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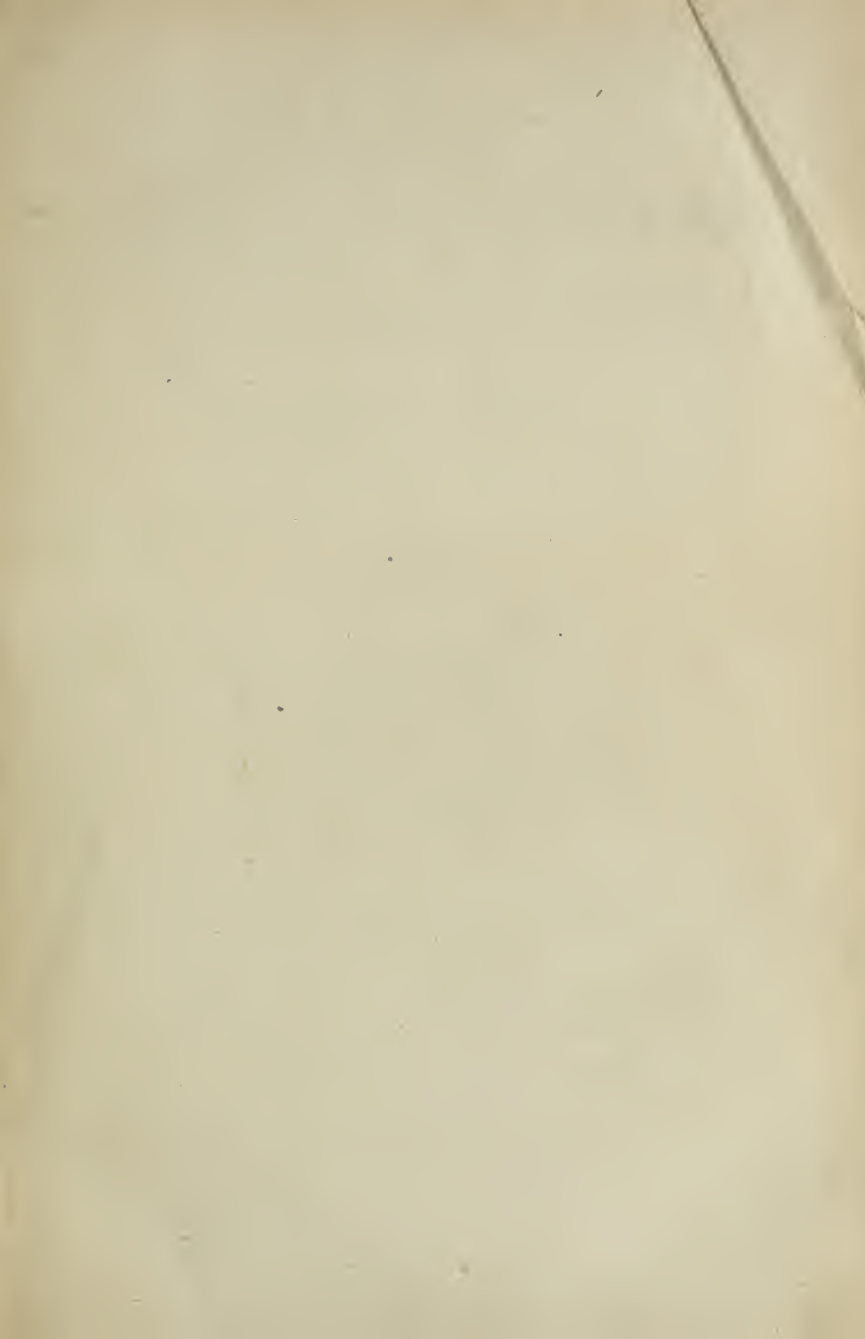




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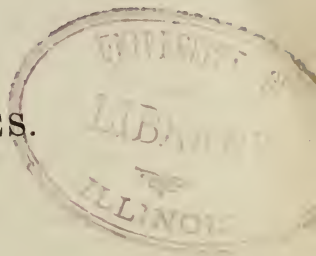




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S. W. BENEDICT,  
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HORSES;



THEIR VARIETIES, BREEDING,

AND

MANAGEMENT IN HEALTH AND DISEASE.

BY

H. D. RICHARDSON,

Author of "Domestic Fowl," "The Pests of the Farm," "The Hog,"  
"The Hive and the Honey-Bee," etc., etc.

WITH ILLUSTRATIONS ON WOOD.

NEW YORK:

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HACKNEY.

ARABIAN.

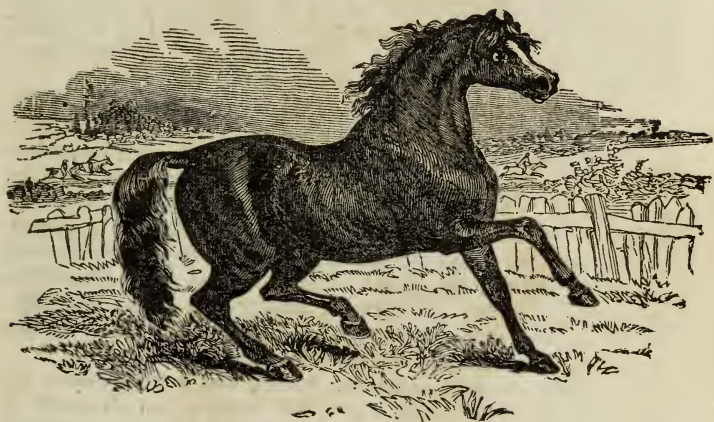
HUNTER.



# HORSES;

## THEIR VARIETIES, MANAGEMENT,

ETC. ETC.



### CHAPTER I.

#### INTRODUCTORY.

OF all animals with which we are acquainted, the Horse is, perhaps, the most calculated to impress the beholder with admiration, and of all quadrupeds, probably presents, in his aspect, the most perfect symmetry of form, and adaptation of part to part; his arched neck, his flashing eye, his expanded and almost transparent nostril, his flowing mane and his gallant crest, his wavy tail and his powerful quarters—all so many points of grandeur and beauty, that cannot fail of arousing the admiration and sympathies of even the most insensible beholder.

We even consider that the graces of his external conformation bear but a secondary proportion to those inner qualities of disposition and sagacity, which it but requires a brief acquaintance with this truly splendid creature to appreciate. We are disposed to rank the horse next to the dog in the scale of intelligence, and would refer any exceptions that may occasionally present themselves, to early bad management, or to *hereditary* vice.

The experience of each and all of our readers will suggest to them an enumeration of this noble servant's valuable qualities. On the utility of the horse to man it is unnecessary to dilate; his services in war, in the chase, in travel, and last, but by no means least, in AGRICULTURE, are familiar to all, and have been experienced by man in every portion of the known world.

The generic character of the horse is—twelve fore-teeth, the upper six erect and parallel, lower six more prominent; tusks, solitary and remote; teats inguinal, and two in number; breathes solely through the nostrils, not through the mouth; fights by biting and kicking. The horse belongs to the class mammalia, and genus (ninth of Cuvier's sixth order) pachydermata. Cuvier's characters of this order are as follow:—Skin very thick, whence the name of the order; some of the genera partially without teeth, others with three sorts of teeth; quadrupedal, usually with hoofs; toes varying in number; stomach simple; do not ruminate; have no clavicles; are inhabitants of the temperate or torrid zones.

The genus equus contains six species, and is thus defined by Cuvier:—Six incisors in each jaw, two canines, and six molar or cheek teeth, furrowed on both sides, with flat crowns, and several ridges of enamel. Between the cheek and canines is a void space on each side, known to veterinarians as the "Bars." The upper lip is susceptible of considerable motion; eyes large, pupil oblong, ovate, placed laterally; sight extremely good; ears small, pointed, and erect, possessing great mobility, which renders the hearing very acute; feet, possessing but one apparent toe, covered with a thick hoof; tail furnished with long hair, or with a tuft at its extremity; two teats, or mammæ, *inguinal*; stomach simple and membranaceous; intestines and cæcum very large.

Much has been written as to the original *habitat*, or the first great breeding country of the horse. Arabia and Egypt are the rival claimants; popular opinion has long been in favor of the former, but these pages not being suited to a lengthened discussion of the question, we may just state, that, beyond any doubt,

the latter (Egypt) is entitled to the honor. One fact, out of many, may be adduced on either side. In the sacred writings, when describing the very earliest stages of the world, we find the horse in extensive use in Egypt; while, in comparatively modern times, when Mahomet attacked the Koreish, we find not a single *horse* in the entire camp—showing how scarce, even at so late a period, were horses in Arabia, and how plenty, at so early a one, they were in Egypt. There is, of course, no question but that Arabia subsequently became a great horse depot, and that in that country this animal attained to a very high degree of perfection; for, in point of fact, it is to the introduction of Arabian blood that the blood-horses of the British Islands owe their present eminent position, maintaining, as they do, an undisputed superiority over all others.

It is proper that we furnish, in the first instance, a brief view of the principal breeds or stocks, as at present known, before entering upon either treatment or diseases, and this necessity will become the more obvious, when it will be recollected that, as a matter of course, different varieties present different modifications of form, of disposition, of constitution, and are also suitable, some to one purpose, and some to another. We shall commence with the exotic varieties, and shall dismiss them with as brief consideration as possible, in order that we may have the more space for full details relative to our own.

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## CHAPTER II.

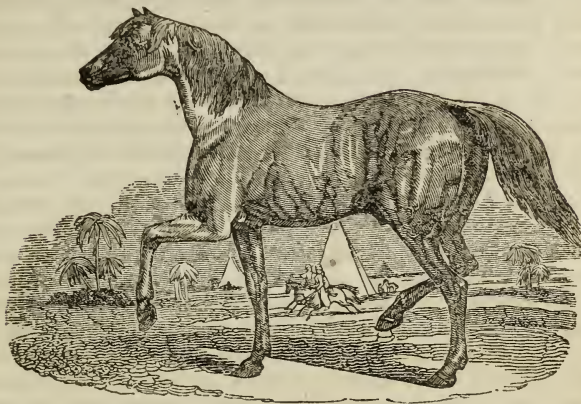
### THE HORSES OF ASIA.

**THE ARABIAN HORSE.**—In Arabia the horse runs wild, and is, even in that feral and uncultivated state, a creature of the most exquisite beauty of form, and endowed with the greatest mildness and generosity of disposition. In size these animals are small, usually averaging between thirteen and fourteen hands high. Their color is usually a dappled grey, but sometimes a dark brown, with short and black mane and tail. They are caught in snares carefully concealed in the sand, by which the feet are entangled, and the terrified horse, falling to the ground, is easily captured. This is the only mode by which they can be taken, their amazing

swiftness rendering all idea of chasing them with dogs, or on horseback, utterly out of the question. The wild Arabs are now nearly extinct, the high price given for Arabian horses having induced the natives to draw largely and constantly upon the resources of the desert. To the wandering Arab the horse is of the greatest value. The poorest Bedouin has his steed, which shares with him and his wife and children the shelter of his humble tent, his caresses, and his scanty fare. Oft may the traveler in the desert, on entering within the folds of a tent, behold the interesting spectacle of a magnificent courser extended upon the ground, and some half dozen little dark-skinned, naked urchins, scrambling across her body, or reclining in sleep, some upon her neck, some on her carcass, and others pillowed upon her heels; nor do the children ever experience injury from their gentle playmate; she recognizes them as the family of her friend, her patron; and towards them all the natural sweetness of her disposition leans, even to overflowing. The Arabs invariably keep *mares* in preference to *horses*; they find them endure fatigue, and the privations necessarily consequent upon a journey over the desert, better; a number of them can also be kept together without danger of their quarreling or injuring each other: on this account it is very difficult, indeed, to induce an Arab to sell his mare. The Arab is particularly careful of his horse's *coat*; he washes the legs, tail, and nostrils, regularly, morning and evening, or again after a long ride; the mane and tail are left in their natural state, and very seldom even combed, lest they might be thinned. The animals are fed only during the night, and from morning to evening they get nothing but one or two drinks of water. From sunrise to sunset they are kept, ready saddled, standing at the door of the tent.

The Arabs carefully preserve the pedigree of their horses, and divide them into classes, or castes. The most noble of these can, it is said, be traced back to the steeds on which Mahomet and his companions rode the night of the memorable "Hegira." The mare is, as we have stated, almost unpurchasable, there being, indeed, a law prohibiting her exportation; and the horse is only to be obtained at the most enormous prices—one thousand pounds not being extraordinary, and instances being on record of mares having gone to double that money. We conclude with a brief description of the appearance of the pure Arabian, as found in a domesticated state, and we conceive this the more necessary, as so many spurious Arabs are frequently endeavored to be palmed upon

the unwary or inexperienced. Below we give a portrait of the celebrated Wellesley Arabian.



WELLESLEY ARABIAN.

The thoroughbred Arab never exceeds fifteen hands, and rarely fourteen hands and a-half in height. The *skin* is pure black, or blue-black, a circumstance which gives to a white horse of this breed that beautiful silvery grey color, so indicative of the purest blood; brown, bay, and chestnut, are good colors, but it has long been remarked in India, that *no dark-grey horse* was ever a winner upon the turf.

The head of the pure Arab is light, clean made, wide between the nostrils, broad in the forehead, short and fine in the muzzle, nostrils expanded and transparent, eyes prominent and sparkling, ears small and neatly set on, neck rather short, shoulder high and well thrown back, the shoulder-blade, indeed, inclining backwards nearly forty-five degrees; withers high and arched; legs fine, flat, and small-boned; body somewhat light, but showing substance wherever it is really wanted; the chest, for instance, has frequently been objected to as being too confined, but a less cursory examination will discover, that although apparently narrow, at a front view, it swells out behind the *arm*, to a remarkable degree, thus affording ample room for the play of the lungs. The hind quarters are set

on somewhat obliquely ; but from the extreme hardness of the bone, which enables it to endure the additional strain thus induced, this formation, far from detracting from the animal's strength, rather has a contrary effect, and to this peculiarity of conformation is the extraordinary speed possessed by the Arabian horse mainly attributable. As a racer, on a regular course, the Arab has never, to my knowledge, been afforded a fair opportunity of competing with our own blood-horses ; such as have been thus tried having always been animals of an inferior stamp, and the natural consequence has been, their invariable defeat.

**PERSIAN HORSE.**—In general appearance this horse resembles the Arab, and though, in most respects, less esteemed than that animal, he is in some points his superior. This horse stands somewhat taller than the Arab, is full of bone, and very fast ; that peculiarity, "ewe-neck," so indicative of very high breeding, is very common. Like the Arab, these horses are fed, cleaned, and watered, only at sunrise and sunset ; their food is coarse and scant. Hay is unknown as a horse-diet in Persia ; the usual diet is barley and chopped straw, which, when the horse is picquetted, is put into a nose-bag ; but, when fed in a stable, is put into a hole, left for that purpose in a mud-built wall, much higher up, however, than our mangers usually are. His sole bedding consists of his dung, which becomes pulverized by the day's sun, and at night is spread out under him ; his body, however, being invariably covered with clothing, varied in quality according to the season, never touches this bedding, which therefore can benefit the horse only by its softness.

**THE TARTARIAN HORSE** resembles the Persian in his swiftness ; but there the resemblance, to a considerable extent, ceases. These horses are heavy-headed, very low in the shoulder, awkwardly made, and, altogether, ill-looking brutes. In the wilds of Tartary, however, are still some coursers to be met with which are yet ignorant of the spur, and upon whose neck bridle has never yet hung, whose forms would almost give the lie to our description ; and in Little Tartary, the natives possess a breed so highly esteemed, that they have entered into a compact not to sell any of them to strangers or foreigners. The Tartars eat the flesh of their horses, and use the milk of the mare, from which they also make excellent cheese. From mares' milk the Bashkirs make a kind of wine, called "*Kumiss*," the nutritious qualities of which are of a very high order.

THE TURKOMAN HORSE is a variety of the Tartar, but superior. It is held in high estimation, and will, even in Persia, frequently fetch so high a price as from one to two hundred pounds. The average height of these horses is fifteen hands, and, in their general shape and appearance, they bear no distant resemblance to a well-bred English carriage horse. They are possessed of very considerable speed, but are not *enduring*, from being *too small in the barrel*, and too leggy. This breed is one of those occasionally used by crafty Asiatics to be palmed off on English speculators as the Arabian.

THE TURKISH HORSE is of slender make, carries his head high, is full of life and fire, and possesses a most docile and affectionate disposition. In his form and character he demonstrates his descent, viz., a cross between Persian and Arabian, or perhaps Barb. The Turkish horses have long been celebrated for their docility and gentleness, and they are treated with the utmost kindness by their masters and grooms.

The tail of the horse is, in Turkey, regarded as a mark of dignity, and is, both in that country and in Persia, employed as an emblem of station, and princes measure their rank by the number of tails they carry. The origin of this custom is as follows:—The Turkish army at one time lost its standard in a battle, and a gallant leader, in order to inspire the faltering spirits of his men, cut off the tail from a slain charger, and hoisting it aloft on the point of a javelin, rallied his soldiers, once again brought them to the charge, and gained a victory over the enemy. From this he received a corresponding military distinction, whence originated “Pachas of Tails.” Those of the highest ranks are invested with *three* tails.

THE HORSES OF HINDOSTAN.—The climate of India does not appear to be congenial to the constitution of the horse, and that animal is invariably found to degenerate, unless the breed be, from time to time, carefully regenerated and sustained by judicious crossing. The most *genuine* native breed, or, in other words, that which has been least affected by *improvement*, is called the “*Tazee*.”

The *Tazee* is, as ordinarily known, a small, ill-made, and ugly beast—equally deficient in spirit and in form. This is not, however, the character of the original race, a bold, spirited, and handsome animal, and so fiery as to require a bold rider. Of this race are the “*Serissahs*,” of the North Bahar, of which upwards of twenty thousand are sold at the annual fairs. Between the *Tazee*

and the Persian a mixed race is bred, called in India the Maginie. There are several other Hindoo breeds; but as it is a matter of notoriety that not one remains the same for three generations—being constantly crossed and re-crossed—it appears to me unnecessary to enumerate them. We may, however, just name a few of the best known:—

Such are the *Takan*—strong, powerful animals; natural amblers, and hence in much esteem for the use of ladies.

*Folaree* breed.—A variety of Takan; tall, but spiritless.

*Cutch*.—Remarkable for the suddenness with which the withers drop, as if a portion of the vertical ridge of the spine had been cut away; hence difficult to fit with a saddle.

*Dattiwarr*.—Superior in blood to any of the preceding; usually dun-colored, striped like a zebra. When thus marked it competes in value with the Arabian.

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### CHAPTER III.

#### THE AFRICAN RACES.

THE principal African race is that known under the name of **BARB**. This horse exceeds the Arabian in stature, and is remarkable for the height and fulness of his shoulders, drooping of the haunches, and roundness of the barrel. The Barb does not fetch so high a price in his own country as the Arab, and he is hence frequently imported, and fraudulently passed off on purchasers as that animal.

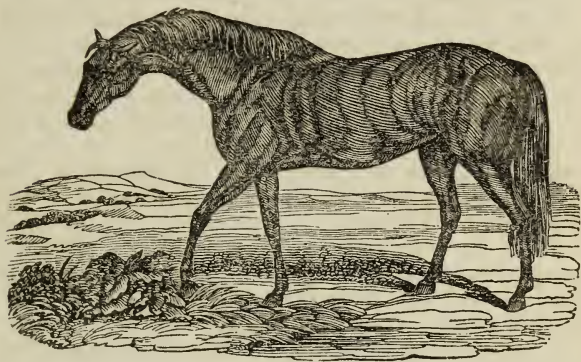
On the opposite page we give a portrait of that remarkable horse, the Godolphin Barb; sometimes erroneously called the Godolphin Arabian.

Amongst the most excellent of the African varieties of horse, we may name the celebrated “Shrubat-ul-reech,” or “Drinkers of the wind,” in possession of the Maugrabin tribes, shaped like greyhounds, wiry and fleshless. Mr. Davidson relates of one of these, having performed a journey of sixty miles, under a burning sun, at the hottest period of an African day, without the rider once drawing bridle. The Arabs ride *mares* only, for they chiefly rely on stealing unawares upon their foes; the Africans rely on force alone, and consequently ride the *horse*, on account of his superior



power. Were the Arabs to ride horses, the moment they came within *scent* of the hostile camp, their steeds would betray everything by neighing.

Towards the central parts of Africa we find the BORNOU race, extolled by Mr. Sully as "possessed of the qualities of the Arab-



GODOLPHIN ARABIAN.

ian, with the beauty of the Barb; they are fine in shoulder, and of general elegance of form." The horses of NUBIA are stated by the celebrated traveler, Bruce, to be far superior to the Arabian, and trace their pedigrees from five stocks; all the horses ridden by Mahomet and his four companions—Abubeker, Omar, Osman, and Ali—in their flight on the night since designated as "Al Hegira."

The little kingdom of Dongola, or Donkala, possesses a remarkable breed of horses of a large size, their chief characteristics being great shortness of body, length of neck, height of crest, and a beautiful forehead. Bosman pronounces them to be "the most beautiful in the world." These horses have been imported into England, but their progeny have never in any instance turned out well.

Egypt has long lost its character as a breeding country, and its horses are deservedly held much inferior to those of either Persia, Barbary, or Arabia.

## CHAPTER IV.

## THE HORSES OF AMERICA.

IN many parts of the southern portion of this vast continent, are still to be met with innumerable herds of wild horses, and many such are also to be found about the back settlements of its northern portion ; both, however, evidently the descendants of domestic horses, that accidental causes have driven to a feral condition. These herds appear to act in admirable concert, and by their united force defy the attacks of the various ferocious animals who share with them the possession of the wilderness. Nor are they formidable only to these equally savage denizens of the prairie : the traveller, if incautious in approaching them, will too dearly rue his temerity or ignorance, and a meeting with such a herd of untamed coursers has often proved to be anything but desirable. When a traveller with laden horses encounters one of these wild herds, even should he personally escape attack, his horses, if they can by any means shake off their burdens, will break away and join their fortunes with those of their emancipated brethren. When it is deemed desirable to capture these horses, the natives employ a long leathern noose called the *lasso*. They never take the *mares*, nor even ride them ; and it is related of an Englishman, attempting once to do so in that country, being hooted and pelted by the natives to such an extent as narrowly to escape with life.

The horses of North America are somewhat more hardy, more inured to slavery, and are much valued by the Indian natives, who use them in hunting, in war, and in travel. The acquisition of the horse must have proved a great boon to the wandering savage, and he is recognized as such, to so great an extent, indeed, that the felony of the horses of a hostile tribe is conceived to be as heroic an action as the taking of their masters' scalps.

The horses of the *Canadas* are, as might be expected, principally of French descent, and from this stock have sprung many of the celebrated American "trotting phenomena." The horses of the United States are crossed with a great variety of breeds, amongst which the *English* is predominant. The Americans are now exerting themselves strenuously for the improvement of their horses ; and, amongst other efforts, we are not to overlook the establishment of horse-races in various states, particularly in the southern

ones ; and in these have been, as a matter of course, adopted the customs common to the turf of Britain.

The horses of the West Indian Islands not unnaturally present themselves to our notice in connection with those of America. They are chiefly the breeds of the states to which each island more particularly belongs. The horses of Cuba especially betray, in a manner too apparent for any mistake, their Spanish origin ; and those of the British colonies, on the other hand, present marked evidence of owing much of their blood to the mother-country.

The Americans have, from time to time, imported first-rate English blood for the improvement of their stock, and the progeny of many horses of celebrity is yet to be met with in many portions of "the States," especially Virginia, Kentucky, and the Jerseys. Amongst these were, "Shark," a horse seldom equalled, and decidedly the star of his day.

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## CHAPTER V.

### EUROPEAN HORSES—AS PARTICULARLY REPRESENTED BY THOSE OF THE BRITISH ISLANDS.

WE now arrive at the history of the horse in the British islands, and his progression, alteration, and improvement, from the earliest periods of which any authentic records remain, up to the present time.

The first mention that we meet with of the history of the horses of England, is the era of the invasion of England by the Romans, under the command of Julius Cæsar ; and they are mentioned by him in his "Commentaries" in laudatory terms, speaking highly at the same time, of the skill displayed by those who managed them. These observations prove that the horse must have been long familiar to the natives of Great Britain, as when in a state of barbarism, almost amounting to savageness, they had acquired so perfect a mastery over it. Even at this time, too, it would appear that the Britons had commenced the use of gorgeous and ornamental housings, and military trappings. We are unable to form even a remote guess at the source whence our ancestors derived this valuable animal, or point out any modern variety of horse as having sprung from, or as retaining any resemblance to the pri-

mitive stock. Some have referred to the rough and diminutive shelties of Scotland, to the *hobbies* of Ireland, or the mountain-ponies of Wales and Cornwall; but if so, these animals must have greatly altered in form and stature, for, however well, as Pennant so justly observes, "they may answer the purposes of these countries—they could never have been equal to the work of war." We conceive the opinion of the late Mr. Youatt to approach the truth more nearly than any with which we have met; he conceives the horse to be "then as ever, the creature of the country in which he lives. With short fare, and exposed to the rigor of the seasons, he was probably the little hardy thing which we yet see him; but in the marshes of the Nen and the Witham, and on the borders of the Tee and the Clyde, there would be as much proportionate development of frame and strength as we find at the present day." It is certain that the horses of Britain, in the time of Cæsar, were powerful and active, for the war-chariots were of a heavy and clumsy description; and the roads, if roads they could be called, unformed, and only passable by the exercise of no ordinary power; that these animals were valuable we learn from the fact, that Cæsar carried back several to Rome; and from the circumstance that they were for a considerable time afterwards in much esteem throughout various parts of the Roman empire. Of the numbers of this animal then kept in Britain, we may form some idea, from the circumstance that the British king Cassibellan, in disbanding the main portion of his army, *retained* four thousand horse, for the purposes of forage and harassing the Romans. About this period the Romans, finding it necessary to employ active measures in order to maintain a secure position in the country they had just conquered, deemed it advisable to garrison it strongly, and consequently, acting on this resolution, they sent into Britain a considerable force, amongst which was a powerful body of cavalry: this, of course, gave rise to a union of the foreign breeds with those of the country into which they were introduced, and this was, in all probability, the first cross to which our British horses had been subjected; nor was this cross to be regarded merely as one with the *Roman* horse. That powerful nation had already established intimate relations with their various neighbors, and horses from many different parts of the then known world, must have formed the component parts of the Roman cavalry. Whether any *improvement* in our British horses is to be attributed to the Roman conquest is, however, at best questionable.

The Anglo-Saxon conquest, doubtless, introduced a variety of other breeds of horses into England, some of which, especially the Frisonic and Danish, were animals of no inconsiderable beauty and stature, and consequently, well calculated to improve our own.

From the Roman invasion until several centuries afterwards, we do not find any record, or any mention of the horse in Britain, until the year 631, when we find the commencement of the use of the *saddle* mentioned by the Venerable Bede, who states that prelates and other dignified persons, who had, until then, been obliged to go on foot, now rode on horseback. It is further stated, that the dignitaries of the church always used the *mare*, and not the *horse*, as a mark of their humility.

King Alfred, of learned and pious memory, the hero of many a tale of valor and romance, exerted himself in the laudable work of improving the indigenous breeds of horses, and that these intentions should be the better carried out, an office was created for the occasion, this officer was called *Horsethane*. Athelstane, son of Alfred, who reigned at 950 years after the landing of the Romans, devoted much attention to the subject of improvement; and so jealous was he of neighboring nations profiting by his exertions, that he prohibited strictly the exportation of horses, unless designed as presents. These enactments furnish the inference, that our horses were then valuable, and that their value was duly appreciated by foreigners.

Although Athelstane did not choose that foreigners should improve their horses by his means, he appears to have had no objection to avail himself of whatever advantages they possessed in this respect, for we hear of him accepting a present from Hugh Le Grand, King of France, father of the celebrated Hugh Capet, and the then suitor of his sister, Ethilda, daughter of Edward, subsequently Athelstane's brother-in-law. Mr. Youatt has stated this present to have come from *Hugh Capet* himself; and, from the reading of the paragraph, we suspect that he derived his information from the much prior work of our own personal and respected friend, Captain Thomas Brown. Both gentlemen, however, were in this instance, incorrect. Athelstane valued these and other presents of foreign horses highly; and in his will he made a careful testamentary disposition of them, particularizing the several presents, "Those given him by Thurbrand, together with the horses given him by Liefbrand." These persons were *Saxons*, so it is probable that these were Saxon horses; but besides these,

we find it related that "sundry princes sought his alliance and friendship, and sent him rich presents, precious stones, perfumes, and the *finest horses*, with *golden furniture*." The horses sent this monarch by the French king are stated to have been "*German running horses*."

In a document bearing date A.D. 1000 there is a curious account of the value of horses in those days. If a horse were destroyed, or lost through negligence, the compensation to which the owner was declared to be legally entitled, was thirty shillings; a mare or colt, twenty shillings; a wild, or untrained mare, sixty pence; a mule or ass, twelve shillings; an ox, thirty pence; a cow, twenty-four pence; a pig, eight pence; and a MAN, *one pound!*—a strange valuation, truly, as placing the value of human life one-third inferior to that of a horse. The Anglo-Saxons calculated at forty-eight shillings to the pound—equal in silver to about three pounds of our own money; and *five pence* were equivalent to a shilling. Howell *dha*, who lived a short time previous, had enacted laws restricting the price of horses, as well as establishing certain regulations relative to this description of traffic, designed to prevent *fraud*: so early had *jockeying* not only commenced, but become notorious in horse-dealing.

William *The Conqueror*, brought many horses with him from *Normandy*, and thus contributed, in no small degree, not only to the number of varieties known amongst us, but to the positive improvement of those which we already possessed. It is probable, also, that the horses imported by William were not confined to the French varieties alone, but were brought from other countries also; for his own favorite charger, ridden by him at the celebrated and eventful battle of Hastings, was a Spanish horse; and it is the general impression of historians, that to his *cavalry* William was mainly indebted for his success on that memorable occasion. Roger de Belesme, also, afterwards created Earl of Shrewsbury by the victorious monarch, introduced several Spanish horses into the kingdom, especially into his own estate of Powisland. Beranger, on what authority I know not, describes these horses as having been of a class peculiarly adapted to the "purposes of war, and the exhibitions of public assemblies, of which horses are always a very essential and ornamental part; for it is not known that at this time, nor till a much later period, that horse-races were introduced into England, although this agreeable and useful diversion, if confined within certain regulations, might have been cultivated with

great propriety among a people fond and proud of their horses, and that at a time when bodily exercises alone were the amusements of all sorts of men ; and especially as the English had opportunities of being instructed in them by the Romans, who generally brought their own customs with them wherever they came, and left their impression behind them when they departed. We may, therefore, reasonably conclude, that they were either ignorant of these sports, or, what is more likely, preferred the parade and magnificence of tilts and tournaments, in which the strength, activity, spirit, and beauty of the horse, as well as the skill and courage of the rider, could be more usefully employed, and more gracefully displayed."

It may be interesting to our *agricultural readers* to learn that, until a comparatively recent period, we find no record of the horse having been employed to draw the plow, oxen alone being used for that purpose ; and we find a law enacted in or about the latter end of the twelfth century, *prohibiting the use of horses in the plow*. This, we think, proves that some change in agricultural matters was even then commencing ; and we have likewise, a piece of tapestry, woven at this period, of that description known as "Bayeux tapestry," a representation of a man driving a horse in a *harrow*. This is, I think, the earliest notice which we have of horses having been employed in field labor.

In the reign of Henry I., in the year 1121, two fine horses of Arabian or Barbary blood were imported into Britain ; one was introduced to the court of Henry of England ; the other was presented to the Church of St. Andrews, in Scotland, by King Alexander I. Col. Smith (*Nat. Lib.*) expresses it as his opinion, that both these horses were *Barbs*, and procured from Morocco, through the medium of the Jewish dealers. Mr. Youatt says, that some pretensions to the derivation of a breed of modern racing-horses from this stock have been put forward, but that they are devoid of foundation. In the reign of Henry II., as appears from a curious and scarce Latin tract, such public exhibitions as tournaments and horse-races became comparatively common. They are spoken of by Fitzstephen, the monk, in his description of London. These exhibitions were then held in *Smithfield*, which appears to have been a resort of merchants and others, and an extensive horse-mart. Fitzstephen says—"Without one of the gates of the city is a certain plane, or *smooth*, both in name and situation. Every Friday, except some festival intervene, there is a fine sight of horses brought

to be sold. Many come of the city to buy or look on—to wit, earls, barons, knights, and citizens. It is a pleasant thing to behold the horses there, all gay and sleek, moving up and down; some on the amble and some on the trot—which latter pace, although rougher to the rider, is better suited to men who bear arms. There, also, are colts, yet ignorant of the bridle, which prance and bound, and give early signs of spirit and courage; there, also, are managed war-horses, of elegant shape, full of fire, and giving every proof of a generous and noble temper; horses, also, for the *cart, dray, and plow*, are to be found here.”

The period of the crusades now followed, and these mad enterprises were the cause of much diminution in the number of our horses, though, I think, of some improvement also. That some valuable horses were at this time brought to England from the East there can, however, be little doubt, and many legendary tales of the Arabian steeds of Richard the Lion-hearted, still exist.

This king also purchased (1185) fifteen brood-mares, for which he paid the sum of two pounds twelve and sixpence, and subsequently distributed to his tenants at four shillings each—a circumstance indicative, at once, of the king’s desire of improvement, and of his subjects’ welfare, as also of, even taking into consideration the difference of currency, the cheapness of the article.

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## CHAPTER VI.

### EUROPEAN HORSES—CONTINUED.

KING John paid attention to the improvement of our native breeds of horses. He imported one hundred choice stallions from *Flanders*—a most important improvement, as being eminently calculated to raise our *agricultural* horses to such a standard of power and vigor as was requisite for field labor and for draught; and, in the same reign—of course in consequence of the encouragement given, and the example set by the monarch—a private gentleman, named Amphitil Till, possessed a noble breed of horses, but falling under the displeasure of his capricious prince, was *imprisoned*, and condemned to pay a fine for his ransom—a fine, also, characteristic of the royal passion, viz., *ten horses*, each worth thirty marks, which is equal to about £300 of our present currency.



The next period in which we find any particular mention of horses, is about a century afterwards, when Edward II., in the second year of his reign, gave a commission to one Bynde Bonaventure and his brother, for twenty war-horses and twelve draught-horses, to be purchased in Lombardy, requiring all his friends and loving subjects to assist in carrying the commission into effect. John de Trokelow, who wrote the annals of this prince in 1307, bears strong testimony to his love of horses, and zeal for their improvement.

Edward III., whose genius appears naturally to have been of a warlike character, was devotedly attached to tournaments, and other similar shows of a military description; hence his warm encouragement of horse-breeding. Among other instances of his zeal in this respect, he bought fifty Spanish chargers, at a price of one thousand marks. We also find him indebted to Count Hainault in the sum of twenty-five thousand florins, for horses which he had purchased; also, sending to France for four *chargers* or great horses. Our modern readers will, perhaps, learn with some surprise that all these war-horses were taught to *amble*; and in the account of Edward's disbursements, for the horses he obtained from France, we find one item of *trammels*, for the purpose of *teaching horses to amble*. This prince had also many *running horses*, which were probably used for hunting and racing, being of a lighter and more active form than the war-horses. The price of a *running horse* was, at that time, £3 6s. 8d. This prince also crossed the heavier with the lighter breeds, and thus produced a noble race of horses for the chase—a pursuit to which he was devotedly attached. It was during this reign that horses were first classified according to their different qualifications and uses.

There was, in these early times, one circumstance which greatly tended to keep up too great a degree of bulk in the horse, and, consequently, to retard his improvement, viz., the mode in which contests were usually decided, the old system of hand-to-hand combat requiring the use of ponderous armor—an objection not removed until the introduction of the use of *gunpowder*.

From this period, the British breed of horses steadily improved, and became known and valued everywhere. As a matter of course, they speedily became a subject of considerable traffic, and this traffic soon led to frauds on the parts of dealers; hence we find Richard II. enacting certain laws, with a view to the prevention of dishonest speculation; and, accordingly, that prince, in 1386, issued

an edict to regulate the prices of the different descriptions of horses then in use. From this as being principally directed to the counties of Lincoln, Cambridge, and York, we can perceive that they were then the principal breeding districts of England; and it is scarcely necessary to remind our readers that the last-named county continues to the present day so famed for its commerce in this description of article, and for the cunning of its dealers, as to have passed into a proverb—few but are familiar with the expression, “To come Yorkshire over me.” The civil wars which arose at or about this time, by throwing the kingdom into confusion, and setting one portion of the inhabitants against the other, as a matter of course not only checked the improvement of the horse, but caused our breeds to retrograde; and, accordingly, Philip de Comyn or Comines, speaks in very disparaging terms of the English army with which Edward IV. disembarked in France.

The only notice of the horse, during the reign of Richard III., that we have been able to obtain is, that in it *post-horses* and *stages* were first established (A.D. 1483).

Henry VII. encouraged the breeding of valuable horses; the English used to keep large herds of them in their pastures and common fields, and when the harvests were gathered in, those of different owners fed promiscuously together; hence the *horses* had to be emasculated, in order to avoid disorder—a practice further rendered necessary, in consequence of an act passed in this reign, that no *entire* horse should be let out into any pasture. This seems to have given rise to our modern appellation of *stallion*, or *stalled one* by contraction, *stallum*, then *stallion*. This king also prohibited the exportation of stallions, and even of such mares as were under two years old, and over the value of 6s. 8d. By means of this arbitrary edict, the best animals were kept in the kingdom, and only the comparatively worthless permitted to leave it; these enactments were only aimed at *dealers*. Any person might take out of the country horses of what quality he pleased, provided that he made oath they were, *bona fide*, for his own use, and not for sale.

Henry VIII. paid particular regard to the raising of a good breed of horses, and did not hesitate about forming stringent laws in order to carry his intentions into effect. The enactments which he promulgated, with a view to the improvement of horses in these islands were very politic. It is well known to all breeders, that in order to produce a large and vigorous progeny, it is essential to select parents, on both sides, of the most desirable form; and when

it is wished to raise the general character of the horses of any district or country, there could be no better or more certain plan adopted, with such a view, than the prohibiting of all *inferior* descriptions for breeding. Such was the course adopted by this king, and a law was accordingly passed, directing that every brood-mare should be, at least, fourteen hands high; and so marked was the effect produced by this statute, that Carew, in his "History of Cornwall," suggests that to this was attributable the almost total loss of the small horses, formerly so common in that part of England and in Wales—a loss which Carew regrets, but which has been amply replaced by a race of large and serviceable animals.

There were further enactments passed in this reign, all with an evident view to the attainment of a large and powerful breed, but some very singular in their character. For example: every archbishop and duke was obliged, under heavy penalties, to keep seven entire horses, each above three years old, and not less than fourteen hands high; each parson holding a benefice to the value of £100 yearly, or a layman, *whose wife should wear any French hood or bonnet*, was obliged, under the penalty of £20, to keep *one such horse*. The obvious reason of enjoining entire horses to be kept, was for the promotion of breeding; and with a consideration that was hardly to be expected from so peremptory a king, the rich and noble were alone compelled to keep *stallions*, their *keep* being so much more expensive, while the humbler classes might keep such mares and geldings as they thought proper—the latter possessing the advantage of being able to be freely turned out to grass.

It being found that the nature of the pasture in some counties, as Cambridge, Huntingdon, Suffolk, Northampton, Lincoln, and Norfolk, was unsuited to the raising of horses of the required bulk, a statute was passed, excepting these counties from the operation of the preceding law, and reducing the required standard to thirteen hands. *Infected horses* were also prohibited from being turned into public pastures.

It is a fact, and one much to be regretted, that all King Henry's enactments appear to have fallen short of the mark, and to have produced only temporary, and not permanent improvement; for when Queen Elizabeth called out the entire strength of her cavalry to oppose the Spaniards, she could only muster a force of three thousand mounted men-at-arms. There were still fine horses in the kingdom, for Aldrovand says that there were, but principally in possession of the nobles. Some have referred this failure to the

tyrannical character of Henry's enactments; but I think that it is far more likely to have been owing to the superiority the British horses rapidly attained during the middle portion of his reign, which caused them to be eagerly purchased up, and taken out of the kingdom by foreign grandees for purposes of state—a circumstance much promoted by the introduction into the kingdom, at the time, of *Italian farriers* and *foreign grooms*, who, of course, had the welfare of their native country far more at heart than they could have had that of a foreign one.

Queen Elizabeth was fond of horses, and she was herself a bold and spirited horsewoman, riding to the hounds even at the advanced age of seventy. In the commencement of her reign she repealed the statutes enacted by her father, as to the standard size of horses to be kept in certain English counties. In the twenty-second year of this reign, *coaches* were first introduced, A. D. 1580, by Fitz Allen, Earl of Arundel. Up to that period, the first ladies of the land had no other mode of conveyance than to ride behind a gentleman on the pillion, and even the Queen rode thus behind her Master-of-Horse when she went in state to St. Paul's. The introduction of coaches tended much to improve the breed of horses, as, up to that period, slow, heavy brutes were preferred; and this may therefore be regarded as one of the most important epochs in the history of the horse in Britain. The use of coaches also gave rise to an increased demand, and at length, so great was the number of horses thus employed, that a bill was actually introduced into the House of Lords "to restrain the excessive and superfluous use of coaches." The Lords, fortunately for the improvement of horses, did not entertain the bill. Still some of the old school persisted in keeping up antiquated usages, for we find that in the reign of James I. the judges rode on horseback to the courts in Westminster Hall.

Gunpowder having now taken place of the heavy armor and the lance, a lighter and more active breed of horse began to be cultivated, and when armor continued at all to be used, it was of a light and partial description. Such was the origin of our light and fleet breeds of horses, which became as necessary as the weight of the rider decreased, as were the more heavy and powerful, so long as the ancient ponderous armor continued to be worn.

In Elizabeth's reign, tournaments continued in high repute; and in that of James I. of England and VI. of Scotland, every description of horse-raship received, if possible, still greater encour-

agement. Horse-racing now became extensively cultivated and promoted. This prince had formerly established this sport in Scotland, but unfortunately his system was *wrong*, consisting almost wholly of matches against time, or trots of long-continued endurance. He set about introducing Arab blood into the kingdom; and his first essay was the celebrated MARKHAM ARABIAN, for which he gave to a merchant of that name the very sporting price of *five hundred pounds*—no ordinary figure in those days, but equal to at least two thousand pounds of present currency. This is the first *truly authentic* Arabian that ever reached England. What the exact characters of this horse were, we possess no means of ascertaining; but the Duke of Newcastle, considered the greatest judge of horse-flesh of his day, conceived such a dislike to him, that, in his "Treatise on Horsemanship"—a book, by the way, displaying much judgment—he describes him as a little, bony, bay horse, of ordinary shape, and almost worthless; and it is certain that it was found that, after training, he was unable to run.

The failure of this first attempt to introduce foreign stock did not discourage James: he had conceived an idea which was not to be lightly removed, and he accordingly purchased, from a Mr. Place, a horse which had been brought from the northern coast of Africa. This horse was the celebrated "WHITE TURK;" Mr. Place was afterwards stud-master to Oliver Cromwell. This importation was speedily followed by the introduction of "the Helmsley Turk," by Villiers, the first Duke of Buckingham, to which that fine horse, called the Morocco Barb, was added by Lord Fairfax. From this period, improvement rapidly advanced—indeed so rapidly, as to call forth the lamentations of Lord Harleigh, for the visible diminution of the old stock, known as "the Great Horse."

Charles I. followed up the advantages which James had already secured, and warmly encouraged both racing and hunting; indeed, to such an extent was the breeding of light and rapid horses brought by this prince, that it became the subject of a memorial, setting forth that the breed of stout and powerful horses, "fit for the defence of the country," was likely altogether to disappear, unless measures were taken to prevent their doing so. This prince first substituted the use of the *bit* for the old *snaffle*.

