themselves, to say nothing of the higher duty of religious gratitude, for the circumstances in which they are placed. There is there at present land enough for all, and open to the acquisition of even the humblest man, who is willing to labour, and to unite with this labour, temperance and frugality.

## XL. IMPORTANT PRACTICAL CONCLUSIONS.

The great points to which I think the attention of American farmers, and of other farmers, should be called I shall briefly enumerate.

1. THOROUGH DRAINING AND DEEP CULTIVATION.—The first of all improvements should be the thorough draining and deep cultivation of the soil. The Deanston system of thorough draining and subsoiling has effected immense benefits in England, and promises to establish itself as one of the greatest single improvements ever made in husbandry. In Flanders, thorough draining, as it is called, does not prevail; but their surface-draining is most carefully attended to, and trenching with the spade is even much better, though in most cases more expensive than subsoiling. Indeed, their land, to the depth of two feet in the best cultivated districts, is completely turned over, and thoroughly intermixed once in the course of every six years.

2. MANURES.—The second great point, and that which almost transcends all others in its claims upon the farmer's attention, is the manufacture and increase of manure. It must be acknowledged that the resources for this object within the reach of most farmers are not half used, and means of creating and accumulating manures are neglected or wasted, which waste, if it could be represented by any pecuniary value, would astonish us. On many an English farm there are resources for manure neglected or lost, which would be much more than an equivalent for the rent. Let me here revert to the immense value of liquid manure, and the provision for and means of saving it, which I have treated so much at large.

3. SOILING OF CATTLE.—The third point of great consideration is that of the soiling of cattle. There are vast tracts of pasture land, to which the plough cannot be applied. Sheep and young cattle may occupy these. But the farmer will find an immense advantage in soiling his beef cattle and cows, and oftentimes his sheep also. They will be fed at less expense; they will be more under his inspection and control; they will give him equal and, according to the opinions of many experienced farmers, greater returns in beef, butter, and cheese, than if kept in the ordinary way. Above all, the extraordinary and valuable increase of his manure-heap and cistern, under such circumstances, is a consideration above all others. Next to labour, manure is the great element of a farmer's prosperity.

4. IMPROVEMENT OF LIVE STOCK.—The fourth great matter to which I would call the farmer's attention is the improvement of his live stock. It is difficult to speak too highly of the skill and success of the English in the improvement of their breeds of sheep, swine, cattle, and, I will add, horses. I do not say that their breeds are all such as are best adapted for the United States. I need not repeat the opinions which I have already given in this matter. Different breeds of animals are suited to particular localities; and the extent of the United States presents every variety of aspect, soil, and climate; and is marked by different kinds of husbandry, such as the raising of stock for beef or labour; the growing of wool, fine or coarse, short or long; and the produce of the dairy. These points are all to be considered in the selection of a stock for breeding. An improved Durham short-horn would thrive and develop all his richness and beauty in the fertile meadows of Kentucky and Ohio, and the rich prairies of the west, who would become poor and dwarfish in some of the rocky and almost barren pastures of the north. But that to which I wish particularly to call the attention of the



farmers of the United States is, the improvement of their stock by patient care, skill, and selection. They may import animals of improved breeds to advantage ; they may cross the best of their own stocks with the best animals which they can find ; and, above all, let them determine always to select the best animals for breeding, and breed only from the best ; never sacrifice a superior calf or lamb to the butcher, nor be satisfied with the services of inferior animals for the increase of their stock, under which they are sure to deteriorate.

5. IMPROVED ARTICLES OF CULTURE.—The next matter to which I beg their attention, is the cultivation of esculent vegetables, the improvement of plants, and the introduction of new articles of cultivation. The cultivation of esculent vegetables for stock, such as turnips, ruta-baga, carrots, parsnips, or beet-root, is a matter which I would strongly recommend. Besides its being more conducive to the health of the animals, to their increase in meat and in milk, it will enable the farmer, in the feeding of his cattle, to consume his straw to advantage, and save more expensive forage ; and so increase his stock.

The improvement of plants, by the careful selection of the earliest ripe, the fullest and the most perfect plants and seeds, may be carried to an equal extent with the improvement of animals. The fine barley called the Chevalier barley, and many of the finest kinds of wheat which are cultivated in Europe, are the product of some individual plants, selected in a large field, and carefully cherished by the cultivator. The difference in the time of ripening, the difference in the amount of product, the difference in the quality of the grain, are all essential considerations.