Cromwell had his stud of race-horses, and proved that he felt mere bone and bulk to be no match for speed and endurance; he therefore recognized horse-racing, as a means of promoting the

breed of active coursers, to be connected with his country's welfare. Cromwell had himself trained, probably, the best regiment of cavalry at the time in existence.

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## CHAPTER VII.

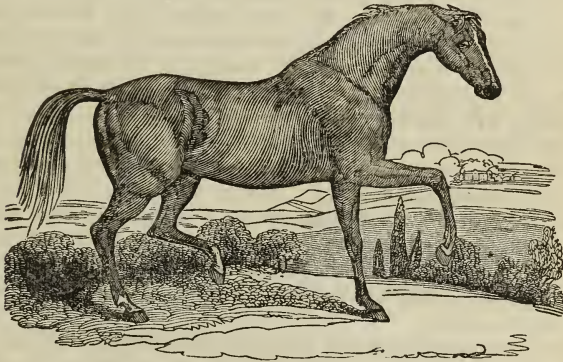
### HORSES OF EUROPE, CONTINUED.

THE Restoration seems to have given a fresh impulse to racing, and, consequently, to horse-breeding; and not only were the courses already established by Charles I. at Hyde Park and Newmarket, still encouraged and patronized by royalty, but others were added to the number, and the monarch himself became a competitor for the prizes. These prizes had, up to this period, consisted of a bell, a simple trophy; and hence the common phrase, intended to imply success, "he bore away the bell." Bells were now abolished, and a cup, or piece of plate, to the value of one hundred guineas, substituted for them. Newmarket now assumed the lead, and that position it has ever since occupied. We may add that, in more recent times, the cup or plate is not always to be taken in the literal sense of the words, the actual value, viz., one hundred guineas, being, in nearly every case, given to the winner instead. Charles II. sent his master-of-horse to the Levant, in order to procure horses and mares. These were, of course, from the locality, frequently Turks or Barbs, but speedily every description of eastern horse became engrafted on British stock.

William III. established a riding-school, under the management of a French gentleman, named Major Foubert; he also added several *plates* in different parts of the kingdom.

Queen Anne encouraged racing, and not only continued a bounty equal to that of her predecessors, but added several new plates. Towards the end of this reign, the prejudice against Arab blood, which originated in the failure of King James's horse, was effectually removed by the introduction of the celebrated Darley Arabian. Mr. Darley procured this beautiful horse from his brother, a merchant settled in Aleppo. This was the horse truly calculated to perfect the British stock, and to render it what it has ever since continued—the FIRST IN THE WORLD! Of the Darley Arabian,

little need be said beyond stating that he was the sire of "Flying Childers," the fastest horse that ever ran. Flying Childers ran over the course at Newmarket, a distance of three miles, six furlongs, and ninety-three yards, in six minutes and forty seconds; the Beacon course (four miles, one furlong, and one hundred and thirty-eight yards), in seven minutes and thirty seconds; and also accomplished very nearly one mile in a minute. Such was the progeny of the Darley Arabian with the old English racer. The British horse is now the fastest in the world, and far superior to the Arab, even in swiftness. It is not many years since Pyramus, the best Arab in Bengal, was beaten with ease by Recruit, an English racer of scarcely fourth-rate merit.



DARLEY ARABIAN.

George I. continued the royal patronage of the turf, and was the first to discontinue the practice of giving cups or plates for prizes, giving specie to the value of one hundred guineas in their stead.

George II. adopted a wise policy, and one calculated alike to retard the progress of an inferior race of horses, and to remove from the lower class of people much of the temptation to attend races. This was embodied in an Act of Parliament, passed in the thirteenth year of his reign. By this it was enacted, that for any and every horse a certain tax should be paid, besides other particulars.

In the reign of George III. special taxes were imposed upon

race-horses, and in the twenty-fourth year of this reign, it was enacted—that every running-horse, entered to start for any plate or other prize, should, in addition to all former imposts, pay the sum of £2 2s., “and the owner thereof shall previously pay two guineas, as the duty for one year, to the clerk of the course, or other authorized person.” This king was strongly attached to racing, which, however, he endeavored to strip of its abuses, probably conceiving that horse-racing, when properly conducted as a mere trial of speed, was perfectly legitimate, and calculated to produce good effects, while it was its abuse alone that rendered this amusement incompatible with true religion. By the zeal of this monarch, public riding-schools were established, and this led to the establishment of many private *menages* by the princes of the blood and persons of fortune. He also instituted the first veterinary college, with a view to placing the treatment of horses and cattle under disease upon a proper footing; a French gentleman, Monsieur Vial de St. Bel, of much skill, was appointed professor.

George IV. was devoted to the horse, to horsemanship, and to the turf, from his earliest years; and during his reign these amusements attained a height hitherto unprecedented, and, we may perhaps add, unsurpassed since. During this reign, the French became infected with enthusiasm relative to horse-racing; and our system, regulations, and even the costume of our jockeys, were all eagerly adopted. The Duke of Orleans was the first who assumed the dress of an English jockey in France, and his example was speedily followed.

We have now traced the history of the horse in England, from the earliest time of which we possess any record, to the present day. That, to many, such an account must have proved wearisome, is possible; but we do trust that to the majority of our readers the contrary has been the case, and that the preceding detail will rather enhance than detract from the interest which will be experienced in the succeeding portion of a more practical character.

Before, however, proceeding to those particulars, it is necessary to say a very few words of the horses indigenous to Scotland and Ireland.



## CHAPTER VIII.

## THE INDIGENOUS HORSES OF SCOTLAND AND IRELAND.

IN Scotland, a small race of horses has existed from time immemorial, remarkable for their symmetry of form and docility of disposition, and known by the name of Galloways. So much esteemed were these little horses in former times, that it became necessary for the Scottish monarchs to restrict their exportation. Tradition says that these horses are of Spanish origin, and that they originally sprung from Spanish horses which swam ashore from some of the ships composing the redoubted Spanish armada, which were wrecked upon the western coast of Scotland.

In the islands and northern counties of Scotland is also to be met with a small, rough, hardy race, scarcely exceeding a large dog in size, and called *Shelties*. With the exception of the head, which is generally somewhat too large, these little creatures are most symmetrically formed, being, indeed, almost miniatures of the Arabian.



THE SHETLAND PONY.

Most Shelties present some objectionable points about the head—in some instances almost amounting to deformity.

Ireland also possesses an indigenous breed of horses; some say *several*, but we are disposed to imagine that but *one* breed is properly entitled to be regarded as primitive, the others being merely

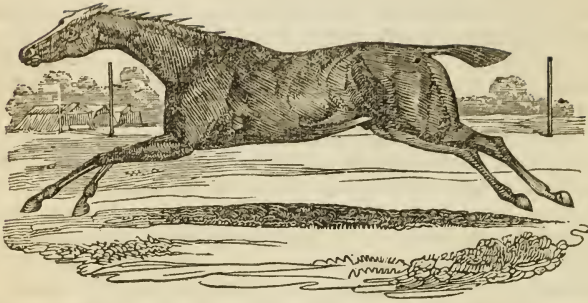
variations resulting from crosses, and subsequent neglect. These horses are of small size, but of good form, very strong in proportion to their stature, active, and of excellent constitution. These were popularly called *Hobbies*; they were formerly in much esteem, both in their native country and in England, and so great was the mania for possessing them, which at one time existed almost universally throughout the British Islands, that their name became afterwards proverbially applied to every object on which an individual placed inordinate affection. "He is on his hobby," is an expression too familiar to require the reader to be more than reminded of it.

Many of the old writers speak in complimentary terms of these little horses, and bear testimony to the high degree of estimation in which they were formerly held. Both Strutt and Campion have recorded their value in their works, as witness the following passages:—"Horses they have of pace easie, in running wonderful swift. Therefore they make of them great store, as wherein at times of need they repose a great piece of safetie." "I heard it verified by honorable to honorable, that a nobleman offered, and was refused, for one such horse, an hundred kyne, five townlands, and an eery of hawks yearly, during seven years." It has been asserted that the climate of Ireland is too moist to be favorable to the breed of horses. The only reply that we can give to this assertion is a practical one—look to these "hobbies," the indigenous breed of the country, ere we possessed the advantage of crossing from English or foreign stocks, so highly valued everywhere; look at the performances of more modern Irish racers and hunters. In the month of October, A.D. 1741, a Mr. Wilde undertook to ride 127 miles in nine hours; he performed it in six hours and twenty-one minutes, riding ten horses, making due allowance for mounting, dismounting and refreshment. This took place at the Curragh meeting (Kildare) of that year. The following redounds more to the credit of the horse than to that of the inhuman rider: Two Irish grooms were drinking at the door of a public-house, one having with him for exercise a favorite hunter of his master's; the trifling bet of a glass of whiskey was made that the horse would not clear a neighboring wall. The drunken brute at once accepted the wager, and turning the horse, put him standing at the wall, the height considerably exceeding seven feet. The poor horse, not having imbibed the same maddening stimulant as his master, refused the leap. The groom immediately wheeled him round, cau-

tered him a short distance, so as to obtain a run, and then putting the poor animal at speed, once more faced him at the wall. The noble creature, too full of spirit to refuse a second time, rose his best—alas! the height of the wall far exceeded the powers of any horse unfurnished with wings, and the generous animal forfeited his life to his courage. His forefeet striking the summit, he grounded on the other side, both forelegs were broken in the fall, and he was shot.

It is principally as high leapers that the Irish horses are renowned, and in this class of performance we believe they are unrivalled, nor is their style of leaping that of an ordinary horse, taking a moderate elevation in “a fly” as a horse in training will take the bar in a riding-school. The Irish horse leaps with a single bound, all his form collected together, rests lightly for half a second upon the summit of the obstacle, and springs as lightly down. The leap of the Irish horse resembles as closely as possible that of the *deer*, and the elevation they will clear in this manner frequently equals the height of their heads. Until a recent date, the Irish horse was valued almost exclusively as a hunter, and for steeple-chases; but events in the racing world have since shown that on the turf he is as little to be despised as after hounds. The performances of Harkaway, The Baron, Foigh-a-ballagh, and a host of others, evincing first-rate speed, are sufficient to remove any slur that might ever have been attempted to be cast upon the racing qualities of the Irish horse. It is not, however, to be denied, that the Irish horse occasionally possesses some peculiarities of shape which might displease an English eye; amongst others may be enumerated a certain degree of *angularity* or *raggedness* of form, and in many a tendency to too great thickness and shortness in the forehead. No writer, however opposed to the admission of anything *perfect* coming out of Ireland, has attempted to refuse to the Irish blood-horse the attributes of immense power, proportioned to his bulk, of a happy combination of spirit and fire, with, for the most part, mildness and docility, courage and gentleness. The Irish blood-horse may, indeed, fearlessly vie with those of any country in the world.

## CHAPTER IX.



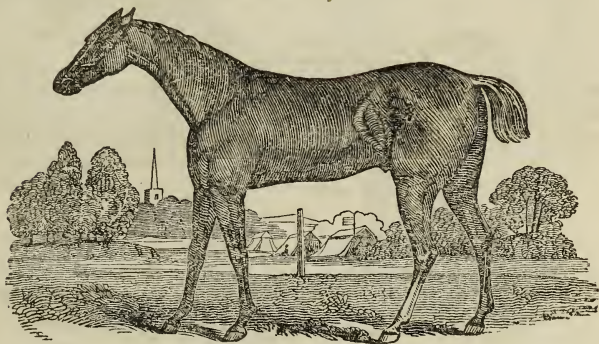
THE RACER.

## OUR PRESENT BREEDS, AND HINTS AS TO MANAGEMENT.

It is now fit that we should glance, somewhat in detail, at the different breeds of horses at present in use throughout the United Kingdom. Probably the best subdivision of these breeds that we could adopt is one founded upon the several uses to which each breed is most properly allotted:—For racing, hunting, road-riding, draught, general agricultural purposes, &c. By following this method, we shall be enabled to enumerate and describe each important breed *seriatim*.

THE RACER of these islands, from having been so frequently crossed with, nay, chiefly formed from, the Arab and Barb, bears a very considerable family-likeness to these animals; but he is superior to them in stature, in stride, and in performance. The Racer should carry a high and lofty head, with bright and courageous eye, small ear, expanded nostril, arched neck, convex on the upper surface, but not presenting any curve underneath; sometimes the neck presents an appearance precisely the reverse of this, usually in mares: this is by many declared to be a sign of very high blood; it is called “ewe-necked.” In my opinion, however, it is less a sign of blood than a proof of the animal’s progenitors having been related within too close degrees of affinity—a circumstance that should, when possible, be avoided. A Racer must

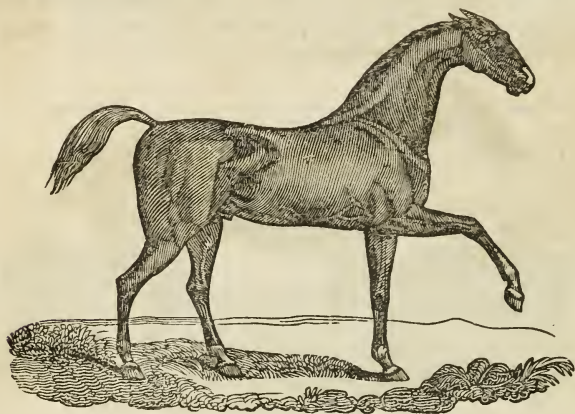
be a blood horse. The meaning of this term is as follows:—The Arab is supposed to be the purest and least adulterated of breeds, and to be the most faithful representative extant of the original horse; the criterion of blood is, therefore, the being able to trace a horse's pedigree to an Asiatic progenitor. Thorough-bred and blood are synonymous terms. It does occasionally, though rarely, happen that a horse is perfectly formed, although not thorough-bred; when such is the case, the horse, notwithstanding his form, is usually deficient in speed, and, however excellent for other purposes, is useless as a Racer; it also occasionally happens that a thorough-bred horse is defective in some of the running points of form. In order, therefore, to constitute a Racer, we must have a combination of blood and form—an ill-formed horse cannot run; and none but a blood-horse can race at speed to the end of a long course, and live. There has been much controversy on this subject; but I think I have, in a few words, rendered the actual facts sufficiently clear and intelligible.



ECLIPSE.

It is not, perhaps, generally known, that the common expression applied by jockeys to a well-formed horse which cannot race, "he wants heart," is literally and anatomically true. The heart of a Racer must be large, and the cavity of the chest capacious. The lungs also must be large, and play freely. The heart of Eclipse, who, next to Flying Childers, was the fastest horse that ever ran, was of a singularly large size, weighing upwards of fourteen

pounds. The expression, "broke his heart" is also, in many cases, literally correct, that viscus being not unfrequently burst or ruptured when the poor animal is pushed to over and undue exertion. To return, however. The neck must be gracefully set on, and the shoulder must be lengthened, oblique, and lie well back; a lofty fore-quarter denotes relationship to the Barb, that race being remarkable for presenting this feature. The Godolphin Barb, indeed (sometimes erroneously called the Arabian), possessed this feature to an extraordinary degree. The quarters should be ample and muscular; the fore-legs straight and fine, but with sufficient bone; the hinder legs well bent, and the pasterns long and springy. Much strength in little compass, provided that compass is not too little to admit of adequate stretch, or stride, constitutes the acme of perfection in a Racer.

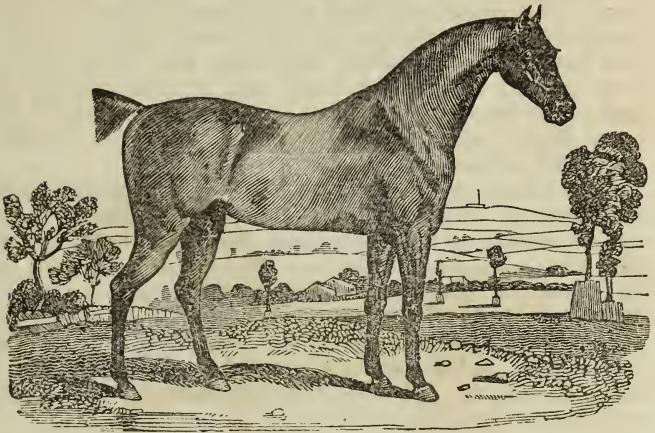


FLYING CHILDERS.

The British Racer has long held a first place in the estimation of the equestrians of Europe.

Some are fond of asserting that our horses are degenerating in excellence, and in proof, recapitulate the performances of some of our coursers of former days. I deny the correctness of the inference, and would rather suggest that our horses have so much progressed in excellence, that feats, once deemed extraordinary, are now regarded as common-place, and scarcely talked of. Thoroughbred horses are now, in consequence of the great general improve-

ment, more equal in point of speed, and fewer individual performances occur to excite wonder. On one point, however, before leaving the subject of the Racer, I would take this opportunity of expressing my unqualified opinion—that the abominable practice of running horses at too early an age, which is at present fast creeping into fashion, is but too certain to produce early foundering and rapid degeneracy of stock.



THE HUNTER.

**THE HUNTER**, in a country abounding with hedges, stone walls, and heavy-plowed lands, should be bred with a view to greater power than is requisite in the Racer, and length of stride is, therefore, less essential to his form than barrel. Let his legs and pasterns be rather short than otherwise; an Arabian would speedily founder in a run with hounds across one of the most level of British counties. Clumsiness is not, however, a necessary concomitant of power. Let the Hunter have as much strength as possible, without weight; sufficient courage, without wild, tameless fire; good wind, free breath, a free gallop, but, at the same time, a light and nimble, and a free, easy, sweet trot; and let him be six years old before he is ridden to hounds: a horse may be advantageously used in the harrow and light draught when rising four, and may thus be made to "pay his keep." Many recom-

mend putting your Hunter in the plow, and so would I, under certain conditions—viz., that the land be not heavy, and the plow be a light one; if these conditions be not attended to, the horse is apt to acquire an ugly carriage, and a habit of poking with his head—faults which, however lightly they may be regarded at first, will prove serious inconveniences, when they cause the Hunter to fall headlong in full career, in consequence of his being unable to use his eyesight when his head is kept up and in hand. This custom of working young Hunters, indeed to a great extent old ones also, prevails much in Ireland. There are in Ireland but few farmers, or small landowners, who do not strive to keep at least one “blood horse,” and in many instances the finances are too low, or prudence is too great, to admit of such being kept as mere idlers, or permitted uselessly to “eat their heads off” in the stable.

Much controversy has arisen relative to the advantages or disadvantages of what is called “summering the Hunter.” In our opinion, nothing so tends to renovate his powers as turning the poor horse out to grass in summer. The opponents to this system argue that doing so destroys the animal’s condition, and gives his owner a world of trouble to get him in order for the ensuing season: even, however, were this the case, would you keep the poor wretch that has served you so faithfully during your winter’s chase, standing in a hot stable during the sultry heats of summer, and all—to save a little trouble?

There is nothing like summering for renovating the hoof; and with a view to this, a soft pasture should be selected, yet not a boggy one: the grass growing on a boggy soil is unhealthful, the vapors arising from it prejudicial, and the “fly” far more troublesome than in drier grounds. This mode of treatment has another advantage: it obviates the necessity of physic, the less of which a horse can be given the better.

Hunters must be fed according to their work; when that is hard, let them have plenty—when otherwise, diminish the food, especially the hay. Beckford judiciously recommends a little clean wheat-straw to be chopped small, and mixed with their corn.

When your horses require physic, if at grass, take them in the first night after each dose; such as require powerful medicine should be physicked in the stable. Nitre is a useful medicine; is very cooling, and otherwise salutary in its effects, as an alterative; it may be given in doses of an ounce to each horse, either



in the water, or among the corn. Carrots are excellent for horses when at all thick in the wind, foul in the coat, or low in flesh; but they should not be given in the corn, as some writers recommend, for the horses are in that case apt afterwards to refuse it unmixed.

THE HACKNEY, or ROADSTER, should be still more compact than the hunter, with more substance in proportion to his height; his forehead should be light, but high; his head small, and placed in a tapering manner on his neck; shoulders deep and spacious, and lying well back; back straight; loins strong; fillets wide, and withers well raised; nor must the croup droop too suddenly, or the tail be set on too low. The forearm should be particularly strong and muscular; the legs should be straight, and set together; the feet should point directly forward (bad shooing, however, which may be remedied, may occasion the reverse of this); see that his knees do not bend; above all things, avoid a horse that *stands over*; he does sometimes turn out well, but you can never depend upon him, never knowing when he may come down; the hind legs should be placed well back, and should stand wide; observe his action, that he lift not his feet too high, for however the novice may conceive such a practice to be a safeguard against stumbling, or to have a showy appearance, it is certain to produce a most uneasy seat, as well as to occasion very unnecessary wear and tear of the hoof. Take care, at the same time, that he lift not his feet in a slovenly manner, or too low, and that, above all, his feet are returned flat to the ground; if the toe first comes down, the animal is sure to prove a stumbler. Always feel your horse's mouth, even when traveling the smoothest road: this is a good habit, and may frequently save him his knees and you a fall.

Too high breeding is objectionable in a roadster, as tending to impart a straight-kneed, upright action, calculated extremely well for racing, but very ill adapted for the road.

In speaking of the hackney, or ordinary riding horse, it would be wrong to omit saying a few words of the horse generally used as a war-steed or charger. The light cavalry are now mounted on half-bred horses, possessing much of the character of the hunter, and indeed some present no inconsiderable appearance of blood. Formerly, all our cavalry were mounted on great, heavy animals, partaking closely of Flanders stock; but it is now long since it was found that lighter and more active horses proved far more

effective in the field, and that rapidity of evolution was a greater desideratum than mere physical weight or strength. What is known as a "weight-carrying hunter" is about the best description of horse for a charger. The horses of the artillery display less appearance of blood than the ordinary charger, and when cast, as it is called, are well worthy the attention of agriculturists, as they are docile and willing, and make excellent servants either for the cart or plow.

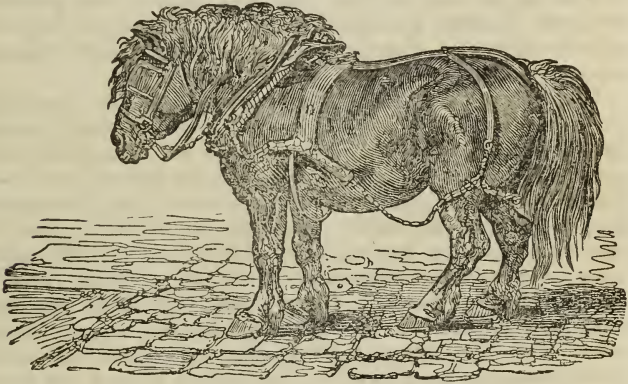
**THE CARRIAGE HORSE.**—The best and most showy carriage horses are those descended from Norman blood. Those in ordinary use are now bred with so much blood as to present very little difference of appearance from the hunter. The best carriage horses that could be bred would be produced by crossing a handsome draught-mare with a thorough-bred horse, provided the latter possesses sufficient bone and height. The best description of draught-mare that could, perhaps, be selected for this purpose, is that called the CLEVELAND BAY, a clean-made but powerful animal, and one which was formerly much in use to mount our cavalry.

**THE DRAUGHT HORSE.**—The present breed of draught horses in England are remarkable for their gigantic size, vast power, and slow, deliberate motion. The most esteemed are the CLYDESDALE; for that breed, although of large size, possesses greater suppleness of limb and more activity than the heavy Flemish. The brewers of London have been long celebrated for their enormous horses, and the utility of their prodigious size has been often thoughtlessly questioned. I say *thoughtlessly*, for their bulk is absolutely necessary to enable them to endure uninjured the shocks they experience in drawing their heavy loads over a rugged London pavement. M. Huzard and M. Desmarests assert that these great horses are of the Boulogne race of France; but Colonel Smith contradicts this assertion, and affirms, "No French horses, save those of Norman blood, have met with consideration in England for more than a century." The English draught horse was, in my opinion, an animal of *gradual development*. It was, I think, first imported by the Saxons, and subsequently gradually improved in size and power by crossing with the Flemish horses, introduced by the followers of William of Normandy, who, with their Earl, obtained a large grant of land at the Conquest. Colonel Smith says, that the Flemish archives contain indications of the horses of that country having been conveyed to England during the Plantagenet dynasty.

The present great horses of the London brewers are, I believe,

bred chiefly in Yorkshire, Lincolnshire, and Staffordshire. Some fine animals are also bred in Northamptonshire.

For *farm use*, cart horses should not be bred too heavy, for they will be found to retain an equal proportion of power if bred with a view to a moderate share of activity. I am of opinion that the English farmers and owners who use horse-power, are in error in employing such large and heavy animals as they do. This system compels them to keep a greater number than they otherwise need have; and it should be recollected that every unnecessary or su-



THE DRAY HORSE.

pernumerary horse kept upon a farm is just as much absolute loss of money as his support costs, and that cost need not necessarily consist of actual outlay; the *produce thus consumed* is to be regarded as so much money wasted. These great horses *cannot, besides, do their fair share of work*; they are too sluggish, too lethargic; and hence English agriculturists, who employ such, are obliged to work a greater number than, with proper management, *ought to be necessary*.—I have frequently been amused to see, in some of the English midland counties, three enormous horses, for instance, drawing a *light plow on light soil*—a work that would be performed with ease by a *single horse* of the lighter breeds.

To such as *breed* cart horses, or wish to do so, I may offer a few words of advice. You must be governed in your operations by the description of *work* for which you design the animal you desire to breed. If you live upon a light, sandy soil, a foal out of a

Clydesdale mare, by a thorough-bred horse, will produce a valuable article, and one that you can work up to six years old, by which time you will have another colt ready to your hand, and may dispose of the former at a remunerative price. If you reside on a stronger soil, you must breed a heavier animal; and if you put a Clydesdale stallion to a mare produced by a cross such as I have described, you will have attained your end to your satisfaction. In rearing your foals, recollect that good feeding and warm housing are absolutely necessary during the first autumn and winter. It is during the first year that you either make or mar your foal; if starved or stinted by neglect during that period, you may abandon all expectation of seeing him a good horse, whatever has been his pedigree.

THE SUFFOLK PUNCH is a very useful horse for agricultural purposes; in color yellowish or sorrel, with frequently a white *blaze* in the face, large head, wide between the ears, rather coarse muzzle, long and straight back, flat sides, low fore-end, and shoulders too much forward, high at the hips, round legs, short pasterns, deep-bellied, and full barrel. This horse is, as will be seen from our description, no beauty, being deficient in several points of symmetry; he is, nevertheless, a hardy and a useful horse, and one capable of performing a greater amount of labor than many better-looking animals. He is also kindly, and a good feeder, it being no ordinary fatigue that will suffice to put him off his feed. In the foregoing description, it is unnecessary to state that we had in our mind's eye the *original* Suffolk Punch horse, and not the modern-bred cart horse of that county. The old Suffolk Punch was remarkable for the willingness and perseverance with which he would pull against a dead weight, which he felt could not be moved by his strength. The present breed seem to have been produced from a cross with the Norman stock; they stand much higher, and are of lighter form. It is questionable how far they may be regarded as an improvement upon their predecessors. The old Punch breed brought very high prices: mares with foals at foot have gone so high as 150 guineas; and 100 guineas was not a very extraordinary price for a stallion. The present alteration in the form and size of the Suffolk horses is to be attributed to a cross with the Yorkshire half-bred stallions: the result has been a larger race and higher forehead breed; but it is, as we already remarked, questionable whether the animal maintains the valuable qualities of energy and temper that he formerly possessed.

## CHAPTER X.

## NOTES ON STABLE MANAGEMENT.

SOME horses do not like fowl in the stable, and if one gets into the manger, the oats will frequently be left untasted ; neither these birds, nor goats, nor pigs, should be permitted to enter the stable.

Human feelings are not a sufficient guide as to the temperature of a stable, and a thermometer should always be kept for that purpose hanging against the wall. The heat should never exceed 50 degrees Fahrenheit in winter, or, if possible, 65 degrees in summer. The stall-floor should not slope more than is absolutely necessary to carry off the superfluous moisture ; if the declivity be too great the flexor tendons of both fore and hind legs are kept on a constant stretch, to the certain injury of the horse.

Much of the ophthalmia prevalent amongst horses is caused by the ammonia given off by the urine and droppings, but more especially by the former. This is to be dissipated by ventilation, but it may be absorbed by sulphate of lime or gypsum, as also by muriatic acid. Many farmers conceive that darkness is an advantage in the stable, inasmuch as it induces bad feeders to eat : perhaps they are not aware that darkness is one of the most frequent causes of early blindness, or, at least, of considerable injury to the sight. Hence, also, a very frequent origin of stumbling and starting—two faults of a most unpleasant character.

A loose box or two are a very useful, nay, necessary appendage to every stable ; in building a new stable, indeed, you can readily have these so constructed that every stall will be convertible, in a few minutes, into one. The box is most useful for a fagged and jaded horse, for it encourages him to lie down and rest ; and to the idle horse, for it encourages him to walk about, amuse, and exercise himself. A box, at some distance from the stable, is useful in case of contagious or infectious disease ; it is also useful as permitting of more variations of temperature than the ordinary stable, and into this—cooled down as nearly as possible to the temperature of the external air—should every horse just taken from grass be put, ere being removed into the warm stable ; and, *vice versa*, ere being turned out of the warm stable to grass, in spring or summer. Such a system of management would prevent the accession of many a cold.

The ordinary practice of limiting the allowance of water is both inhuman and contrary to common sense. Nature never errs : and if water be left to the horse's own discretion, he will only take as much as is good for him. I am disposed to attribute to this curtailment of water many of the diseases of the horse—as slow fever, glanders, nasal catarrh, &c. When a horse is warm with violent exertion, the chill had better be taken off ; but it is bad to do this by letting the water lie in the stable ; it is better to add a little warm water to it. In well-conducted racing-stables, water is given to the horses so frequently that they will drink but little at a time : surely this is better than keeping them so long thirsty that when the water is given them they will fill themselves to repletion.

The quality of the water is also of primary importance ; it should be pure, fresh, and sweet. Do not let nitre be mixed with it, unless when required as medicine—a very common practice amongst ignorant grooms, and occasionally even advocated by those who should know better.

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## CHAPTER XI.

### GROOMING AND DRESSING.

A FEW words in reference to cleaning and dressing. The ordinary farm-horse, at work all day and turned out at night, requires little more grooming than a rub down with a wisp of straw, and the removal of mud and dirt from his limbs ; hardiness is necessary to the existence of this horse, and a regular system of grooming would only render the skin more sensitive, and the horse more susceptible of cold. But it is of the stable and the stabled horse that we are more immediately treating, and it is to him—deprived, as he is, to a great extent, of exercise—that grooming is most necessary, in order to cleanse away the scurf that obstructs the pores, and thus admitting of free perspiration, and promoting circulation towards the extremities.

There are two ways by which a fine, glossy coat may be produced—by heat and by dressing. The former produces it at the expense of the animal's health ; the latter is, on the other hand, highly conducive to health. The proprietor should therefore see that the fine coat of his hunter or riding-horse is produced by fair,

honest rubbing, and the free use of the currycomb, and not by heated stabling and warm sheeting. Horses should, as a matter of course, be dressed every morning; the cleaning they receive after work is quite an extra matter. With horses that possess a very tender skin, the use of the currycomb may be dispensed with, and the brush or haircloth glove substituted for it. If you wish to ascertain whether or not your horse has been properly dressed, rub his coat with one of your fingers; if a greasy stain be present, your groom has slurred over his task.

It is in winter that the neglect of grooming, or its slovenly performance will produce the worst effects on the horse, and with the greatest rapidity. On a horse coming in in dirty weather, the mud should be first removed; this is usually done in two ways—first, by scraping it away with the sweat-knife, and finishing with the currycomb and brush; secondly, by washing it away. The best mode of doing it, however, is, first of all to remove all the mud and loose water, by the aid of the knife; and then, should the horse be warm, walk him about for a quarter of an hour or so; then use the wisps, and rub him dry; wash the feet and legs, pick the soles, look at the shoes, rub the feet and legs dry—this is a most important consideration, and one that is generally too much neglected, hence giving rise to many severe colds, inflammations, and often grease. Comb the mane and tail. These operations are terminated by a careful finishing with dry wisps. When a horse is quickly and effectually dried in the manner we have detailed, there is not the slightest danger of his catching cold; but there may occur—in very rare instances, certainly—but still there may occur,—cases where the horse cannot be thus groomed, but must be put up in the wet state in which he came off the road.

In these cases we resort to clothing; this is never to be resorted to where it is possible to groom, and is on no account to be regarded as offering a substitute for manual friction; it is merely to be regarded as an expedient—a last resource, better than absolute neglect; it may, however, be well to know that such a resource exists. The object of clothing, and the manner in which it acts as a preventive against a wet or over-heated horse catching cold, are as follow: cold is caught in consequence of the sudden cooling down of the body at the surface, producing increased action of the respiratory and vasculatory system; in order to the supply of the deficiency of animal heat thus produced, inflammation of those organs, or some portion of their attendant apparatus, consequently takes

place. The cooling of the surface is caused by the evaporation; the more rapid the evaporation, the more sudden and severe the chill. The clothing then acts, by preventing or retarding evaporation; the horse consequently loses heat so slowly that his natural vigor is able to keep up the necessary supply—in short, he never becomes chilled. The clothing also absorbs some of the superfluous moisture; it should be woolen, and thrown loosely over the body—not strapped down upon it, as that is apt to excite undue perspiration.

All horses are more or less liable to injury from cold; to be sure, horses will constantly be seen exposed to all the severity of the most severe weather, and yet escape; such have been probably gradually inured to exposure; and the power of the animal system to accommodate itself to circumstances is very great; but surely a little trouble is preferable to great risk, especially when valuable horses are concerned. A wet horse requires most care when he has been heated by his work. Before he has been heated he might stand in cold, or with his coat wet, for, perhaps, half-an-hour, without experiencing any ill effects; but, after perspiring pretty freely from exertion, exposure, without exercise, to a cold atmosphere, for fifteen minutes, will do him more mischief than similar exposure for an hour would have caused him before the exertion: in the former case he would have had cough next day—in the latter, he would probably be nothing the worse.

When a horse has contracted mischief from the exposure, the first symptom is generally a staring of the coat. When you perceive this, let the animal be at once put into a warm stable, and warmly clothed; or, if the weather be favorable, let him be at once put into motion. Your object is, to restore the vital heat—to produce a healthy reaction in place of chilliness and prostration. If shivering—which usually next shows itself, if you have not attended to the matter in time—should supervene, you will have to administer hot drink, and to clothe the horse with flannel sheeting, previously warmed; friction with the hair-glove, in the warm stable, especially under the belly and behind the joints, will be useful.



## CHAPTER XII.

## A FEW WORDS TO FARMERS.

It is a bad practice to take a horse from the plow or cart, and put a saddle on his back ; but it is quite a different thing for the farmer to keep for his own riding, a stout, well-formed horse, that, should a demand for extra horse labor at any time arise, can be put into the plow or cart with a confidence that, in that capacity, it will work well and willingly.

While on this subject I think a word of caution necessary. I have known farmers breed from mares only because they were useless. I have known a mare whose health incapacitated her from work, and who had, consequently, to be turned out to grass for the season, put to the horse that her services might not be wholly lost ! The infirmities of the mare are perpetuated in her wretched offspring—they become hereditary, and the breeder at length finding his pockets the worse for his experiment, gives up with the reflection that “horse-breeding is a losing concern.” No mare, however good, should be bred from, without a careful and deliberate consideration of her qualifications as a brood-mare ; and this is a point wherein many farmers err greatly. A person has a mare which has proved a valuable servant, and which is, consequently, a favorite : he wishes, if possible, to “preserve her breed,” and accordingly takes a foal out of her, after, perhaps, a long life of toil. Another mistake is the following, and it is a common one : a man sees a handsome horse, and takes a fancy to him ; he happens to possess a mare, it is the season, and without a moment’s consideration of how far that individual mare is suited for that individual horse, he puts her to him, and obtains—what ? a mongrel nondescript, presenting a combination of bad qualities, and not one redeeming point. Both parents must be selected with a reference not only to their respective points of excellence, but to the relative adaptation which the points of one present to the points of the other. Both may be excellent in their way, but one parent may possess points of excellence which actually counteract those of the other. Breed from none but sound parents : accidents, however, are not to be regarded as unsoundness ; but in purchasing a mare for breeding, it is necessary to be perfectly certain that the defect, if such exist, be a mere accident, and not a congenital mal-forma-

tion. See that both parents are as free from moral as from physical infirmity, from faults or vices of temper or disposition. A defect of one parent may sometimes, however, be removed, or rendered null, by the other possessing a counteracting excellence to a preponderating extent; but, above all things, take care that the same defect be not possessed by both parents. Make up your mind as to the description of animal you intend to breed. Nothing is more unsatisfactory, or so likely to turn out an unprofitable speculation, as breeding a nondescript—a brute fit neither for the carriage nor the plow—for the saddle nor the cart; and it is, with some few exceptions, within the power of the breeder, by a judicious selection of parents, to insure a certain offspring. Few things are more certain than horse-breeding; for the rule, “like produces like,” in most cases holds good from generation to generation. It is better to be on the safe side, and to avoid even such mares as have suffered from accidents.

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## CHAPTER XIII.

### HINTS ABOUT BREEDING.

THE best form of a mare from which to breed, for any purpose, is a short-legged, lengthy animal, with a deep, roomy chest and carcase, wide and capacious hips, and a sound constitution; such is the mare best calculated to perform the important functions of generation and nutrition. Few mares are more objectionable than tall, gawky, leggy animals, whose carcase you will invariably find proportionably confined and deficient in depth and room. Then, of course, we must look for “breed,” according to the class of horses to which your mare belongs; a good animated countenance, an upright sprightly carriage; general structure of muscle, bone and sinew firm, dense, and compact; such a horse will do three times as good a day’s work as an ill-bred, ill-made garron. Some persons seem to set light value on the form of the head of a brood-mare; but the head of every animal is the point where good or ill-breeding will be most obviously indicated. A mare that has a heavy head and a stupid countenance cannot breed a good foal, unless to a horse possessed of fire almost to madness, for her countenance is an index to her disposition.

The neck should be brought out of the top of the withers, and not of the bottom of the shoulders and chest; this is a common fault, but one to be avoided. The shoulders should lie well back; the scapula, or blade bone, lying obliquely from the shoulder joint; the blade should also be long and wide, and extend nearly to the top of the withers, but attached so closely, and so well covered with muscle as not to present any remarkable prominence; the back of the shoulder should be well furnished with muscle, and it should appear to the mounted rider, of a wedge-shape, widening towards his knee; the fore-leg should be perpendicular, the toe and the point of the shoulder being in a right line; the foot should be round, even, and of a dark color; the heels should be open, but not low; the brisket should be deep, this especially applies to a riding-horse, as otherwise a crupper will be necessary to keep the saddle in its proper place; the quarters should be long, and oval on the top; in a brood-mare, too much latitude cannot be allowed to the hips; but too wide hips in a stallion are an ugly and objectionable point; attend to the hocks, and see that the shank-bone and sinew, both before and behind, be well developed, and dropped straight below the joint. Horses with steep pasterns are seldom comfortable roadsters.

Foals produced from a well-selected mare, by a suitable stallion, may be worked from their third to their sixth year; they may be then sold, and they will be found amply to repay their breeder. Breeding injudiciously is, on the other hand, like flinging your money into the ocean; you can risk as much as you please, but you will rarely see a return. It will sometimes happen that a farmer, from a deficiency of pasture, may be unable to breed; and instead of doing so, may purchase young colts of good quality at from two to three years old, and rear them to a proper age for sale. The advantage of this system is questionable, especially if the cause of its adoption has been deficiency of pasture; for the best possible plan of making up young horses for sale is to turn them into good grass, taking them up only about a week before they are to be sold, for the purpose of giving them a coat, reducing their carcase, and teaching them to lead; at all events, it is certain that to deal in this manner successfully requires no small amount of knowledge of the animal, and of the tricks to which jockeys are in the habit of resorting, as well as no inconsiderable capital.

The age at which a mare should be put to the horse is from three years upwards. Some have injudiciously bred at an earlier age, and disappointment has been the result. Mr. Youatt says, that if the mare have been lightly worked, she may be used for breeding until she is twenty. We question whether breeding from any mare over twelve years old, at the very utmost, will prove satisfactory. If you desire a large colt, have a large mare; her size has, in general, more to do in the matter than the size of the male parent. The most favorable time for putting the mare to the horse is from March to the beginning of May: the reason of this is, that the time of foaling will be thus regulated, and the earlier after the beginning of March that a mare foals, the more profitable; the colts foaled in March are generally found to turn out hardier, and to stand better, than those foaled earlier. A mare may be with advantage rested for ten days after having had the horse, and may then be worked as usual, lightening her work, however, as pregnancy advances. When the period of foaling approaches to within about a fortnight, the mare should be discontinued working, and turned into the best pasture on the farm; a few weeks' high feeding at this period will not only nourish the foal which she is carrying, but will furnish her with a supply of nourishment for it against its birth. The pasture into which the mare is turned should also be well provided with sweet water, and with shelter. The thoroughbred mare being of a more artificial constitution, demands some extra care at the period of foaling, and requires to be taken up and put into a loose box; she should also have a couple of feeds of grain in the day. This is the period when abortion usually occurs; the eye, therefore, of the owner should be constantly on the mare. Moderate exercise and good feeding are about the best preventives. Mr. Youatt observes, that the imagination exercises a powerful influence on mares, and therefore a mare liable to abortion should not be kept with others that have gone to the fifth or sixth month, lest her example should infect them with the disease.

Should the mare experience any difficulty in delivery, it is advisable in every case to call in a regularly educated veterinary surgeon, and on no account to permit the rude quackery of itinerant "horse-doctors," as they style themselves. Many a valuable mare, and many a foal, has been thus lost. After foaling, the mare should be again turned into a good pasture, well supplied with water and shelter; and if she have foaled early, say in April, and

the grass is scanty, let her have a feed or two of oats or Indian corn per day; if the corn be given in a trough upon the ground, the foal will partake of it along with its dam. When the grass becomes plentiful, the corn may be diminished, or even discontinued. The proper care of young foals will repay a hundred-fold: this is, in short, the most critical period of the animal's life, and when attention or its reverse produces the most striking and lasting results.

If it answer the convenience of the farmer, the foal may be permitted to run for twelve months at the foot of the mare; but when mares are kept expressly for breeding purposes, many circumstances combine to render this objectionable. Within about six weeks from foaling, the mare will be again at heat, and should be put to the horse; she may then also resume light work. At first the foal should be shut up in the stable during working hours, but as it acquires sufficient strength, it is better to allow it to follow its dam. The work will contribute to the health of the mother, and increase her flow of milk, and by accompanying her the foal will suck more frequently, thrive better, acquire tameness—no slight consideration—and will become gradually familiarized with the objects among which it is afterwards to live. Under these circumstances, the foal may, if the farmer chooses, be weaned at the age of six months. For this purpose, it should be either housed, or turned into some pasture or rick-yard at a distance from the dam. The latter should also get a few purgatives, in order to remove the milk, and the foal should be well and liberally fed every morning and evening. Bruised oats and bran are about the best description of feeding that could be adopted, and towards the end of summer the foal may be turned out to general pasture without fear of his again seeking his dam. Too much pampering will, however, prove as injudicious as neglect, and should consequently be equally avoided. Should the foal be a male, and emasculation be desirable, it is a good plan to perform the operation at the period of weaning, in order that the one trouble shall serve for both occasions. This, however, must not be done if weaning have taken place in the months of June or July, when the fly abounds, which, by its attacks, will promote restlessness and consequent inflammation, and retard convalescence. Early spring, or an advanced period of the autumn, are the best periods. Let no itinerant impostor, or village quack, be the operator, unless you really desire to lose your colt. Call in a regular

veterinary surgeon; leave the operation in his hands, and attend implicitly to his directions as to after-treatment. Nothing is more unwise, as well as unfair, than to neglect the directions given by the operator, which may produce perhaps fatal results, and then blame him, and perhaps cast an undeserved slur upon his professional character. Indeed, for the sucking foal, scarcely any further after-treatment than simple quiet is necessary, but bleeding and the exhibition of aperients are advisable for a colt of more advanced age.

One thing deserves mention: when a horse is suffered to attain two-thirds of his growth, prior to emasculation, you obtain an animal of far superior form, power, and value, to that which has been operated upon when a foal. It is well to bear this in mind, yet I cannot but cordially condemn the practice of emasculating horses at all.

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## CHAPTER XIV.

### THE ART OF BREAKING OR TRAINING.

THE next part of the rearing consists in breaking. There is no greater mistake than to postpone this. It should, in fact, be commenced at the very period of weaning, or as soon as the effects of castration have passed away; it should, in this manner be commenced and prosecuted gradually, with gentleness and kindness. Let the young animal be daily handled, caressed, and led about, and let him occasionally be rubbed down, and even at times tied up for an hour or so. The man who feeds the colt should have the entire management of him at this time, and he should be a respectable person, characterized by equanimity of temper and a kindly disposition. Half the battle in horse training consists in this early management; many a horse is spoiled and rendered permanently intractable by early harshness or improper treatment, and many a horse that might otherwise have turned out a vicious, unmanageable brute, has been moulded into a gentle, affectionate, and useful servant by the judicious treatment of those who first inducted him into the knowledge of his duty.

For the first year such treatment will suffice; after the second winter the operation of training may commence in good earnest.

The horse must be first bitted, but the bit at first used must be small, and of such form as will not hurt his mouth. The work of biting may occupy three or four days. When the colt becomes accustomed to the bit, he may then have two long ropes attached to it, slightly fastened to his sides by a loose girth over the back, and his feeder may thus drive him, as it were, round a field, pulling upon him as he proceeds. This will act as a first lesson in draught. If intended as a saddle horse, a filled bag may be thrown across his back and secured there, and after a while, when he has become used to this, a crotch may be fastened upon his back, the inferior extremities grasping his sides, and thus inuring him to the legs of a rider.

Portions of harness may now, from time to time, be added, the winkers being kept for the last. He may now be put in a team, and it is better he should be one of three, having one before him and the shaft horse behind him. It is best to begin draught on grass, where the colt will not be frightened with the noise of the wheels. He has enough to occupy his thoughts without that, and the grand secret consists in not hurrying or confusing him. Let everything proceed gradually and by successive stages, and above all, let me entreat that no whip or harsh language be permitted to be used.

Breeders of horses are very apt to fall into a common fault, viz., of postponing the breaking of them to a period comparatively advanced, and then fancying that the training can be at once perfected. We have endeavored to show that the work of training should be a gradual and progressive one, and that it should rather consist of a consecutive system of judicious management than be converted into a separate piece of business, suddenly undertaken and summarily performed. If the colt has been treated as we have recommended, much subsequent trouble will be saved his owner; and if it were generally so treated, there would be fewer instances of vice and sulkiness displayed by the adult horse.

All horses, especially such as are required for agricultural purposes, should be broken into the saddle as well as to harness. This is easily effected when once the animal has suffered himself to be yoked in the team, as already described. Let his accustomed feeder and handler be the first to mount him; there is no doubt that the colt will suffer him to do so without struggling, and gentleness alone is requisite to complete the lesson thus auspiciously begun. At the same time that mildness is absolutely necessary, it

is not the less essential that the colt be taught implicit obedience to the will of its master. For this purpose, however, neither the whip nor spur must be employed, nor must he be shouted or halloed at; nothing is required but firmness, steadiness, and patience—the three great requisites in a successful horsebreaker.

When the colt has acquired the art of drawing and carrying, it will be time to instruct him in, perhaps, the most difficult part of his duty—backing. This must be done cautiously at first, by the long rope, and gradually. Let first a light cart, and then a loaded one be added; let care be taken not to hurt the mouth with the bit; many a good and valuable horse has been spoiled by this bad management. Patience and gentleness will effect everything; a contrary course of treatment will generate vice. Few, it may almost be said, no horses, are naturally vicious. It is cruel usage which has first provoked resistance. That resistance has been followed by greater severity, and the stubbornness of the animal has increased. Open warfare has ensued, in which the man has seldom gained advantage, and the horse has been frequently rendered un-serviceable. Correction may or must be used, to enforce implicit obedience after the education has proceeded to a certain extent, but the early lessons should be inculcated with kindness alone. Young colts are sometimes very perverse. Many days will occasionally pass before they will permit the bridle to be put on, or the saddle to be worn; and one act of harshness will double or treble this time. Patience and kindness, however, will always prevail.

A similar system is to be observed in breaking horses for hunting or racing, and at about three years old the regular course of training may be begun. The colt is first accustomed to be led, and to endure the rein; he is then led upon soft ground. He is next mounted, and gradually taught his several paces, from the walk to the trot, canter, and gallop. Each portion of the colt's duty should constitute a separate lesson, and be taught him perfectly and thoroughly before proceeding to the next. The earlier lessons should be short; but as the animal's education advances, they may be increased in length, always, however, taking care not to push them to such a pitch as to produce absolute fatigue or disgust.

When accustomed to his paces, the colt may gradually be brought into the thoroughfare, and at length into the street. In this, of course, much caution must be used; and if the young patient display symptoms of shying at any object, he must be cau-



tiously brought to approach it, and made sensible of its innocuous nature. We have now done enough in explaining the principle; any man of common understanding, united with a moderate share of tact, courage, and skill in riding, can effect the rest.

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## CHAPTER XV.

### FEEDING AND GENERAL MANAGEMENT.

HALF the disorders to which horses are subject may be traced to improper or careless management, which principally runs into two extremes—1st, too close confinement in ill-ventilated stables; 2d, want of sufficient shelter, and exposure to all weathers, and at all seasons in the open fields. If, however, it were absolutely necessary to run into either extreme, we should say that of the two the former is most certain to produce bad consequences, and we would prefer risking the chances of the latter. Half the diseases of the horse owe their origin to the causes just recited, the other half may be assigned to over-feeding with hay. This applies more particularly to young horses, and to such as are not put to severe work. They are ever placed before a full rack, and just as children with bread and butter, they eat merely for amusement, until at length the stomach gradually becomes preternaturally distended, the appetite gradually increases in a relative proportion, becomes sooner or later voracious, and finally merges into a mere craving—it being a matter of indifference what the food is, so that the stomach is filled by it. This depravity of appetite is always accompanied by more or less thirst. This naturally enough produces general debility of the entire digestive function, including stomach, bowels, liver, spleen, and pancreas; worms are produced in thousands, and symptoms present themselves, of so many varied hues, that enumeration, far less classification, were utterly impossible.

A horse's appetite is not to be taken as the criterion by which to determine the quantity of hay he is to be permitted to consume, for most horses will eat three or four times as much as they ought. Horses have been known to consume thirty pounds weight of hay between a day and a night, and ten pounds is the most that should have been given during that time. Upon eight pounds of hay

daily, with a due allowance of oats, a horse can be kept in full work, in prime health and spirits. It is better to keep young horses at grass until about five years old, and to work them during that period. When kept in the stable and not worked, they are apt to acquire many very bad habits; and if the rack and manger be kept empty, with a view to prevent their overloading their stomachs, they will fall into a habit of playing with and mouthing them—a habit which will finally degenerate into wind-sucking or crib-biting.

As to the STABLE. The greatest desideratum in a stable is *ventilation*. A horse requires air equally with his master; and as the latter requires a *chimney* to his sleeping apartment, so does the former. The chimney may be a mere outlet opening through the ceiling, or it may be formed as a dome or cupola. It should not, of course, be open at *top*, or rain will get in, but roofed over, and have an opening at the sides. Besides this, there should be openings in the wall, near the ground, but not in the *stalls*. This will produce a thorough air, and may be so placed as not to expose the horses to *draught*. The stables should not be less than twelve feet high, from floor to ceiling, and the former should be well paved, slope slightly backwards, and along the back of the stalls should run a gutter, about a foot wide and an inch or two deep. No stable should be less than eighteen feet deep, and each stall should be at least six feet *clear*; but if eight feet can be afforded, so much the better. Although some horses will agree when kept together in the one stall, it is far better to give each a stall to himself. The manger should be about sixteen inches deep, the same from front to back, narrower at bottom than at top, and two feet in length. The rack is best when closed in front, the back part being an inclined plane of wood, sloping gradually toward the front, and terminating about two feet down. This rack effects a considerable saving in hay, for we need scarcely remind our readers that, in the common rack, much of the hay given is dragged down and trampled in the litter. It also prevents the hay-seed from falling into the horse's eyes, for the rack is on a level with the manger, and about three feet from the ground. Another advantage also gained by this rack is the facility with which it can be filled, thus obviating all necessity for a loft over the stable, and, consequently, admitting of a greater height of ceiling as well as superior ventilation.

The windows and the doors should be at opposite ends; this

promotes ventilation: the latter should be divided transversely, at the height of about four feet from the ground. The upper portion may thus be occasionally open. *Whitewash* is a bad dressing for the interior of a stable, as it causes too great a glare of light; *paint* of a leaden color is best, and it can be *washed* from time to time with soap and water. There should be a *bin*, divided properly into partitions, for oats, beans, &c., and this is better at the back of the stable.

A few buckets of water dashed over the floor of the stable while the horses are at work, will keep all sweet. The litter should also be turned out to dry, and a little fresh straw spread for the horses to stale on. A shed placed beside the stable is a great advantage, on two accounts—it admits of the litter being dried, and the horse dressed there in wet or stormy weather.

A little powdered gypsum, strewn upon the stable floor, will also act by absorbing the ammoniacal gas, and thus removing both the foul smell and the gas—a frequent predisposing cause of ophthalmia. Should the ammonia, however, have accumulated in any quantity, the speediest and most efficacious remedy, as a disinfectant, is muriatic acid.

A few words as to *horses at grass*. There are certain months of the year when the putting the horse to grass will be productive of decided improvement in his health, will invigorate his constitution, renovate his hoofs, and serve, in all respects, in place of medicine. The time for turning the horse to grass is from the middle of May to the end of August. When first turned out, horses are apt to make too free with clover and other such rank and luscious feeding, and they should not, therefore, be turned into the richest pasture at first. Clover, vetches, sainfoin, lucerne, are all very excellent descriptions of feeding, whether the horse be suffered to graze them from the field, or be given cut in his rack in the stable. To these may be added Italian rye-grass, the value of which is beginning to be appreciated of late years more than ever.

If the weather be wet or cold, let the horses be taken in during the night, and let the field be provided with trees, a shed, or other similar shelter from the rain or sun. If you make them work as usual, give a feed of equal parts of oats and cut hay each morning, two hours before putting on the collar, and the same on return from work before putting them out. This is necessary to working horses, as a counterpoise to the *green food* which forms the staple of their diet. Much absurdity has been written as to the necessity

of bleeding, purging, and what not, consequent upon every change of food: the only precaution necessary to be observed is, to effect the change gradually, and to *work* the horses. Idleness is the cause of more ailments than ever change of diet was amongst horses at these seasons. As winter approaches, the horses are to be taken up from grass, both because at that season the herbage becomes too scant to afford sufficient food, and because the weather is usually too cold for constant exposure. There can, however be no precise rule of month or day laid down to direct you: you must judge of your horse's condition and capabilities, and of the state of the weather peculiar to the season. The first step, however, will be the housing at night, and turning out in the daytime.

Let horses be always *fed according to their work*. The materials, besides those we have enumerated, are various: split peas, split beans, oats, barley, chaff, chopped straw, potatoes, turnips, carrots, bran, &c. It is too much the custom to feed working horses exclusively upon *oats*, with, of course, *hay* as usual, and too often *ad libitum*. Beans, peas, and various sorts of roots, are advantageously substituted for the oats.

You will hear people often talk too much of *hard* and of *soft* food; and you will, on the other hand, hear others cry down these expressions as absurd. Some substances are richer in *chyle*-producing powers than others, while others possess a greater amount of watery or diluent matter. The former is hard, the latter soft feeding. A due proportion of these two descriptions of feeding must be maintained, if you wish to preserve the horse in health and condition.

The common farm-horse often passes years upon grass or hay alone, and, if not hard worked, supports himself in tolerable condition. Hay and grass will not, however, support a horse in condition under severe labor—some more nutritious, more *condensed* substance is required. This is chiefly furnished by the use of OATS. Oats are of a highly nutritious quality. In 1,000 parts, they contain 750 of nourishing matter. In most parts of the continent of Europe, barley is the staple food of the horse in lieu of oats. It is more nutritious than oats, containing only 80 parts of non-nutritious matter in every 1,000. Barley, however, would not appear to agree with all constitutions, being of a heating or inflammatory tendency, *surfeit* and *mange* being frequently consequent upon its continued use.

BRAN, the ground husk of wheat, acts upon the bowels, when given occasionally, as a gentle aperient; it must not, however, be made a frequent food, far less a constant one. Both bran and pollard have been found to accumulate in the large intestines. When bran is given, let it be in the form of a mash.

BEANS contain somewhat less than 600 parts of nutritive matter in the 1,000, but they are a most valuable food, eminently calculated for horses on hard work. There is a fact in connection with food, whether as relating to man or to the brute creation, that is scarcely even yet sufficiently understood, viz., that the food containing and showing, by analysis, the greatest amount of nutritive ingredients, is not of necessity the most nutritious. Beans present a remarkable instance of this fact, and one worthy of attention.

PEAS possess a slight degree more nutritive matter than beans, and are said to be less heating. They should, however, never be given *whole*, but be always previously *crushed*. If swallowed whole, they are sure to swell considerably in the stomach, and painfully to distend it. Pea-meal is considered good food for the horse, and a remedy in certain diseases of the urinary organs.

Indian corn in combination with roots, forms a valuable article of diet. Horses will eat the mess with an avidity of appetite calculated to excite surprise at first. The mess, to which a little salt should invariably be added, will keep them in fair average condition, and those which it is desirable to fatten may have a small quantity of oats, pea or bean meal added.

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## CHAPTER XVI.

### HORSE-TAMING AND ITS SECRETS.

THE principal danger and inconvenience attendant upon vice in a horse, consists in the difficulty attendant upon approaching, securing, handling, or dressing him. The situations in which the vicious animal is found require to be considered separately—viz., in the stable, fastened to the manger, saddled, harnessed, or naked and at liberty. Previous to approaching any horse, it is necessary to form some sort of judgment of his moral character, and this will be gathered from his physiognomy and gesture, with far more

certainly than from the reports of those about him. If the eyes be wild and threatening, if rapid glances be thrown around, if the ears be thrown backward, be cautious not only how you approach, but how you quit him. If you approach a horse in the stable, do not do so abruptly, but first speak to him. If he obey, and move to one side, you may approach up close to his shoulder, seizing the halter in your hand the moment you arrive there. If his head be then kept down he can do no mischief, especially if the right hand be laid on the horse's shoulder, and the body extended so as to keep at a sufficient distance from the forelegs. While thus held, the horse may be blinded, muzzled, hobbled, or, in short, done any thing you please with. If a vicious horse have his eyes bandaged, and be rapidly turned round and round a few times, he will become passive, and this plan has succeeded where all other means have failed. Never approach a horse from the right side; it is from this side he kicks.

Instances of persons possessing unwonted power over horses, are on record. In one, the trainer had a leaden knob at the end of his whip, and with this he struck the animal on the nape of the neck every time it kicked, plunged, or showed any sign of vice. This came on the creature like an electric shock; and being struck on a part so sensitive, it soon ceased to resist, and stood for a moment as if stunned. The trainer then caressed it, and spoke to it coaxingly, and gradually succeeded in bringing it to do all that he required. Many a vicious horse has also been tamed by being ridden furiously over heavy plowed land, until his strength was perfectly exhausted. In Germany, it is a common practice to suspend furious horses in a frame until their strength is exhausted. Starvation, bleeding, narcotics, have severally been tried with a view to taming a vicious horse: these remedies will, however, be generally found to have only a temporary effect, and they are more or less calculated to prove prejudicial to the animal's health. I have happened to make one or two notes relative to extraordinary powers of horse-taming possessed by individuals. The following is from the pen of Mr. Castley, in "The Veterinarian":—

"When a young man, I remember purchasing a horse at a fair in the north of England, that was offered very cheap, on account of his being unmanageable. It was said that nobody could ride him. We found that the animal objected to have any thing placed on his back, and that when made to move forward with nothing more than a saddle on, he instantly threw himself down

on his side with great violence, and would then endeavor to roll upon his back.

"There was at that time in Yorkshire, a famous colt-breaker, known by the name of JUMPER, who was almost as celebrated in that country for taming vicious horses into submission, as the famed WHISPERER was in Ireland. We put this animal into Jumper's hands, who took him away, and in about ten days brought him home again, certainly not looking worse in condition, but perfectly subdued, and almost as obedient as a dog; for he would lie down at this man's bidding, and only rise up again at his command, and carry double or any thing. I took to riding him myself, and may say that I was never better carried for six or eight months, during which time he did not show the least vice whatever. I then sold him to a Lincolnshire farmer, who said that he would give him a summer's run at grass, and show him as a very fine horse at the great Horncastle fair. Happening to meet this gentleman on the following year, I naturally enough inquired after my old friend. 'Oh,' said he, 'that was a bad business: the horse turned out a sad rebel. The first time we attempted to mount him, after getting him up from grass, he in an instant threw the man down with the greatest violence, pitching him several yards over his head; and after that he threw every one that attempted to get on his back. If he could not throw his rider, he would throw himself down. We could do nothing with him, and I was obliged at last to sell him to go in a stage-coach.'"

Sullivan, the celebrated Irish horse-tamer, whose peculiar method of effecting the desired end procured for him the title of "The Whisperer," had a method of taming horses that made him famous. When sent for to tame a vicious horse, he directed the stable in which he and the subject of his experiment were placed to be shut, with orders not to open the door until a signal was given. After a *tête-à-tête* between him and the horse for about half an hour, during which little or no bustle was heard, the signal was made, and on opening the door the horse was seen lying down, and the man by his side, playing familiarly with him, like a child with a puppy dog. From that time he was found perfectly willing to submit to discipline, however repugnant to his nature before. Some saw his skill tried on a horse which could never be brought to stand for a smith to shoe him. The day after Sullivan's half-hour lecture, I went, not without some incredulity, to the smith's shop, with many other curious spectators, where we were eye-witnesses

of the complete success of his art. This, too, had been a troop-horse, and it was supposed, not without reason, that after regimental discipline had failed, no other would be found availing. I observed that the animal seemed afraid whenever Sullivan either spoke or looked at him. How that extraordinary ascendancy could have been obtained, it is difficult to conjecture. In common cases this mysterious preparation was unnecessary. He seemed to possess an instinctive power of inspiring awe, the result, perhaps, of natural intrepidity, in which I believe a great part of his art consisted; though the circumstance of the *tête-à-tête* shows that upon particular occasions something more must have been added to it.

An account published some years ago by Mr. Catlin, whose experience among the American Indians has obtained for him so much celebrity, bids fair to solve the mystery, or at least to suggest some important inferences. He thus describes the mode in which the Indian tames the wild horse. "He coils the lasso on his arm, and gallops fearlessly into the herd of wild horses. He soon gets it over the neck of one of the number, when he instantly dismounts, leaving his own horse, and runs as fast as he can, letting the lasso pass out gradually and carefully through his hands, until the horse falls for want of breath, and lies helpless on the ground. The Indian advances slowly towards the horse's head, keeping the lasso tight upon his neck, until he fastens a pair of hobbles on the animal's two forefeet, and also loosens the lasso, giving the horse a chance to breathe, and passing a noose round the under jaw, by which he gets great power over the affrighted animal, that is rearing and plunging when it gets breath, and by which, as he advances, hand over hand, towards the horse's nose, he is able to hold it down, and prevent it from throwing itself over on its back. By this means he gradually advances, until he is able to place his hand on the animal's nose, and over its eyes, and at length to breathe into its nostrils, when it soon becomes docile and conquered, so that he has little else to do than to remove the hobbles from its feet, and lead or ride it to the camp. The animal is so completely conquered that it submits quietly ever after, and is led or ridden away with very little difficulty."



## CHAPTER XVII.

## VICES AND THEIR REMEDY.

THERE are certain vices peculiar to individual horses, of a very annoying character, and productive of very unpleasant consequences, both to the animal and his owner. We will enumerate a few of the most remarkable of these, and, at the same time, suggest remedial expedients.

**CRIB-BITING.**—This very disagreeable vice, in law, constitutes unsoundness. It consists in a violent extension of the neck, an attempt to gripe the manger with the teeth, and, with a convulsive action of the throat, a sucking in of the air. Crib-biting is decidedly infectious, for one horse will, to a certainty, contract the habit from any other who possesses it, if placed in the next stall to him. The effects of this vice are serious. Besides the injury to the teeth, and the waste of corn (for the horse will usually bite with a full mouth), much loss of saliva takes place, by which digestion is, of course, impaired; flatulence is also produced by the inhalation of air, and a crib-biting horse is never so well up to his work as another.

Many remedial measures have been tried, but to no purpose. Among these, I may enumerate covering the edge of the manger with iron, with sheep-skin, with tar, with aloes; a strap round the throat has been recommended—it cures crib-biting, but usually produces, if possible, a worse affection, viz., *roaring*.

Turning out to grass for a few months commonly succeeds with young horses, and some are cured by turning them into loose boxes. Youatt recommends a muzzle, with bars across the bottom, sufficiently wide to allow the horse to get at his corn, but sufficiently close to prevent his getting hold of the manger.

**WIND-SUCKING.**—The horse bends his neck, draws his head inward and downward, and sucks in the air. The effects are the same as those produced by crib-biting. Mr. Youatt's remedy has been found successful. It consists in attaching to the head a leathern strap, with spikes pointing towards the neck. When the horse draws in his head, preparatory to sucking, the spikes prick his neck, a new and sudden impulse is given to his ideas, and the attempt at inhalation of air is abandoned.

**SHYING.**—This vice, which will often occasion the unseating of

the best rider, if taken in an unguarded moment, proceeds from several different causes, and upon the individual cause the curative treatment must depend.

If the cause be imperfect sight, gentleness and coaxing are necessary. The use of whip or spur will only make matters worse; but if the horse be treated with gentleness, and coaxed up to examine the object which terrified him, he will soon learn to place confidence in his rider, and his shyness will gradually disappear.

If the cause be mere skittishness, severity is also an objection. Keep the mouth well under command, ride on without more notice of the matter than an occasional touch with the spur; and when the animal perceives that his pretended fright has failed to elicit any notice, he will soon weary of his performance.

If the cause be inexperience, the being unacquainted with the many new objects the animal encounters, the remedy is the same as that just described, remembering to avoid all harshness, and to treat the animal precisely as you would a timid child.

Mr. Laurence says—"These animals generally fix on some particular shying butt; for example, I recollect having, at different periods, three hacks; the one made choice of a windmill for the object or butt; the other a tilted wagon, and the last a pig led in a string. I once rode the two former when amiss from a cold, and they paid no more attention to either windmills or tilted wagons than to any other objects, convincing me that their shying when in health and spirits was pure affectation—an affectation, however, which may be speedily united with obstinacy and vice. Let it be treated with marked displeasure, mingled with gentle but decided firmness."

I quote the following from "The Veterinarian":—"We will suppose a case—a very common one, an every-day one. A man is riding a young horse upon the high road in the country, and meets a stage coach, or railroad train. What with the noise, the bustle, the imposing appearance altogether, and the slashing of the coachman's whip, noise of the train, the animal, at its approach, erects his head and crest, pricks his ears, looks affrighted, and no sooner comes alongside of the machine, than he suddenly starts out of the road. His rider, annoyed by this, instantly commences a round of castigation with whip, spur, and curb, in which he persists until the horse, as well as himself, has lost his temper, and then one whips, spurs, and pulls, and the other jumps, plunges, pats, and throws up his head, until both, pretty well exhausted by

the conflict, grow tranquil again, and proceed on their journey, though not for some time afterwards in their former mutual confidence and satisfaction. Should they in their road, or even on a distant day, meet with another coach, or train, what is the consequence? The horse is not only more alarmed than before, but now the moment he has started, being conscious of his fault, and expecting chastisement, he jumps about in fearful agitation, making plunges to strike into a gallop, and attempting to run away; so that by this correction, instead of rendering his horse tranquil during the passage, the rider adds to the evil of shying, that of subsequently plunging, and, perhaps, running away."

The horse will sometimes prove restive and obstinate when mounted by a strange rider. If the party be unused to riding, he had better give up the attempt; but if he possess a knowledge of the art of sitting a horse, he may speedily let the animal know that he is his master, and it is astonishing what an amount of respect this will produce. A few masterly touches will usually sober a horse at once.

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## CHAPTER XVIII.

### DISEASES OF THE HORSE.

THE horse is too valuable, too costly an animal, to be rendered, at any time, the subject of blind quackery. He who endeavors to "doctor" his own horse is a fool. Veterinary surgeons are now happily plenty; as soon as your horse is indisposed, send for one, or send the animal to him. It is better to disburse a moderate fee than to sacrifice, or risk sacrificing, a valuable horse. In order to treat the diseases of the horse, you should understand his organization, habits, &c. To attain to this would require years of close application, followed by years of diligent practice. Better avail yourself of the aid of those who have acquired this necessary knowledge, and who have made its practical application their profession.

There are still, however, cases in which you may advantageously become your "own horse-doctor," and I must give you some instruction relative to these.

**BLEEDING.**—Every man who keeps horses should know how to

bleed, as timely bleeding will, in many instances, avert a dangerous fit of illness. Colds may lead to serious results, and amongst others fever, that may terminate fatally. Prompt bleeding will often avert this ; by the time a veterinary surgeon could arrive, the disease might have passed to another stage, in which bleeding would not only be too late, but improper. I shall therefore tell you how to bleed.

In bleeding, the lancet is doubtless preferable to the fleam, but only in the hands of the veterinary practitioner. The place for bleeding is usually the jugular vein. You have the horse blindfolded ; smooth the coat along the course of the vein ; have the head of the animal turned from you by an assistant ; with the fingers of the left hand, which holds the fleam, press upon the vein just sufficiently to bring it well into view. The best point is about two inches below the junction of the two branches of the jugular near the angle of the jaw ; place the fleam exactly on the course of the vein, and strike smartly, but not too violently, on the back of the fleam. Bleed always from a large orifice, and for this purpose a large-bladed fleam is preferable ; for a small quantity of blood rapidly abstracted will produce more valuable effect than a large quantity gradually drawn. When enough of blood has been taken, remove the pressure, bring the lips of the wound together, pass a pin through them, and roll some tow or silk thread round it, over the extremities of the pin. Secure the horse for a couple of hours, so that he cannot rub this off against the manger. There is a spring-lancet, that is to be greatly preferred to the fleam. See that the blade be clean. Blood may be, for local purposes, abstracted from any superficial vein in the same manner.

**DRENCHING.**—You should also know how to administer **DRENCHES**. Never use a bottle for this purpose, as the horse might bite away the neck, and either swallow a portion of the glass, or otherwise injure himself. Have a cow's horn for this purpose, the larger end cut in a slanting direction ; pass a halter into the mouth, and let an assistant keep the head elevated, by means of a stable-fork, as high as he is able ; you then draw forth the tongue with your left hand, and, with the right, introduce the small end of the horn into the mouth, gently of course, over the tongue ; a turn of the wrist will then empty the contents into the mouth ; a simultaneous movement withdraws the horn and lets go the tongue. Keep the head up till all is swallowed ; and if the horse retain some of the drench obstinately in the mouth, a slap on the nose will

generally compel him to swallow it. Do not try to give too much at once ; be sure to introduce the horn far enough, and to turn and withdraw it quickly, but without hurting the gums or lips of the horse.

Balls are given in a somewhat similar manner ; but the head does not require to be held so high.

**ACCIDENTS.**—There are also some accidents that the proprietor of a horse may with safety look after himself. For instance, broken knees. When a horse falls and lacerates his knees, your first object should be, by careful washing, to remove all foreign substances from the wound. In the next place, ascertain whether the joint cavity has been penetrated. Do not use a probe for this purpose ; but apply a poultice of linseed-meal, and when, in about eight or ten hours afterwards, you take it off, you will see a yellowish, glairy fluid, effused upon it, if the joint have been penetrated. Should this have been the case, send at once for the veterinary surgeon. When the joint has not been penetrated, get the lips of the wound together, and keep them so by a compress and bandages, which need not be renewed till the third day. The earlier the wound is closed the less mark will be left on the part,

**LAMENESS.**—It is sometimes difficult to detect the cause of lameness, especially of the anterior extremities ; I would, however, say, that it is a safe criterion to watch how the horse moves. If he lift his feet, the shoulder is not the injured part ; but if the shoulder be affected, the pain that any raising of the foot will occasion will cause him to drag the toe along the ground, instead of attempting to raise the foot. In shoulder-lameness you can do nothing but get the surgeon as soon as possible ; in the other case, examine the foot, as bad shoeing may be the exciting cause.

**STABS OR CUTS.**—Let your first care be to remove the cause, if any such remain in the wound ; send at the same time for the nearest veterinary surgeon. If there be much effusion of blood, strive to check it as much as possible, pending that gentleman's arrival : this may be best done by producing pressure on the bleeding vessels, and affusion of cold water. In some cases a solution of alum, or any other harmless astringent, may be useful. Pricks in the sole are a very frequent cause of "Quittor," and should, therefore, be timely looked to ; but it is well to caution you to observe the manner in which the farrier removes the shoe for the purpose of examination. Do not suffer him to take it off violently ; each nail should be separately extracted, and the shoe then

removed, otherwise the affair will probably be made worse. When the shoe is thus gently removed, the appearance of matter or moisture on some particular spot will usually indicate the seat of pain.

As we are speaking of farriers, it may not be amiss to add, that many cases of lameness are induced by bad shoeing. Want of space renders it impossible for me to enter into a treatise on the foot of the horse; but it may be well to state, that the reader can purchase separately many excellent works on that most important subject. My own advice is, to send your horse always to a forge that is under the superintendence of a veterinary surgeon.

COLIC attacks a horse in many instances very suddenly, and requires immediate relief. Send for the veterinary surgeon, but, pending his arrival, give, as a drench, about two ounces of oil of turpentine with six drachms of laudanum, in a pint of castor or linseed oil, warm. After the spasms have disappeared, rub the horse dry, the belly and flanks especially; but I do not, as some do, recommend the horse to be trotted about—better let him rest. Give no spirits, pepper, or other stimulants.

FIRS.—You had better in this case, send for the surgeon at once, if your horse be valuable; if otherwise, get rid of him.

GLANDERS.—In purchasing a horse, be very careful to ascertain that he is unaffected with this truly terrible disease, for which there is no cure, and which has, in so many frightful instances, proved its communicability to man and other animals. Notwithstanding the awful nature of this disease, however—not a whit less dreadful than Hydrophobia—dealers at fairs and other places will frequently endeavor to pass off a glandered horse upon an unwary customer. The usual trick is, stimulating the nostrils till the horse has snorted away all the matter lying in them, and then, by injections of an astringent nature, producing a temporary suppression of the discharge. Others cram a pledget of tow up the nostrils. These tricks may be detected by the animal's uneasiness, tossing of his head, efforts to sneeze, the red and vascular appearance of the interior of the nostril, but especially by the fetid breath.

FARCY and glanders are, to a considerable extent, connected, as each when neglected, or proving obstinate, is apt to run into the other. Like glanders, farcy is highly contagious; but is not, like that disease, wholly impregnable to the attacks of science. When the disease first appears—and its appearance is familiar to all about horses—give an aperient drench. If it be the batton-farcy, touch

the buttons with the extremity of a hot iron; if you have no "budding-iron" by you, the top of an "Italian iron," such as laundresses use, may be made to answer. Examine the sores daily, and as soon as they begin to slough, touch with a solution of a drachm of corrosive sublimate, in an ounce of spirit of wine, to which is added two drachms of creosote. Give internally a ball daily, composed of corrosive sublimate, twelve grains; two drachms of powdered gentian, one drachm of ginger, and one ounce of powdered brimstone. As soon as the mouth begins to look affected by the mercury, or the animal is violently purged, omit the corrosive sublimate, but continue the remainder of the ball. Keep the animal in an airy situation, but one not exposed to draughts or damp; and feed on green meat, such as parsnips and carrots especially, which roots possess sweetening qualities of a high order.

LAMPAS, or swelling of the "bars," or vacant spaces between the tusks and grinders—an affection very common to young horses when teething—will generally yield to mild alteratives, and cooling drinks; but if it do not, a few slight incisions with a lancet or pen-knife will produce relief, taking care to confine your scarification to the outside edge, so as to avoid the palatine artery and vein. Do not permit the bars to be fired.

STRANGLES, or Distemper, common to young horses, and presenting symptoms so like those of glanders, as to be sometimes confounded with that disease. Strangles may, however, be distinguished from glanders, by the formation in the former of a continuous tumor in the hollow under the lower jaw. The treatment consists in bringing this swelling to a head, by means of a blister; as soon as it is soft on the top, it should be opened, and that by free incisions. The sore may then be dressed for a few days with common digestive ointment. Cooling drinks, as cream of tartar and nitre, may be given with advantage; if there be appearance of fever, or affection of the chest, send for the surgeon, as the treatment is now beyond your skill. This, however, is rarely the case.

POLL EVIL, a swelling of the poll, caused by the horse striking it against the lower edge of the manger, when raising it suddenly after stooping, or by pulling upon his halter. In most cases, all attempts to prevent suppuration are useless, and I think it best to endeavor at once to hasten it. Then open the tumor by means of a seton, which should be passed in at the top, penetrate through

the bottom, and pass out at the side of the neck, just below the abscess. Foment with warm water, and keep the parts clean.

**ROARING**, most generally the consequence of malformation of the larynx, but sometimes occurring by a sequel to strangles, and sometimes arising from palsy of the muscles connected with the larynx. The use of a strap for the cure of crib-biting is also an occasional cause. I know of no cure, and am disposed to think that, in all cases, roaring is beyond the reach of treatment. I would also advise you not to breed from a "roarer," as this defect is, in many cases, transmitted to the progeny.

**SADDLE-GALLS** might have been prevented by using properly-adjusted and well-stuffed harness or collars. Rest the horse, bathe twice daily with warm water, and after each bathing dress with spermaceti ointment.

**INFLAMMATION**.—When you find a horse dull, listless, off his feed, coat staring, chest and nose hot, extremities cold, some attack of an inflammatory nature is at hand. Bleed from a large orifice, until you find the pulse sensibly diminish; administer a purgative, but, meanwhile, the veterinary surgeon should have been sent for with all speed.

**SPAVIN**.—An enlargement of the little sacs of mucus placed between the tendons to prevent friction. The most common place for this to occur is at the inside of the hock, at the bend. This is called bog-spavin. When this becomes so much enlarged as to produce compression of the vein passing over it, between it and the integuments, the vein shares in the distension, and it becomes blood-spavin. In general, a spavined horse is lame, but not invariably so. Blistering, or perhaps firing, is the only cure on which I place any reliance.

"**DISTEMPER**," or more correctly, epidemic catarrh, generally commences in shivering; then heat of mouth and nostrils, cough, red and heavy eye, redness of the membrane of the nose. From the commencement, there is generally, but not invariably, a discharge from the nostrils, which, in neglected cases, becomes fetid andropy. This disease requires too much judgment, and too much knowledge of the very varied treatment called for in each different stage, for me to be disposed to give you any advice, further than that, if you have detected it at its very commencement, bleed copiously, and give a strong purgative, the veterinary surgeon being also sent for. Do not suffer yourself to be made a victim of quacks. There is no specific for this disease, and, under



improper treatment, it is more frequently fatal than otherwise. The early attendance of a veterinary surgeon in this disease is the more desirable, as its early symptoms are extremely like those of

**MALIGNANT EPIDEMIC**, which latter disease rapidly runs into gangrene, and terminates in death; and the former disease frequently passes into the latter, when not properly combated at first.

**BROKEN WIND, or HEAVES.**—Incurable; it may be alleviated by condensing the food—reducing as much as possible the quantity necessary to be consumed, by giving the necessary nutriment in as small a compass as you can—as, for instance, more oats and less hay. Keep the bowels moderately open, and never work upon a full stomach. Feeding upon carrots will also be found beneficial.

**WORMS.**—The symptoms show themselves in the appearance of the vermin in the excrements, or creeping out of the anus. Give two drachms of tartar emetic, with twenty grains of powdered ginger, every morning, fasting. When there appears much irritation about the anus, give a strong dose of aloes, and inject linseed oil.

**JAUNDICE**, known by the yellowness of the eyes, mouth, and of all naked portions of the skin, with high-colored urine, dullness, and loss of appetite. Bleed; give twice daily, until the bowels have been freely opened, two drachms of aloes, with one drachm of calomel; warm white-water, or thin gruel. Keep the stable cool; feed on green meats.

**DIFFICULTY OF STALING**—Give plenty of warm drink; give linseed boiled in plenty of water; turpentine made into a ball with linseed meal; half an ounce of turpentine and half a drachm of ginger, with as much of the meal as is required to form the ball.

**IN PROFUSE STALING**, (the opposite of the preceding,) the treatment should be bleeding, purging; every kind of counter irritation; astringent medicines; feed on carrots.

**WINDGALLS.**—An enlargement about the fetlock, caused by the enlargement of the mucus sacs, spoken of already in reference to spavin. Treatment the same.

**RINGBONE.**—A deposit of bony matter on the cartilages and bones of the pastern and foot. The only cure is firing, and even it is only occasionally successful.

**THOROUGH-PIN**, analogous to windgalls and spavin, being a similar enlargement above the hock, between the extensor muscle of the hock and the flexor tendons of the foot. Mode of treatment same as for windgalls.

**CURB** is the consequence of a strain of the tendon or its sheath, or the circular ligament which holds it in its place. It appears under the form of an enlargement at the back of the hock, two or three inches below its point. Bleed from the subcutaneous vein nearest the seat of injury; use emollient fomentations. Firing is sometimes, but not invariably, advisable. A veterinary surgeon must judge of this.

**STRINGHALT**—Cause and cure alike unknown.

◆ **GREASE** commences in inflammation of the skin of the heels, proceeding to excoriation, cracking, ulceration, and fungus. Cleanse well with soft-soap and water; use a solution of alum, or sulphate of copper, as a lotion. If there be much foulness, a carrot-poultice is valuable. Keep the bowels well open.

**CORNS**—Resulting from bad shoeing. Cure obvious.

**OVERREACH**—The bruise given by an awkward blow of the toe of one foot against the heel of another. Cleanse, and fasten a pledget of tow, dipped in friar's-balsam, upon the wound. When neglected, overreach will run into **QUITTOR**, which will require veterinary care.

Feeling that the above brief hints are all that would be likely to aid the amateur in the treatment of his horse, I conclude with an earnest reiteration of my advice—Whenever a horse worth saving displays symptoms of illness, send, without any loss of time, for—not a village farrier, or “cattle doctor”—but a regularly educated and diploma'd **VETERINARY SURGEON**.

THE HOG;  
HIS ORIGIN AND VARIETIES

MANAGEMENT WITH A VIEW TO PROFIT,

AND

TREATMENT UNDER DISEASE;

ALSO,

PLAIN DIRECTIONS RELATIVE TO THE MOST APPROVED MODES OF  
CURING AND PRESERVING HIS FLESH.

BY

H. D. RICHARDSON,

Author of "The Horse," "Domestic Fowl," "The Pests of the Farm,"  
"The Hive and the Honey-Bee," etc.

WITH ILLUSTRATIONS ON WOOD.

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# H O G S ;

## THEIR ORIGIN AND VARIETIES.

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### CHAPTER I.

#### UTILITY OF THE HOG.

THE HOG is an animal whose properties are calculated, in a very remarkable degree, at once to awaken the aversions and command the consideration of mankind: the former excited by the habits and manners displayed by the animal during life; the latter the result of reflection upon the sources of profit derivable from his carcass after death. The hog is at once the foulest and the most useful of quadrupeds. In aspect and general form he is uninviting; his life is seemingly devoted to the attainment of sensual or disgusting objects which constitute his enjoyments: and yet, however filthy in his habits, unsocial, often ferocious, he may be, he is one of the most valuable of animals; and is esteemed from the palace to the meanest cabin.

It is probable, that the repulsive habits of the hog, in a domesticated state, are attributable to his domesticators—the human race. The wild boar, the original of the domestic hog, does not present the same disgusting habits or gross sensuality as does his reclaimed descendant. It may be stated, that the domestic hog is bloodthirsty and treacherous. The proofs of such a disposition rest upon a few occurrences; we can easily bring forward instances of an opposite character. We have many proofs of the sagacity that the hog is possessed of, and to elicit which, education and judicious management are required! Have we not had “learned pigs,” capable of selecting cards from the pack, and of joining letters together to form words; and of performing many other

tricks that, were the sagacity of the hog of inferior grade, it never could have been taught to perform? There are two instances of this animal having been trained to the sports of the field: one occurred in the establishment of that celebrated sportsman, Colonel Thornton; and a sow was broken in to set game by Mr. Toomer, gamekeeper of Sir H. P. S. Mildmay. The latter animal turned out a most stanch pointer, and would quarter her ground, point, and even *back the dogs*, as correctly and as brilliantly as any first-rate setter of the canine race. Having been detected in the act of devouring a lamb, she was sold, and met the usual fate of her brethren—the knife of the butcher.

Nor are instances rare of the hog having conceived affection for other animals of a different race. A domestic pig attached itself to a bulldog, whom he would follow everywhere, and with whom he would gambol and play in the most harmonious manner; if the dog went with his master on a ramble, the pig would form, if permitted, one of the party; and when a stick was thrown into the water, for the dog to fetch, the pig would rival his canine associate, boldly take to the water, and delight in swimming; if it succeeded in reaching the stick sooner than the dog, it would take it in its mouth, and fetch it safely to land.

Such pigs as I have been for any length of time in the habit of visiting, have not only recognized me, but testified joy on my approach, and satisfaction at my caresses; nor could this have originated in motives of a selfish or sensual nature, as I was not their feeder.

It may be said that the pig *naturally* loves foul food and filthy bedding. That the wild boar does not is evident from his cleanly habits, and the dry and clean lair which he forms in his native forest; and that the domestic hog does not will be admitted by any person who has witnessed the delight that animal manifests on being furnished with fresh straw after his sty has been cleansed. "A hog is the cleanest of all creatures, and will never dung or stale in his sty, if he can get forth." "The hog, though he tumble in the dirt in the summer, is not a filthy animal. He doeth it, partlie to cool himselfe, partlie to kill his lice; for when the dirt is drie he rubbeth it off, and therebie destroyeth the lice." And do not other members of the order, including the *half-reasoning* elephant, practise the same; a resource no more than parallel with the custom of some savage nations, anointing their skins with grease for the same purpose. It is the fact that the hog will thrive

distinct species of true pig; but erroneously. It is not impossible that we might reclaim the Babyroussa and the Dicoteles; and the acquisition would be sufficiently valuable to warrant the attempt.



WILD BOAR.

The Wild Boar is very common in all the reedy marshes of Tartary and Siberia, and in the mountainous forests in the vicinity of Lake Baikal, as far as Lat. 50°, but is said not to occur in the northern extremity of Siberia.

The hog was not indigenous to the American Continent, but introduced into it by the Spaniards; either the original stock was a good one, or the breed has thriven peculiarly in that country, the present South American breed being remarkable for arriving early at maturity, and fattening easily. A sow, and a litter with her, were brought from Monte Video. One of these fattened, when very young, to 336 pounds; and although *ripe*, it had, in the opinion of the butcher, more flesh in proportion than he had ever before witnessed.