6. NEW ARTICLES OF CULTURE.—The introduction of new articles of cultivation are points of much importance. The flax crop is not by any means so extensively cultivated in the

United States, as it may be to advantage, especially when the value of its seed for fattening cattle is taken into the account. No article is more nutritious nor fattening both for sheep and cattle. I am diffident in advising the cultivation in the United States of the oleaginous plants of Holland and Belgium, such as colza, rape, poppy, &c. The expediency of doing this can only be determined by experiment. The cultivation of beet-root for sugar, considering the cheapness of the manufacture where it is well understood, and managed on a large scale, and especially in connexion with the value of the refuse for feeding and fattening cattle, deserves much thought and inquiry. Without reference to the production of sugar, the value of the crop for feeding stock, considering that no crop yields more, is more relished by cattle, or keeps sound to a later period in the spring, is great, and strongly recommends it. Few crops yield more to the acre, when well cultivated, or leave the land in better condition for a succeeding crop of grain. My own views in regard to this crop have most essentially altered in its favour.

Lucerne, sainfoin, and vetches, are comparatively little cultivated in the United States. They are all in proper situations highly valuable. Lucerne, in any system of soiling, would be extremely useful as sowing early in the spring, and giving under good culture an enormous yield, being at the same time a plant which actually enriches the soil. For later feeding in the season, the farmers of the United States have that most valuable of all plants for its forage and its grain, Indian corn, or maize. I may say, with the great Arthur Young, "that a country is signally blessed above others, which can grow Indian corn." In the middle states of the United States, sainfoin might perhaps be cultivated to advantage; in the northern states, experience has shown that the winters are too severe for it. It makes a most nutritious and excellent hay. Vetches yield a large abundance of green

feed. St. John's day rye, of which I have spoken, may be cut two or three times, and yield also a large crop of grain. This would make an excellent forage for the purpose of soiling ; so, also, the improved Italian rye grass, which, when properly cared for, bears cutting several times in a season, and yields most abundantly.

I must add, in the next place, that I should be glad to see the cultivation of the vine extended in the United States. In many parts of France, Germany, and Switzerland, it occupies land, steep acclivities, heights wholly inaccessible to a horse or cart, and where the manure is always carried up, the produce brought down, and sometimes the very soil in which it grows, transported by hand. There is land enough in the United States for its cultivation without such extreme toil. As an article of commerce, it would probably prove lucrative ; and as an article of comfort, perhaps few are more grateful and harmless. I speak in this case of the light wines of France, which do not intoxicate unless drunk to beastly excess. The strong wines of Spain and Portugal are made by some factitious process, and charged with brandy ; but the light wines of France, being the pure juice of the grape, exhilarate, but do not intoxicate. They take the place of tea and coffee among the labouring people, and constitute an innocent alleviation of their severe toil. I should be sorry in any way to abridge these comforts, especially as I may say in truth, after travelling a long distance in the wine-growing districts, and at the time of the wine-making, or vintage, when it is to be had in the greatest abundance, that I saw no drunkenness or intoxication in any degree ; and I may add, that so far as my observation goes, there is not a more temperate people, than are to be found in the wine-growing departments of France.

I need not add, that under the auspicious circumstances in which the United States are placed, her agriculture must be constantly increasing in importance to the country itself, and

to the civilized world, for her commerce penetrates every sea, and her bread-grains, as they have already done, may be of immense importance, and of indispensable necessity, in feeding the inhabitants of the old world.

This completes the task which I undertook of giving, from personal observations, an account of European Agriculture and Rural Economy. I commend my work to the indulgence and candour of my readers. It was an undertaking too great for an individual to accomplish as one would desire that it should be done. It must satisfy me, I hope it will satisfy my friends, that I have, with unceasing anxiety, sought to execute it as well as I could. It was not to be expected that I should give a complete system of agriculture; but I have constantly endeavoured to collect and present that information which would be most useful; and to convey it in a simple and practical form. I have omitted many circumstances, because they are well known. I have given full details wherever I thought they were required. As to my opinions on any subject upon which I have treated, I can only answer that they are my own; that I am quite ready to yield them, when I find, upon further information, reason so to do; and, above all, that my opinions or judgments do not encroach upon the personal right of independent judgment and opinion in any and all others.