The food of the wild hog consists chiefly of roots and vegetables. Worms, insects, as well as acorns, beechmast, chestnuts, are

also greedily sought after and devoured; and acting upon a knowledge of the animal's feral habits, some proprietors turn out their swine to feed in the forests, searching for and driving them home when in a fitting condition. The pork of hogs, thus suffered, for a time, towards the close of their life, to cater for themselves, is found to be peculiarly sweet and delicate. A similar system is still resorted to in many parts of America, and with equal success; for we are not to judge of the true flavor of American pork from such as is at present imported into this country, its coarse taste and extreme hardness of texture being the result of the curing process adopted, and not of any improper method of feeding.

The Hog is, unless hard pressed, by no means so foul a feeder as many suppose. This will be the better understood from the following table, representing the comparative gramivorous propensities of the ox, horse, sheep, goat, and hog.

The ox eats	276 plants	and rejects	218
The horse	262	" "	212
The sheep	387	" "	141
The goat	449	" "	129
The hog	72	" "	171

The boar is, in his wild state, an object of terror, but when reduced to captivity, becomes comparatively gentle and manageable. A wild boar kept some years ago in the Parisian menagerie, performed several tricks, went through different exercises, and assumed various attitudes;—the stomach was however the "master of arts" on this occasion, for bread was the reward of obedience. In confinement, the wild boar soon becomes as inured to filth as the nastiest amongst his domesticated brethren.

The color of the wild boar is a brownish black, inclining to grey; he is usually not so large as our domestic breeds of hog, not exceeding from twenty-five to thirty inches in height at the shoulder; instances, however, of its attaining a larger size are recorded. He lives about thirty years; having attained maturity at about the fourth season. In habits, he is solitary, and lives apart from his kind in the forests. During the rutting season, in the months of December and January, he goes forth from retirement, and rejoining the herd, selects a mate. This selection is of course not made without many an obstinate conflict with fierce and formidable rivals, but the conqueror and his bride betake themselves to some unfrequented spot, and pair for thirty days.

better, and fatten more quickly, if kept with proper attention to cleanliness. We have not improved the character, or ameliorated the condition of this animal by domesticating him,—many of those habits that excite our disgust, are attributable to our misconception of his natural propensities, and mismanagement of him in a state of captivity. The hog, as we generally find him, is, in life, a very disgusting brute; and still, all these disagreeable qualities are amply counterbalanced by his extraordinary utility after death.

The flesh of the hog is remarkable for the property of taking salt more *kindly* than any other description of meat; it consequently retains its sweetness for a much longer period, and is, on that account, particularly calculated for ships' stores. It can be used for a greater length of time without change, without producing weariness of its use, or any of those unpleasant effects commonly attendant on the continued use of salt provisions, *as scurvy, &c.*, than any other description of salted meat; besides, it is denser in texture, and therefore *goes farther*.

The lard of the hog is in high esteem with the apothecary, for forming plasters, ointments, and other similar preparations—with the hairdresser, for forming pomatum, *bear's grease, cold cream*, and other accessories of the toilet. Its bristles are in demand with brushmakers and shoemakers; of the skin is made pocket-books, saddles, boot-tops; and even the ears are frequently made into pie. The hog furnishes another article, when properly fed and managed with a view to its production, namely, *brawn*. Among the properties of the hog, we must not omit sausages and black puddings, the former so greatly relished as adjuncts to dishes of a less savory character; nor, in conclusion, is the manure produced from the sty to be overlooked, nor its fertilizing properties forgotten.

I thus offer an apology for the hog's disagreeable peculiarities; he really is the most useful of quadrupeds.

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## CHAPTER II.

### THE WILD ORIGINAL.

THE Hog belongs to the Class Mammalia, or animals possessing teats or *mammæ*, for the nourishment of their young—to the sixth order, Pachydermata, or thick-skinned animals—to the ge-

nus, third of the order, *Sus*, or swine—and to the species, *Sus Scropha*, or Hog.

The dentition of the hog is as follows:—

Incisors  $\frac{4}{6}$  or  $\frac{6}{6}$       Canines  $\frac{1}{1}$       Molars  $\frac{7}{7}$

The incisors of the lower jaw are directed obliquely forwards; those of the upper are of a conical form. The canine teeth, or tusks, continue to grow, and increase in size during the whole of the animal's lifetime, projecting from the mouth, often to a very considerable length, and frequently curving outwards and backwards towards the extremities. The molars, or cheek teeth, are simple and tuberculated. There are four toes on all the feet, of which the two middle ones only rest upon the ground; but there exists a peculiar breed of swine, in other particulars true hogs, but possessing a *solid hoof*, formed of a *single toe*. These hogs are found in Sweden, especially about Upsall.

The nose of the hog is elongated, cartilaginous, and the snout is furnished with a particular bone. This arrangement is apparently with a view to facilitate the rooting and turning up the earth, in which the animal, in a state of nature, finds the chief portion of its subsistence. The teats are twelve in number; the body is cylindrical in form, and is covered with a thick skin, furnished, more or less, with bristles and stiff hairs; besides which, in some varieties, is an under coat of close curled hair. The ear is either small and upright, or large and pendulous. This member forms the chief characteristic of the domestic hog, and a large and pendant ear will be found the general concomitant of large size.

THE WILD BOAR is the origin of our domestic varieties of hog. They resemble him closely in form, and when permitted the enjoyment of their natural propensities, in habits also. The period of gestation in the wild and domestic Sow is the same, viz., sixteen weeks, and the two animals freely breed together, and produce fertile young; and these young will breed between themselves. Some writers have asserted the hog of the South Sea Islands, of China, and the Indian dominions to be distinct species, but without foundation.

The Hog is to be found in Europe, Asia, and the North of Africa. It has been introduced into, and thrives in America, Australia, and the South Sea Islands. In America he presents a slight variation of form in the *Dicoteles*, and in Africa in the *Phacochæres*. That of the South Sea Islands has been asserted to be a

In India, boar-hunting is still deemed a favorite diversion, and is eagerly pursued. The chase is usually followed on Arabian horses, which are preferable on account of their superior speed and tractability; the boar goes off at first in a slow trot, which soon, on being pressed, merges into a shambling gallop; the pace of the animal is then so swift that he can only be taken by running down. In a run of three miles the boar has often escaped altogether, and instances frequently occur of the chase extending over seven miles of country. The ordinary height of the Indian boar is three feet, but sometimes three feet six inches in height. The young of the Indian animal are of a pale yellow color, irregularly brindled with yellowish brown.

In former times, the wild boar roamed the glades of our own forests, and, as one of the noblest beasts of chase, had the honor of enjoying, with his compeers, the express protection of royalty. Of its existence, various records remain, and these consisting chiefly of edicts or proclamations that had been issued, announcing sundry pains and penalties as the consequence of its illegal destruction.

Fitzstephen, who wrote in the latter part of the twelfth century, states, that boars, wolves, wild bulls, and other game, abounded in the great forests surrounding London; and Scottish writers have not failed to mention those of Scotland.

Of the precise date of the extinction of the wild boar in the British Islands, we have no available record; but it is known, that so recently as the date of Charles I. that monarch endeavored to introduce these animals to the New Forest, Hampshire; these were, however, all destroyed in the civil wars.

We conclude this chapter with a few observations as to the estimation in which the hog has been held in different ages and in various lands. Moses, the inspired lawgiver of the Jews, prohibited the use of swine's flesh to his followers: "Because it divideth the hoof, yet cheweth not the cud." The Egyptians could eat pork only once a year, viz., on the Feast-day of the Moon, on which occasion they sacrificed to that luminary as a goddess. At all other times the hog was held to be unclean; and if any one only touched one of these animals, he could not enter a temple, nor hold intercourse with his fellow-men, until he had dipped, clothes and all, in the waters of the far-famed Nile. Those employed as swineherds belonged to a class or *caste*, degraded, despised, and, like their charge, held in utter abomination. This

aversion to the hog became transmitted to Northern Egypt, and the Copts altogether avoided rearing or keeping any of the race. The causes for these prohibitory enactments have been variously explained, but perhaps the most probable is, that in Egypt, Syria, and even the southern parts of Greece, the flesh of the hog, though in appearance white and delicate, is destitute of firmness, and is so overloaded with fat as to be calculated to disagree with the strongest stomach. An indulgence in such pork, therefore, under a burning sun, would possibly be attended with fatal consequences. Tacitus states, as the cause of swine's flesh being rejected by the Jews, the liability of that animal to be afflicted with leprosy; the use of sow's milk is mentioned by Plutarch as productive of that loathsome disease.

It has been affirmed that the chief cause of the rejection of Mahometanism by the Chinese was, their partiality for the flesh of the hog, denounced by that religion as an abomination.

During the days of the Roman empire, when epicurism had probably attained a greater height than it has ever since been permitted to reach, one of the most favorite dishes of the time, as well as the most fashionable, was a pig roasted entire, stuffed with various delicate birds and spices, steeped in choice gravies and costly wines.

Another great Roman dish was an entire hog, one half roast and the other boiled, and so carefully and curiously prepared, that the most accurate eye could not discover the process by which the animal had been put to death, or the stuffing introduced.

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### CHAPTER III.

#### VARIETIES OF THE DOMESTIC HOG.

DOMESTICATION has invariably the effect of producing *varieties* of any given species of animals. These variations from the original, spring from variety in the feeding and management—individual taste or caprice in breeding, with a view to a particular form or size—or the crossing with other and allied stock. It is possible that all these have operated in the case of the hog; and it is certain that we have now, in the breeding of that animal, arrived as nearly at perfection as we could reasonably hope. It



The sow brings forth from four to ten little ones at a litter. The domestic hog is more prolific than his wild original, and even fourteen and fifteen young have been produced by the domestic sow at one litter. At birth, the sow carefully conceals her farrow from the boar, who would otherwise devour them. The color of the young of the wild sow is a pale yellowish brown, marked with longitudinal black bands. The females live together in herds; several litters, with their dams, joining company, and the young boars remain with the herd until maturity. The habits of the wild boar are nocturnal, for he lies close during the day, and in the evening he goes forth to feed. In harvest time he does much mischief to the grain crops, and to the vineyards, trampling beneath his feet more than he consumes as food. The boar has been asserted to be in part carnivorous, and it has been stated that he eats horseflesh, and that the skins of deer, as well as claws and bones of birds, have been found in his stomach. It has even been stated that he will seek for and devour the smaller kinds of game, as partridges, leverets, and also eggs. Some, in alluding to the propensity for devouring their young, frequently displayed by the domestic sow, as also her occasionally destroying and devouring young children in the cradle, have endeavored to account for it, by attributing to them a violent craving for blood; this may be so.

Professor Lowe very naturally suggests that a sow's devouring her young is, in the strictest sense of the word, an *unnatural* act, one that would not take place in a state of nature, and most probably the consequence of the artificial position in which the animal is placed,—surrounded by filth and damp, and exposed to the annoyance of being constantly disturbed by visitors; for at this period, the sow is particularly irritable.

As to their destroying children, other animals have done so quite as frequently as the swine; and yet, these solitary instances have never been recorded as a stigma upon their entire race. The fact is, that the poor pig has far more than its just share of sin to answer for.

Hunting the wild boar is an exciting and dangerous amusement, perhaps one of the most so amongst field sports. It is usually followed by mounted huntsmen, armed with spears or rifles, aided by hounds, and attended by assistants, called on the continent "*piqueurs*" or *prickers*, whose duty it is to find and rouse their game from his lurking place. The boar is an animal of no

contemptible swiftness, and it is not every horse that is able to keep up with him, when once fairly afoot. Unless molested, or his lair threatened with invasion, the boar will not attack man; but once aroused, his ferocity is formidable, and his defence of the most resolute description; he displays so much courage and determination, that it is impossible not to regard his character as partaking of the noble, and almost to regret the destruction of so brave a foe. When overtaken and brought to bay, is the time when the affray becomes invested with a serious character. Woe then to the horse who suffers himself to be seduced or goaded into too close proximity with the infuriated animal: woe to the dog who attempts to seize the monster by the ear or flank, prior to its strength having been sufficiently reduced by the spears or bullets of his human foes: and woe to the huntsman, who, thrown from his steed, or whose own foolhardiness has induced him to venture too near, fails in heart or hand, so as to cause the fatal ball to swerve from its true course, or direct the boarspear with nervelessness or irresolution. In such case, death and destruction are dealt around;—dogs, horses, and men are successively overthrown with ferocity and irresistible force. The boar inflicts a terrific wound with his tusks; and a horse once wounded by him, can never again be induced to approach him. Most dogs that have been thus served, and have recovered, have proved useless cowards.

The wild boar of Europe is now, however, by no means the formidable quarry he once was; and, in the foregoing description, it was his Indian Congener that I had more particularly in view.

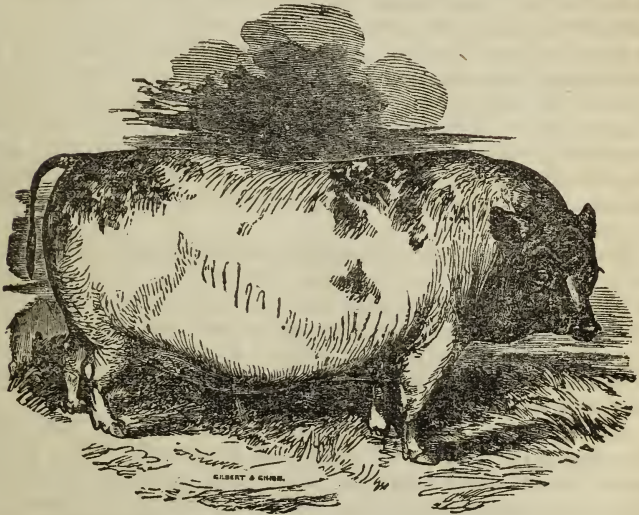
An old French newspaper details an account of an extraordinary boar killed near Cognac, in Augoumois. This was a beast of most formidable dimensions and notoriety. He had been frequently hunted, but unavailingly; his prodigious strength and powers of endurance bringing him off on all occasions, safe, if not scatheless; he had killed many horses and dogs, and maimed and killed several men; when at last slain, several bullets, received during previous conflicts, were found between the skin and the flesh. His size was prodigious, but his exact measurement not known. He had a very lengthened head, an elongated and sharp snout, and a terrific mouth, with formidable tusks of unusual magnitude and shape. The hair on the body was white, on the head yellowish, and on the neck was a black band; the ears were very large and straight. Notwithstanding the prodigious bulk of this creature, he displayed great swiftness.

were well that breeders always knew where to stop, for even improvement has a limit; and crossing, when carried beyond a certain point, will almost inevitably result in deterioration.

It has been asserted, that there exist only **THREE** actual varieties of the domestic hog—the Berkshire, Chinese, and Highland, or Irish; and that all other breeds, described as separate varieties, are nothing more than offshoots from one or other of these three main stocks. That such, to a certain extent, is the case, we admit. The fact is, however, that we are indebted for our numerous varieties of hog, as at present known, not only to these three well-known varieties, but also to the African hog—the Spanish, and Portuguese, and the Italian—chiefly, however, to the wild boar of the European forests.

#### THE CHINESE HOG.

**THE** Chinese Hog is to be met with in the south-eastern coun-



tries of Asia, as Siam, Cochin China, the Burman empire, Cambodia, Malacca, Sumatra, and in Batavia, and other eastern islands. There are *varieties* of the hog in India and China, and hence the

occasional confusion of nomenclature met with in books of natural history.

There are two well-marked varieties of the Chinese hog—that from Siam, and that from China proper. The chief, if not only, point of difference subsisting between them is, however, in color—the Siamese variety being usually black and the Chinese white. Neither of these hogs, however, present constant uniformity in this respect, their color frequently varying, and black hogs coming from China, while white ones are brought from Siam. Even in the same litter, have pigs of different colors frequently been seen, and instances of the occurrence of *pie'd* individuals. In the case of all animals submitted to the influence of domestication, color alone is by no means a safe criterion in the enumeration of varieties.

The Chinese hog is of small size. His body is very nearly a perfect cylinder in form; the back slopes from the shoulder, and is hollow, while the belly is pendulous, and in a fat specimen almost touches the ground. The ear is small and short, inclines to be semi-erect, and usually lies rather backward. The bone is small, the legs fine and short. The Bristles are so soft as rather to resemble hair. The skin itself is, in the Siamese variety, of a rich copper color, and the hair black, which gives to the general color of the animal somewhat the effect of bronzing. In the Chinese variety, the color is usually white, sometimes black, and occasionally *pie'd*. The white sort are deemed preferable, from the superior delicacy of their flesh. The face and head of the Chinese pig are unlike those of any other description of swine, somewhat resembling a calf.

Both the Siamese and Chinese hogs are very good feeders, arrive early at maturity (a most important particular in any description of live stock), and feed fat, on less food, and become fatter and heavier within a given time, than any of our European varieties. The Chinese value the hog very highly; they live more upon pork than on any other description of animal food; and it is said, that they even use the milk of the sow.

The Chinese take great care of their swine, and pay particular attention to the quality and quantity of their food, feeding them at regular and stated intervals. They do not permit them to walk, but when necessary, have them carried from one place to another. They keep the beds and styes of their hogs scrupulously dry and clean; it is to this attention that we are possibly to attribute the excellent qualities of Chinese pork. The Chinese hogs that

we generally see in this country come principally from the vicinity of Canton, brought thence as sea stock. It is scarcely to be regretted that this breed is not sufficiently hardy to thrive in our climate. From this circumstance, we are compelled to limit the advantages we might otherwise derive from its introduction to crossing with our own coarser domestic breeds of swine. For this purpose it is truly valuable; and the improved race, thus produced, is infinitely superior even to its Chinese progenitor, the latter, in a pure state, being too small, and hence answering rather for pork than bacon, besides fattening even *too easily*. Both these objections are obviated in the cross, which has further the effect of restoring diminished fecundity.

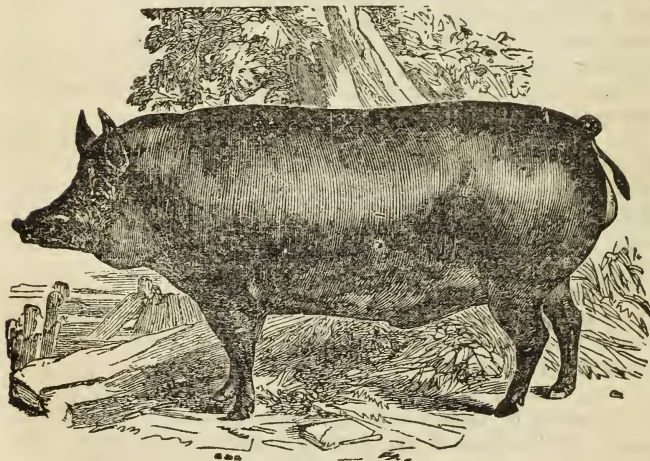
The most profitable cross to be resorted to, was, in the first instance, found to be between the old English, which is not unlike the present Irish breed, and the black Chinese. This cross produced a most capital breed, and a little judicious intermixture afterwards, with proper selection of boar and sow, has eventuated in the desired improvement. By too constant crossing with the Chinese, we may possibly diminish both the size and fecundity of our own hog. This circumstance should induce breeders at all events to use caution and judgment, that they may be aware of the precise moment when they have arrived at the highest attainable perfection; these observations will apply only to a very limited percentage of breeders; the majority, requiring rather to be aroused from the indolence which induces them to abstain from all endeavors towards bettering the condition or character of their stock.

The Chinese breed is not so well known in Ireland as it is in England, or in Scotland, although the climate of the last-named country appears so unsuitable to its constitution. France cultivated this breed earlier than we, and the hog usually described as the **PORTUGUESE**, is so extremely like the Chinese, that it has been made a question whether these varieties are not identical.

In cases where the reader has reason to suspect that he has crossed too long from the Chinese breed, he will find a dash from the wild boar, or Westphalian, most valuable; this cross will aid in restoring size, but have a still greater effect on the quality of the meat, causing the fat and lean to be more regularly mixed, and imparting to them a delicacy of flavor that will be duly appreciated by the lover of good pork or of sound sweet bacon. The imperfections in shape, and excess of bone and offal which characterize the wild boar, will altogether disappear in the finer form

of the *degenerated* stock with which you cross him. This cross will further supply a suitable THICKNESS of skin—a most essential quality, especially in *pork*—for in thin-skinned pork the *cracklin* or skin becomes so hard and *metallic* that no teeth can master it, whereas in a thick-skinned animal it is merely gelatinous, may be easily masticated, and is a part of the animal too much valued by epicures, and consequently too valuable in the *shambles*, to admit of being neglected by the judicious breeder or producer. This *thinness* of skin, so objectionable in a *pork* pig, becomes the reverse when the animal is designed for *bacon*. The small size, however, of the eastern hog renders him only suitable for *pork*, and hence one reason why too long crossing from him should be avoided. The thinness or thickness of the skin must not of itself alone be deemed a recommendation or the reverse. The *thick* skin must not be *coarse*, for a *coarse thick* skin denotes a bad stock, and pork encased in such a cuticle is *shrunk* in the *cooking*; hence a practice with some cooks to *score* the skin even of *boiled* pork, in order to allow to the flesh room sufficient for swelling.

#### THE BERKSHIRE.



This county has the honor of being the first to avail itself of

the opportunity of improvement afforded by the introduction of foreign stock, nor have its breeders paused where they began, or omitted following up with judgment, perseverance, and success, the advantage they thus, in the first instance, obtained.

The Berkshire hog is of large size, and is almost invariably of a reddish brown color, with black spots or patches. The old breed of Berkshire is now extinct, and has been so for many years; it had maintained a high reputation for centuries. It was long and crooked-snouted, the muzzle turning upwards; the ears large, heavy, and inclined to be pendulous; the body long and thick, but not deep; the legs short, the bone large, and the size very great. This, of course, was not any thing like perfection; the want of depth of body and the weight of bone were highly objectionable, but it was altogether a material improvement upon the gaunt and rugged old English pig, whom it speedily superseded.

The modern and improved Berkshire was in Laurence's time lighter both in head and ear, shorter and more compactly formed, with less bone, and higher on the leg. This breed has been since still further improved by judicious crossing; it still has large ears, inclining forward, but erect, is deep in the body, with short legs, small bone, arrives early at maturity, and fattens easily and with remarkable rapidity. In these improvements we recognize the results of intermixture with the Chinese, but also with another variety yet to be described. The colors and marking of the Berkshire hog show him also to owe a portion of his blood to the wild boar. The true and improved breed of Berkshire is of large size. One of the greatest improvers of modern times was Richard Astley, Esq., of Oldstone Hall.

#### THE OLD IRISH "GREYHOUND HOG."

THESE are tall, long-legged, bony, heavy-eared, coarse-haired animals, their throats furnished with pendulous wattles, and by no means possessing half so much the appearance of domestic swine as they do of the wild boar, the great original of the race. In Ireland the old gaunt race of hogs has, for many years past, been gradually wearing away, and is now perhaps wholly confined to the western parts of that country, especially Galway. These swine are remarkably active, and will clear a five-barred gate as well as any hunter; on this account they should, if it be desirable to keep them, be kept in well-fenced inclosures. The breed of hogs in:

Ireland has improved greatly of late years, and this, the old unprofitable stock, is rapidly disappearing. The form of the Irish hog is now so nearly approximated to that of the English, that the two animals are not readily distinguished from each other.

Notwithstanding the rather unpromising exterior presented by the original old Irish hog, it would be unfair to omit recording his peculiar susceptibility of improvement. It may be well to add that the Irish swine possesses flesh of a peculiarly good flavor

The most remarkable breeds of hogs, are those of :



SUFFOLK BOAR.

SUFFOLK, said by most writers to be the most nearly related to the CHINESE: my reasons for espousing this opinion will be found in the description of the animal, that of the Chinese being at the same time duly borne in mind. The Suffolk breed of Swine are a small, delicate pig, thin-skinned, soft-haired, small, pricked ear,—color white; they are in character like the Chinese, fed almost as easily, are more hardy, and possess more lean meat.

THE CHESHIRE BREED is chiefly remarkable for its vast size,



which is almost gigantic. It has a very large and heavy head, long narrow body, long legs, large bone, great heavy ears, and loose, ungainly skin: color, large patches of black and white, or blue and white, or white. This breed is susceptible of much improvement by crossing with the Chinese, or the Neapolitan.

**THE HAMPSHIRE.**—This breed is not unfrequently confounded with the Berkshire, but its body is longer, and its sides flatter; the head is long, and the snout sharp. The color is usually dark spotted, but sometimes black altogether, and sometimes white. In many parts of Hampshire, especially in the neighborhood of the New Forest, it is usual to permit swine to pass a considerable portion of their existence in the woods; the result is superior quality of flesh, exhibiting much resemblance to that of the Westphalian hog, but still more delicately flavored. On this account, the Hampshire bacon is in much demand, and fetches a higher price than that of Westphalia. This is partly attributable to the mode of curing. The original breed of Hampshire was not such as I have described, being generally of a white color, coarse, raw-boned, and flat-sided. The present race owes its origin to the Berkshire, Suffolk, and Chinese breeds, and latterly to a cross from the Leicester; the effect of the last has been increase of size, the original race seldom exceeding four hundred pounds.

**THE YORKSHIRE.**—The old breed was about the very worst and most unprofitable we had, being gaunt and greyhound shaped, with long, ungainly legs and great excess of bone. Its constitution was likewise bad, it did not well endure the cold of winter, when severe, and hence was a bad sty-pig. These swine, however, attracted the attention of breeders to the improvement of their form, for they possessed one excellent quality. They were quicker feeders, and fattened more rapidly than many pigs more promising in external appearance. The improvement that ultimately proved successful was a cross with the true Berkshire.

**SHROPSHIRE.**—The original pigs of this county were of a white or brindled color; the head was long and coarse, the ear large and flabby, and the hair wiry—the leg also too long and the weight of the bone great. A cross with the Berkshire and original Chinese has greatly improved this stock. The same may be said of the

**WILTSHIRE** breed, originally, it is believed, from Wales. They were long-bodied, low and hollow about the shoulder—high on the rump, of middling size, round-limbed; large pointed ear; of

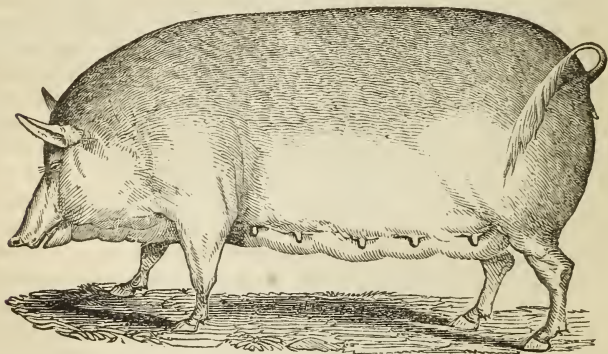
a light color. Of itself, of comparatively little value, but like the preceding breed, an excellent cross with the Berkshire stock.

**HEREFORDSHIRE.**—Generally supposed to be the result of a cross with the Shropshire; it is shorter in the body, carries less bone than that breed, has also a lighter head, a smaller ear, a less rugged coat, and is altogether a far more valuable animal. This hog is little inferior to the Berkshire breed.

**GLOUCESTERSHIRE.**—The Gloucestershire hogs are somewhat less in size than the preceding, and are also shorter in the body, rounder both in frame and limb, and altogether more compactly built. They make good store hogs, and their pork is of prime quality.

**NORTHAMPTONSHIRE,** of a light color, of a handsome shape, light and small ear, little bone, deep-sided and compactly formed. This is a profitable porker and a good store, for he feeds well, fattens rapidly, and arrives early at maturity.

**NORFOLK.**—A small breed, with pricked erect ears; color various, but generally white. The white colored are said to be the best; when striated or blue, the breed is inferior, at least generally so. This is a short-bodied and compactly formed pig, and is an excellent porker. There is another Norfolk variety, of larger size, spotted; but inferior in point of delicacy.



THE LEICESTER SOW.

**LEICESTERSHIRE.**—An ancient breeding district, and once greatly celebrated for its swine. The old stock were large-sized, deep

in the carcass, and flat-sided ; head and ear light and handsome ; color light spotted.

LINCOLNSHIRE.—The old LINCOLNSHIRE breed was light colored, or even white, with, in most specimens, a curly and woolly coat, of medium size ; good feeders, came early to maturity, and fattened easily.

THE ESSEX was in former days a very capital hog, but degenerated, and, of course, lost the esteem of breeders. A recollection of the former good qualities which characterized the breed induced some persons of practical judgment to revive it, which was accordingly done ; and now this hog, under the name of

THE IMPROVED ESSEX, ranks, most justly, very high amongst our British breeds of swine. The improvement of this hog is due to a cross with the NEAPOLITAN ; and this cross has been so frequently resorted to, that the pure ESSEX breed and the NEAPOLITAN are so much alike that it is not every cursory observer who is capable of discriminating between them. It is probable, also, that the Chinese was employed in the regeneration. The ESSEX hog is up-eared ; has a long, sharp head ; a long and level carcass, with small bone ; color most frequently black, or black and white. This is a quicker feeder, but he requires a greater proportion of food than the weight he attains to justifies ; besides which, he is troublesome in a fold, being restless and discontented. The pure breed should be almost bare of hair, and black in color.

There is another improved Essex breed called the *Essex half blacks*, resembling that which I have described in color, said to be descended from the Berkshire. This breed was originally introduced by Lord Western, and obtained much celebrity. They are black and white, short-haired, fine-skinned, with smaller heads and ears than the Berkshire, feathered with inside hair, a distinctive mark of both ; have short, snubby noses, very fine bone, broad and deep in the belly, full in the hind quarters, and light in the bone and offal. They feed remarkably quick, grow fast, and are of an excellent quality of meat. The sows are good breeders, and bring litters of from eight to twelve, but they have the character of being bad nurses.

THE SUSSEX.—Black and white in color, but not *spotted*, that is to say, these colors are distributed in very large patches ; one-half—say, for instance, the forepart of the body—white, and the hinder end black ; or sometimes both ends black, and the middle

white, or the reverse. These are no way remarkable; they seldom feed over 160 lbs.



THE ORIGINAL OLD ENGLISH BREED was not very unlike the Old Irish or Highland; long in the legs, large coarse ear, heavy head, rugged hair, and carrying too much bone to be profitable. This breed has yielded to the march of improvement; and, unless in parts of Cornwall, it would be difficult to discover a surviving specimen.

#### CHAPTER IV.

##### VARIETIES OF THE DOMESTIC HOG CONTINUED—CONTINENTAL VARIETIES.

OF the Continental varieties of the hog, the most important, and which requires our attention in the first instance, is

THE WESTPHALIAN.—This is the animal whose hams are so

much relished amongst us, and which, on that account, form no small item of the importations for which we are indebted to our German neighbors. The Westphalian hog requires little description, for he is a very near relative of the wild boar of his native country; and like that fierce and once formidable animal, usually roams at large in the forest, feeding chiefly upon beechmast and acorns, until slaughtered. The color of the adult Westphalian hog varies; but in every case whatever may be the hue of the parents, the young are, at birth and for some months afterwards, marked with the longitudinal bands characteristic of their wild blood. As to the improvement resulting from an occasional cross with the wild original, I refer to the animal under consideration. It is, in the first instance, to the *cross* that their excellent quality of flesh must be attributed.

The Westphalian swine are seldom over-fat; but they are not on that account to be deemed difficult to fatten. On the contrary, they will, if kept up, take fat with remarkable facility, and attain an enormous weight.

**THE NEAPOLITAN SWINE.**—This is a variety well worthy of attention, as a cross from it is productive of very remarkable improvement. The color of the Neapolitan swine is black, with no bristles, and little or no hair. The flesh of these swine is extremely delicately flavored, and the fat has not that rankness so objectionable in some other varieties; they are anything but hardy animals, not being able to endure our climate; it is merely as affording the opportunity of forming, by crossing, a valuable mixed breed, that they are deserving of notice. With the true Berkshire breed, the Neapolitan produces a cross, surpassed by none in every desirable quality, especially if a dash of the *white* Chinese be added. The intermixture of these breeds—the Neapolitan, Chinese, and Berkshire—may be regarded, if done judiciously, as the perfection of swine breeding. After having been a short time in this country, the Neapolitan hog begins to lose his naked appearance, and to acquire a coat better suitable to a more chilly climate.

**THE FRENCH SWINE.**—The French appear to have long known the value of a cross with the Chinese variety of hog, and most of their best breeds bear evidence of having, more or less, relationship to that animal. The most remarkable French breeds are, those of Poitou, the Pays d'Auge, Perigord, Champagne, and Boulogne

The Poitou has a long and rather bulky head, with pendulous and somewhat coarse ears—an elongated body, broad and strong feet, and large bones; its hair and bristles are harsh. That of the Pays d'Auge has a smaller head, with a sharp muzzle, narrow and pointed ears, long body, broad and strong limbs, but small bone—hair coarse, scanty in quantity, and of a white color. The Perigord swine are generally black—a very short and lumpy neck, with a broad and compact carcass. Those of Champagne are of considerable size, long-bodied and flat-sided, with a broad pendant ear. Those of BOULOGNE are related to the English breeds. Their color is usually white. They are of a large size, have a large broad ear, and are quick fatteners. It is to these swine that we are indebted for the celebrated Boulogne sausages.

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## CHAPTER V.

### POINTS OF A GOOD HOG.

I WOULD caution the reader against being led away by mere *name*, in his selection of a hog. A hog may be called a *Berkshire*, or a *Suffolk*, or any other breed most in estimation, and yet may, in reality, possess none of this valuable blood. The only sure mode by which the buyer will be able to avoid imposition is, to make name always secondary to *points*. If you find a hog possessed of such points of form as are calculated to ensure early maturity, and facility of taking flesh, you need care little what it has seemed good to the seller to call him; and remember that no *name* can bestow value upon an animal deficient in the qualities to which I have alluded. The true Berkshire—that possessing a dash of the Chinese and Neapolitan varieties—comes, perhaps, nearer to the desired standard than any other. The chief points which characterize such a hog are the following:—In the first place, sufficient depth of carcass, and such an elongation of body as will ensure a sufficient lateral expansion. Let the loin and breast be broad. The breadth of the former denotes good room for the play of the lungs, and a consequent free and healthy circulation, essential to the thriving or fattening of any animal. The bone should be small, and the joints fine—nothing is more indicative of high breeding than this; and the legs should be no longer than, when

full fat, would just prevent the animal's belly from trailing upon the ground. The leg is the least profitable portion of the hog, and we require no more of it than is absolutely necessary for the support of the rest. See that the feet be firm and sound; that the toes lie well together, and press straightly upon the ground; as, also, that the *claws* are even, upright, and healthy. Many say that the form of the head is of little or no consequence, and that a good hog may have an ugly head; but I regard the head of all animals as one of the very principal points in which pure or impure breeding will be the most obviously indicated. A high-bred animal will invariably be found to arrive more speedily at maturity, to take flesh earlier, and with greater facility, and, altogether, to turn out more profitably, than one of questionable or impure stock; and, such being the case, I consider that the head of the hog is, by no means, a point to be overlooked by the purchaser. The description of head most likely to promise, or rather to be the concomitant of, high breeding, is one not carrying heavy bone, not too flat on the forehead, or possessing a too elongated snout—the snout should be short, and the forehead rather convex, curving upwards; and the ear should be, while pendulous, inclining somewhat forward, and, at the same time, light and thin. Nor should the buyer pass over even the *carriage* of a pig. If this be dull, heavy, and dejected, reject him, on suspicion of ill health, if not of some concealed disorder actually existing, or just about to break forth; and there cannot be a more unfavorable symptom than a hung-down, slouching head. Of course, a fat hog for slaughter, or a sow heavy with young, have not much sprightliness of deportment.

Nor is color altogether to be lost sight of. In the case of hogs, I would prefer those colors which are characteristic of our most esteemed breeds. If the hair be scant, I would look for black, as denoting connection with the Neapolitan; but if too bare of hair, I would be disposed to apprehend too intimate alliance with that variety, and a consequent want of hardihood, that, however unimportant if pork be the object, renders such animals hazardous speculations as stores, from their extreme susceptibility of cold, and consequent liability to disease. If white, and not *too sn all*, I would like them, as exhibiting connection with the Chinese. If light or sandy, or red with black marks, I would recognize our favorite Berkshire; and so on, with reference to every possible variety of hue. These observations may appear trivial; but they are the

most important I have yet made, and the pig buyer will find his account in attending to them.

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## CHAPTER VI.

### HOUSES AND PIGGERIES.

AN enclosure, proportionate to the number of swine which you intend to keep, and, if possible, so managed as to admit of extending the accommodation, will be found the best for general purposes. It should be provided with a range of sheds, so situated as to be thoroughly sheltered from wind and weather, paved at the bottom, and sloping outwards. Relative to the paramount necessity of cleanliness and dryness, let both enclosure and sheds possess the means of being kept so. In order to keep the sheds, which are designed as sleeping places, in a dry and clean state, an inclination outwards is necessary: a shallow drain should run along the whole of their extent, in order to receive whatever wet flows down the inclined plane of the sleeping huts; and provision should also be made for this drain to carry off all offensive matters beyond the precincts of the piggery.

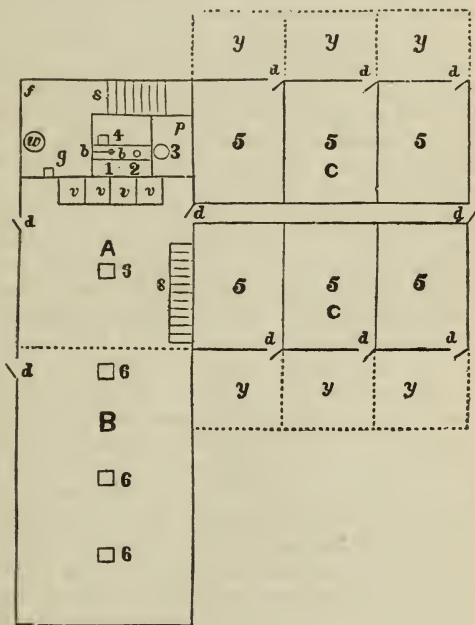
The ground, on which the piggery is established, should likewise be divided into two parts, by a drain, which should run through it; and towards this drain each section should slope. This the main drain should be carried beyond the fold, and fall into a large tank or pit formed for that purpose. The object in view is to keep the pig-fold and styes in a clean and dry state, and to preserve the valuable *liquid manure*, which comes from the animals you keep. Some will probably inquire whether it would not be better to suffer the moisture to soak into earth or straw, or other substances on the *floor* of the enclosure, and then to clear all away periodically, than to drain off the liquid into a tank. By drawing off the liquid you add to the cleanliness of your swine, and, in proportion, to their health and capacity for thriving; and the collection of the liquid manure into tanks is less troublesome than the removal of substances, saturated with it, from the floor of the fold, would be.

The sties should be so constructed as to admit of being closed up altogether, when desirable; for swine, even the hardest breeds,



are susceptible of cold, and if exposed to it in severe weather, it will materially retard their fattening. The sty should be kept constantly supplied with clean straw. The refuse carted into the tank, will, in the form of manure, more than repay the value of the straw. It has been asserted, that swine do not thrive, if kept together upon the same ground in considerable numbers; this assertion rests on a want of ventilation and cleanliness.

As to *troughs*, let them be of stone or cast metal;—if of wood, the pigs will soon gnaw them to pieces;—and let them be *kept*



PIGGERY.

A, B, front; C, C, rear for pens; 5, 5, pens with alley between; v, v, v, v, vats on level with pens: 1, safety valve; 2, Steam pipe; 3, supply barrel to boiler; b, boiler; f, furnace; p, platform partly over boiler; 4, chimney; t, drain; w, water-cistern; g, door to cellar; s, s, stairs; d, d, doors; 6, 6, scuttles to cellar; y, y, yards to pens.

*clean.* Before each feeding, a pail of water should be dashed into the trough : this may be deemed troublesome, but it will confer *golden returns* on those who attend to it.

A supply of fresh water is essential to the well-being of swine, and should be freely furnished. Some recommend this to be effected by having a stream brought through the piggery ; and undoubtedly, when this can be managed, it answers better than any thing else. Swine are dirty feeders, and dirty drinkers, usually plunging their fore-feet into the trough or pail, and thus polluting with mud and dirt whatever may be given to them. One of the advantages, therefore, derivable from the stream of running water being brought through the fold is, its being, by its running, kept constantly clean and wholesome. If, therefore, you are unable to procure this advantage, it will be desirable to present water in vessels of a size to receive but one head at a time, and of such height as to render it impossible, or difficult, for the drinker to get his feet into it. The water should be renewed twice daily.

I have hitherto been describing a piggery capable of containing a large number ; a greater proportional profit will be realized by keeping a number of swine than a few. It may happen, however, that want of capital, or of inclination to embark in swine-feeding as an actual speculation, may induce many to prefer keeping a small number of pigs, or even perhaps one or two, in which case such accommodations as I have been describing would be more than superfluous. In this case, a single hut, well sheltered from wind and rain, and built with a due regard to comfort, to warmth, with a little court surrounding its door, in which the tenant may feed, obey the calls of nature, and disport himself, or bask in the sunshine, will be found to answer ; a small stone trough, or a wooden one, bound with iron, to preserve it from being gnawed to pieces, will complete the necessary furniture. The trough will serve alternately for food and drink. Even, however, when this limited accommodation is resorted to, a strict attention to cleanliness is no less necessary than when operations are carried on, on the most extensive scale. Both the floor of the hut and that of the little court should be paved, and should incline outwards ; along the lowest side should be a drain, with a sufficient declination, and so contrived as to communicate with your dung-tank. The farther the manure-heap, or tank, from the dwelling, the better : vegetable matter, in progress of decomposition, gives rise to pestilential vapors, or miasmata.

When the weather is fine, a few hours' liberty will serve the health and the condition of your hog, and a little grazing would be all the better. Should you be desirous of breeding, and keep a sow for that purpose, you must, if you have a second hog, provide a second sty, for the sow will require a separate apartment when heavy in pig, and when giving suck. This may be easily effected by building it against that which you have already erected, thus saving the trouble of raising more walls than are absolutely necessary; and it need not have a court attached it, should it be inconvenient for you to have one, as the best accommodation can be given up to the breeding sow, and your pigs will do well enough with a single apartment, if not too confined, and have sufficient ventilation; and if you permit them the advantage of taking the air for a few hours daily. The extensive feeder should have a boiler of large size, properly fitted up, and an apparatus for steaming, as some vegetables are cooked in this mode more advantageously than by boiling. The poor man can use a pot as a substitute for a boiler, remembering in every case to clean it before using. Food should be presented to swine in a warm state—neither too hot nor too cold.

A sty should be about seven or eight feet square, and the court about ten feet. The second sty need not be more than six feet square, and does not absolutely require a court.

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## CHAPTER VII.

### BREEDING, REARING, AND FEEDING.

In the selection of a boar and sow for breeding, much more attention and consideration are necessary than people generally imagine. It is as easy, with a very little judgment and management, to procure a good as an inferior breed; and the former is infinitely more remunerative, in proportion to outlay, than the latter can possibly ever be.

In selecting the parents of your future stock, you must bear in mind the precise objects you may have in view, whether the rearing for pork, or bacon; and whether you desire to meet the earliest market, and thus realize a certain profit, with the least possible outlay of money, or loss of time; or whether you mean

to be contented to await a heavier, although somewhat protracted return.

If bacon, and the late market be your object, you will do well to select the large and heavy varieties, taking care that the breed has the character of being possessed of those qualities most likely to ensure a heavy return, viz: *growth*, and *facility* of taking fat, relatively possessed by each. To that description I refer my reader.

If your object be to produce pork, you will find your account in the smaller varieties; such as arrive with greatest rapidity at maturity, and which are likely to produce the most delicate flesh. In producing *pork*, it is not advisable that it should be *too fat*, without a corresponding proportion of lean; and, on this account, rather take a cross-breed sow than a pure Chinese stock, from which the over-fattening results might most naturally be apprehended. The Berkshire, crossed with Chinese, is about the best porker I can mention.

In every case, whether your object be pork or bacon, the *points* to be looked for are,—in the Sow, a small, lively head, a broad and deep chest, round ribs, capacious barrel, a haunch, falling almost to the hough, deep and broad loin, ample hips, and considerable *length* of body in proportion to its *height*. One qualification should ever be kept in view, and, perhaps, should be the first *point* to which the attention should be directed, viz.: *smallness of bone*.

Let the BOAR be less in size than the sow, shorter and more compact in form, with a raised and brawny neck, lively eye, small head, firm, hard flesh, and his neck well furnished with bristles,—in other respects, look for the same points as I have described in reference to the sow. Breeding within too close degrees of consanguinity, or, *breeding in and in*, is calculated to produce degeneracy in size, and also to impair fertility; it is therefore to be avoided, although some breeders maintain that a *first cross* does no harm, but, on the contrary, that it produces offspring which are disposed to arrive earlier at maturity, and take fat with greater facility. This may in some instances be the case; it is so with horned cattle, but as far as swine are concerned, it is not my own experience.

Differences of opinion exist as to the precise age of boar and sow, at which breeding is most advisable. They will, if permitted, breed at the early age of six or seven months; but this is a practice not to be recommended. My advice is, to let the sow be, *at least*, one year old, and the boar, *at least*, eighteen months; but,

if the former have attained her second year, and the latter his third, a vigorous and numerous offspring are more likely to result. The boar and sow retain their ability to breed for about five years, that is, until the former is upwards of eight years old, and the latter seven. I do not recommend using a boar after he has passed his fifth year, nor a sow after she has passed her fourth, unless she have proved a peculiarly valuable breeder; in which case, she might be suffered to produce two or three more litters. When you are done with the services of the boar, have him emasculated—an operation that can be performed with perfect safety at any age,—fatten or sell him. When it is no longer desirable to breed from the sow, kill her. Before doing so, it is a good plan to put her to the boar, as she takes fat afterwards more rapidly than she otherwise would.

If a sow be of a stock characterized by an unusual tendency to take fat, it is well to breed from her at an unusually early age,—say eight or nine months; for this tendency to fat, in a breeding sow, is highly objectionable, as conducing to danger in parturition. Let her have the boar a couple of days after pigging, and let her breed as frequently as she is capable of doing. This will effectually check the tendency to fat; and, after having taken a few litters from her, you will find the rapidity with which, should you desire her for the butcher, she will take flesh, quite extraordinary. In the case of such a sow, do not give the boar before putting her up to fatten.

Feed the breeding boar well; keep him in high condition, but not fat: the sow, on the other hand, should be kept somewhat low, until after conception, when the quantity and quality of her food should be gradually increased. The best times for breeding swine are, the months of March, and July or August. A litter obtained later than August has much to contend with, and seldom proves profitable; some, indeed, state that when such an occurrence does take place, whether from accident or neglect, the litter is not worth keeping. It is little use, however, to throw any thing away. Should the reader at any time have a late litter, let him leave them with the sow; feed both her and them with warm and stimulating food, and he will thus have excellent pork, with which to meet the market, when that article is at once scarce and dear, and consequently profitable. By following this system of management, he will not only turn his late litter to account, but actually

realize almost as good a profit as if it had been produced at a more favorable season.

The period of gestation in the sow varies ; the most usual period during which she carries her young, is four lunar months, or sixteen weeks, or about one hundred and thirteen days. M. Teissier, of Paris, a gentleman who paid much attention to this subject, in connexion not merely with swine, but other animals, states that it varies from one hundred and nine to one hundred and forty-three days ; he formed his calculation from the attentive observation of twenty-five sows.

The sow produces from eight to thirteen young ones at a litter, sometimes even more. Extraordinary fecundity, is, however, not desirable, for a sow cannot give nourishment to more young than she has teats for, and, as the number of teats is twelve, when a thirteenth one is littered, he does not fare very well. The sufferer on these occasions is of course the smallest and weakest ; a too numerous litter are all indeed generally undersized and weakly, and seldom or never prove profitable ; a litter not exceeding ten will, usually, be found to turn out most advantageously. On account of the discrepancy subsisting between the number farrowed by different sows, it is a good plan, if it can be managed, to have more than one breeding at the same time, in order that you may equalize the number to be suckled by each. The sow seldom recognizes the presence of a strange little one, if it have been introduced among the others during her absence, and have lain for half an hour or so amongst her own offspring in their sty.

While the sow is carrying her young, feed her abundantly, and increase the quantity until parturition approaches within a week or so, when it is as well to diminish both the quantity and quality. While she is giving suck you cannot feed too well. You may wean the young at eight weeks old, and should remove them for that purpose from the sow ; feed them well, frequently, abundantly, *but not to leaving*, and on moist, nutritious food, and pay particular attention to their lodgment—a warm, dry, comfortable bed is of fully as much consequence as feeding, if not even of more. Should the sow exhibit any tendency to devour her young, or should she have done so on a former occasion, strap up her mouth for the first three or four days, only releasing it to admit of her taking her meals. Some sows are apt to lie upon, and crush their young. This may be best avoided by not keeping the sow too fat or heavy, and by not leaving too many young upon

her. Let the straw forming the bed also be short, and not in too great quantity, lest the pigs get huddled up under it, and the sow unconsciously over-lie them in that condition.

The young pigs should be gradually fed before permanently weaning them; and for first food, nothing is so good as milk, which may be succeeded by ordinary dairy wash, thickened with oat or barley meal, or fine pollard; this is better scalded, or, better still, boiled. To the sow, some dry food should be given once daily, which might consist of peas, beans, Swedish turnips, carrots, parsnips, or the like, either well boiled, or raw; but I prefer the food to be *always* boiled, or, what is still better, *steamed*. Some wean the pigs within a few hours after birth, and turn the sow at once to the boar. Under certain circumstances, this may be found advantageous; but I think that the best mode of management is to turn the boar into the hog-yard, about a week after parturition, at which time it is proper to remove the sows for a few hours daily from their young, and let them accept his overtures when they please. It does not injure either the sow or her young if she take the boar while suckling, but some sows will not do so until the drying of their milk.

CASTRATION and SPAYING should be only performed on such as you intend to keep, as you do not know what a purchaser's wishes on the subject might be. It is, of course, unnecessary for me to give any directions as to the mode of performing this operation, as no amateur should attempt it, and men who make the practice their means of livelihood, are, in every district, not difficult to be got at, or exorbitant in their terms. The sow is, if desirable, to be spayed while suckling; the boar, as I have already stated, may be castrated at any age with perfect safety.

At weaning time, RING the young pigs. This operation must be a painful one, but scarcely so much so as the little sufferers would seem to indicate. RINGING is, however, absolutely necessary, unless the cartilage of the nose be *cut away*, a practice resorted to in substitution for it in some parts of England; the latter practice is, however, far more cruel than ringing, and its efficacy is by many stated to be at the best questionable.

After about five weeks' high and careful feeding subsequent to weaning, the young pigs may be put up for stores, porkers, &c., according to your views respecting them. Very young pigs, immediately after being weaned, if fed on the refuse of a dairy, will be brought up for delicious pork in five or six weeks; for the last

week, prior to killing, the addition of grains or bruised corn will impart a degree of firmness to the flesh, that is considered an improvement. This is called "dairy-fed pork," and it never fails to fetch an enhanced price, thereby amply remunerating its producer.

Hogs designed for pork should not be fattened to the same extent as those designed for bacon. I am aware that it will be vain for me to request the reader not to do so, as fat produces weight—weight, profit—and profit is the object of the feeder. But to those who feed for domestic consumption, I urge the suggestion, and they will find their account in following it. Porkers should be suffered to run at large. Grazing, or the run of a wood in which roots or nuts may be met with, is calculated in an eminent degree to improve the quality of their flesh. It will be necessary to give the hogs regular meals, independent of what they can thus cater for themselves; and the hours for so doing should be in the morning, before they are let out, and in the evening, before they are returned to their sty. Too many swine should not be kept in one sty; and if one become an object of persecution to the rest, he should be withdrawn. The introduction of strangers should likewise be avoided.

Bacon hogs fatten best by themselves; they need no liberty; and it is only necessary to keep the sty dry and clean, and to feed abundantly, in order to prepare them for the knife. In order to fatten a hog, his *comforts* must in every respect be attended to.

Those who make pork-feeding a business, and consequently keep a number of these animals, should so manage as to be enabled to provide for their maintenance and fattening from the produce of their crops. They should therefore raise the potato, beans, peas, barley, buckwheat, flax, parsnips, carrots, cabbage, lettuce, Lucerne, Italian rye-grass, clover, rape, chicory, and vetches. Nor are we to forget the important articles, mangold and Swedish turnips; the latter especially, as being an article that sad necessity has recently, for the first time, brought into the full degree of notice it has always deserved;—and an article that is now found to be no less valuable for human food than it is admitted to be for the food of cattle.

The best possible mode of feeding hogs is with a mixture of two or more of the roots or plants enumerated, well steamed, and a little meal or bran added, or, instead of meal or bran, add brewer's grains, wash, half malted barley, pollard, &c.,—let these be well-boiled and given moderately cool, and in a moist state.



The advantages derivable from the use of hay-tea in storefeeding hogs was, I think, for the first time demonstrated to the public, some years ago, by Mr. Saunders, of Stroud, in Gloucestershire. Mr. Saunders was induced to try this diet with hogs, from an observation of its efficacy in weaning calves; his experiments were attended with the most unqualified success.

The use of flax-seed, as an addition to the other food for fattening swine, has been recommended, but is found not to answer nearly so well in the crude state as previously kiln-dried, and well crushed, so as to crack the seed, otherwise the animal will pass a large proportion of the seed in a whole state; the whole seed acts as a purgative and diuretic, which will be opposed to the secretion of fat. To prepare the seed for food, steep them for twelve hours in water, which may be poured on them in a tepid state, but not at boiling heat; and, prior to giving the mess, add as much lukewarm wash as will bring it to the consistence of gruel. This wash may be produced from brewer's grains, or simply from mangold or Swedish turnips, well boiled and mashed, and given with the water in which they have been boiled: the addition of a proportion of bran improves the mess, and when one has it, it should not be omitted.

The adoption of hay-tea as the vehicle for mixing these ingredients, will be found also advantageous. Do not *boil* the flax seed—boiling will produce a coarse, tough and not very digestible mass; but steeping, on the contrary, furnishes a rich and nutritious jelly. Linseed cake is a good substitute for the seed, and is to be given in a proportion of fourteen pounds, for seventeen or eighteen pounds of ground seed. Neither should be given, except in combination with a large proportion of other substances, as they are of a very greasy nature, and are apt to impart a rank flavor to flesh, if given in an unmixed state, and are actually more efficacious in combination. If you have plenty of meal, the addition of a little to the daily feeds, will be found to tell well, especially towards the close of fattening, a few weeks previous to transferring your stock to the butcher.

The refuse of mills form a very valuable item in swine food, when mixed with such boiled roots as I have enumerated;—as starch sounds, the refuse from the manufacture of that article; also the fibrous refuse remaining from the manufacture of potato starch.

Swine are frequently kept by butchers, and are then fed principally upon the garlage of the shambles,—as entrails, the paunch

es, lights, and the viscera of sheep and cattle, as well as the blood. Swine are, like their human owners, omnivorous, and few articles come amiss to them. It must, nevertheless, be confessed, that the flesh of hogs fed on animal food is rank both in smell and taste, and readily distinguishable from that produced from a vegetable diet. I am not unnecessarily prejudiced, and it is on the *merits* of the case alone that I condemn butcher-fed pork. Pork butchers, resident in large towns, are very apt to feed chiefly on offal of all sorts, including that arising from the hogs daily slain and dressed for the market.

There is yet another description of feeding: I allude to the feeding of swine in knackers' yards. The animals are kept in considerable numbers, and are fed wholly upon the refuse of dead horses—chiefly the entrails, the carcass being in too great demand among those who keep dogs, to permit of it being unnecessarily wasted. Nor are these horses always *fresh*, the swine revelling in *corruption*, and disputing with the maggot the possession of a mass of liquid putrefaction. And are we to say nothing of the number of horses who die of glanders, farcy, or some similarly frightfully contagious and incurable disorder? How can we be certain that this is not one of the many sources whence occasionally spring apparently causeless pestilences, or malignant epidemics? While such a practice is tolerated, with what caution should we not purchase bacon or pork, lest we should thus eat at second-hand of substances so revolting to the feelings, so dangerous to individual and public health.

CHANDLER'S GREAVES are likewise objectionable as food for swine, unless given in comparatively small quantities, and mixed with bran, meal, and boiled roots. If fed wholly on either greaves, or oil-cake, or flax-seed, the flesh becomes loose, unsubstantial, and carryon; and gives out a flavor resembling that of rancid oil.

Hogs that have been fed chiefly on corn, alternated with the vegetable diet already described, produce pork nearly equal in delicacy of flavor, whiteness of color, and consequent value, to that well-known, delicious article, DAIRY PORK. INDIAN CORN is most useful in *feeding* and in *fattening* pigs; it should be employed in conjunction with oat or barley meal, or some other equally nutritious matter.

Respecting the *quality of food*, vast numbers of bacon hogs are almost invariably fed upon potatoes; but however apparently satisfactory may be their weight and condition, yet when slaughtered

immediately, or before having several weeks of substantial food, to harden their flesh, they are always found inferior to corn-fed pork and bacon, the fat having a tallowy appearance, of an insipid taste, and shrinking for want of firmness; whereas, when boiled, it should be transparently hard, with a tinge of pink in its color, the flavor should be good, and the meat should swell in the pot. Potatoes, therefore, though fine food for stores, should never be used *alone* as sustenance in the fattening of bacon hogs; for, in proportion to the quantity employed, it will render the flesh, and consequently the price, inferior to that of hogs which have been properly fed. They are, however, frequently employed, when steamed, in conjunction with either tail, or stained barley, coarsely ground; and farmers who grow potatoes for the market may thus profitably dispose of the chaff along with their unmarketable corn: but those persons who wish to acquire a reputation for producing fine bacon, should never use anything for fattening but hard meat, together with skim-milk, if it can be procured.

When swine are not of very large size, and it is desirable to raise pork rather than bacon, a very economical mode of feeding may be advantageously employed:—it consists of equal parts of boiled Swedish turnips and bran. If it be desirable to render the accumulation of fat more rapid, let Indian meal be substituted for the bran, and, in flax-growing countries, the seed prepared as already directed.

A hog WASHED WEEKLY WITH SOAP AND A BRUSH will be found to thrive, and put up flesh in a ratio of at least five to three, in comparison to a pig not so treated. This fact has been well tried, there can be no possible question about its correctness, and the duty is not a very difficult matter to perform, for the swine, as soon as they discover the real character of the operation, are far from being disposed to object, and after a couple of washings, submit with the best grace imaginable.

BEWARE NOT TO SURFEIT your hogs. It is quite possible to give too much even to them, and to produce disease by over-feeding.

Many examples of great weights, produced by judicious feeding and management, are upon record. Mr. Crockford's Suffolk hog, at two years old, weighed 980 lbs.; but I scarcely think it could have been *true Suffolk*, that being a small breed. Mr. Ivory's Shropshire hog weighed fourteen hundred, *when killed and dressed*, and there was, a short time since, a specimen of the *improved Irish breed of hogs* exhibited in Dublin, at the Portobello Gardens, which

weighed upwards of twelve hundred weight; this, when killed, would have amounted to something over half a ton.

In conclusion, observe caution in conjunction with the directions already given relative to feeding.

I. AVOID FOUL FEEDING.

II. DO NOT OMIT ADDING SALT in moderate quantities to the mess given: you will find your account in attending to this.

III. FEED AT REGULAR INTERVALS.

IV. CLEANSE THE TROUGHS PREVIOUS TO FEEDING.

V. DO NOT OVER-FEED; give only as much as will be consumed at the meal.

VI. VARY YOUR BILL OF FARE. Variety will create, or, at all events, increase appetite, and it is further most conducive to health; let your *variations* be guided by the state of the *dung cast*: this should be of medium consistence, and of a greyish-brown color; if *hard*, increase the quantity of bran and succulent roots; if too liquid, diminish, or dispense with bran, and let the mess be firmer; if you can, add a portion of corn, that which is injured, and thus rendered unfit for other purposes, will be found to answer well.

VII. FEED YOUR STOCK SEPARATELY, in classes, according to their relative conditions; keep sows in young by themselves; stores by themselves; and bacon hogs and porkers by themselves. It is not advisable to keep your stores too high in flesh, for high feeding is calculated to retard development of form and bulk. It is better to feed pigs intended to be put up for bacon, *loosely*, and not too abundantly, until they have attained their full stature; you can then bring them into the highest possible condition in an inconceivably short space of time.

VIII. DO NOT REGRET THE LOSS OR SCARCITY OF POTATOES so far as swine-feeding is concerned. Its loss has been the means of stimulating inquiry and producing experiment, which has resulted in the discovery that many other superior vegetables have been hitherto neglected and foolishly passed aside.

IX. DO NOT NEGLECT TO KEEP YOUR SWINE CLEAN, DRY, AND WARM. These are *essentials*, and not a whit less imperative than feeding, for an inferior description of food will, by their aid, succeed far better than the highest feeding will without them; and suffer me to reiterate the benefit derivable from *washing* your hogs; this will repay your trouble manifold.

X. WATCH THE MARKETS.—*Sell* when you see a reasonable

profit before you. Many and many a man has swamped himself by giving way to covetousness, and by desiring to realize an unusual amount of gain : recollect how very fluctuating are the markets, and that a certain gain is far better than the risk of loss.

## CHAPTER VIII.

### TIME REQUISITE FOR FEEDING FAT—QUANTITY OF FOOD—AND PROPORTIONATE INCREASE OF WEIGHT IN A GIVEN TIME.

THIS will, of course, vary very considerably, according to the weight, age, breed, and condition of the store when first put up, as well as the description of food on which, up to that period, the animal has been fed. The same observations are applicable to the quantity of food required for the production of fat.

If a young store, five or six weeks may be sufficient ; if older, six or eight ; and if of the mature age, intended for a perfect bacon hog, of that moderate degree of size and fatness which is preferred for the general consumption of the middle classes, from twelve to fourteen. A bacon hog, if intended to be thoroughly fattened for farm use, should, however, be of a large breed, and brought to such a state as not to be able to rise without difficulty, and will, perhaps, require five or six months, or even more, to bring him to that condition. This, however, supposes him to be completely fat ; to ascertain which with perfect accuracy, he ought to be weighed every week during the latter part of the process ; for although his appetite will gradually fall off as he increases in fat, yet the flesh which he will acquire will also diminish, until *at last it will not pay for his food*, and he should then be immediately slaughtered. Thus the increase of flesh in a hog put up to be fattened, and regularly weighed, was, on the following dates :—

			stone.	lbs.	
" Oct.	10	..	36	7	
	24	..	41	5	. 38 lbs. gain.
Nov.	7	..	45	7	.. 34 do.
	21	..	47	2	.. 11 do.
Dec.	5	..	48	7	.. 13 do.
	22	..	48	6	.. 1 lb. loss.

## CHAPTER IX.

## DISEASES OF SWINE.

IN order to prescribe, with any reasonable hopes of success, for any animal, a knowledge of that animal's anatomy, physiology, and habits when in health, are indispensable, and an intimate acquaintance with the characters of the substances employed as remedies. I would not recommend you to place much confidence in books published by quacks, and purporting to contain infallible specifics for the several diseases to which live stock are liable. Veterinary text-books, written by competent persons, are very different things. A host of honorable names stand upon record, on the face of their publications, in proof of the correctness of my assertion. By diligent study of these books, farmers might, I have little doubt, eventually arrive at a very respectable share of veterinary knowledge; acquire a tolerable idea of the internal structure of the several inhabitants of the farm-yard, and of their physiology; by practical observation they would become able to detect the presence of disease from the symptoms present, and be then able to adopt a course of treatment as might be suggested in the books they possessed. Under these circumstances, apply, if possible, to a regular veterinary surgeon.

Swine are by no means the most tractable of patients. It is anything but an easy matter to compel them to swallow anything to which their appetite does not incite them, and hence, 'PREVENTION' will be found 'BETTER THAN CURE.' CLEANLINESS is, in my opinion, the great point to be insisted upon in swine management; if this, and warmth, be duly attended to, the animal will not, save in one case, perhaps in a hundred, become affected with any ailment.

As, however, even under the most careful system of management, an occasional disappointment may occur, the reader is furnished with the following brief view of the principal complaints, by which some are, *under the most unfavorable circumstances*, liable to be attacked, and the plainest effectual mode of sanatory treatment, in such cases, to be adopted.

The principal diseases to which swine are liable are :—1, Fever; 2, Leprosy; 3, Murrain; 4, Measles; 5, Jaundice; 6, Foul skin; 7, Mange; 8, Staggers; 9, Cracklings; 10, "Ratille," or swelling

of the spleen ; 11, Indigestion, or Surfeit ; 12, Lethargy ; 13, Heav. ngs ; 14, " Diarrhœa ;" 15, Quinsy ; 16, Tumors ; 17, Catarrh.

All which dangerous, and often fatal, maladies may be PREVENTED from occurring by the simple attention to cleanliness already recommended, with judicious feeding. A hog can be relieved by bleeding, when such an operation will effect relief, whether he like to submit or not ; but it is very questionable whether he can be compelled to swallow medicines without his perfect consent and concurrence ; these, therefore, will best be administered by stratagem, and the hog's *appetite* is the only assailable point he has.

I. FEVER.—The symptoms are, redness of the eyes, dryness and heat of the nostrils, the lips, and the skin generally ; appetite gone, or very defective, and the presence, usually, of a very violent thirst. Of course, no symptom can be regarded as individually indicative of the presence of any particular disease ; these, which I have named, might, individually, indicate the presence of many other disorders, nay, of no disorder at all, but collectively, they point to the presence of fever as their origin.

Let the animal, as soon as possible after the appearance of these symptoms, be bled, by cutting the veins at the back of his ears. The pressure of the finger raises the vein, and you can then puncture it with a lancet. If the bleeding from this channel be not sufficiently copious, you must cut off a portion of his tail ; and after bleeding let him be warmly housed, but, at the same time, while protected from cold and draughts, let the sty be well and thoroughly ventilated, and its inmate supplied with a constant succession of fresh air. The bleeding will usually be followed, in an hour or two, by such a return of appetite as to induce the animal to eat a sufficient quantity of food to admit of your making it the vehicle for administering such internal remedies as may seem advisable. The best vehicle is bread, steeped in broth. The hog, however, sinks so rapidly, when once he loses his appetite, that no depletive medicines are in general necessary or suitable ; the fever will usually be found to yield to the bleeding, and your only object need be the support of the animal's strength, by small portions of nourishing food, administered frequently.

Do not, however, at any time suffer your patient to eat as much as his inclination might prompt ; the moment he appears to be no longer *ravenous*, remove the mess, and do not offer it again until

after a lapse of from three to four hours. It is a singular fact, that as the hog surpasses every other animal in the facility with which he acquires fat, he likewise surpasses all others in the rapidity with which his strength becomes prostrated when once his appetite deserts him. The French veterinarian practice recommends the addition of peppermint to the bread and broth. If the animal be not disgusted by the smell, it may be added; and if the bowels be confined, the addition of castor and linseed oil, in equal quantities, and in the proportion of two to six ounces, according to the size of the hog, should not be omitted.

If you find yourself unable to restore the animal's appetite, the case is nearly hopeless, and you may regard its return as one of the most infallible symptoms of returning convalescence. It is, however, *possible* to administer medicine to the pig by *force*; although, for my own part, I cannot say that I have ever found it practicable.

There is a description of fever that frequently occurs as an epizootic. It often attacks the male pigs, and generally the most vigorous and the best-looking, without any distinction of age, and with a force and promptitude absolutely astonishing; for in the space of twelve hours, I have sometimes seen a whole piggery succumb: at other times its progress is much slower; the symptoms are less intense and less alarming; and the veterinary surgeon, employed at the commencement of the attack, may promise himself some success.

THE CAUSES OF THE DISEASE are, in the majority of cases, the BAD STIES in which the pigs are lodged, and the noisome food which they often contain. The food which the pigs meet with and devour are the remains of mouldy bread and fruit, especially those of peas and lentils—the fermentation and decomposition of which farinaceous substances, and especially the bran which is too frequently given to them, and the prolonged action of which determine the most serious in the whole economy. In addition to this, is the constant lying on the dung heap, whence is exhaled a vast quantity of deleterious gas; also, where they remain far too long, on the muddy or arid ground, or are too long exposed to the rigor of the season.

As soon as a pig is attacked with disease, he should be separated from the others, placed in a warm situation, some stimulating ointment be applied to the chest, and a decoction of sorrel administered. Frictions of vinegar should be applied to the dorsal



and lumbar region. The drinks should be emollient, slightly imbued with nitre and vinegar, and with aromatic fumigation about the belly. If the fever now appears to be losing ground, which may be ascertained by the regularity of the pulse, by the absence of the plaintive cries that were before heard, by a respiration less laborious, by the absence of convulsions, and by the non-appearance of blotches on the skin, there is a fair chance of recovery. We may then be content to administer, every second hour, the drinks and the lavements already prescribed, and to give the patient his proper allowance of white water, with ground barley and rye. When, however, instead of these fortunate results, the symptoms are redoubling in intensity, it will be best to destroy the animal; for it is rare that, after a certain period, there is much or any chance of recovery. Bleeding, practised at the ear or tail, is seldom of much avail, but occasionally produces considerable loss of vital power, and augments the putrid diathesis.

II. **LEPROSY.**—The symptoms of this complaint usually commence with the formation of a small tumor in the eye, followed by general prostration of spirits; the head is held down; the whole frame inclines towards the ground: universal languor succeeds; the animal refuses food, languishes, and rapidly falls away in flesh; blisters soon make their appearance beneath the tongue, then upon the throat, the jaws, the head, and the entire body. The flesh of a leprous pig is said to possess most pernicious qualities, and to be wholly unfit for human food. If the animal be killed in the very first stage of the disease, however, the affection is only superficial, the flesh nothing the worse, but rather improved in tenderness, and indeed, not to be distinguished from that of a perfectly sound animal. The cause of this disease is want of cleanliness, absence of fresh air, want of due attention to ventilation, and foul feeding. The obvious cure therefore is—first, bleed; clean out the sty daily; wash the affected animal thoroughly with soap and water, to which soda or potash has been added; supply him with a clean bed; keep him dry and comfortable; let him have gentle exercise and plenty of fresh air; limit the quantity of his food, and diminish its rankness; give bran with wash, in which you may add, for an averaged sized hog, say one of 160lbs. weight, a tablespoon full of the flour of sulphur, with as much nitre as will cover a sixpence, daily. A few grains of powdered antimony may also be given with effect.

III. **MURRAIN.**—Resembles leprosy in its symptoms, with the

addition of staggering, shortness of breath, discharge of viscid matter from the eyes and mouth. The treatment should consist of cleanliness, coolness, bleeding, purging, and limitation of food. Cloves of garlic have been recommended to be administered in cases of murrain. Garlic is an antiseptic, and as, in all those febrile diseases, there exists a more or less degree of disposition to putrefaction, it is not improbable that it may be found useful.

IV. MEASLES.—This is one of the most common diseases to which hogs are liable. The symptoms are, redness of the eyes, foulness of the skin, depression of spirits, decline, or total departure of the appetite, small pustules about the throat, and red and purple eruptions on the skin. These last are more plainly visible after death, when they impart a peculiar appearance to the grain of the meat, with fading of its color, and distension of the fibre so as to give an appearance similar to that which might be produced by puncturing the flesh.

Suffer the animal to fast, in the first instance, for twenty-four hours, and then administer a warm drink, containing a drachm of carbonate of soda, and an ounce of bole armenian; wash the animal, cleanse the sty, and change the bedding; give at every feeding, say thrice a day, thirty grains of flour of sulphur, and ten of nitre. It is to dirt, combined with a common fault, too little thought of, viz. giving the steamed food or wash to the hogs at too high a temperature, that this disease is generally to be attributed. It is a troublesome malady to eradicate, but usually yields to treatment, and is rarely fatal.

V. JAUNDICE.—Symptoms, yellowness of the white of the eye, a similar hue extending to the lips, with sometimes, but not invariably, swelling of the under part of the jaw. Bleed behind the ear, diminish the quantity of food, and give a smart aperient every second day. Aloes are, perhaps, the best, combined with colocynth; the dose will vary with the size of the animal.

VI. FOUL SKIN.—A simple irritability or foulness of skin will usually yield to cleanliness, and a washing with solution of chloride of lime, but if it have been neglected for any length of time, it assumes a malignant character, scabs and blotches, or red and fiery eruptions appear, and the disease rapidly passes into

VII. MANGE.—If the foul hide, already described, had been properly attended to, and the remedies necessary for its removal applied in sufficient time, this very troublesome disorder would not have supervened. MANGE is supposed, by most medical men, to

owe its existence to the presence of a minute insect, called "*acarus scabiei*," or "mange-fly," a minute creature, which burrows beneath the cuticle, and, in its progress through the skin, occasions much irritation and annoyance. Others, again, do not conceive the affection styled mange to be thus produced, but refer it to a diseased state of the blood, which, as is usually the case, eventually conveys its morbid influences to the superficial tissues. Much has been, and still might be said on both sides of the question, but such a discussion is scarcely suitable to the pages of a popular work. The *Symptoms* of the disease are sufficiently well known, consisting of scabs, blotches, and sometimes multitudes of minute pustules, on different parts of the body. If neglected, these symptoms will become aggravated; the disease will rapidly spread over the entire surface of the skin, and if suffered to proceed upon its course, unchecked, it will ere long produce deep-seated ulcers, and malignant sores, until the whole carcass of the poor affected animal becomes one mass of corruption.

THE CAUSES OF MANGE have been differently stated; some referring them to too high, and others to too low a diet. The cause is to be looked for in *dirt*, accompanied by *hot-feeding*; hot-feeding alone would, perhaps, be more likely to produce *measles* than *mange*, but *dirt* would unquestionably produce the latter disease, even if unaided by the concomitant error of hot-feeding.

Hogs, however well and properly kept, will occasionally become affected with this, as well as with other disorders, from *contagion*. Few diseases are more easily propagated by *contact* than mange. The introduction of a single affected pig into your establishment may, in one night, cause the seizure of scores, and, probably, furnish you with a three months' hospital experience. Do not, therefore introduce any foul-skinned pigs into your piggery; in fact, it would be a very safe proceeding, to wash every new purchase with a strong solution of *chloride of lime*. This substance is very cheap, and a little trouble, when applied as a preventive, is surely preferable to a great deal of both trouble, and, perhaps, *disappointment* when you are compelled to resort to it to cure.

If a hog be only afflicted with a mange of moderate virulence, and not of *very long standing*, the best mode of treatment to be adopted, is—

1. Wash the animal from snout to tail, leaving no portion of the body uncleansed, with *soft soap* and water.

2. Put him into a dry and clean sty, which is so built and

situated as to command a constant supply of fresh air, without, at the same time, being exposed to cold or draught; let him have a bed of clean, fresh straw.

3. Reduce his food, both in quality and in quantity; let boiled or steamed roots, with buttermilk, or dairy wash, supply the place of half-fermented brewer's grains, house wash, or any other description of feeding calculated to prove of a heating or inflammatory character. It is, of course, scarcely necessary to add, that those who have been feeding their swine on *horseflesh*, or chandler's greaves, cannot be surprised at the occurrence of the disease; let them, at all events, desist from that rank and nasty mode of feeding, and turn to such as has been indicated.

4. Let your patient fast for five or six hours, and then, give to a hog of average size—epsom salts, 2oz. in a warm bran wash. This quantity is, of course, to be increased or diminished, as the size may require. The above would suffice for a hog of 160lbs. It should be previously mixed with a pint of warm water. This should be added to about half a gallon of warm bran wash. It will act as a gentle purgative.

5. Give in every meal afterwards—of flour of sulphur, one tablespoon; of nitre, as much as will cover a sixpence, for from three days to a week, according to the state of the disease. When you perceive the scabs begin to heal, the pustules to retreat, and the fiery sores to fade, you may pronounce your patient cured. But before that pleasing result will make its appearance, you will perceive an apparent increase of violence in all the symptoms—the last effort of the expiring malady, as it were, ere it finally yields to your care and skill.

6. There are, however, some very obstinate cases of mange occasionally to be met with, which will not so readily be subdued. When the above mode of treatment has been put in practice for fourteen days, without effecting a cure, prepare the following: Train oil, one pint; oil of tar, two drachms; spirits of turpentine, two drachms; naphtha, one drachm; with flour of sulphur, as much as will form the above into the consistence of a thick paste. Rub the animal, previously washed, with this mixture—let no portion of the hide escape you. Keep the hog dry and warm after this application, and suffer it to remain on his skin for three entire days. On the fourth day, wash him once more with soft soap, adding a small quantity of *soda* to the water. Dry the animal well afterwards, and suffer him to remain as he is, having again

changed his bedding, for a day or so: continue the sulphur and nitre as before. I have never known any case of mange, however obstinate, that would not, sooner or later, give way before this mode of treatment.

7. Your patient being convalescent, white-wash the sty; fumigate it, by placing a little chloride of lime in a cup, or other vessel, and pouring a little vitriol upon it. In the absence of vitriol, however, boiling water will answer nearly as well.

Finally, all mercurial applications are, as much as possible, to be avoided; but, above every thing, avoid the use of ointments composed of hellebore, corrosive sublimate, or tobacco-water, or, in short, any *poisonous* ingredient whatever; very few *cures* have ever been effected by the use of these so called remedies, but very many *deaths* have resulted from their adoption.

VIII. STAGGERS, caused by excess of blood to the head; bleed freely from behind the ears, and purge.

IX. CRACKINGS will sometimes appear on the skin of a hog, especially about the root of the ears and tail, and at the flanks. These are not at all to be confounded with mange, never resulting from anything but exposure to extremes of temperature, without the suffering animal being able to avail himself of such protections as, in a state of nature, instinct would have induced him to adopt. They are peculiarly troublesome in the heats of summer, if the hog be exposed to a hot sun for any length of time, without the advantage of a marsh or pool in which to lave his parched limbs and half scorched carcass. Anoint the cracked parts twice or thrice a day with tar and lard, well melted up together.

X. RATILLE, or SWELLING OF THE SPLEEN.—The symptom most positively indicative of this disease, is the circumstance of the affected animal leaning towards one side, cringing, as it were, from internal pain, and bending towards the ground. The cause of the obstruction on which the disease depends is over-feeding, permitting the hog's indulging its appetite to the utmost extent that gluttony may prompt, and the capacity of its stomach admit of; a very short perseverance in this mode of management will produce this, as well as other maladies, deriving their origin from a depraved condition of the secretions and obstruction of the excretory ducts.

On first perceiving the complaint, clear out the alimentary canal by means of a strong aperient. If you think you can manage it, you may administer this forcibly, by having the mouth kept open

by two cords, that attached to the upper jaw being thrown across a joist, and drawn just so tight as to compel the patient to support himself on the extremities of his fore-toes; or allow the animal to fast for from four to five hours, he will then take a little sweet wash or broth, and in it you may mingle a dose of Epsom salts, proportioned to his bulk. This will generally effect the desired end of a copious evacuation, and the action of this medicine on the watery secretions will further relieve the existing diseased state of the spleen. Many recommend *bleeding*; and if the affection have continued for any length of time, it should be resorted to at once; when the disease is, however, discovered ere it has attained any considerable head, the aperient will suffice. The French veterinarians recommend the expressed juice of the leaves and tops of wormwood and liverwort to be given, half a pint for a dose. The decoction of these plants produced by boiling them in soft water for six hours, may be given in doses of from half a pint to a pint and a-half, according to the size, age, &c., of the patient.

Scammony and rhubarb, mixed up in a bran mash, or with Indian meal, may be given with advantage the following day, or equal portions of bluepill mass and compound colocynth pill, formed into a bolus with butter, and the animal, having been kept fasting the previous night, will probably swallow it; if he will not do so, let his fast continue for a couple of hours longer; Lower the animal's diet, and keep him on reduced fare, with exercise, and if you can manage it, *grazing*, until the malady has quite passed away; if you then wish to fatten, remember to do so gradually; be cautious of at once restoring the patient to full diet.

XI. SURFEIT.—Another name for indigestion; the symptoms are such as might be expected—panting, loss of appetite, swelling of the region about the stomach, &c., and frequently throwing up the contents of the stomach. In general, this affection will pass away, provided only it is permitted to cure itself, and all food carefully kept from the patient for a few hours; a small quantity of sweet grains, with a little bran-wash, may then be given, but not nearly as much as the animal would wish to take. For a few days the food had better be limited in quantity, and of a washy, liquid nature. You may then resume the ordinary food, only observing to feed regularly, and remove the fragments remaining after each meal.

XII. LETHARGY.—Symptoms, torpor, and desire to sleep, hanging of the head, and frequently redness of the eyes. The apparent

origin of this disease is the same as the last, only in this instance acting upon a hog having a natural tendency to a redundancy of blood. Bleed at the back of both the ears as copiously as you can, and if you cannot obtain a sufficient quantity of blood from these sources, have recourse to the tail. Administer an emetic, of which a decoction of chamomile flowers will be found the safest; a sufficient dose of tartar emetic, which will be far more certain. After this, reduce for a few days the amount of the animal's food, and administer a small portion of sulphur and nitre in each morning's meal.

XIII. HEAVINGS, or inflammation of the lungs.—This disease, which has acquired its name from the principal symptom by which it is characterized, is scarcely to be regarded as curable. If, indeed, it were observed in its first stage, when indicated by loss of appetite, and a short, hard cough, it might run some chance of being got under by copious bleeding, and friction with stimulating ointment on the region of the lungs, minute and frequent doses of tartar emetic should also be given in butter, all food of a stimulating nature carefully avoided, and the animal kept dry and warm. Under these circumstances, there would be no reason absolutely to despair of a cure, but it would be advisable at the same time, if the hog, when this primary stage of the malady was discovered, were not in very poor condition, to put him to death. If once the *heavings* set in, it may be calculated with confidence that the formation of tubercles in the substance of the lungs has begun, and when these are once formed, they are very rarely absorbed. The cause of this disease is damp lodging, foul air, want of ventilation, and unwholesome food. It is difficult to suggest what should be done when matters have reached this pass, or what remedies would prove of any service. It is now too late in most cases to resort to blood-letting, and the hide of the hog is so tough that it is not easy to blister it, for the purpose of counter-irritation; you may, however, try the following, though perhaps the knife might be best, if only to relieve the poor sufferer, and provide against the danger of infection; for it may be as well to state, that once tubercular formation becomes established, the disease may be communicated through the medium of the atmosphere, the infectious influence depending upon the noxious particles respired from the lungs of the diseased animal. Shave the hair away from the chest, and beneath each fore-leg; wet the part with spirits of turpentine, and set fire to it; you will, of course, have had

the patient well secured, and his head well raised, and have at hand a tannel cloth, with which to extinguish the flame, when you conceive it has burned a sufficient time to produce slight blisters; if carried too far, a sore would be formed, which would be productive of no good effects, and cause the poor animal unnecessary suffering. Calomel may also be used, with a view to promote the absorption of the tubercles, but the success is questionable.

XIV. DIARRHŒA, or *looseness*.—The symptoms, of course, require no comment, as they constitute the disease. Before attempting to stop the discharge, which, if permitted to continue unchecked, would rapidly prostrate the animal's strength, and probably terminate fatally, ascertain the quality of *food* the animal has recently had. In a majority of instances, you will find this to be the origin of the disease; and if it has been perceived in its incipient stage, a mere change to a more binding diet, as corn, *flour*, &c., will suffice for a cure; if you have reason to apprehend that *acidity* is present, produced in all probability by the hog having fed upon coarse, rank grasses in swampy places, give some chalk in the food, or powdered egg-shells, with about half a drachm of powdered rhubarb; the dose of course varying with the size of the hog. In the acorn season, and where facilities for obtaining them exist, they alone will be found quite sufficient to effect a cure. When laboring under this complaint, dry lodging is indispensable; and *diligence* will be necessary to maintain it and cleanliness.

XV. QUINSY, or an inflammatory affection of the glands of the throat.—Shave away the hair, and rub with tartar emetic ointment. Stuping with very warm water is also useful. When external suppuration takes place, you may regard it as rather a favorable symptom than otherwise. In this case, wait until the swellings are thoroughly ripe, then, with a sharp knife, make an incision through the entire length, press out the matter, wash with warm water, and afterwards dress the wound with any resinous ointment, or yellow soap with coarse brown sugar.

XVI. TUMORS, or hard swellings, which make their appearance on several different parts of the animal's body. It would not be easy to state the causes which give rise to these tumors, for they vary with circumstances. They are not formidable, and require only to be suffered to progress until they soften; then make a free incision, and press out the matter. Sulphur and nitre should be



given in the food, as the appearance of these swellings, whatever be their cause, indicates the necessity of alterative medicines.

XVII. CATARRH, an inflammation of the mucous membranes of the nose, &c., if taken in time, is easily cured by opening medicine, followed up by warm bran-mash, a warm, dry sty, and abstinence from rich grains or stimulating farinaceous diet. The cause has probably been exposure to drafts of air—see to it.

The instructions given comprise all that the amateur will ever find necessary for domestic practice, and FAR MORE than he will ever find occasion to follow, if he have attended to cleanliness, dry lodging, regularity of feeding, the use of *salt* in the food, and the addition of occasionally a small quantity of sulphur and nitre to the morning's meal.

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## CHAPTER X.

### SLAUGHTERING AND CURING.

THE Almighty Creator, when he had formed man, and placed him upon the earth, gave him power of life and death over all the inferior animals. This power was, however, given to him to be used, not to be abused; while permitted to slay for food, clothing, or other necessaries, nay, luxuries of life, it was never designed by our all-benevolent as well as omnipotent Lord that this power should be converted into a medium of cruelty, or that life should be taken away from any of his creatures in any other than the most humane manner possible. The necessity of humanity towards animals thus stands as not only a high moral duty, but one absolutely enjoined as a divine ordinance; it is also a part and parcel of all that is noble or excellent in human nature.

It is a mistake to suppose that this poor animal is insensible to pain. The poor hog does indeed feel, and that most acutely; well would it be for him that he did not, for then what miseries would he not be spared! he would not then care whether he was put out of pain at once, or suffered to hang up by the hind legs, the limbs previously dislocated at the hocks, between the tendons and the bone of which has been passed the hook by which he is suspended. Were he indeed insensible to pain, it would of course be a matter of indifference whether or not he were suffered to die

first, or, as soon as he had bled a sufficient quantity—was, still living and breathing, plunged into boiling water, in order to remove his hair; or then, with a refinement of cruelty that would not even permit of his being put out of his misery so soon, removed from the cauldron, ere life or feeling had yet departed, opened, and disembowelled alive.

I should be sorry to give pain to the feelings of any of my readers, but I had rather hurt their feelings than leave a suffering, a tortured quadruped, and that, too, one so useful to us, to experience such an ungrateful return, in the shape of such terrible and revolting miseries. I have described nothing but what I have personally witnessed, and I trust that what I have said may induce master-butchers and others to ascertain the conduct of their slaughterers, and the manner in which they perform their necessary but painful duty.