European agriculture lays under many burdens, from which the United States are free, and I pray may long remain so. The weight of taxation in most of the countries of Europe is very oppressive. The unproductive classes are numerous to an excess. Immense standing armies; governments enormously expensive, and in a great measure irresponsible to the people; ecclesiastical establishments, and their attachés, demanding large contributions from labour, and returning, in many cases, little more in value than the bishop's blessing in Æsop's fable, are all to be sustained from the soil, and by the labour of those who cultivate it. In their present exemption from

these burdens, the farmers of the United States are greatly blessed. May they duly appreciate their singular advantages, than which none greater ever fell to the lot of man in his social condition. To them we may apply the beautiful line of the immortal poet—

O ! ter beati Agricolaë, si sua bona nôrint<sup>1</sup>.

<sup>1</sup> Thrice happy farmers, if they only knew their blessings.

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## APPENDIX.

EXTRACTS FROM THE REV. MR. RHAM'S FLEMISH HUSBANDRY.

### SELECT FARMS.

I. "A little beyond Courtray is a farm particularly noticed by Mr. Radcliffe. This farm is one of the finest and most compact we have seen. It consists of about one hundred and forty acres, of which about twenty are fine meadows along the river, occasionally flooded in winter, but not irrigated; about ten acres are rich heavy land, adjoining the meadows, in which beans and wheat thrive well; all the remainder, about one hundred and six acres, lie in an oblong field bounded by a hedge-row. A road or path, six feet wide, runs through the middle of the field. The soil of this field is a rich light loam, which lies over a substratum of clay, but at such a depth as to be perfectly sound and dry. It is not extremely fertile in its own nature, but has been rendered so by many years of an improving husbandry. Every part of the land has been repeatedly trenched and stirred two or three feet deep; and the immense quantity of manure, chiefly liquid, put on year after year, has converted the whole into a very rich mould. The strength and vigour of the crops bear witness to the goodness of the husbandry. There were fifteen acres of most beautiful flax of a bright straw colour, and the stems a yard long. This, besides the seed, was worth in the stack from 25*l.* to 30*l.* per acre; twelve acres of colza had produced about four hundred bushels of seed; eighteen acres of oats looked so promising, that they could not be set at less than forty-five bushels per acre; eighteen acres of wheat, which stood well with short but plump ears, we valued at forty bushels per acre; eighteen acres of rye, partly cut, with the straw above six feet high, would probably produce rather more than the wheat. There were six acres of white poppy, of which every plant was strong and upright, and the ground under it as clean as a garden: the expected produce would be about twenty to twenty-three bushels per acre; six acres were in potatoes, expected to produce three hundred and seventy-eight bushels per acre. A small patch, about an acre, was in carrots, which looked fine and large; twelve acres were in clover, nearly the whole of which was cut

green to give to the cows and horses ; it produces three good cuts in the year where it is not allowed to go to seed. The ten acres of heavy land were partly in beans and partly in wheat.

“ Thus we have one hundred and sixteen acres all profitably cropped, leaving four acres for the roads and farm-buildings. Although this farm is within two miles and a half of Courtray, the greatest part of the manure is collected on the farm. Rape-cake is used most profusely, and to this, as well as to the depth of the soil, the beauty of the flax is ascribed.”

II. “ Near Alost we met with one of the smallest farms, which will maintain a family without other work : it was barely five acres. There was a small orchard of about a quarter of an acre, in which there were some thriving apple and plum trees. The grass under these was good ; and the only cow which the man had was led by the wife to graze there for a short time every day, apparently more for exercise than for food. The grass seemed to have been cut for her in another part. The man regretted that he had not the means to purchase a second cow, as he could have maintained two very well. Half of the land was in wheat, the other half in clover, flax, and potatoes ; so that the clover did not recur sooner than in six years ; the flax and potatoes in nine. As soon as the wheat was cut, he began to hack the stubble about four inches deep, with the heavy hoe, and as fast as he got a piece done, it was sown with turnips, after having some of the contents of the urine-tank poured over it ; for, small as the farm was, it had its reservoir for this precious manure. Thus a considerable portion of the wheat stubble was soon covered with young turnips of a quick-growing sort, which, if sown before the middle of August, were fit to be pulled in November, and stored in the cellar for winter use. There was a small patch of cameline, which was sown less for the seed than for the stem, of which he made brooms in his leisure hours, when snow covered the ground. The whole five acres had to be dug in the course of the year, and as much of it as possible trenched ; the soil being a stiff loam of a good depth, which was much improved by trenching and stirring. The milk and potatoes fed the family, with the addition of a little salt pork ; for a pig was fed on the refuse of the food given to the cow, and a very little corn, and consequently was not overburdened with fat. Most of the wheat and all the flax were sold, and more than paid the rent, which was not high—about 10*l.* a year. Incessant labour kept the man in good health, and his wife was not idle. They had two or three young children ; but, except the wish for another cow, there seemed no great dissatisfaction with their lot, nor any great fears for the future. They had no parish-fund to fall back upon, not even a union workhouse ; but, had they come to want by unforeseen accidents, they would have found the hand of private charity stretched out to help them.”