The usual mode of killing a hog in the country parts of England is, is, or used lately to be, fastening a rope around the upper jaw, and throwing it across a joist or beam; this is hauled by an assistant just sufficiently tight to compel the animal to support himself upon the extremities of his toes, with his snout elevated in the air. The butcher then kneels in front of him, and taking a sharp and pointed knife, first shaves away the hair from a small portion of the front of the throat, then gently passing the sharp-pointed steel through the superficial fat, gives it a plunge forward, a turn, and withdraws his weapon. A gush of blood follows, which is usually caught in proper vessels, for the purpose of forming black puddings. The rope is somewhat slackened—the victim totters, reels, the eye glazes—his screams cease—he falls, and life would speedily become extinct; but, alas! the butcher is paid by the job, he is in a hurry, and ere the breath is out of the poor brute's carcass, nay, ere he ceases to struggle or moan, he is tumbled into the scalding tub; he is then withdrawn in a second, placed upon a table, the hair and bristles carefully removed by scraping with a knife; disembowelling follows—and it is well if the poor wretch has perished before that process commenced.

In olden times, it would appear that our butchers were less hasty, or more merciful. All the skulls of hogs were broken in upon the frontal bones, precisely in the same manner as are now the skulls of oxen and other animals. Were the hog first deprived of sensibility by compression of the brain, as produced by a violent blow upon the forehead, he would be a passive victim in the butch

er's hands, who could not only perform all the remainder of the process with more humanity, but—and think well of it, such of you as might probably be swayed by no other consideration—with more despatch and less trouble.

I am happy in being able to add, that the humane custom of knocking the hog on the head before cutting his throat, is rapidly gaining ground, and that no respectable butcher will allow it to be dispensed with. In the country parts of both England and Ireland, however, the old abuses are still permitted to exist; and I am grieved to say that *everywhere*, with a very few honorable exceptions, the barbarous practice of plunging the hog into the scald, while yet living, is still *systematically* and *designedly* adopted. A very respectable man surprised me the other day, by deliberately telling me that “A hog will no way scald so well as when the life is in him.” This is, however, a mistake. It is only necessary not to suffer the animal to become cold and stiff. Readers—I raise my voice in behalf of a most useful and most cruelly treated animal; may I beg of you all to unite with me in the cause of humanity, and then I shall not have raised my voice in vain.

And now, having supposed the animal killed and dressed, let us proceed to inquire into the most approved modes by which its flesh may be converted into bacon and ham. The hog should be left fasting for full twenty-four hours before killed; and after the carcass has hung all night, it should be laid on its back upon a strong table. The head should then be cut off close by the ears, and the hinder feet so far below the houghs as not to disfigure the hams, and leave room sufficient to hang them up by; after which the carcass is divided into equal halves, up the middle of the back-bone, with a cleaving-knife, and, if necessary, a hand-mallet. Then cut the ham from the side by the second joint of the back-bone, which will appear on dividing the carcass, and dress the ham by paring a little off the flank, or skinny part, so as to shape it with a half round point, clearing off any top fat that may appear. The curer will next cut off the sharp edge along the back-bone with a knife and mallet, and slice off the first rib next the shoulder, where he will find a bloody vein, which must be taken out, for, if left in, that part is apt to spoil. The corners should be squared off when the ham is cut out.

I quote this passage, because it recommends a novel mode of cutting bacon, and one which I have not as yet seen practised. The ordinary practice is to *cut out* the spine or back-bone, and, in some

English counties, to take out the ribs also. It is only in porkers that the back-bone is thus divided.

The most approved mode of saving bacon, as practised by a majority of those extensive curers who have kindly favored me with the necessary details of this portion of my subject, is as follows :— If the swine you design killing have been a recent purchase, and have been driven from a distance, so as to have become winded or jaded, it is right that they should be kept up for a week, or perhaps more, until the effects of the journey have been entirely removed, and the animals restored to their original tranquillity and primeness of condition ; during this interval they should be fed upon meal and water. A difference of opinion exists, as to whether this food should be given in a raw state or boiled. I have taken some pains to ascertain the truth, and have no hesitation in pronouncing in favor of the latter ; at the same time, however, the mess should be given in a perfectly cold state, and not of too thick consistence. Some recommend that a small dose of nitre should be given daily in the food for a fortnight previous to killing ; others pronounce this to be unnecessary ; but all unite in recommending a very considerable reduction in the animal's food for two or even three days before killing, and a total deprivation of food for at least the last twelve hours of life.

In the country districts of Ireland, the hog is usually secured by the hind leg to a post or ring, the head is fastened to another ; the animal is thus securely strapped down upon a sloping slab or table, and the head is severed from the body by means of a sharp knife. I am informed that the bacon of a hog thus killed is more easily saved, and is superior in flavor and color.

The ordinary mode of killing a hog is, I am most happy to say, gradually approximating to such as humanity would dictate. It is thus :—A flat stage or table, inclining downwards in one direction, is prepared ; the pig receives a powerful blow with a mallet upon the forehead, which effectually deprives him of sensation ; he is then thrown upon the stage, and a knife plunged into the chest, or rather into that spot where the chest meets the neck. The blood flows freely, and is received into vessels placed for the purpose. A large tub or other vessel has been previously got ready, which is now filled with boiling water. The carcass of the hog is plunged into this, and the hair is then removed with the edge of a knife. The hair is more easily removed if the hog be scalded ere he stiffens or becomes quite cold, and hence some butchers cruelly

conceive it advisable to scald him while *yet there is some life in him*. The animal is now hung up, opened, and the entrails removed; the head, feet, &c., are cut off, and the carcass divided, cutting up at each side of the spine. A strong knife and mallet are necessary for this purpose, and will be found to answer better than a saw.

Bacon is cured in very different ways. For domestic use, it is usually laid upon a table, and salt with a little nitre added, well rubbed in, first on one side and then on the other, either with the bare hand or the salting glove. Some straw is then placed upon the floor of an out-house, a flitch laid thereon, with the rind downwards—straw laid above this, then another flitch, and so on; above the whole is placed a board, and heavy stones or weights above all. In three weeks or a month the meat is sufficiently salted, and is hung up on hooks in the kitchen rafters. The general practice of burning wood and turf in Irish kitchens, imparts a sweetness to the bacon thus saved that is not to be met with in *any* which you can purchase.

Another mode is as follows:—Prepare a pickle, by boiling common salt and nitre in water; mix, for a single hog, of tolerable size, one pound of coarse brown sugar, with half a pound of nitre; rub this well in with the salting glove, then put the meat into the pickle, and let it lie in this for two days; afterwards take it out of the pickle, and rub it with salt alone, then put it back into the pickle.

For a *mild cure*—Form *sweet pickle*, by boiling molasses with salt and water; rub the meat with sugar and nitre—add a small portion of strong pickle to the meat—put the meat into this, and let it lie in it for three weeks. If there be any spare room in the cask, fill up with molasses—eight pounds of salt, one pound of nitre, and six pints of molasses will about suffice for each hundred weight of meat; and will take about five gallons of water.

In about three weeks, less or more time being required according to size, take the meat out of pickle, and hang it in the drying-house. While in the drying-house, the flitches should be hung, neck downwards. You may cut out the ham, and trim the flitch according to fancy—nearly every county in England has, in this respect, a fashion of its own.

You then remove your hams and bacon to the smoking-house: they should not be suffered to *touch each other*; with this precaution you may hang them as closely as you please. Smoke-houses are of every dimension, but the smallest answer as well as the

most extensive. Before suspending the meat in the smoke-house, it should be previously well rubbed over with bran. The fire is made of saw-dust, which burns with a low smouldering glow, giving out far more smoke than if actually flaming.

In the process of smoking, your meat will lose from about fifteen to twenty pounds per hundred weight—a fact necessary to be borne in mind.

Sometimes the hogs are killed before they arrive at full size, and their hair removed by singeing; the bacon and hams of these are said to possess peculiar delicacy of flavor.

The best saw-dust for smoking hams or bacon is that made from oak, and it should be thoroughly dry. The saw-dust of common deal imparts a flavor of a disagreeable character, not unlike that of red herrings.

WESTPHALIAN HAMS.—The *genuine* Westphalian bacon is particularly good, but all sold under that name is not genuine; spurious Westphalian hams are manufactured to a considerable extent. The process of imitation is not difficult, and none but one of the trade can detect the imposture. The fine quality of Westphalian bacon depends on several causes: the healthy and semi-wild life the swine are permitted to enjoy—their relationship to the wild boar—they are not fattened to the fullest extent previous to killing. A large proportion of *sugar* and *juniper-berries* are used in curing—the proportion being usually one and a half pounds of sugar to three of salt, and two ounces of nitre. The *smoke* is also applied in a *cold state*. This is, perhaps, the principal secret. The hams are all hung at the top of a very lofty building, and by the time the smoke reaches them it is perfectly *cold*.

The ham of the Westphalian hog closely resembles that of the common *old Irish* breed; and the hams of that animal, when cured as has been described, could not be distinguished from those of Westphalia by the nicest judge.

LIMERICK.—The hams cured in Limerick have long enjoyed considerable celebrity, and are supposed to be superior to any others—those of Westphalia and Hampshire alone excepted. Their excellence appears chiefly to depend upon the sparing use of salt, and the substitution for it, to a great extent, of coarse sugar, with judicious smoking. Some of the Limerick smoking-rooms are upwards of thirty feet in height.

HAMPSHIRE.—The Hampshire bacon is in greater esteem than even the Westphalian—a circumstance attributable to the superior

excellence of the New-forest *swine* to those of that country, while they share equally with them the privilege of a forest life and acorns. The Hampshire curers smoke with saw-dust. In both this county and in BERKSHIRE, *singeing* is adopted more generally than scalding, and this process is considered superior to scalding, the latter being supposed to soften the rind and render the fat less firm.

The WILTSHIRE bacon is of peculiarly delicious quality, but the cause is obvious, and is not to be referred to any of the details of the curing process. This bacon is prepared from *dairy-fed* pork—this is the true secret.

In some counties, the pig is *skinned* prior to curing. Some amount of additional profit is of course derivable from this practice, but the bacon is inferior, being liable to become rusty, as well as to waste in the boiling.

Hams and flitches should always be hung up in a *dry* place, indeed it will be found useful to sew up the former in pieces of canvass or sacking, as is practised with the Westphalian.

It is difficult to save bacon in summer time, or in warm climates, but a machine has recently been invented, for which a patent has been obtained, which renders the saving of meat under the most adverse circumstances perfectly easy. The machine acts as a force-pump or syringe. Its extremity is inserted into the meat, and the handle worked; the brine, which must be very strong, is thus *forced through* the grain of the meat, and it is effectually impregnated with it, and well cured long ere it could turn: there can be no doubt but that this instrument is, under such circumstances as I describe, eminently useful—but it is no less certain that meat so cured is not equal to that saved under ordinary circumstances, and in the ordinary manner; the *grain of the meat* is too much loosened by the use of the machine, and the texture is thus deteriorated; it should, therefore, only be used when *necessity* requires, and never by *preference*, where the ordinary process can be adopted.

To extract the superabundant salt from your meat, prior to use, has long been a desideratum. The steeping it in water to which carbonate of soda has been added, is found useful; so is the addition of the same substance, or of lime, to the water in which it is boiled; so is changing the water, after the meat has been about half boiled. Sailors find washing the meat in sea water very efficacious, but I have made the discovery that this object can be attained to a far fuller extent by a very simple chemical process.

Put your meat to steep in tepid water, and after it has lain in it for some hours, add a small quantity of sulphuric acid. In three or four hours, take it out, and wash it two or three times in water; to the third water, add a small portion of carbonate of soda. Take your meat out, wash it again, and boil it for dinner. You will find the salt nearly, if not wholly, discharged; but you need not be surprised should the *color* of the meat be somewhat darkened—the deterioration does not extend farther; the flavor remains the same as when first corned, and the article becomes as wholesome as fresh meat. It is possible that this simple process may be found useful in long voyages, for a long-continued use of salted animal food without a free use of vegetables is found to contribute to the production of many diseases.

The following communication, coming from a curer by profession, will be found at once interesting and useful:—

“The hog is usually kept fasting for twenty-four hours previous to being killed. He is then brought to the slaughter-house, and despatched in the following manner: The butcher takes a mallet (a hammer with a long handle, like those used for breaking stones on a road), and with it strikes the hog on the forehead; if he be an expert hand, a single blow will suffice to knock the hog down, and render him quite senseless. A knife is then taken, and the butcher sticks the animal in the lower part of the throat, just between the fore legs. A boiler or tub, full of very hot or boiling water, is then prepared, in which the hog is immersed until the hair becomes so loose that it can be scraped off with a knife quite clean; where there is no convenience of this kind, the same effect may be produced by pouring boiling water over the hog. The hog is then hung up by the hind legs, cut up the middle, and the entrails taken out; after this, the carcass is left there for about twelve hours, to cool and become firm, when it is fit for boning or cutting up. Sometimes, instead of scalding, the hog is singed by fire—burned straw is generally used for this purpose; and this is called ‘singed pork.’

“The following is the mode of boning or cutting:—The pig is placed on a strong table or bench; the head is then cut off close to the ears; the hog is then opened down the back, a cleaver or saw is used for the purpose, and both back-bone and hip-bones are taken out, except in one or two places, yet to be spoken of, where a different system is pursued. The hind-feet are then cut off, so as to leave a shank to the ham. The fore-legs are then cut round



at the hough, the flesh scraped upwards off the bone, and off the shoulder-blade, which is taken out, quite bare, under the side. The saw is then run along the ribs, so as to crack them; they then lie quite flat. The hog is then divided straight up the back, and the sides are ready for salting, the ham still remaining in.

“When the sides are ready for salting, they are well rubbed on the rind side, and the space from which the shoulder-blade was taken out is filled with salt. The sides are then laid singly upon a flagged floor, and salt is shaken over them. In a day, or two days if the weather be cold, they must again be salted in the same manner; but now two sides may be put together, and powdered saltpetre shaken over each side, in the proportion of about two ounces to each side, if of average bacon size. After three or four days, the sides are to be again changed, the shanks of the hams rubbed, the salt stirred on, a little fresh salt shaken over them, and five or six sides may now be placed over each other. The sides may then be left thus for a week, when they may be piled one over the other to the number of ten or twenty sides, if you have killed so many hogs. Leave them so for above three weeks, until they get firm; they may then be considered saved, and will keep so for six or eight months, or according to pleasure.

“When required for use or for market, the sides are taken out of the salt, well swept and cleaned—the ham taken out, hung up, and dried with turf smoke; if a brown color be desired, a little sawdust of hard wood may be thrown over the turf. If hung up in a kitchen where turf is burned, and suffered to remain, not too near the fire, the same effect will be produced; and if the bacon have been well saved in salt, it will be excellent.

“The Belfast and Limerick methods of cutting differ from what I have described, inasmuch as the hip bones are left in, and the hams are cut out, while the hog is fresh, and saved separately. In some cases, also, the ribs are taken out of the sides, and, in Belfast, the shoulder blade is taken *out over the side*.

“Both the BELFAST and LIMERICK hams are cured in the same mild manner; they are, as I have stated, cut out of the hog when fresh, cured separately, and only left a sufficient time to be saved, and no more. They are not suffered to become too *salty*, a fault sometimes perceptible in the Wicklow hams. The Limerick and Belfast curers also make up different other portions of the hog separately, as *long sides*, *middles*, and *rolls*, for the English market.

“ Sometimes the ribs are taken out, and sometimes not, according to the market for which they are intended.

“ Limerick and Belfast hams are cured in the following manner:—They are cut fresh from the pig, with the hip bones left in them, and are placed on a flagged floor, the front of the second ham resting upon the shank of the first, and so on until all are placed; they are then sprinkled with strong pickle from a watering pot, and a small quantity of salt is shaken over them. Next day, the hams are taken up, well rubbed with salt, and laid down as before, when saltpetre is shaken over them in quantities proportionate to their size; they are left so for two days, and then taken up and rubbed as before, when they are laid down again, according to the space they have to fill—from three to six hams in height, with layers of salt between. After six days, the hams are reversed in the piles, that is, those that were packed on the top are put at the bottom. They then remain for six days longer in the pile, when they are considered cured. They are then taken up, and washed, and hung up to dry in the air. When they are to be smoked, they should be placed in a house made for that purpose, and smoked—in Belfast, with wheaten straw and sawdust, in Limerick with peat or turf.

“ The English method of cutting up and curing is similar to that practised in Belfast and Limerick, with the difference, that, with the exception of Hampshire, and, I believe, one other county, they never smoke their bacon.

“ We have, this season, had imported a great quantity of hams and other bacon from Cincinnati, and Baltimore, in America. They are cut in the same manner as the Limerick, and are in much esteem. The cured *shoulders* of the hog have also been imported—cut straight across, with the blade in, and the shank left attached. We have also received *middles*, and quantities of pork, in barrels, which is merely the hog cut up in pieces, and pickled.

“ I have reason to know that there are at the present time numbers of curers emigrating from our best curing districts to America and we may accordingly expect, ere long, to find our American hams surpassing, owing to the *quality* of the hogs they will have to operate upon, even our long-famed Limerick hams.”

THE  
HIVE AND THE HONEY-BEE;

WITH  
PLAIN DIRECTIONS

FOR  
OBTAINING A CONSIDERABLE ANNUAL INCOME FROM THIS  
BRANCH OF RURAL ECONOMY.

TO WHICH IS ADDED,  
AN ACCOUNT OF THE DISEASES OF BEES,  
WITH THEIR REMEDIES.

ALSO,  
REMARKS AS TO THEIR ENEMIES, AND THE BEST MODE OF  
PROTECTING THE BEES FROM THEIR ATTACKS

BY  
H. D. RICHARDSON,  
Author of "The Horse," "Domestic Fowl," "The Pests of the Farm,"  
"The Hog," etc., etc.

WITH ILLUSTRATIONS ON WOOD.

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# THE HIVE AND THE HONEY-BEE.

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## CHAPTER I.

### INTRODUCTORY.

THE subject of Bee culture is one that should occupy a far more prominent position than it at present does, in the domestic economy of the farmer. When successfully conducted, the management of these interesting insects becomes a source of pecuniary profit; and to be a successful cultivator requires only a very moderate degree of care and attention: let it be remembered that the first outlay in procuring a swarm, and providing suitable accommodation in the shape of hives or bee-boxes, is the only expense to be incurred; while the return, yielded by each honey harvest, is very considerable, and to be regarded as clear gain.

In order to give the reader some idea of the profit which may accrue from bee-keeping, under favorable circumstances, I may mention a statement of the late Mr. Nutt, relative to the quantity of honey taken by him from one set of collateral boxes, in a single season, viz: 183 lbs. 5 oz.

This statement has surprised many, and its accuracy has been doubted by some bee-keepers; and it certainly does, at first sight, appear startling. A correspondent informed me that he had last season, and one considered a bad one for bees, taken 102 lbs. of honey from two sets of boxes, and that he might have taken, perhaps, 10 lbs. more, without impoverishing the bees. The writer on Bees in the "Naturalists' Library," details the quantity taken from cottage hives in one season at about 10 lbs. from each hive. This is a very low average, however, and it has reference to a single deprivation only, as well as to a very imperfect description of hive. It is not my intention to exhibit the advantages of keeping bees on old and erroneous, and, I

wish I could add, *exploded* systems of management; but to show what can be done, if done *correctly*. I shall say nothing, therefore, as to what may be done with the common old hives, as I regard keeping bees in them, when more fitting ones may so easily be procured, as evincing something very like a self-willed determination *not* to make profit. Bee-keeping, when conducted on a proper principle, will form no mean item in the domestic economy of the extensive agriculturist; while to the humble cottier it will prove a little fortune, and furnish the means of effectually and permanently bettering his condition. I would say that a single set of collateral boxes, so simple in its construction, and composed of such inexpensive materials that any one could make them, ought to yield a profit at least sufficient to pay the rent of from five to ten acres of land, by no means a despicable holding, and one which, in its turn, will become a source of comfort, of independence, of social, and consequently, of course, of *national* amelioration.

The importance of honey both as an article of food and a valuable medicament, would appear to have been known to the ancients from the very earliest times. "The land of promise," to reach which the Israelites journeyed in protracted pilgrimage across an arid desert for a period of forty years, was described as "a land flowing with milk and *honey*;" while numerous passages throughout the sacred volume furnish evidence of the attention devoted by the ancient fathers of the Jewish people to the habits of the Bee itself, and the degree of acquaintance with that insect at which they had arrived. We are also told that several of the enlightened sages of ancient Greece deemed this subject worthy years of diligent investigation. Pliny informs us that Aristomachus made bees his whole study for a period of fifty-eight years.

Philiscus retired into desert places for the purpose of keeping and contemplating them.

Aristotle, also, wrote much concerning bees, proving himself intimately acquainted with the subject, and his observations were subsequently confirmed and enlarged upon by Pliny. Aristotle's observations furnished the Mantuan bard, Virgil, with the groundwork of his very beautiful, and in many respects faithful descriptions of these insects, and their management. We have since them Columella and others, and in more modern times an actual host of writers, amongst whom I may mention Prince Frederick

Ceci, Swammerdam, Boerhave, Wildman, Reaumur, Huber, Huish, Nutt, Cotton, Briggs, with a host of other and eminent names, to many of whom, but to Mr. Briggs in particular, I have to acknowledge myself indebted, for some of the suggestions conveyed in the course of these pages, which it is to be hoped may prove as useful as it is my earnest desire they should, and I sincerely trust that no obstinate attachment to old usages, or dislike to encounter the very trifling degree of trouble consequent on a change of management, will prevent their being, at all events, taken into consideration.

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## CHAPTER II.

### THE HONEY-BEE AND ITS THREE CLASSES.

THE Honey-bee belongs to the social family of the Apidæ (from *Apis*, the Latin for bee), to the order, fifth of INSECTA, termed Hymenoptera, and including all insects possessing four membranaceous, gauze-like wings, of unequal sizes, furnished also with a sting, or process at the extremity of the tail, resembling one. The interesting family of bees now under consideration, is known peculiarly as the *Apis Mellifica*, Honey-making or Honey-bee—not that this species alone makes honey, but that it is the one so long known to man, and which has so long yielded to him its rich store of sweets.

Of the family of the Honey-bee there are two varieties to be met with in Europe—one inhabiting the north, and the other the south; the principal difference, however, would appear to consist in color, the southern bee having the rings encircling his body of a deeper red color; the description, consequently, of the common Hive-bee of the British Islands will apply, sufficiently for every practical purpose, to both insects.

The number of bees contained in a hive will, of course, vary with their condition, and the amount of accommodation they possess: whatever, however, be their numbers, their occupations are alike, and are similarly distributed amongst the three classes composing the inmates of the hive: These classes are, first, the Queen-bee, the sovereign of the community, and literally, the prolific parent of her subjects. The Queen-bee reigns alone;

but one of her sex is permitted to exist in a hive at the one time, and to her protection and comfort are the energies of the other bees to be directed. The Queen-bee may be recognized by her greater length of body, which is of a blackish color above, and of a yellowish tint beneath. She is usually, but not by any means invariably, of a larger size than



either of the other classes; her abdomen contains two ovaries, or receptacles for eggs; and her sting is of a curved form. The Queen-bee commences depositing her eggs when about five days old; during the heat of the season she lays from 150 to 200 eggs per day, and lays with little or no intermission from early Spring to the middle of Autumn. The progress of her eggs from their deposition to maturity, shall be treated of elsewhere.

The second class of bees are the Drones. These are bulkier in the body than either the Queen or the Working-bee. Their head is rounder, proboscis shorter, eyes fuller, an additional articulation to the antennæ, and *no sting*. They also make more noise in flying than the other bees. The Drones are the *males* of the hive; by them the royal mother is impregnated and her eggs fertilized. How or when



this intercourse takes place has long furnished philosophers with a subject for controversy and inquiry; and it has not even yet been set at rest in such a manner as to admit being proved to a positive demonstration.

Aristotle supposed that no such connection took place; Swammerdam held the same opinion, but imagined that she required to be in the neighborhood of the Drones, from whose bodies there proceeded to her a *vivifying aura*, producing fertilization.

It has been by some supposed that the eggs are fertilized by the Drones after having been deposited. This cannot be the case, as many accurately instituted experiments satisfactorily prove that eggs *once laid* will progress to maturity, and prove fertile in the absence of Drones.

M. de Reaumur described passages which occurred between the Drones and the Queen, which were sufficient to induce suspicions at least of somewhat more than he actually witnessed,

but farther, he never could ascertain. The passages to which I allude are not very creditable to the royal character, from whom De Reaumur states all the advances came, while the Drones appeared cold, distant, and to prefer being let alone, destitute of all gallantry, and thoroughly justifying their name.

The celebrated Huber, whose reiterated experiments and close observation entitle him to the greatest confidence, is of opinion that actual intercourse does take place, not, however, while the parties are in the hive, but during their flight in the air. This also satisfactorily explains the reason why the number of drones in each hive is so great, viz., in order that the queen-bee may have the greater likelihood of meeting with a consort when on the wing; it is also probable that the drones perform some yet unexplained functions relative to the young or larva. The late Mr. Nutt coincided with Mr. Huber in this opinion while at the same time he expressed his conviction that this will ever remain a debateable point. Mr. Huber, likewise, was of opinion that the Queen, once impregnated, remained so during her life; and that as she exists for some years, the Drones are called into existence for the purpose of fecundating the young Queens, or supernumeraries—insects kept as it were in *reserve*—lest she which first comes forth should prove sterile, or meet with any casualty. During the working season, especially the months of May, June, and July, when the working bees are continually absent from the hive, the presence of the Drones is perhaps requisite for some offices they may render the larvæ; but whether they are spared for that purpose, or are, contrary to Huber's opinion, still requisite for the impregnation of the Queen, I am not prepared to say; but the fact remains the same, that at the end of summer they are ignominiously expelled the hive, and even slain by the workers, as if they, being of no longer any utility to the community, should not be fed from the store during winter, and were killed to avoid this unnecessary waste. This destruction usually takes place in August or the end of July.

During summer, the Drones remain dispersed through different parts of the hive, but towards its close they assemble together in companies, as if preparing for their impending fate, which they await in patience, or rather, perhaps, in motionless lethargy. When the attack commences, they resist to their utmost; from the number of their executioners, how-

ever, and their own deficiency, not being furnished with a sting, they have not a shadow of chance.

It is, perhaps, unnecessary to observe that the Drones do not work for the support of the hive, but lead an idle life, feeding upon the produce of others' labor.

We now come to the most interesting inmate of the hive—the WORKING-BEE.

The Working-bee is considerably less than either the Queen-bee or the Drone. It is about half an inch in length, of a blackish brown color, covered with closely set hairs all over the body, which aid it in carrying the farina it gathers from the flowers; and on the *tibia*, or *forearm*, as it were, of the hind leg, is a cavity of cup-like form, for the reception of the little kneaded ball of pollen. It is the Working-bee which collects honey and pollen, and which forms the cells, cleans out the hive, protects the Queen, looks after the condition of the young brood, destroys or expels the Drones, when these are no longer necessary to the well-being of the community; who, in short, performs all offices connected with the hive and its contents, save only those which have reference to the reproduction of the species. The Working-bees are of no sex, and are furnished with a horny and hollow sting, through which poison is ejected into the wound it makes; this poison is of an acrid character, and of great power in its effects, proving fatal to any insect, and instances being on record of its proving so to horses and cattle, nay, even to human beings: when human beings, however, are stung (an accident that will happen very seldom, if they use the precautions, in manipulating with their bees, that shall be detailed in the course of this volume), they can instantaneously obtain relief by pressing upon the point stung with the tube of a key; this will extract the sting, and relieve the pain, and the application of common spirits of hartshorn will instantaneously remove it; the poison being of an acid nature, and being thus at once neutralized by the application of this penetrating and volatile alkali.



I may here describe the structure of the bee. The one description answering, with some exceptions, to be pointed out as I proceed, for the three classes—Queen—Drone—and Workers.

The bee is, like *insects* generally (which derive their name

from two Latin words, signifying *cut in parts*, or divided), composed of three parts—the head, thorax or chest, and abdomen. The shape of the head varies somewhat, as also does its size, in the three classes; it is attached to the thorax by a thin ligament, and the thorax is attached in a similar manner to the abdomen. In front of the head are two eyes, which are protected by hairs from any substances that might otherwise injure them, and on the top of the head are three smaller eyes. This visual apparatus renders the bee's power of sight a very extended one. Two *feelers*, or antennæ, spring from between the front eyes, and curve outwards on each side; these are endowed with a very acute sense of touch, and doubtless perform many of the offices of eyes in the dark recesses of the hive. It is probably by the assistance of these delicate and highly sensitive organs that these insects form their combs, fill their cells, and feed the young. I am of opinion also, that they serve as a medium by means of which the bees convey intelligence to each other.

The mouth of the bee is composed of a pair of mandibles, or jaws, which open vertically, and act (opening and shutting) to the right and left. These are furnished with teeth at their extremities. The mouth is also furnished with a very minute tongue, and with a long, slender instrument, called a proboscis, or trunk, resembling in form and use that of the elephant; it is composed of numerous cartilaginous rings, fringed with minute hairs. This instrument does not, however, act as a tube, but by rolling about and attaching to the hairs which fringe it, whatever substances the insect wishes to convey to the mouth; from about the base of the proboscis also arise the *labial feelers*, as they are called, which are also furnished with a hairy fringe.

The bee possesses three pair of legs, of which the posterior are the longest, and the anterior the shortest. These are formed and articulated much like the same limbs in man, and are attached to the thorax; at their extremities we find two little hooks, which appear like sickles, or reaping hooks, and have their points opposed to each other. By means of these, the insect suspends itself to the top of the hive, or in any other position it may desire. I have already mentioned the basket-like provision on the hinder thighs of the *workers*—it is peculiar to, and characteristic of them.

To the superior portion of the thorax are attached four wings, consisting of two pair of unequal size. These wings are hooked

together, in order that they may act simultaneously, and not only serve to convey the insects from place to place, through the air, but by the humming, buzzing noise their motion produces, to give notice of their departure from, and return to, the hive, as well as possibly to animate their fellows in their mutual labors.

Interiorly, the thorax contains the œsophagus, or gullet, which traverses its extent on its way into the abdomen, where it dilates into, first, the honey-bag, which is furnished with two pouches posteriorly, and a muscular apparatus, by which it is enabled to give forth its saccharine contents; and, secondly, into the true stomach, in which digestion goes on for the nourishment of the insect, and the secretion of wax.

Next to the stomach is situated the sting: this consists of two darts enclosed in a sheath. The whole apparatus enters the wound, and the two small darts then enter still farther: these are barbed, and, on the insect withdrawing them, aid in widening the puncture, and thus afford greater room for the introduction of the poison. At the base of the sting, the bag containing the poison is placed; this fluid is, as already stated, an acid, but further than that it is so, has not been ascertained.

The bee respire by means of *spiracles*, or breathing-holes, situated in the thorax, beneath and behind the wings. Through these, air is admitted into the thorax, for the purpose of oxygenating the circulating system: for oxygen is no less essential to the well being of the bee—nay, to its very existence—than it is to that of man. Will not this convince every reader of the necessity which exists for duly ventilating the hives, or beehives?—an operation so much neglected, and yet so important a feature, as I shall show hereafter, in the proper and remunerative management of these insects.

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### CHAPTER III.

#### ARCHITECTURE OF THE HONEY-BEE, AND ECONOMY OF THE HIVE.

WHEN a new swarm of bees establish themselves in a hive, or other receptacle, whether natural or artificial, their first proceeding is to cleanse the interior thoroughly, and carefully to stop up



every chink that might admit the weather: the substance which they employ for the latter purpose, and which likewise forms the basis of their comb, is called propolis, and is quite distinct from wax. Even the ancients appear to have recognized the distinction between wax and propolis; for Virgil particularly describes *two* sorts of wax, one of a character adapted for *smearing* (this was the true wax), the other for cementing or glueing—this was the substance we now know as propolis. This is a resinous substance of a greyish-brown color, and aromatic odor, and possessed of singular tenacity. Huber first showed that the bees collect this substance from the alder, birch, and willow trees, but especially from the *poplar*. A small filmy thread of the viscous produce of the tree is drawn off by the bee, and carefully kneaded into a ball by the action of the mandibles, after which it is secured in the *basket* which I have described as existing on the hinder legs: so tenacious is this substance, that on the laden bee's arriving at the hive, it requires the united efforts of many bees to disengage the load from the receptacle in which it has been placed; it also rapidly hardens; the bees, therefore, use it at once while it is yet fresh and plastic. It is with this substance, also, that the hive is attached to the stand on which it is placed, and with which the bees attach the comb to the hive: it is, however, of *wax* that the cells are formed.

To Huber we are indebted for having been the first to communicate to the world the mode in which the cells are commenced. He compelled the bees to *build upwards*, instead of allowing them to begin in the ordinary manner from above, downwards, and thus avoided the concealment of their work, attendant on their usual suspension from the top of the hive. A glass window did the rest.

Mr. Huber's discoveries are astonishing and interesting in the extreme. The combs formed by the bee, when permitted to follow its natural instinct, are commenced from the top of the hive, and consist of parallel plates of comb, having cells on both sides, the one *base*, therefore, serving for both, which effects a great saving of material. The form of each cell is hexagonal, having six equal sides, with the exception of the uppermost row, the shape of which is an irregular pentagon.

Here we must pause for a moment to wonder and admire—to admire the extraordinary instinct the Almighty has implanted in the bodies of these little insects. The chief requisites to be looked

for in constructing the cells, would naturally be, economy of materials, of room, of labor, and the greatest possible quantity of internal space. M. De Reaumur employed the celebrated mathematician, Koënic, pupil of the no less celebrated Bernouilli, to ascertain what the measurement of the angles composing these prisms should be, in order to obtain the above requisites; and the result of his calculations showed the exquisite nicety with which instinct enabled the bees to work. I shall explain in the words of Dr. Bevan:—

“The partition which separates the two opposing rows of cells, and which occupies, of course, the middle distance between their two surfaces, is not a plane, but a collection of rhombs, there being three at the bottom of each cell; the three together form in shape a flattened pyramid, the basis of which is turned towards the mouth of the cell; each cell is in form, therefore, a hexagonal prism, terminated by a flattened trihedral pyramid, the three sides of which pyramid are rhombs, that meet at the apex by their obtuse angles.

“The union of the lozenges in one point, in addition to the support which it is the means of affording to the three partitions between opposing cells, is also admirably adapted to receive the little egg, and to concentrate the heat necessary for its incubation. Each obtuse angle of the lozenge or rhombs forms an angle of 110 degrees, and each acute one an angle of about 70 degrees. M. Maraldi found, by mensuration, that the angles of these rhombs, which compose the base of a cell, amounted to 109 degrees and 28 seconds, and 70 degrees and 32 seconds; and the famous mathematician, Koënic, pupil of the celebrated Bernouilli, having been employed for that purpose by M. Reaumur, has clearly shown, by the method of infinitesimals, that the quantity of these angles, using the least possible wax, in the cell of the same capacity, should contain 109 degrees 26 seconds, and 70 degrees and 24 seconds. This was confirmed by the celebrated Mr. Mac Lauren, who very justly observes, that bees do truly construct their cells of the best figure, and with the utmost mathematical exactness.” It will be seen, then, that, in their architecture, the bees obtain the requisites which I above enumerated.

Perhaps the following is the most wonderful of Huber's discoveries: *The design of every comb is sketched out, and the rudiments laid by one single bee, who forms a block from a rough mass of wax, from materials furnished him by hosts of industrious*

workmen; determines the relative position of the combs, and their distances from each other; attaches the blocks to the hives, and then leaves his inferior architects to go to work, and form the cells. One bee does not complete any cell; but these insects relieve each other in succession, to the number of from fifteen to twenty, until the last finishing polish is given to the work. The cells designed for the drones are built with due reference to their superior size, and are usually near the bottom of the combs. The royal cells are built last, are usually from five to ten in number, and placed near the centre of the hive: these are designed as receptacles for the infant queens. I should not omit observing, that, while one set of workers are forming the comb and cells, another set are busy flying to and fro, collecting materials, and bringing them to the hives. Nor do they furnish their architectural brethren with materials only; they supply them with food also, and with the sweets from which they likewise elaborate wax in their interior.

The royal cells differ in form and dimensions from the others. They are much larger; more wax is expended on their formation; their form is not hexagonal, but an oblong spheroid; the mouth, which is at bottom, is left open until the grub is ready to undergo its transformations, when it is closed like the rest; and immediately on a perfected queen emerging from her cradle, it is destroyed, and its site built upon with common cells. Nor are the royal cells built in among the other cells, but attached to them externally, suspended perpendicularly, with their sides parallel to the orifices of the common cells.

The bees occasionally depart from the regular form of their cells, and in doing so exhibit something so nearly resembling design as to become absolutely startling to the observer. These deviations appear when, after having formed a number of small cells, the bees wish to form larger ones—they may be termed cells of *transition*; their bases are composed of *two* rhombs and *two* hexagons, instead of *three*. Reaumur and others have regarded this departure from regularity as a proof of imperfection. Dr. Bevan justly looks upon it as “determined by a sufficient motive,” and forming “no impeachment of the sagacity of the bee.”

The cells are by no means used indiscriminately for all the purposes of the hive: there are, on the contrary, as I have shown, cells peculiar to the royal brood: there are also cells peculiarly

kept for the young workers, and others for the young drones—these latter are much less numerous than those of the former: there are likewise cells reserved for containing honey. It is true that, when the breeding season terminates, the cells of the drones and workers are generally well cleansed out, and these also employed as receptacles for honey, but the honey preserved in them is never so pure or fine in quality as that which has been kept in its own peculiar storehouses: some of the cells are also kept apart for holding pollen; these are of large size. Pollen is not, as Reaumur erroneously conceived, the sole substance on which depends the formation of wax—if, indeed, it have anything at all to do with that process. It is eaten by the bees, forms a large portion of the food for the young, and may possibly thus lend its quota of assistance to the general elaboration.

To give some idea of the extreme thinness of the walls of the cells, I may mention that two of them laid together are not equal in thickness to a leaf of ordinary letter-paper; yet not only are they first formed, independent and sufficiently strong, of wax alone, with a basis of propolis, but are likewise subsequently coated over with a mixture of propolis and wax. The soldering at the orifice of each cell is formed with a large proportion of propolis; according as each cell is filled with its appropriate contents, it is carefully covered in.

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## CHAPTER IV.

### GENERATION OF THE HONEY-BEE.

As soon as the severity of winter has passed away, and the genial influences of spring have begun to be felt, the queen-bee commences laying; and a hive, however it may have lost in number during winter, will by the middle of summer be crowded to excess, and, unless properly managed, throw off a swarm. The queen continues to lay until about September, and as she is calculated to deposit nearly 200 eggs per day, my readers may form some idea of the prodigious number she deposits in an entire season. This has by many authors been calculated at from 8,000 to 10,000, which I think much under the mark.

Wherever the queen-bee moves, she is attended by ten or a

dozen workers, who watch her every motion apparently with the utmost attention. Previous to depositing the egg, the queen puts her head into the cell for a moment, as if to ascertain its emptiness and fitness otherwise to receive its charge. If she find everything satisfactory, she then turns round, introduces her posterior extremity until it almost touches the bottom of the cell, and lays the eggs. Mr. Wildman says, that while thus occupied, the attendant bees, surrounding her in a circle, perform a sort of obeisance, and caress her with their feet and trunks. I am disposed to think this a little fanciful; I have never witnessed any such demonstration myself, but it is possible that my observation may have been defective. When she has deposited one egg, she goes on to another cell, and so on, and after laying about ten eggs in succession, she retires for awhile, and then resumes her prolific employment. The egg remains without undergoing any apparent change for about four days, when it gradually assumes the form and aspect of a little maggot, changing in the same manner as the caterpillar. This little maggot is nourished by the bees until the eighth day, by which time it has grown so much as to occupy the whole cell, when they close up the cell, and imprison its inmate for about twelve days more, during which time it undergoes gradual transformation until it becomes a *nymph* or *aurelia*, presenting the appearance of a perfect fly, except in being soft and white in color.

The white pellicle which envelopes the nymph now gradually strips off, and about the twentieth day the perfect fly is ready to attempt extricating itself from its confinement. This object she speedily attains by cutting round the *cover* with her mandibles.

On first emerging from the cell, the young bee appears weak and lethargic, doubtless from the novelty of its situation and the effects of the new medium by which it is surrounded. It soon, however, acquires vigor, and the very first day of its entrance into the world it may be seen returning from the fields, emulating its elder born comrades in the richness and quantity of the sweet burden with which it is laden.

As soon as the young bee has left the cell, two workers come to it, one of which draws out and works up the wax of which it was composed, while the other repairs it, restores its symmetry, and cleans out its interior. Sometimes new eggs are deposited in these cells the same day, and sometimes they are filled with

honey or farina. When five days old, the young bee, if a queen, is ready to commence the office of a mother.

In the event of the eggs being designed to produce drones, their changes present precisely the same phenomena as in the case of workers, except that they take more time, requiring twenty-four days for the change. Huber states that the eggs of the males require eleven months to be perfected in the ovaria of the queen, and assigns this as a reason why the eggs of workers continue to be deposited for eleven months before the queen commences depositing those of Drones. There are, however, some facts which at least throw some doubt on this suggestion; among others, that if a young queen be not impregnated within twenty days after her emergence from the cell, all her subsequent progeny will be drones, and drones only. I am not aware that any naturalist has yet attempted an explanation of this very remarkable fact. The eggs of the queen differ in no respects, when laid, from those of workers or drones, but they are deposited in peculiarly formed cells, already described; but when the larva appears on the fourth day, and from that time, extraordinary attention is bestowed upon it, and it is fed upon a peculiar substance, a sort of rich jelly of an acid character. In five days the royal larva commences forming her web, and the nurses close up her cell. In four and twenty hours she has completed her cocoon, in which state she remains for nearly three days. She is then *pupa aurelia* or *nymph*, and after five or six days more the royal insect is perfect. The young queen does not, however, like the other bees, begin at once to extricate herself from her cradle; her cell is, on the other hand, now more securely fastened than ever. But one reigning monarch is permitted to exist in the hive, and it is only in the event of the old queen dying, or issuing forth with a swarm, that the young aspirant to the throne is discharged from captivity. So strong is the instinct which prompts the bees to permit but the presence of a single sovereign in each hive, that the old queen makes frequent attempts to get at the royal cells; if she succeed in doing so, she will rend them open, and furiously destroy their contents; and the moment a young queen is suffered to depart from her cell, her very first act is to destroy her yet unreleased, and often undeveloped, royal sisters. It occasionally happens that two queens emerge at the same time; when this occurs a mortal combat ensues, which only terminates in the death of one of the combatants—

the workers meanwhile looking quietly on, not only not interfering to put a stop to the conflict, but actually, should one or both appear anxious to give up the struggle, hemming them round, and will permit of no compromise, but compel the rivals to bring the affair to a deadly issue. It very rarely happens that both queens perish in the encounter, for such is their instinctive dread of leaving the community unprovided with a sovereign, that should they, in the engagement, get into such a position in reference to each other, as would permit of mutually plunging their stings into each other's bellies, the only point where they are vulnerable, they hastily disengage, and do not use their stings unless when one queen can take the other at a disadvantage. Even, however, should such a casualty occur as the death of both queens, or should any other accident occasion a hive to be deprived of its queen, the bees possess a most wonderful power of supplying the deficiency.

The bees do not at once discover the loss of their queen, but when they do, all is tumult and confusion, these insects humming loudly, and hurrying hither and thither over the combs in a state of apparent distraction. If there be any royal nymphs ready to be released, one is at once set free—if only royal larvæ exist, their attention is at once devoted to them; but now comes the wonderful portion of the matter. If the bees possess only the larvæ of *working bees* they at once enlarge their cells, converting them into royal cradles, for which purpose they pull to pieces whatever cells are in the way, unhesitatingly sacrificing life after life to the great end they have in view: these larvæ, by peculiar feeding, become converted into *queens*. It was that close observer, Schirach, who first made this singular discovery, the truth of which was subsequently confirmed by Huber. I quote his account: "I put some pieces of comb, containing worker's eggs in the cells, of the same kind as those already hatched, into a hive deprived of the queen. The same day several cells were enlarged by the bees, and converted into royal cells, and the worms supplied with a thick bed of jelly. Five were then removed from these cells, and five common worms, which, forty-eight hours before, we had seen come from the egg, substituted for them. The bees did not seem aware of the change; they watched over the new worms the same as over those chosen by themselves; they continued enlarging the cells, and closed them at the usual time. When they had hatched them seven days,

we removed the cells to see the queens that were to be produced. Two were excluded, almost at the same moment, of the largest size, and well formed in every respect. The term of the other cells having elapsed, and no queen appearing, we opened them. In one was a dead queen, but still a nymph; the other two were empty. The worms had spun their silk cocoons, but died before passing into their nymphine state, and presented only a dry skin. I can conceive nothing more conclusive than this experiment. It demonstrates that bees have the power of converting the worms of workers into queens, since they succeeded in procuring queens by operating on the worms which we ourselves had selected."

Huber likewise proved by experiment that the working-bees occasionally become endued with fertility, this taking place only in hives which have been deprived of their queen, and altogether he came to the conclusion that a development of the ovaries can be given to any bees by feeding them on the *royal food*, a wonderful provision, by which nature has secured the industrious inhabitants of the hive from the effects of unexpected contingencies, which would otherwise be attended with disastrous results.

"When bees," says Huber, "give the *royal treatment* to certain worms, they, either by accident, or by a peculiar instinct, the principle of which is unknown to me, drop some particles of royal jelly into cells contiguous to those containing the worms destined for queens."

It will occasionally happen, however, that a queen is lost when no eggs of any kind in a fit state of transformation exist in the hive. When such is the case, the bees discontinue the collection of honey; live riotously on whatever is left in the hive, while that lasts; fly about with no apparent object, and soon either perish or seek a home elsewhere. If, however, they be supplied with a new queen, they revive; but if they appear much reduced in numbers, it is better to join them to another stock.

It has been suggested that this power possessed by bees of manufacturing queens in cases of necessity, might be taken advantage of for the purpose of forming artificial stocks. I do not, however, see either the necessity or utility of so doing. One strong stock is ever worth three weak ones; and *union not scattering*—giving the bees plenty of house-room, according as they may require it, instead of partitioning them into insignificant and feeble colonies, is the only line of conduct towards them that



may be expected to keep the hive wealthy, and consequently bring profit to its human proprietor.

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## CHAPTER V

### POSITION OF THE APIARY.

THE most favorable aspect for your hives or boxes is south-westerly; but if you can so contrive as to reserve to yourself a power of modifying this aspect with the season, so much the better. In spring, for instance, the aspect would be improved by inclining more to the west; in autumn the reverse. My reason for this recommendation is, that the *morning* sun is prejudicial to the interests of the hive, not from any inherent bad quality in its rays, but because when the bees are so placed as to receive the early light, they are tempted forth too early—an event objectionable on two accounts; first, that, especially in early spring, the dawn is *too cold*, and will occasion the death of numbers if they are induced to venture forth; and secondly, because the bees, if they commence operations so early, become wearied before they have performed a good day's work, and the afternoon is a more advantageous period for their labors. I shall afterwards treat of "*shifting*"—a subject which has produced considerable controversy among bee-fanciers.

The place where you intend to fix your stand must be a dry soil—if sandy, so much the better. It should slope towards the front, in order to carry off the surface water produced by occasional rains, and should not, on *any account*, be exposed to the droppings from the eaves of houses, or even hedges. Shelter is essential, especially behind, and on the east of the hives, a house or high wall is the best you can procure; and I am also an advocate for the stand being placed in a sort of small, open shed, well painted on the outside to protect it from the weather; a few shrubs planted about the stand are also good as additional shelter. Some recommend high trees for the purpose of keeping the air calm, lest the bees should be blown down when returning home. *High trees* are *not* advisable; they form an evil themselves of greater magnitude than that which they may be designed to remove. Bees are seldom blown to the ground by mere

wind ; but even when they are, they can, in a great majority of cases, recover themselves. Whereas, if blown amongst trees, they will be sure to be *whipped* so violently by the branches, that they are absolutely *hurled* to the ground with such force as to render their recovery hopeless. The bees also fly *low* on their return, when they arrive at the immediate neighborhood of their stand, and, consequently, high trees would be not only useless, but absolutely inconvenient. Whatever trees you wish, therefore, to plant in the immediate vicinity of the hive should be of low size. Wildman recommends them—and I think very judiciously—to be “of the dwarf kind, with bushy heads, in order that the swarms which settle on them may be more easily hived.” Now although by judicious management swarming will generally be prevented from taking place, yet despite of our utmost care it may accidentally occur ; or the bees may quit their boxes in a body, from various causes—some of which I shall endeavor hereafter to explain—and under such circumstances, Mr. Wildman’s suggestions will be found valuable. The garden, therefore, in which you fix your stands should be thus planted ; and I further, for the same reasons, recommend *wall* fruit trees and espaliers.

Avoid a site near mills or other noisy places, or the neighborhood of bad smells, as factories and the like ; and if, as occasionally may happen, your stand be placed against your garden wall, behind which is the farm-yard, let not a dunghill be built *against the opposite side*. I have witnessed this before now, and in one instance found the consequence to be a desertion of the boxes. Do not place your stand where you see rat or mouse holes, and let your shed be all of *wood*, never thatched with straw, as that substance harbors mice, moths, and other similar enemies to your stock.

Water is essential to the well-being of your bees ; it must, however, be presented to them judiciously, or it will prove a greater evil than a good. If you can coax a shallow rippling brook through your garden, so much the better ; if not, place near the stand, small, shallow, earthen pans of water, and put some pebbles in them. This water must be changed daily. It is highly objectionable to have a pond or canal in your neighborhood : you will lose thousands of your bees through their means every season, as they will be constantly blown into them when returning heavily laden to the hive, especially in the evening, when wearied after the toil of an industriously-spent day. The pebbles in the trough are for the bees

to rest on while drinking, and are the recommendation of Columella. I have seen tin plates perforated with holes, and placed over the pans, just on the surface of the water, used for drinking-vessels for bees; I, however, prefer the pebbles.

It is essential that you have your gardens abundantly planted with such shrubs and flowers as afford honey, in order, as much as possible, to prevent the necessity of your bees constantly traveling to an inconvenient distance in search of food. It will be as well also that you contrive to have a *succession* of such food, adapted to the season, a matter comparatively easily managed and of very great consequence to the well-being of your stock. Among these plants I may enumerate broom; furze or gorse; thyme, especially lemon thyme; clover; crocus; heaths; fruit-trees; mustard; mignonette; sage; single roses; radishes; primroses; privet; parsley; pease and parsnips; marigolds; violets; lily; laurustinum; daffodils; celery; cauliflower; asparagus; sunflowers, &c. Mr. Nutt has given a very copious list of bee flowers in his work on bees, but I think many of them might be omitted without any loss. Mr. Briggs, a most enthusiastic bee-fancier, mentions also as good bee-flowers—*phacelia tenacitifolia*; *salvia nemorosa*; *lithrum salicaria*; *winter aconite*; *hepatica* and wall-flowers; borage, winter vetches, ivy, a few perches of turnips *running to seed* in spring, and a succession of crops of buckwheat during summer and autumn. Mr. Briggs also mentions a plant so very valuable to bees that it is only a pity it is not more generally known, viz., MELILOTUS LEUCANTHA, which, with BORAGE, he seems to think the most important of bee-flowers. Mr. Briggs adds that the former, for bee purposes, “should be sown in March or the beginning of April, on a deep, rich, and dry loamy soil, in drills about eighteen inches apart, and the plants thinned to nine or ten inches’ distance from each other. It will grow from six to eight feet in height during the first summer, and from ten to twelve during the second. If some plants of it are cut down to the ground, when about two feet in height, they will bloom later in the summer—a succession of them may be had from June to November, and they will be frequented by thousands of bees during every fine day throughout the season. Mr. Briggs has, with unusual generosity, distributed quantities of this valuable seed to bee fanciers, so that there can be no difficulty in obtaining it.

While I recommend the sowing of such seeds as will produce

plants beneficial and grateful to the bees, I have also to observe that there are plants which prove noxious to them or to the consumers of their produce; sometimes to one, sometimes to both. Xenophon mentions, in the *Anabasis*, that soldiers of his army were poisoned by honeycomb they found near Trebizond; and M. Tournefort, a traveler through that country, discovered a plant called "*chamærhododendron, mespili folio*," a plant closely resembling the *honeysuckle* in smell, which produced effects identical with those described by Xenophon, namely intoxication, vertigo, stupor; the men affected recovering from their illness in about three or four days.

Recollect also that your hives should on no account be so placed as to be exposed to the noonday sun—this will injure the honey and melt it, and will raise the temperature of the hive so as to produce unwished-for swarming, besides otherwise annoying and injuring the bees. A few shrubs, therefore, should be so placed as to cast their shadow across your stand during the heat of the day; you may also let these shrubs be of such a description as the bees are fond of—you will thus effect a double object; and you may also dispose them tastefully, so as to give your apiary a pleasing and picturesque appearance.

Finally, I object to *bee-houses*, whose chief recommendation is set forward as consisting of their capacity for containing a *great number* of hives—these are only fit for keeping the bee-boxes in during winter—one, two, or three sets of collateral boxes are as many as any moderate bee-keeper will desire, or be able conveniently to attend, and these can be kept, each in a little shed by itself. Beehives should never be placed *close* to each other, as they must necessarily be in these houses, for bees are naturally very irritable and pugnacious insects, and if two colonies be kept too near each other, battles will ensue, and the weaker hive be destroyed. If you persist, therefore, in using hives, at all events let them be at least three feet apart—but I shall show you in the next chapter, how you can make for yourselves collateral boxes, sufficient for success, and for so little money, if indeed you are called upon for *any* outlay, that I think I shall be able to wean you altogether from the old and unprofitable straw basket.

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## CHAPTER VI.

## HIVES AND BOXES.

THE old straw, conical-shaped hive is too well known to need description, and is too unprofitable to be worthy of it. I may merely observe, that its mode of management was simple enough, consisting only in leaving the bees to themselves until autumn, then inserting brimstone matches into the hive, suffocating its miserable inhabitants, and taking, perhaps, 15 or 16 lbs. of very bad honey, smelling foully of sulphurous acid gas, and full of the dead bodies of its ill-requited producers. When, about midsummer, the temperature of the hive increased to such a degree as to become insupportable to the inmates, they *swarmed*, as it was called, that is to say, the queen took her departure, accompanied by a certain number of her subjects, to seek a more roomy residence.

The main objections to this old system of management are, its *inhumanity*, its *absurdity*, and its *unprofitableness*. What could be more inhuman than killing the poor things *unnecessarily*, for the sake of their produce? What would be said, did we kill the cow for her milk, or calf, or the hen for her eggs? Indeed, to nothing can I compare this practice more aptly than to the man in the old fable, who killed and cut open his goose, in order to come at her golden eggs. What can be more absurd than to destroy in mere wantonness the lives of multitudes of creatures that, if permitted to live, would be ready to resume work for you the following spring? and in what is its absurdity shown so plainly as in its unprofitableness? What signify ten or fifteen pounds weight of honey, or even thirty pounds weight to be produced by a single stock in a season—and that, too, when 100 lbs. weight will be furnished, provided only that you take advice—and that honey, moreover, of superior quality, pure, crystalline, and limpid?—very unlike the foul produce of a dirty straw hive, copiously clogged with the bodies of your murdered benefactors.

The chief objects to be effected by the use of a suitable receptacle for your bees are—

First—The power of depriving your bees of their honey at pleasure, and without injury to them.

Secondly—The obtaining it in its pure and uncontaminated form.

Thirdly—The means of enlarging their accommodation when necessary, and the consequent prevention of swarming.

These requisites have been recognized for a great many years back; and the humane system of management so enthusiastically promulgated and insisted upon by the late Mr. Nutt, is by no means novel, as it is identical in principle with that described by bee-fanciers who lived more than half a century before him. As Mr. Nutt's hive is in more fashionable repute at present than any other with which I am acquainted, I shall give it the precedence in order of description; I shall quote Mr. Nutt's own description, from his very interesting work.

“There has been some difference of opinion as to the most suitable dimensions for bee-boxes. I approve of and recommend those which are from eleven to twelve inches square inside, and nine or ten inches deep in the clear.

“The best wood for them is, by some, said to be red cedar; the chief grounds of preference of which wood are, its effects in keeping moths out of the boxes, and its being a bad conductor of heat. But of whatever kind of wood bee-boxes are made, it should be well seasoned, perfectly sound, and free from what carpenters term *shakes*. The sides of the boxes, particularly the front sides, should be, at the least, an inch and a half in thickness; for the ends, top, and back part, good boards one inch thick, are sufficiently substantial; the ends that form the interior divisions and openings must be of half-inch stuff, well dressed off, so that, when the boxes and the dividing tins are closed—that is, when they are all placed together, the two adjoining ends should not exceed five-eighths of an inch in thickness. These communication ends, the bars of which should be exactly parallel with each other, form a communication or division, as the case may require, which is very important to the bee, and by which the said boxes can be immediately divided, without injuring any part of the combs, or deluging the bees with the liquid honey, which so frequently annoys them, in extracting their sweets from the piled or storified boxes. This is not the only advantage my boxes possess: the receptacles, or frame-work, for the ventilators, which appear upon each side of the end boxes—the one with the cover off, the other with it on—must be four inches square, with a perforated flat tin, of nearly the same size; and

in the middle of that tin must be a round hole, to correspond with the hole through the top of the box, in the centre of the frame-work just mentioned, an inch in diameter, to admit the perforated cylinder tin ventilator, nine inches long. This flat tin must have a smooth piece of wood, well made to fit it closely, and to cover the frame-work just mentioned, so as to carry the wet off; then placing this cover over the square perforated tin, your box will be secure from the action of wind and rain. The perforated cylinder serves both for a ventilator, and also for a secure and convenient receptacle for a thermometer, at any time when it is necessary to ascertain the temperature of the box into which the cylinder is inserted. Within this frame-work, and so that the perforated flat tin already described may completely cover them, at each corner make a hole with a three-eighths centre bit, through the top of the box. These four small holes materially assist the ventilation, and are, in fact, an essential part of it.

“ We next come to the long floor, on which the three square bee-boxes which constitute *a set*, stand collaterally. This floor is the strong top of a long, shallow box, made for the express purpose of supporting the three bee boxes, and must of course be superficially of such dimensions as those boxes, when placed collaterally, require; or, if the bee boxes project the eighth part of an inch over the ends and back of this floor box, so much the better; because the rain or wet that may at any time fall upon them will drain off completely. For ornament, as much as for use, this floor is made to project about two inches in front; but this projection must be sloped, or made an inclined plane, so as to carry off the wet from the front of the boxes. To the centre of this projecting front, and on a plane with the edge of the part cut away for the entrance of the bees into the pavilion, is attached the alighting board, which consists of a piece of planed board, six inches by three, having the two outward corners rounded off a little. The passage from this alighting board into the pavilion is cut, not out of the edge of the box, *but out of the floor-board*, and should be not less than four inches in length, and about half an inch in depth, or so as to make a clear half inch way under the edge of the box for the bee passage. I recommend this as preferable to a cut in the edge of the box; because, being upon an inclined plane, if at any time the wet should be driven into the pavilion by a stormy wind, it would soon drain out, and the

floor become dry; whereas, if the entrance passage be cut out of the box, the rain that may, and at times will be, drifted in, will be kept in, and the floor be wet for days and perhaps for weeks, and be very detrimental to the bees. In depth, the floor-box, measured from outside to outside, should be four inches, so that, if made of three-fourth-inch deal, there may be left for the depth of the box part two inches and a half. Internally it is divided into three equal compartments, being one for each beehive. Admission to these compartments, or under boxes, is by the drawer, or drawer-fronts, or blocks, which will be described presently.

“The bottom, or open edge of each of the boxes, should be well planed, and made so even and square, that they will sit closely and firmly upon the aforesaid floor, and be as air-tight as a good workman can make them, or technically expressed, be a *dead fit*, all round. In the floor-board are made three small openings, *i. e.*, one near the back of each box. These openings are of a semilunar shape (though any other shape would do as well), the straight side of which should not exceed three inches in length, and will be most convenient, if made parallel with the back edge of the box, and about an inch from it. They are covered by perforated, or by close, tin slides, as the circumstances of your apiary may require. The drawer, the front of which appears under the middle box, is of great importance, because it affords one of the greatest accommodations to the bees in the boxes. In this drawer is placed, if necessity require it, a tin made to fit it, and in that tin another thin frame, covered with book muslin, or other fine strainer, which floats on the liquid deposited for the sustenance of the bees. Here, then, you have a feeder, containing the prepared sweet, in the immediate vicinity of the mother hive, and without admitting the cold or the robbers to annoy the bees. When you close the drawer thus prepared with bee food, you must draw out the tin placed over the semilunar aperture, which will open to the bees a way to their food in the drawer beneath. The heat of the hive follows the bees into the feeding apartment, which soon becomes the temperature of their native hive. There the bees banquet on the proffered boon in the utmost security, and in the temperature of their native domicile. Under such favorable circumstances, it is an idle excuse, not to say a want of humanity, to suffer your bees to die for want of attention to proper feeding.”



The box fronts on each side of the feeding drawer are formed of a bit of talc suspended over a hole on the outside, thus permitting egress, but precluding ingress. By means of this contrivance you are enabled to add to the number of your bees, without alarming or annoying them, and they can likewise escape when you are depriving them of one or the other of the collateral boxes. This contrivance further precludes the intrusion of insect enemies.

The centre is perforated on the top, and over the hole a bell glass is placed, which, when the hive is filled, the bees fill with honey, and it is unnecessary to add that this honey is of the very purest description. Wooden fittings or covers are provided for the protection of these glasses.

The bees being placed in the centre box, or pavilion, soon commence operations, and speedily fill it with honey. When full, which you may ascertain by looking through a window fixed in the back of the box, you are to draw the tin slide which separates it from the bell glass; this is best done on a warm day, and you should previously cut through the comb with a thin wire. Before taking off the glass the operator should pause for a few minutes, to observe whether there be any unusual stir among the imprisoned bees, for if they do not appear alarmed, the queen is among them, and, in that case, you should withdraw the slide, and postpone the operation to another day.

In taking away the glass, envelope it in a silk handkerchief, and remove it about ten yards from the boxes; then place it a little on one side, so as to permit the imprisoned bees to escape, which they will do in the course of a few minutes.

When occasion requires, the bees are to be similarly admitted into the side boxes, by drawing the slides, but in removing one of these boxes some precautions require to be used. For instance, open the ventilator the night previous; this will, by lowering the temperature of the hive, and admitting a current of air, induce the bees to leave the box thus treated, and to congregate in the pavilion. You may then put down the slide, and let the bees remain for ten minutes or so in darkness. If the queen be not in the box to be taken, any bees that may remain in it will be restless and in confusion. If she should be there, the commotion will be in the centre box. If the queen should be in the box you intend taking, draw up the slide again and she will soon leave it. Having emptied the full box, return it to its

place. In Mr. Nutt's system it will be perceived that *fumigation*, or *bee-dress* (hereafter to be described), are rendered unnecessary, and that even a child may manage his boxes with ease and safety.

The centre box, on account of its being the breeding place, is never to be meddled with.

"Weaken not its population, but support its influence, and extend it to those accommodations which no practice, expect my own, has yet put into operation, or made provision for."

The value of Mr. Nutt's set of bee-boxes is unquestionable, but they are, at the same time, necessarily too costly to be within the reach of those whom Providence has not seen fit to bless with "golden store." Mr. Nutt's views, although possibly, as far as he himself is concerned, original, were entertained by bee-keepers many, many years before him. Among the rest, I may mention Wildman, who not only used *collateral boxes*, but even *bell glasses*, similar to those of Mr. Nutt; the Rev. S. White, and Madame Vicat. Mr. White evidently mismanaged his boxes, for the complaint against their utility was, that the queen laid her eggs promiscuously in all of them. This would have been obviated had he thought of Mr. Nutt's subsequent idea, viz., of reserving one box as the seat of generation, and separating it from the side boxes, until necessity called for junction, by tin sliders. Not only, however, must I pronounce Mr. Nutt's boxes an evident improvement upon those I have just mentioned, on the score of utility and completeness, but actually also on the score of simplicity, and the comparative facility with which they are consequently susceptible of being worked.

Any person of common ingenuity can form for himself a set of collateral boxes, by attending to the following directions:

Take as a stand a piece of strong board; let it be about four feet long, and about two feet wide, as thick as you can procure it; place it on four legs, and let the edge project over the legs, in order to prevent the incursion of insects; plane the upper surface smooth.

Make three boxes, each about ten inches square, with, of course, no bottom, and have the edges of the bottomless portion planed smooth, so as to lie as close as possible to the board. Cut away a portion of the bottom of one side of each box, and in that designed for the centre box, do so on two opposite sides—these are for communication. Get two sheets of tin, or

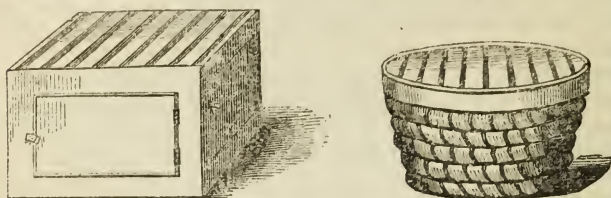
thin wood—a piece of a broken tea-chest will do admirably—and place one between each of the collateral boxes and the centre one, so as to cut off communication between them, until it is desired to open it, when of course one of them is withdrawn, and, at the same time, the side-box, thus opened, will be pushed close to the central one. Let the standboard be on an inclined plane, sloping towards the front, so as to throw off wet, and let the said board project a couple of inches, to serve the bees as a place on which to alight. You may make a small hole, about half an inch, or rather less, in diameter, in front of this centre box, partly in the box, and partly in the board, for the ingress and egress of its inhabitants. If the board have a proper inclination outward, there is no fear of any wet either penetrating or lodging. Paint your boxes externally, but do so a considerable time before you require to use them, and encompass them, with the best sort of rough shed that you can “knock up;” bore a hole, with a centre bit, in the top of each box, and place a glass vessel over it. When it is necessary to feed your bees, you can do so by attaching a feeder to the entrance door, and the holes for the bell glasses will afford you ample means of ventilating. In case they should not, however, you may have a hole at the back of each box, stopped with a cork, which you can withdraw for the admission of air when necessary. Take care, however, that you do not push the cork entirely through the wood of the box, or it will be so cemented by propolis, that you cannot, perhaps, draw it out without injury or disturbance to the combs. Such a set of boxes as I describe may be made easily enough, and for little or no cost, and will answer all purposes of utility, though, perhaps, deficient in *ornament*, as well as the most costly and elaborate.

Mr. Briggs, on the formation of bee-boxes, says :

“They should be chosen, or constructed, of as good quality as possible, so as to effectually preserve their contents from either extreme heat or cold, dampness, or any sudden changes of temperature.

“The size of the centre box should be about ten and one-half inches cube, inside measure; and it would be an advantage to have six bars fixed across the top of it, from front to back, which should be one and one-eighth inch in width, half an inch in thickness, and half an inch apart—the ends of each of which should be neatly rabbeted into the front and back of the box.

Over the bars should be laid a piece of thin gauze, and upon it the top or covering board of the box, which may have a circular hole in the middle of it, securely stopped by a good cork bung,



to be removed for the purpose of placing a small bell glass over the hole as occasion requires.

“The side boxes may be made and used of different sizes if desired, and to contain from 350 to 1100 cubic inches each. If the smaller sizes are adopted, the entrance to them must be along the hollow part of the bottom board; but it would be considered more complete to have the side boxes of the same width and depth as the centre one, and to have them well fitted and secured together during the honey-gathering season. The entrance from the centre to the side boxes may then extend along the under edges of each of them from front to back, and about three-eighths to one-half an inch in depth: there should also be a perpendicular one three inches long, and half an inch wide, up the centre of the end of each of the boxes, the upper part of which should reach to within three inches of the top of the box inside.

“The use of bars to the top of boxes is frequently of much service to the apiarian, as he can thereby occasionally remove a few of the old combs from the box, and can, at any time, have an opportunity of examining the state of the interior of the boxes. Before using a new box with bars, as above, a piece of pure and clean brood comb should be neatly fixed to each, or every alternate bar, which may be readily accomplished by the assistance of a long and smooth piece of heated iron—the comb being rubbed for a few seconds on the iron, should immediately be applied to the bar, and will then, in a short time, firmly adhere to it.

“The use of hives of straw is by many persons still continued and approved; and I have no doubt, that when they are pro-

per.y made, and judiciously managed, according to the directions previously given, the returns from them will often equal, or surpass, those from some of the more fancy-shaped and expensive wooden boxes.

“The size of straw hives should be from sixteen to seventeen inches in diameter, and twelve to thirteen inches in height; and they should have a narrow, flat, and thick top of wood, with a circular hole and cork bung in the centre of it, similar to that which is recommended for wooden boxes.

“The outer box, in which the stock-hive and side boxes are enclosed, having been made wider than the interior hives or boxes, should have a partition from front to back, on each side of the stock-hive, and the interstices round the centre hive filled up with dry sawdust, powdered charcoal, or other suitable materials, which will be of service in preserving the temperature of the hive in a congenial and uniform state.

“I have above stated that the communication from the straw stock-hive to the side boxes should be along the hollow centre of the bottom board; and I recommend that three or more circular holes be made in the bottom board on each side, in such a manner that each of them may be covered with a bell-glass, or that one of the larger side hives or boxes may be placed over them, as may suit the wishes or convenience of the apiarian.

“When glasses are used, they should be well covered with some soft woollen materials, and a hive or box should then be placed over them to effectually exclude the light, and preserve them from accidents of any kind, and sudden changes of temperature.

“It is advisable to have the outer box well made, with a neat and substantial roof to carry off the wet, &c.; and it should be made of such breadth as to leave a space of one-half inch on each side of the stock-hive.

“I would recommend, that if the bees are kept in a straw hive, that it be of a large size, and well made; and should be stocked with a strong swarm at the usual period of the year. It should then be placed on the centre of a stout bottom board, made long enough to hold a small hive or box on each side of it, and having hollow communications from the centre hive to the side ones, which can be opened or closed at pleasure. When the bees require room in the Spring or Summer months, the entrance from the centre to one of the side hives must be opened, and

after they have fairly taken possession of it, it must be properly ventilated by a hole previously formed on the top, and covered with a piece of perforated zinc, keeping the temperature between 65° and 75° of Fahrenheit's thermometer.

"The three hives should have a well made wooden covering over them, with a span-shaped roof to carry off the wet, &c., and an opening at the back for the purpose of examining the progress of the bees; the outer box should be well painted and waterproofed, and will greatly assist in regulating the temperature of the hives, and in protecting them from extreme cold, dampness, and sunshine.

"I would recommend a set of two or three of the improved collateral boxes, which may be made of well-seasoned boards, about ten and a half inches cube, inside measure, and to be neatly fitted together, with convenience for ventilation and inspection, and they must also have a wooden covering over them, with an opening at the back, similar to the one above mentioned.

"The outer box should be one inch, or one and a half inch wider inside than the outer dimensions of the interior boxes.

"By constructing boxes on the above plan, the swarming of the bees may be, by judicious management, for a time prevented, but it is not recommended that that propensity should be entirely defeated, as a swarm may be occasionally taken from collateral boxes with advantage to the swarm and to the stock hive.

"By proper attention, large quantities of pure honey may be obtained by the above system of management. Last year, a friend in this vicinity obtained 109, 97, and 89 pounds of pure honeycomb from three sets of Nutt's collateral boxes."

Mr. Taylor, in his "Beekeeper's Manual," speaks as follows of bee-boxes:—

"It matters not much of what wood the boxes are made, provided it is sound, thoroughly seasoned, and well put together. Different opinions are entertained as to the best size of bee-boxes, but I think that much must depend on the number of bees they are to contain, and on the honey locality; there must also be a reference to the proposed mode of working them, for, where no swarming is permitted, a larger hive may be advantageously used. A good size is twelve inches square, and nine inches deep withinside, the thickness throughout being not less than an inch. The top of the box ought to project on all sides nearly three-quarters of an inch, for better protection and ap-

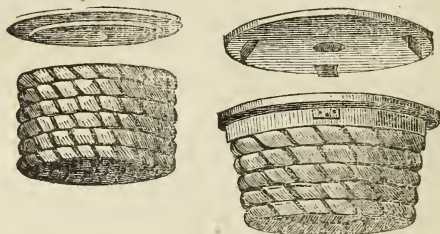
pearance, and as affording convenience for lifting. On the top, a two-inch hole should be cut in the centre, for placing a bell-glass, and for the purpose of feeding; and another hole to receive a ventilator may be made near the back window, that position being better for inspection, and less in the way of the bees, than the centre of the hive, which is, or ought to be, the seat of breeding, and should not be disturbed. A window may be placed at the back and front, five inches high, and six or seven inches wide. The best and neatest way of securing the windows, that I have seen, is by a sliding shutter of zinc. Round the window, there must be a projecting moulding, mitred at the corners. On one side, the piece of moulding is movable, and to the back of this is screwed a plate of sheet zinc. This passes into a rabbet to receive it, cut, on the remaining three sides, at the back of the lower edge of the moulding. To prevent any wet from lodging at the bottom moulding, an opening or two may easily be cut through, on the under side, to allow its escape. For the sake of uniformity of appearance, blank windows may be made opposite to the real ones. Hives of this kind require to be placed under some cover or shed, as a protection from wet, and a hot sun."

It will not, I am sure, be deemed amiss that I here supply my readers with an account of the "Leaf Hive" invented by the celebrated Huber, and designed by him to furnish all the requisites for which Mr. Nutt produced his collateral boxes:—

"This hive," says Huber, "consists of eight frames, each eighteen inches high and ten inches wide inside, having the uprights and top cross pieces one and a half inch broad, and one thick, so that the eight frames, when placed close together, constitute a hive eighteen inches high, twelve inches between end and end, and ten inches between back and front, all inside measure. The frames are held together by a flat sliding-bar on each side, secured by wedges and pins. To the first and eighth of these frames is attached a frame with glass, and covered with a shutter. The body of the hive is protected by a sloping roof, and the entrance is made through the thickness of the floor-board. We dislike the sliding-bars, with their pins and wedges, which are so far inconvenient, that, in drawing them out, all the frames are liable to open, and the observer is exposed to some hazard of annoyance, from the bees issuing out at every joint: and we have substituted for them hinges on one side, and a hook-and-eye on

each frame on the other ; we can thus open any particular leaf without meddling with the rest. In taking honey from this hive, the bee-master has the whole interior completely under his eye, and at his disposal, and can choose what combs best suit his purpose, both as to quantity and quality ; taking care, however, to do so only at such periods as will leave the bees time to replenish the vacancy before the termination of the honey season. It is also well adapted for artificial swarming. By separating the hive into halves, the honey, brood-combs, and bees will, generally speaking, be equally divided ; and by supplying each half with four empty frames, we shall have two hives, one half empty, equal in number of bees, of brood, and even of stores. One of the new hives will possess the queen ; and if the operation has been performed at the proper time—that is to say, a week or ten days before the period of natural swarming—the probability is, there will be a royal brood coming forward in the other ; at all events, there will be plenty of eggs and larvæ of the proper age for forming an artificial queen.”

Cheapness, and an obstinate adhesion to the customs of our forefathers, induce straw hives still to be used by many. Mr. Briggs has already shown how they may, when necessarily or optionally employed, be rendered almost as productive as boxes. I add the following from Mr. Taylor, who objects to the use of sticks or *cross-pieces*, sometimes employed for the purpose of supporting the combs :—



“The sticks are only an annoyance to the bees ; and there is little fear of the combs falling, except in very deep hives ; at any rate, it may be prevented by contracting the lower part a little. The best way of doing this is, by working a wooden hoop inside the bottom band of the hive, as recommended by Dr. Bevan, who says, ‘It should be perforated through its whole course,



and the perforations made in an oblique direction, so distant from each other as to cause all the stitches of the hive to range in a uniform manner.' The hoop gives greater stability to the hive, preserves the lower edge from decay, and affords facility in moving it. I advise a circular piece of wood (turned with a groove at the edge, to retain it in its place) to be worked into the crown, having through it an inch and a-half hole. With a little ingenuity, the bees may be fed through this opening—a better method than the ordinary one at the bottom of a hive. A piece of wood or tin will commonly cover the hole; but at times, and especially in winter, it may be used for the purpose of ventilation, and allowing escape to the impure air of the hive. In this case, a bit of perforated tin or zinc should be placed over it, which, when stopped up by the bees, can be replaced by a clean one. An earthen pan is a common cover to a straw hive; and this may be slightly raised by wedges on the four sides, to permit a small space underneath. Of whatever material the outer covering consists, it must project so far on all sides as to protect the hive from the least moisture. This cannot be too much guarded against; and whether of wood or straw, all hives ought to be well painted at the beginning, and periodically afterwards."

I can confidently recommend the following simple and cheap description of hive to my readers:—Get a common straw hive, but let it be of somewhat larger dimensions than are ordinarily used, and cut it across (about one-third of its length) from the upper or conical end; fit to this end a round piece of wood, about an inch in thickness, having in its centre a hole about an inch and a half in diameter, fitted with a cork or bung. Take another hive of ordinary dimensions, and place it over this. This is called *capping*. When, during the proper season, the bees have filled the lower part of the hive, and show symptoms of requiring more room, you have only to draw out the cork, and place the cap over the board. This acts as a bell-glass; and the honey you will collect in it will not be inferior to that procured from the most costly set of bee-boxes. A coating of Roman cement on the exterior surface of these hives, will render them almost everlasting.

De Gelieu states that he took 72 lbs. weight of fine, pure honey from a straw hive thus capped, in one season.

Glass, or, as they are called by some, "observatory hives," are not such as I approve of. Bees love darkness, and hate light

or observation. In a state of nature they are in the habit of seeking some hollow, vacant spot beneath a bank or rock, the cleft of a tree, or some similarly dark and secluded situation. The observatory hive is, then, foreign to the natural habits of the insects, and as such, of course, it is not to be recommended.

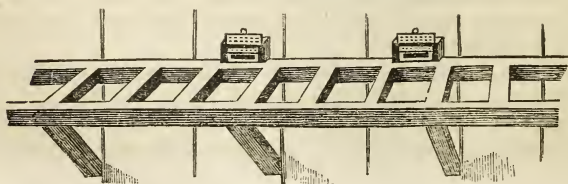
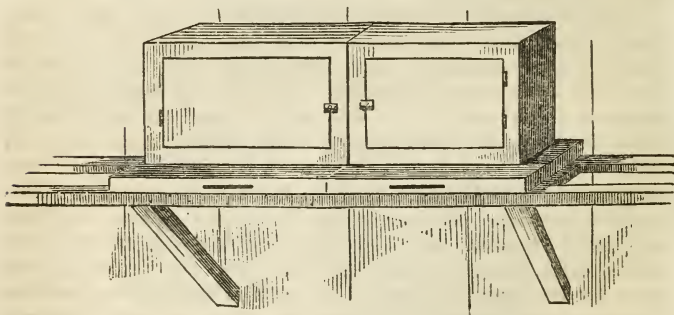
The accompanying cuts will give a good idea of stands for hives. This one is intended for the open ground. It is a post



set into the ground, with cross pieces let into it.



The annexed cuts show a frame-work for shelves, instead of



whole boards. These frame-works have the advantage of more firmness and the facility they afford for ventilation. On whole boards the hive must be elevated by bars, or holes be cut through the shelf.

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## CHAPTER VII.

### HOW YOUR STOCK IS TO BE OBTAINED.

You may procure stock either in the spring or autumn. I should prefer the former period, because that is the fitting time for removal of stocks from the old-fashioned, awkward hives to the more improved modern receptacles; but it is more difficult to ascertain the exact condition of the stock you are about purchasing in spring than it is in autumn. I am sorry to say that unless you purchase your stock from a friend, or from some one, at all events, that you can confidently depend on, you are very likely to be taken in, and must, therefore, be upon your guard against imposition: as some writer—I forget who—quaintly enough remarks, “Let it be with the bees as with a wife, never *take them on the recommendation of another party.*” If you would purchase a stock in early spring, just after the bees have been removed from their winter quarters, you need not attempt it unless from a person on whose honor you can positively depend. If during the months of May or June, you can form some judgment for yourself, and if you act cautiously, may, perhaps, bid defiance to trickery: in this case you should visit the garden, or other locality, in which the hive stands that you intend purchasing, about mid-day; stand opposite to it, and observe attentively the actions of its inhabitants. If they crowd busily in and out of the hive, giving evidence of their industry by the laden appearance of their legs, and altogether exhibiting a busy *earnestness* in their toils, you may safely buy the hive; and if you obtain this hive before swarming has taken place, you may look upon yourself as a fortunate man.

If the object of your intentions be an autumnal hive, you had better ascertain that the massacre of the drones has taken place; an observation of the stand and of the ground around the hive will tell this. Observe the actions of these bees—see that they

are lively and industrious ; and if, on your too near approach, one or two bees dash at your face, do not be alarmed, but rather regard their pugnacity as a sign of vigor, and buy the hive. Some writers speak of the necessity of purchasing only such stocks as are in nice new hives. This is an advice very necessary to be attended to, but it would not be so, were you sure that the interior of the hive were filled only with honey-comb, and with no old, worn-out comb, the accumulation of years. If you are in doubt on the subject, you should *fumigate* the hive in the evening, in the manner hereafter to be described ; then, turning up the hive, you can readily ascertain the character of its contents. If the comb be black, have nothing to do with the stock. The genuine color of the comb is white, and, consequently, the lighter it is, the more the stock is to be esteemed.

Never, unless you can depend on the party, *send* your hive to receive a swarm ; for you may, if you do, have a *second* swarm imposed upon you for a *first*—a comparatively valueless stock for just the very thing you desire. The first swarm begin the formation of the combs at the *middle* of the apex of the hive ; the *second* does so at the *side*. These are the only criteria I can furnish, for neither weight nor bulk are to be depended upon. It is to the obstinate use of the old-fashioned hive that these difficulties, and these opportunities for fraud, are attributable. Were the improved system once established, these cautions would be no longer called for. Wildman has given some good advice as to the purchase of stocks ; and in this advice he speaks like an oracle. Attend to him :—

“The person who intends to erect an apiary, should purchase a proper number of hives at the latter end of the year, when they are cheapest. The hives should be full of combs, and well stored with bees. The purchaser should examine the combs, in order to know the age of the hives. The combs of that season are *white* ; those of a former year are of a *darkish yellow* ; and when the combs are *black*, the hives should be rejected, because old hives are most liable to vermin and other accidents.

“If the number of hives wanted have not been purchased in the autumn, it will be necessary to remedy this neglect after the severity of the cold is past in the spring. At this season, bees which are in good condition will get into the fields early in the morning, return loaded, enter boldly, and do not come out of the hive in bad weather, for when they do, this indicates that they

are in great want of provisions. They are alert on the least disturbance, and by the loudness of their humming we judge of their strength. They preserve their hives free from all filth, and are ready to defend it against every enemy that approaches.

“The summer is an improper time for buying bees, because the heat of the weather softens the wax, and thereby renders the comb liable to break, if they are not very well secured. The honey, too, being then thinner than at other times, is more apt to run out at the cells, which is attended with a double disadvantage—viz., the loss of the honey, and the daubing of the bees—whereby many of them may be destroyed. A *first* and strong swarm may indeed be purchased; and, if leave can be obtained, permitted to stand in the same garden until the autumn; but if leave is not obtained, it may be carried away in the *night*, after it has been hived.

“I suppose that in the stocks purchased, the bees are in the hives of the old construction. The only directions here necessary are, that the first swarm from these stocks should be put into one of my hives; and that another of my hives should, in a few days, be put under the old stock, in order to prevent its swarming again.”

Nor can I very well leave Wildman, without saying something of the “Count de la Bourdonnaye,” so frequently quoted by him in his “Account of Bees.” M. de la Bourdonnaye is justly entitled to our gratitude and remembrance as the original inventor of the *caped* or capped hives; a most useful contrivance, and one which I have already described.

“Count de la Bourdonnaye’s hives are made of straw, divided into two parts, which are placed one over the other. Each of these parts is thirteen inches in diameter in the inside, and twelve inches high; so that when joined, they make a hive twenty-two inches in height. They are nearly flat on the top, and have in the middle of the top a hole an inch and a quarter square. The upper half rests on the lower. They are made of sufficient thickness to be proof against cold, and not to be heated by the rays of the sun. When *united*, their joining is luted close.”

So then the origin of our modern *caps* is to be referred to a period of upwards of ninety years ago! I may, however, observe that proper *fitting* of the upper portion, or cap, upon the lower portions or true hive will quite do away with the necessity of *luting*.

## CHAPTER VIII.

## SWARMING.

BEES multiply, during the breeding season, with astonishing rapidity; it is, therefore, not to be wondered at that the young brood should speedily produce *crowding* in the hive, thus becoming not only inconvenienced for room, but more than agreeably warm: it is also supposed that the queen becomes alarmed at the number and progress to maturity of the royal larvæ, which indeed she would fain kill, were not she prevented from doing so by the workers. While swarming is by no means to be *forced*, yet if symptoms of a swarm present themselves, early, say in April or May, you may permit it to take place—provided the parent stock be still sufficiently strong in numbers—otherwise it is of course highly disadvantageous to the well-being of the hive as well as to the emigrants. I disapprove altogether of late swarms, *i. e.*, allowing them to come off in July or August—hence the utility of such hives as place this circumstance under the control of the keeper.

The most certain indications of swarming are, the hive appearing full of bees—clusters of them gathering on the outside, and sometimes hanging from the alighting-board; they also neglect their daily toil and refrain from going abroad in search of sweets, even though the weather be ever so inviting. Just before they take flight the hive is hushed, the bees are silent and carefully loading themselves with provender for their journey. For two or three nights prior to swarming, you will also hear a peculiar humming noise within the hive; the second swarm is announced by a different sort of buzzing, being, according to some writers, the result of a contest as to which of the two queens shall lead off from the hive. It is the old queen who leads off the first swarm.

If a swarm be about to quit the hive, the slightest change of weather will prevent their doing so; but nothing so effectually as a shower of rain: hence an excellent mode of preventing it, when the bees cluster on the outside of the hive, by syringing them with water from a common metallic syringe. When a swarm leaves the hive, if it do not settle on some tree or bush, but remains in the air, and you fear its going off to too great a

distance, if not evading you altogether, you may bring it down by throwing up sand or dust, which the bees mistake for rain, or by firing a gun, which they mistake for thunder; hence the old fashion of the country-people following a swarm with the noise of fire-shovels and frying-pans. You must be the more diligent in at once securing your swarm, for it is a fact that the bees send out scouts previous to swarming, whose duty it is to select a proper habitation for the colony. It is, on this account, a good plan, when you anticipate a swarm, to leave an empty hive, previously smeared on the interior with honey, in some convenient place, but not too near the old one.

When the swarm settles, the bees collect themselves in a heap round the queen, hanging to each other by means of their feet. When thus suspended from a tree, they may be secured by simply holding an empty hive under them, and tapping the branch from which they are suspended. They should, in this case, be sprinkled with honey and water, and confined for about twelve hours. When a swarm divides into two or more bands, and settle separately, it is probable that there are two queens. In this case you must secure one of them.