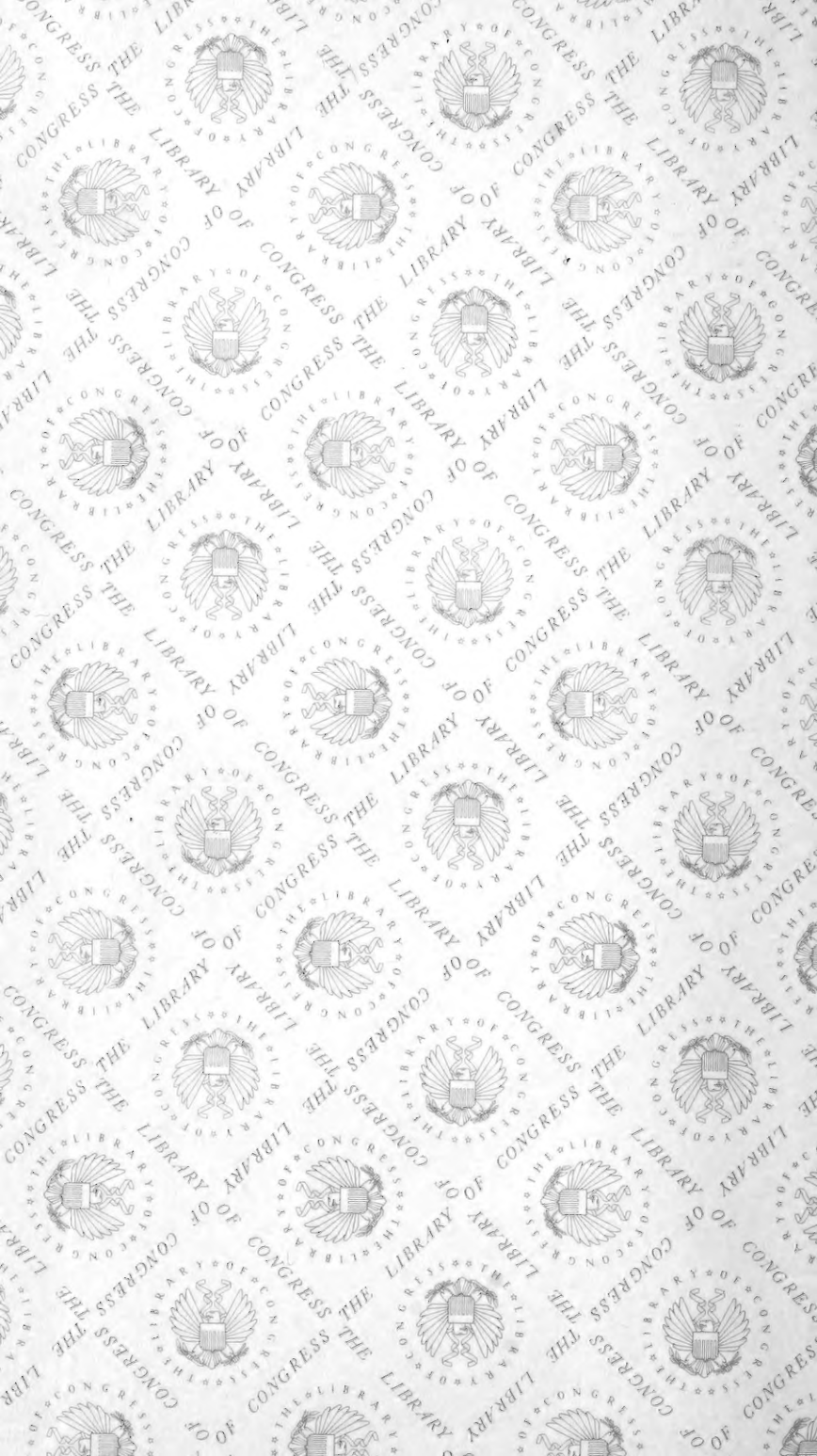
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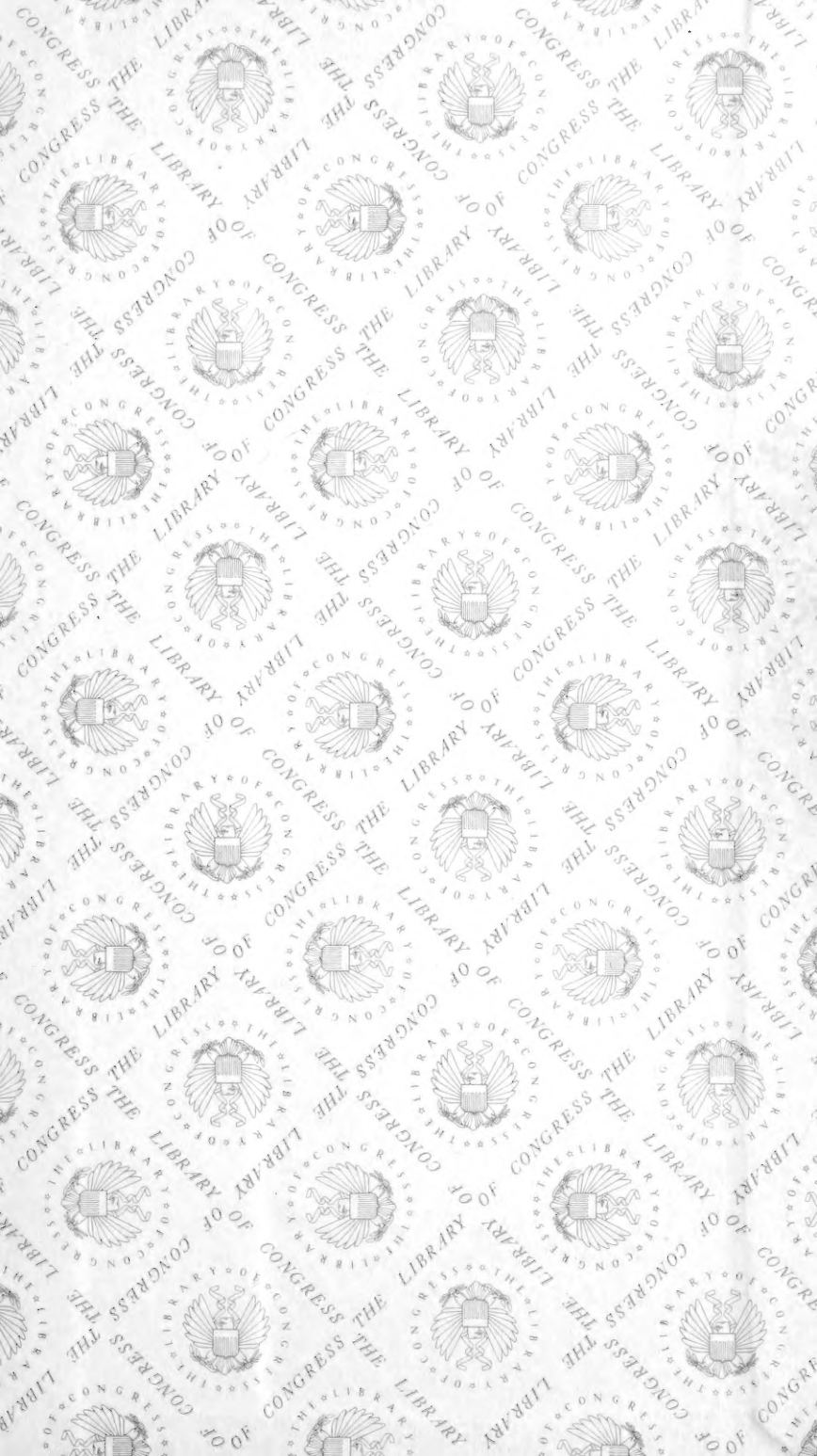
Page 5, line 7 — *after nearly, insert half.*  
" 194, " 26 — *for Cobza, read Colza.*











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