If through your inattention, a second swarm comes off, you should, as soon as you have hived it, secure its queen, and return the swarm to the hive; indeed, when deprived of its queen, it will usually immediately return of its own accord. Swarming is a subject I have reason to believe is very generally misunderstood, most persons desiring to promote it, conceiving that the greater number of swarms, the richer will the hives be in August. The very reverse of this is the case; for when a hive is weak in numbers, a sufficient number of bees cannot be spared to go forth for honey; and, hence, they will be scarcely able to collect enough for their actual support, far less to collect any surplus for their master's benefit. Hear Mr. Briggs:—

“The swarming of bees is a subject on which much misconception prevails. Most persons who keep their bees in the old straw-hive plan, and suffocating system, appear to anticipate their swarming with much anxiety, and to be of opinion that the greater number of swarms—firsts, seconds, thirds, &c.—that they obtain from their old hives during the summer, the more remunerative will they prove to the owner at the end of the season; whereas the reverse of the above practice is much nearer of being the best system to follow, which I shall endeavor to eluci-

date. It has been proved from observation, that the average percentage of swarms have been—twenty-four in May, sixty in June, fourteen in July, and two in August; from which it will appear that June is the principal month for swarming, in ordinary seasons; and it is in June and July that the greatest quantities of honey are stored up by the bees, when managed in a judicious manner.

“When the swarming is assisted and encouraged during June and July, the old stocks are considerably weakened, and the swarms are employed in building combs in their new hives, collecting pollen, and attending to the young brood, until the best part of the honey-storing season is over; so that, at the honey harvest in autumn, it will frequently require the contents of five or six old stocks, or late swarms, to produce as much pure honey as might have been obtained from one colony on the system of management which is recommended.”

In collateral boxes, and in capped hives, swarming may be prevented by affording the bees additional accommodation, and reducing the temperature; and for this end, it is recommended, by most apiarians, that the hive or box should be furnished with a thermometer as well as ventilator. I think, however, that even those who do not possess these accommodations may manage well enough by proper observation and attention to the symptoms I have detailed. When these appear in a collateral box-hive, open one of the partitions, and admit the bees into a new apartment; if all be full, take off a box, empty and restore it. In the case of a capped hive, remove the bung, and admit the bees to the cap; if full, remove, empty, and restore it. On this subject, Mr. Briggs says:—“The most favorable degrees of heat for the prosperity of the brood are from  $75^{\circ}$  to  $90^{\circ}$  in the stock hive, and from  $65^{\circ}$  to  $75^{\circ}$  in the side boxes. The heat in a prosperous hive is sometimes upwards of  $70^{\circ}$  at Christmas, and will, in hot summer weather, sometimes rise to near  $120^{\circ}$ , at which time the combs are in great danger of being damaged, and of falling to the floor of the hive; this may, however, be prevented, by giving extra room when required, and by shading the hives from extreme heat as previously directed. It should always be borne in mind that all operations with bees should be performed as carefully and as speedily as circumstances will permit. The late Mr. T. Nutt remarked, in a conversation with him a few months previous to his decease, ‘that in removing



boxes, glasses, slides, &c., the apiarian should proceed in a manner so steady and cautious, that the bees should scarcely know that their habitation had been meddled with;’ in which remarks I fully concur.”

After having a new swarm, you must also recollect, that if unfavorable weather follow their departure, you must feed them, otherwise they will be starved; indeed it would be well if each new swarm were always fed for a few days, as this will assist them in gaining strength in numbers and in store, before the principal part of the boney season goes over. In conclusion I would merely say, that the weight of a good swarm should be from five to seven pounds, and that all under five pounds in weight should be united to others, as being too weak in numbers to support themselves.

You shall receive instructions for uniting swarms in the next chapter, as the process is the same as that adopted in depriving a hive of its honey. In hiving a swarm it is as well to be protected with a proper bee dress, as well as to use such precautions as you will find detailed in a subsequent chapter when treating of the honey harvest. *Prevention is better than cure*, and it is *better to be sure than sorry*; yet bees are certainly less apt to sting at this time than any other.

Some persons are particularly unhappy in possessing those qualities which render them disagreeable to bees. The main objections are, excessive timidity, and likewise, with some an unpleasant odor, in some instances the result of personal negligence, but frequently of peculiarity of constitution. The remedies are, a *bee-dress* for the former, and the use of some strong perfume which the bees like, and which will effectually conceal whatever is offensive to them.

“I have gone among them,” says Mr. Worlidge, in their greatest anger and madness, only with a handful of sweet herbs in my hand, fanning about my face, as it were to obscure and defend it. Also, if a bee do by accident buzz about you, being unprovided, thrust your face amongst a parcel of boughs or herbs, and he will desert you. But the most secure way of all, and beyond the completest harness yet published, is to have a net knit with so small meshes, that a bee cannot pass through, and of fine thread or silk, large enough to go over your hat, and to lie down to the collar of your dress, through which you may

perfectly see what you do, without danger, having also on a pair of gloves, whereof woollen are the best."

Some writers on bee management have suggested other modes to prevent objectionable swarming, besides the collateral boxes and the capped hive. Among these plans I may mention *storifying* or *piling*, and *eking*. The latter is speedily disposed of; it consists of adding *ekes*, or additional bands of straw to the bottom of the common hive, according as additional room was required. The objection is, that although it may thus answer your purpose during one season, the next finds you in as much perplexity as ever.

Storifying requires some notice, as it is a custom of very considerable antiquity, and also as it is a practice that has been approved by such eminent bee-masters as Warder, Thorley, and more recently by Dr. Bevan.

The principal objections to the storified hive are—

1st, Its occasioning the bees greater trouble and labor, and hence rendering their labor less productive.

2d, The absence of provision for dividing the ordinary cells from the more sacred and mysterious operations of the queen, and of course a consequent deterioration of the honey in respect of purity; besides much inconvenience and waste of time to the poor bees, which certainly should be taken into consideration. A laden bee cannot *mount up* from one box to another, and through a labyrinth of comb, with anything like comfort or ease.

3d, In taking a box of honey, the proprietor cannot be certain of not taking away a quantity of brood-comb, &c. This objection, however, may be classed with that which rests on the impurity of the honey, except with the additional one, that this also refers to loss of life, which the bees, both brood and adult, must thus sustain. And,

4th, In consequence of these objectionable circumstances, which are the inevitable consequences of the piling system, the profit accruing from such management will be far inferior to that obtainable by the system I have already recommended.

A very eminent writer on bee management says—"In piled boxes bees are subjected to unnecessary labor, which is so far a waste of time. From piled boxes not nearly the quantity of honey and wax is procured, that may be procured from collateral boxes; nor is that deficient quantity of a quality at all comparable with the other. In managing piled boxes many bees are

destroyed. These are my objections to that system of bee management; and I put it to every person who has practised stori-fying to say whether they are not well founded."

It sometimes, but very rarely, happens, that a swarm is almost wholly, if not altogether, composed of an entirely new generation of bees, but usually old and young go forth together. You may distinguish the young from the old by the intensity of their coloring, the latter being of a deeper red. The swarm is usually led forth by a *young* queen; but at all events the bees never swarm unless led by a queen, and sometimes by *two* or even *three*. In this case the supernumerary sovereigns are put to death by the workers. Sometimes, indeed, instead of the supernumerary queens being destroyed, the swarm divides, and a portion follows each monarch, and sometimes the queens themselves do battle for the throne. The destruction of the supernumeraries by the workers is, however, the most common case.

Battles also will frequently occur in consequence of a swarm seizing upon a habitation already occupied by other bees, or two swarms simultaneously selecting a similar place of abode. The attack is said to be usually begun by the queens, with what truth, however, I am unprepared to say.

Having now suggested all that occurs to me interesting, or profitable for you to know, on the subject of swarming, we shall leave the bees at work, and in the next chapter presume matters ripe and ready for the "honey harvest."

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## CHAPTER IX.

### THE HONEY HARVEST.

THOSE who possess collateral boxes may begin taking a box or a bell glass very early in the season, indeed even so early as May or June; this must be, of course, dependent on the state of affairs, and on their own discretion. Those who keep their bees in the capped hive, may also get a cap full of honey in or about the middle of June—I do not call this the "honey harvest." I allude to the grand deprivation that should take place in the beginning or middle of August, ere commencing other operations still to be explained.

I may observe with reference to the collateral hives that no instructions of mine are necessary further than those already given when describing the mechanism of Mr. Nutt's boxes. You who possess these admirable contrivances will have little or no trouble—a child could manage them, and long ere this (August) you have already begun to gather your delicious harvest. You have, of course, had more than one bell-glass full, and possibly a box of pure honey removed in May. You have certainly obtained, at least, one box in June; but I should rather imagine that you have, during that month, obtained *both the side boxes* full of honey. You must now, however, act with caution, and recollect that wet, damp weather is unfavorable to the operations of the bees; they cannot go abroad to collect their treasure, and you must avoid trespassing too much upon their stores in such weather.

The old mode of obtaining the honey was, by the suffocation of the inmates of the hive. I fear I need scarcely tell the majority of my bee-keeping readers, but sincerely hope I am wrong, that this used to be effected by digging a hole in the ground, placing therein a bundle of matches, or scraps of tow dipped in sulphur, igniting these, and setting the hive, covered with a thick cloth over it, in the latter part of the evening. The fumes of the sulphur soon caused death, and the honey was removed afterwards at pleasure. Whatever others may think or write, I must assert as my own opinion that this is a most barbarous practice; and it is as silly as it is cruel. You, if you act thus, effectually prevent the fulfillment of what should be your chief object, viz., the increase of your stock, you also impregnate your honey with filthy vapors, and seriously injure its quality by the dead bodies, which you thus cause to be intermingled with the combs.

Mr. Huish recommended dried rags, or leaves, to be employed instead of sulphur, the smoke from these only producing partial stupefactions from which the bees subsequently recovered, when the surviving stock was *united* to some other *weak* hive in the apiary.

It is a long time indeed since Wildman, White, and others, showed that the honey could be taken, even from a common straw hive, without injury to the inmates. Without, however, wearying my readers with an investigation of the several approved methods of doing this, I shall briefly direct them as to

the manner in which I, myself, recommend this very simple process to be performed.

“Fumigation” is a word employed by bee-keepers to express the process in which, by the aid of certain intoxicating *smoke*, the insects become temporarily stupefied, in which state they are perfectly harmless, and may be deprived of their honey without any risk or trouble. They subsequently soon recover from their stupefaction, and are nothing the worse for it. Indeed, as Mr. Cotton quaintly observes, this intoxication proves, contrary to its effects in the case of man, rather salutary than otherwise. The dried *Fungus Pulvurulentus*, or fuzz ball; the *Bovista gigantea*, or frog-cheese, will be found best for that purpose: but, in their absence, rags steeped in a solution of saltpetre, or a few tobacco leaves, wrapped in brown paper, will do nearly as well. If tobacco be used, care is necessary, lest the fumigation be carried to too great an extent, so as to cause the death of some or all of your stock. Persons not accustomed to deal with bees, should wear an over-all of thin gauze over the head and breast, and gloves on their hands. With this, and a little bottle in their waistcoat-pocket, containing aqua ammoniæ, or aqua potassæ, to be used in case of accident, they need have no cause for trepidation, but can go to work with coolness and deliberation.

There should be provided, for the purpose of fumigation, a small tin box, with a tube extending from each of two opposite ends; one end of this tube being so fashioned that it can readily be inserted into the hive, and the other so formed, that it can readily be attached to the tube of an ordinary bellows. The box should be so formed that it can be opened at pleasure.

In this box the matter to be employed in fumigation is first placed, having, of course, been previously ignited, and the proper end of the tube having been inserted into the hive at the lower part, ply the bellows very gently. The bees begin at once to feel the effects of the smoke. At first, you will hear an unusual humming and commotion, but in less than ten minutes all will be still. The bees will fall upon the board under the hive, and lie quite still, as if dead. The hive may then be removed, and a fresh hive—the interior well smeared with honey—may be placed over them, or they may be united to another stock, which should also be previously fumigated, one queen being removed.

Some persons may conceive it to be a difficult matter to come at the queen. When fumigation is resorted to, she is, of course,

easily discovered; but even when it is dispensed with, and the practice adopted which I have yet to describe, she is not so very difficult to come at; for, on a hive being turned up and *tapped*, the queen is among the first, if not indeed the very first, who makes her appearance, as if to discover the occasion of the unwonted disturbance; the *dusk* of an *autumnal evening* answers best for this purpose. The queen usually lodges near the crown of the hive, and is, when fumigation is resorted to, one of the last to fall; she will, consequently, in this case, be found amongst the uppermost bees. In practising fumigation, two persons should act in concert, each taking a hive, and operating upon it, in order that both stocks should be simultaneously in a similar condition as to *intoxication*. I may add, that in fumigation, the hive must be well covered with a cloth, to prevent the escape of the smoke. When you have united the two stocks in the manner I have described, it is advisable to confine the insects to their hive for that night and the following day. Do not, however, wholly deprive them of air in doing so, or you may smother them. On the evening of the following day, about dusk, uncover the hive, and open the entrance. The bees will probably at first tumultuously issue forth, but finding the lateness of the hour, will as hastily return. Let me here forewarn my readers to be more cautious on this than perhaps any other occasion, as the bees will doubtless be very indignant at the manner in which they have been treated. They are naturally a very irritable insect, and if they find you near them and unprotected when they sally forth, they will be apt to attack you in a body. The sting of a bee is not only very painful, but even sometimes seriously dangerous.

The most suitable period of the year for uniting weak with strong stocks is from the middle of August to the latter part of September. This, however, is not a proper time to remove stocks from straw hives to boxes, for the season is too far advanced. When taken from their warm hive, and removed into a cold box, bees rarely recover from the effects of the fumigation sufficiently to resume business. May or June is the best time for this removal, or perhaps still earlier, say the beginning of April, before the eggs of the queen bee have attained the stage of larvæ. If the operation be performed in cold or even cool weather, it is recommended by Nutt to do so "in a room where the temperature is about 60 degrees." Twelve hours or thereabouts suffice for the

recovery of the bees, and they may then be removed with safety to their ordinary stand.

Various other precautions besides outer clothing are recommended by writers on bee management—such, for instance, as taking a short pipe in the mouth, and smoking during the operation: every one does not, however, smoke. Others recommend taking a drink of ale previous to commencing. Others again recommend rubbing the face and hands with ale or beer; for my own part, I do not see any absolute necessity for the adoption of any of these measures, if the protecting *overall* be used; but if I were to recommend any, it would be that spoken of by Mr. Briggs—viz., *water* to which a small quantity of *creosote* has been added. Mr. Briggs adds, “The juice of the *Black ocymum*, or Indian basil, is also strongly recommended for the same purpose; and it is said that the bees will not go near to a person whose skin has been recently rubbed with it. It is, I suppose, unnecessary to observe, that *aqua potassæ* will answer the same purpose, and fully as well. These remedies will likewise be found equally efficacious for the sting of that wolf of insects—the ferocious and formidable wasp. It may be as well that I wind up my observations on fumigation with a few directions for the preparation of the fuzz balls for that purpose.

Put the ball into a piece of stout paper, and compress it as tightly as you can; tie it closely up in this condition, and put it in a moderately cool oven, about as cool as that from which bread has just been withdrawn—let it remain there until it will serve as *tinder*. The quantity of the prepared fungus necessary for the fumigation of a hive is a piece of about the size of a hen’s egg—less *may*, in some instances, answer; but it is unquestionably better to have too much than too little. I should have observed, that, prior to union, even where fumigation has been employed, the sprinkling with liquid honey should not, on any account, be omitted.

The system which dispenses altogether with fumigation, called tapping or “Driving,” is spoken of favorably by many writers; it is as follows:—

When twilight appears, you will find the bees all quietly reposing in the hive; let whoever is in the habit of tending the bees be the agent in the process; no assistance is necessary; let him or her take an old chair from which the bottom has been either worn or cut away—but a worn one is best, as it best *fits*

the reversed hive; turn up the *hive* on the chair, and place over it an empty one, which you have previously smeared interiorly with honey, or sugar dissolved in water; wrap a cloth round the point of junction for the first few minutes, and, with a stick, tap the reversed hive round the sides, beginning near the bottom, and gradually ascending in your strokes towards the top; let your strokes be not too rough, lest you loosen the combs; still, however, these are far more firmly attached than non-practical writers are aware of.

Ere you have been long thus employed, you will hear a humming noise, and presently the disturbed bees, more than half asleep, will mount into the upper hive. If the ascent of the bees appear checked ere all have left the lower hive, remove the cloth, which, by the way, is, once the ascent has commenced, no longer necessary, and raise the upper hive an inch or so above the lower. This will be found to facilitate the emigration, and will be unattended with danger. The lower hive being fully deserted, place that containing the bees on the stand. Some like to close the aperture for a short time; but I conceive such procedure to be useless, as, at that hour, the insects are too sleepy, too *stupid*, to have any desire to stir abroad; and on the morrow will proceed to their ordinary avocations, as if nothing had occurred. This resumption, however, of the insects' ordinary avocations, will not take place unless the above operation be performed early in the season.

The most secure mode of procedure, and the most approved, is, to unite these exiled bees with those of another hive. You must always, be it remembered, leave your bees a sufficient store of honey as food. This is usually done by setting apart what is called a *stock-hive*—a hive well filled with honey, and capable of containing and supporting more bees. Turn up this stock-hive; sprinkle its drowsy inmates, or rather *drench* them, with sugar or honey, dissolved in water. Do the same with your exiles; and once again invert the abode of the latter over the mouth of your inverted *stock-hive*. Proceed in other respects as you did before; and by *tapping* drive them down. The two families speedily recover from their surprise, and the agreeable employment afforded to all their individual members, of licking the results of your sprinkling from each other's bodies, will soon produce friendliness, meanwhile the odor of the liquid with which you have saturated them, will prevent their distinguishing



betwixt stranger and comrade. Of course you have previously taken the precaution of removing the *queen* of the swarm to be united to the stock hive. Some recommend permitting the rival queens to "fight it out." This is too apt to occasion a general affray, which can readily be avoided by the plan I mention. The whole procedure will not occupy above half an hour, if indeed so much. You need be under no apprehension of being stung. The bees are too sleepy, too lethargic, too much fatigued after their day's toil to care for you. In order to inspire you with confidence, let me call to your recollection the lethargic condition of common house-flies on a ceiling, in a summer or autumn evening. The bees are similarly disposed; and unless you clumsily crush some of them in your hand, they will not *take the trouble* of hurting you. If you be so very clumsy as to do so, you have only yourself to blame.

This is your *first* harvest: you may, by adopting the following approved system of management, obtain even a second, ere placing your bees in their winter quarters. This latter operation is termed "shifting."

Many writers on bee management have been in favor of shifting the hives at certain periods of the year, in order to secure a succession of food, according as it fails in one place, or proves more abundant in another. One of the earliest advocates of this system was Columella. He founds his advice on the observation that scarcely any one district can afford an equally adequate supply of pasture both in spring and autumn. Celsus and Pliny hold the same opinion. Later writers have also recommended this removal, as A. de Montfort, Maillet, in which they are followed by Wildman and others. This practice is still extensively followed, and there is still living on the Pentland hills near Edinburgh, a shepherd, who takes charge of upwards of a hundred hives annually for bee-keepers living at a distance.

From the middle of August to the end of September is the usual time when we perceive the food of bees beginning to fail them. This is the period for removing them to new pasture, which is then in bloom. Before moving, ascertain the condition of your hives; for these which are well stocked with honey should be *deprived* by the process already detailed; and this should be done some days prior to removal, for the combs containing the young may have been loosened in the operation, and

the bees should be allowed time to fasten them once again securely in their places.

“Water carriage, when procurable, is the best, as it shakes the hives least; but when land carriage must be resorted to, the hives should be carried on poles, slung on men’s shoulders. The journey should be pursued at night only, and the bees suffered to go forth and feed during the day. Such is their instinct, that they will readily find their way back; but they should not be suffered to go forth until at the distance of upwards of ten or eleven miles from their original home, otherwise they will be lost in endeavoring to regain it—a moderate distance induces them to abandon the idea, and to become reconciled to their new quarters. If traveling by canal, the hives should be removed from the boat, and placed on stands, at some distance from the bank ere the insects are let out, otherwise they will be lost in thousands by falling into the water on their return. If your weak stocks happen to be placed near the strong ones of some one else, you will stand a fair chance of having them all killed in encounters with their more powerful neighbors. It would be well also to see that your hives are placed in a situation where they will be safe from the attacks of cattle or other foes. Before fetching the hives home again, it will not be amiss to ascertain their condition and weight, and to take from them what honey they can spare.

I must here inform you how to ascertain the state or wealth of a hive. About the middle of September examine your hives; at all events do not, whatever be the aspect of the season, neglect this necessary operation until October; but if the season appear likely to turn out to be a severe one, set about it even earlier than I have indicated. But do not mistake me—I do not mean that you can *deprive* your bees of any honey so late as this; if I said so, I should be only instructing you in the best and most expeditious method of destroying your stocks. I only mean, that under certain circumstances, and in peculiarly favorable weather, you may postpone until the periods I have named, your *final* examination of your stocks, in order to ascertain which *can*, and which *cannot*, support itself, unaided by you, during the winter months.

In *observatory* hives, and such as are formed on the collateral box, or *piled* box principle, there are usually such contrivances as will admit of inspection of the hive and its contents without the

necessity of handling it. In the ordinary hive, however, we cannot avoid *manually* ascertaining the weight and condition of our stock. In order to do so, you must previously have been acquainted with the weight of your *hive*, and of the probable number of bees which it contains; and I may also add, that it would be as well if you had your stands so contrived as to admit of their being raised with the hive for the purpose of weighing, as, if you forcibly separate the latter from the former, you break the cement of *propolis*—a substance I have yet to describe, which unites the hive to its position on the stand, and puts the bees to much unnecessary trouble and annoyance.

A hive should contain *twenty pounds* of honey for its support during winter; an *increase* of *number* in the hive, produced by *union*, will not require an increase of food. Precisely the contrary is the case; and the more abundant the stock of the bees in autumn, the richer and the better able to work will they be in spring—the more forward, therefore, will they be in summer, and the greater will be your profit.

There should be twenty pounds of honey left in a hive for winter consumption, exclusive of the weight of both hive and bees. Of course I cannot give you any assistance in ascertaining the weight of the former, as that feature must depend upon its structure, &c., and the materials of which it is composed. But the weight of the bees themselves is quite a different matter. In 1lb. avoirdupois, or 16 oz., there are about five thousand bees—from fifteen to twenty thousand bees constitute a strong hive, that is, from *four* to *five* pounds in weight.

If you find, after making these calculations and deductions, that your stocks are under weight, you may either supply them with food or unite two or more together. I am in favor of union; I now only speak with reference to such persons as have reaped a second, or perhaps a *third harvest* from their bees. Had they omitted the last, no such care would have been called for.

Mr. Briggs, in a few words as to autumnal *feeding*, says, The hives should be weighed. *Age* will cause hives to weigh heavier than their *legitimate* contents would call for; this is occasioned by an accumulation of *bee-bread* and the cast sloughs which had formerly served as envelopes to the young. In the case of old hives, you must, therefore, allow from two to five pounds, according to age, for these matters. These substances require to be occasionally removed from the hive, as otherwise they will accumu-

late to such an extent as to render the hive too small for breeding, and your stock will thus soon become extinct. Spring is the proper season for removing these substances; the process is very simple, consisting merely in fumigating the hives, and thus rendering the bees for the time insensible, then, while they are in this state, turning up the hive and cutting out a portion of the old comb; you should only cut away half at a time. The following spring, perform the same process; you will find the gap your knife had made the previous year completely restored, and you may now remove the remaining portion of old comb. By this system of constantly inducing a renovation of the combs, you will preserve your stock in a state of perpetual youth. Your hive, even if made of straw, will last for an indefinite length of time if protected externally by a thick coat of whitewash, or, which is better, Roman cement; do not let any one persuade you to employ paint for this purpose; if you do, you will lose your bees. This cutting away of the combs may also be resorted to in cases where your hives are infested with moths; under such circumstances you may cut away *all* the combs that contain the larvæ of those insects.



EVERY bee-keeper should have an ordinary spatula, and a set of bee knives. These should be in the forms of the cut. They should be a foot long, beside the handle, of metal; and the blades should be so sharp as to *cut* the combs and not *bruise* or *break* them.

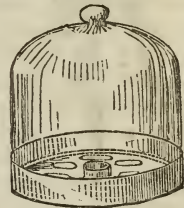
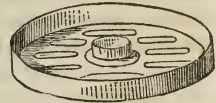
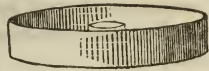
All hives under the clear nett weight (bees and honey, the hive and stand properly deducted) of 20 lbs. avoirdupois, must receive an allowance of food; the examination to take place at the close of September. *Honey*, when you have it and can spare it, is, of course, the best food you can give your bees, and will not, as Mr. Huish has asserted, give bees the dysentery; but if you cannot give honey, you may form an excellent substitute by boiling ale and sugar together gently in a clean and well-tinned vessel, over a clear fire, for about five minutes. One pound and a-half of sugar may be added to each quart of ale, and the mixture is to be skimmed, according as the scum rises to the surface during boiling; when the syrup is taken from the fire, add to it about a teaspoonful of common table-salt for each quart of syrup.

The cuts show a bee feeder. There is a hole in the centre and tube in it. The lower cut shows the feeder with a glass bell

over it. It may either be placed near, or on top of the hive with the tube going into a hole in the top of the hive.

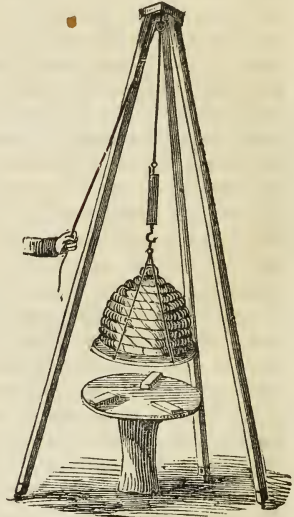
It is bad to be compelled to feed bees in the winter, as, by descending to the bottom of the hive in order to get at the food, they expose themselves to cold, and many perish; by early examination in autumn, and uniting weak hives, together with judicious feeding at that season, if necessary, the winter management will be simplified.

Bees kept in boxes are as liable as any others to the attacks of insects, mice, weasels, and other foes. In such case the stand should have been removed, and traps or poison used to banish the vermin. You will sometimes find the bees strong in numbers, yet poor in stores. This may also be a result of the presence of moths, &c., in the hive; that should, therefore, be examined, and the intruders removed. Do not, on any account, fumigate a hive with tobacco or sulphur for the purpose of expelling or destroying moths; for, if you fail of destroying your bees along with them, you may safely calculate on, at all events, rendering the *honey injurious* to them; and, in some cases, especially when tobacco has been used, absolutely poisonous. Doubtless, it was honey, impregnated with these deleterious fumes, that Mr. Huish found to give his bees the dysentery. When bees are found to be thus rich in numbers and poor in store, it frequently happens that the cause is the loss of the queen; for if anything happen to the sovereign, the community speedily decay away. The remedy in this instance is, of course, union to another stock. If this occur in winter, I should recommend you to unite, and feed abundantly. Mr. Nutt, however, says, that when this occurs in winter, all your feeding will be thrown away, and your bees perish, despite your care. Some people also defer feeding until the bees are absolutely in want. This is very wrong; the assistance should be rendered several weeks before the hive is in a state of positive destitution, otherwise, when you *do* feed, the bees will be too weak to avail themselves of your bounty. The good mode of feeding is, to put the honey, or syrup, as the case may be, in a shallow box; lay over the sweet liquid



a sheet of strong paper, perforated with holes, through which the bees can suck the syrup without falling into the mess, or becoming clogged by it; attach the box to the mouth of the hive, the bees will soon make it out, enter, and remove the store to their cells.

It is bad to *lift up* the hive for the purpose of feeding, as, by so doing, you lower the temperature of the interior, and often destroy your stock. When the feeder is attached to the entrance of the hive, all this is obviated.



It is quite important to the bee-keeper to have a *weighing machine*. This may consist of three poles of wood, seven feet long, fastened by hinges to a triangular block of wood, six inches on each side. The poles must have spikes at the lower end, to stand firmly on the ground. To the underside of the block is fastened a pulley wheel. Over this a cord passes, one end of which is held by the hand, while the other is attached a spring balance, with a hook at its end. The cut will show the method of using.

## CHAPTER X.

## MANAGEMENT DURING WINTER AND EARLY SPRING.

ONE of the most important particulars connected with bee management, is taking care that they are abundantly supplied with food in autumn, and also taking care at that season to ascertain whether or not they are sufficiently strong in *numbers*, and if not, to *unite your weak stocks*, so as to form *strong ones*. It is by such treatment as this that you may expect to preserve your bees in health and strength through the winter, and to have them in a condition to attend properly to their brood in the early spring.

In a large straw hive, there should be left, at your autumnal honey harvest, from twenty to twenty-five, or even, according to the size of the hive, thirty pounds weight of honey, exclusive, be it remembered, of the weight of hive, stand, and bees. If you should, from any accident, find your hive deficient in weight, you must make up the deficiency by artificial feeding, either with honey or with the mixture of ale and sugar.

Having ascertained that you have supplied your stocks with a sufficiently ample quantity of food for their support during winter, or that they already possess enough, you should next *narrow* the entrance of the hive so that it will scarcely admit of the passage of more than a single bee at a time; and towards the middle of November the entrance should be closed nearly altogether. The hives should be covered up with matting, fern, or other similar substance, in order to preserve them from rain, frost, or, the most dangerous of all, the sun's rays of a fine winter's day. These deceptive rays would afford a temptation to the bees to sally forth, and the result would be, that they would become chilled by the cold. Few would survive the flight so as to return to the hive: its temperature would fall, and you would lose your stock. Your hives should remain thus carefully covered and closed until the beginning of March.

I must here mention a mode of protecting your hives, and rendering them in point of warmth in winter, coolness in summer, imperviousness to wet, inaccessibility to moths, and other foes at least, unless through the entrance, and also in durability, equal to wooden boxes, viz., a coating of Roman cement on the exterior:

When there is snow upon the ground, the entrances of your hives should be entirely closed, and a screen or shade should be placed before the hive, in case of an accidental sunny day occurring, in order to prevent the bees from encountering even a single deceptive ray.

Another danger from which you are imperatively called upon to protect your bees during winter is *dampness*. It is to this cause that the loss of many a stock is to be attributed—an *internal dampness*, generated within the hive itself. This is best remedied by careful ventilation, placing a bell-glass, well covered with flannel, over the aperture on the top of your hive or box, removing it from time to time, and carefully wiping away from its interior the damp formed by condensed vapor; this remedy is at once simple and efficacious.

It will, perhaps, appear to some of my readers a singular experiment, resorted to by some bee-keepers, viz., *burying the hives*. When this is to be attempted, the hive should be buried in a cool, dry, shady place, among leaves, about a foot deep, and the interment should be performed during the first or second week of November.

A friend buried a hive of bees, in the first week of November, about a foot deep, amongst dry leaves, &c., and disinterred it in the last week of February, when it was just 2 lbs. lighter than it was in November, and the bees in a lively and healthy state. Another person immured a hive of bees in the earth, four feet deep, in the second week of November, and at the end of January it was removed, and weighed only 3 oz. less than it did before it was buried.

The above experiments are worthy of attention; a shed, having a northern aspect, and which is as dry as possible, would be a suitable place for further trials. The principal points by which there might be cause for fear of failure, would, as in other cases, be from dampness, disease for want of fresh air, and attacks from vermin, &c. To prevent the former I would recommend that the hives be placed on a long frame of wood, covered by a web of closely-worked wire, and raised a few inches from the ground, the ends of which should communicate with, and be occasionally opened to, the fresh air. A long tube should also be placed from the hole at the top of each hive to the open air of the shed, from the upper end of which any dampness might be condensed by bell-glasses, and conveyed away as already directed.



The materials with which the hives are covered and surrounded, should consist of dry leaves pressed closely together, or dry and powdered charcoal or cinders, and may be several feet in thickness, to preserve the bees in a cool and torpid state, and at a regular temperature, in which state they should be kept as *dry, dark and quiet* as circumstances will permit.

It is the opinion of many experienced apiarians, that a cold winter is not injurious to bees, provided they are sufficiently prepared for withstanding it, in the manner above detailed; and which, I trust, comprises several facts, hints, and suggestions, which are not generally known, and may be of service to beekeepers of the present day.

It is considered that those localities which are suited to the cultivation of good barley and Dutch clover, are also suited to the production of honey, and that where a rose will prosper, a bee will prosper also; consequently there are but few situations in which the keeping of bees might not be profitably extended.

In all plans and operations with bees, the laws of nature should be attentively observed and assisted, by which much may be experienced and acquired from attention and perseverance, and the results aimed at obtained at less trouble and expense than if an opposite course were pursued.

As the spring approaches, the winter coverings should be gradually removed, and those hives which have been buried placed in their summer situations. Small quantities of food should then be supplied as occasion requires, until winter is past.

It must always be borne in mind that seasons, situations, and the laws of nature, present influences which may be guarded against, or assisted, but cannot be completely controlled. Thus, the aspect for the entrances of the hives may require to be varied a few points between the eastern and western sides of the kingdom; and there may also require to be, on some occasions, an advance or delay of a few weeks in some operations with bees between the northern and the southern parts of any country of some considerable extent.

Among other obvious mistakes, I may mention the recommendation to give the bees an opportunity of leaving the hive, and going abroad every fine day, already detailed. What advantage is expected to be derived from thus permitting the insects to go forth? They may be supposed to want exercise. This is a mistake; for the bees naturally crowd together, and remain in a

sort of torpor during winter, and every thing that could tend to interfere with, or arouse them from it, must, of course, prove contrary to their natural instincts, and consequently, prejudicial. During winter the bees are inactive.

It seems generally recommended that the hives should be removed to a northern aspect during winter. If the bees are to be set at liberty, this very removal, otherwise so necessary, will cause their destruction; for they will, on being permitted to issue from the hive, of a certainty fly back to their old quarters, where they will remain until benumbed by the cold that, despite a few gleams of treacherous sunshine, pervades the air, and will, of course, soon fall to the ground, and miserably perish—all owing to your bad management.

Independent of these considerations, I may also, and I think most reasonably, adduce the very considerable, and at the same time, most unnecessary *waste of food* consequent on the adoption of the liberty system.

Bees can endure the extreme cold of a Russian winter with impunity, while a far inferior degree of cold often proves fatal; the true cause of the phenomenon is the *greater dryness* of the Russian climate, and that to *dampness* it is that we are to ascribe failure.

An old French work suggests a mode of preserving bees by *interment* during winter. It consists of laying some very dry, powdered earth upon the bottom of an old cask, to the depth of about half a foot, pressed down very hard, and setting on this the stool with the hive; then preserving a communication with the air, by cutting a hole in the cask, opposite to the mouth of the hive, and placing a piece of reed from the mouth of the hive to the hole in the cask; then covering the hive up with a quantity of dry earth similar to that on which it stands. In spring it is only necessary to remove the winter coverings gradually and with caution; to examine also the state of the bees' provisions, and, if necessary, feed them. Be cautious in at once giving them liberty, or in doing so too early, or in unsettled weather. The mouth of the hive should be kept facing *due west*, until all these dangers have passed away: when the working season arrives, the aspect of the hive must be moved southward, and the insects left entirely to themselves. When spring-feeding is necessary, it is usually in April, for then the demands of the young brood call for a greater consumption of honey than ordinary, and from

want of attending to this circumstance, hives have been lost even so late in the season as the month of May.

About the beginning of the month of March, is the proper time for transferring stocks from hives to boxes; the latter should be previously well cleaned out, their interior smeared, and supplied with a portion of honey, in a proper feeder.

As the warm weather approaches, shade your hives from the sun. If the bees be induced by the heat to attempt injudicious or ill-timed swarming, and hang in clusters about the entrance of the hive, you can check it by sprinkling them with some water from the nose of a watering pot or syringe; they will mistake this for rain, and retire within the hive to resume their work.

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## CHAPTER XI.

### THE DISEASES AND ENEMIES OF BEES.

BEES, when properly attended to, and managed on the improved modern system, are neither very subject to disease, nor very liable to suffer from the attacks of enemies; still, however, accidents of these kinds will occur, once in a while, despite of our most anxious care.

The diseases of bees are not numerous, so that a lengthened detail will be unnecessary.

#### DISEASES OF BEES.

These are Diarrhœa and Dysentery. The latter is probably only produced by neglect of the former: at all events, we may regard these two affections as springing from the one cause, and certainly they can only be combated by the same remedies.

COLUMELLA speaks of diarrhœa as a purging which seizes bees annually, in the spring; and conceives it to be occasioned by the bees surfeiting themselves on the young flowers in their first repast. He recommends a remedy, still earlier proposed by Hyginus, viz., covering the bees with the warm ashes of the fig-tree. On his own part, Columella recommends giving them rosemary and honey diluted with water.

In my opinion this looseness is occasioned by the bees feeding on what is called "candied honey"—a substance, the deleterious effects of which were well known to Aristotle, and subsequently

to Virgil, who gives, in his account of bees, express directions for preventing honey from candying. He regarded the cause of its doing so to be cold.

I cannot very positively account for the formation of candied honey, unless, as is very probable, Wildman's opinion be correct, viz., that it becomes so by being *too long* in the hive, *too stale*, and hence unfit for use. The mode of prevention is obvious:—A periodical examination of the hives or boxes, and a removal of a portion on each occasion of the old or mouldy combs. The presence of candied honey in a hive is so obnoxious to bees, that it frequently induces them to desert it.

The candied honey proves fatal to bees in another way beside their being poisoned by it. When the bees find candied honey in the combs, they, knowing its prejudicial qualities, if they have other and wholesome store, throw it out of the combs, and it of course falls on the bottom board of the hive. In doing this the bees prepare their own graves. They can neither enter nor leave the hive without bedaubing themselves, and their endeavors to free themselves and their companions from the incumbrance only make matters worse. When bees are found in this state, it is difficult to relieve them; but if anything will do so, it is immersion in *tepid water*; for this purpose you can sweep them into a tub with the wing of a fowl, leave them in the water until insensible, and *unite them*, when they revive a little, to the bees of another hive, taking care to serve these latter similarly. Though I recommend this treatment, I can by no means pronounce it infallible; but I have known it to succeed in more than one instance.

In an old French treatise we find purging and dysentery attributed to the bees feeding on *too pure honey*, which is there said not to be sufficiently substantial for them by itself. The cure recommended is to give them from another hive combs well supplied with bee-bread or crude wax.

#### ENEMIES OF BEES.

These are far more numerous than their diseases, and are as follows:—

Poultry, Mice, Toads, Frogs, Snails, Slugs, Caterpillars, Moths, Millipedes, Woodlice, Ants, Lice, Spiders, Wasps, Hornets.

FOWLS should not be permitted in any apiary. They will kill and eat the bees, and such as they do not destroy they will annoy and disturb—besides, your bees will probably occupy a

stand in your *garden*, a quarter whence other reasons should necessarily exclude poultry.

MICE.—While the bees are vigorous, the field-mouse does not dare attack the hive; but as the cold approaches, and the bees become less active, he enters, and commencing with the lower comb, ascends by degrees as the bees become torpid, until he either clears all away, or by the smell of the honey he has wasted on the board, induces other bees to come and plunder. As soon as the warm weather returns, the surviving bees will leave the hive in disgust. The remedy is easy. By having your straw hives, if you use such, coated on the exterior with Roman cement, you will prevent mice from nestling in the straw, whence otherwise they would speedily eat their way into the interior, and by *narrowing* the *entrance* of the hive in the manner already described, you will effectually keep out these little intruders. If your stands be placed on a single foot, or if the feet are so placed under the foot board as to leave a wide, projecting *ledge*, no mice can arrive at the hive.

TOADS will kill bees occasionally, but not in sufficient numbers to excite our alarm; but is rather to be regarded as a friend to the bees, one of their enemies, the *spider*, being his favorite food.

FROGS may be classed with TOADS.

SNAILS and SLUGS.—These creatures are not absolutely *enemies* of bees, as they have no design upon them or their honey in entering the *hive*, but merely do so from accident. The mischief done by them consists in the alarm and confusion they occasion. The bees first attack the unfortunate intruder and kill him with their stings, after which they carefully encase him in propolis, effectually preventing putrefaction or the production of maggots.

CATERPILLARS.—The most dreaded is the caterpillar of the *Wax-moth*, so called from the ravages it makes amongst the combs as soon as it obtains entrance. By having the legs of the stand placed as I have already described, no caterpillar can climb up to the hive; but this will not prevent the *MOTH* herself from entering and depositing eggs in the hive; and so prolific are these moths, that a single brood would suffice to destroy a whole stock. Periodical fumigation, and cutting away such combs as contain the grubs, is the remedy to be adopted. Moths are only *nocturnal* enemies. During the day you have nothing to fear from their attacks. Let the entrance to the hive, there-

fore, be *nearly closed* in the evening, and you will protect your bees from their ravages. Columella recommends, as a trap for moths, a bottle, or other vessel, with a long and narrow neck increasing gradually to a wide mouth, and having a *light* in the neck, to be placed under the hive in the evening. I can vouch for the efficacy of this trap—it will destroy numbers. Another particular to be attended to is to have your stocks sufficiently strong; and for this purpose, if the hive attacked be weak, unite it to the bees of another hive, in the manner already described. The bees are themselves, if sufficiently strong in numbers, both willing and able to destroy the intruders. If weak, they will necessarily fall victims.

MILLIPEDES, or WOODLICE, are often produced by the *stand* being made of decayed wood, or the hive being placed too near an old hedge. Let the stand be of new wood, and strew *soot* on the ground under and about the hive. This will also serve in part as a protection against the attacks of

ANTS.—You should always destroy such ants' nests as you find in the neighborhood of a hive. In the West Indies *glass feet* are used to prevent these insects from getting into furniture, &c. Might not such be used with advantage for bee-hives?

LICE.—These are small parasitical insects of a red color, which adhere to the body of the bee, and derive their nourishment from her juices. They are about the size of a grain of mustard seed, or rather smaller.

Reaumur and others tried many remedies for these troublesome insects, but in vain, till at length Madame Vicat discovered that *Morocco tobacco* will kill the lice without injuring the bees.

SPIDERS.—Brush away their webs wherever you meet with them near your stand.

WASPS and HORNETS.—These insects are most noxious to bees. Dig up and destroy their nests wherever you meet with them; but you will most effectually get rid of them by offering a reward for every queen wasp brought to you in spring. The destruction of each queen is tantamount to that of an entire nest; and if this plan were generally adopted, wasps would eventually be extirpated.

BIRDS.—Among those which are the greatest enemies to bees, I may mention *sparrows* and *swallows*. Set traps near the hives, baited with dead bees; shoot the birds; and hang up a few of

such birds as you kill, on trees near the stands. Perseverance for a time in this will rid you of the annoyance.

BEES.—Bees are amongst the most dangerous foes of their own kind, being bold and resolute plunderers. It is only weak stocks, however, that suffer, so that *union* is the obvious cure. Avoid also placing your hives too close together; and also avoid at any time placing a weak stock near a strong one.

I have now enumerated the principal foes you have to apprehend, and you will find if you follow my directions, they will not prove so very formidable, but be much more easily got rid of, or guarded against, than you imagined. On the other hand, if you neglect proper precautions, and suffer the enemy to remain unmolested, you will be equally astonished at the incredible amount of mischief they will do, and the rapidity with which they will do it.

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## CHAPTER XII.

### HOW TO TREAT THE PRODUCE OF YOUR HONEY HARVEST.

IN the first place, you must remove your store to some room without a fire-place, for the bees have been known to make use of even that mode of access in order to come at the honey, which they are able to scent from a considerable distance. Close all the doors and windows. You should previously have in the room whatever implements you want—viz., some large glazed earthen vessels, clean, new, horse-hair sieves, a *strainer*, some clean linen cloths, and abundance of water to wash your hands. Wildman recommends burning cowdung, or rotten hay, at the doors and windows of the room in which you are at work, in order to keep away the bees, and experience has shown that this recommendation should be attended to.

Your first care should be to examine the combs, and free them from all dirt, grubs, young bees, or other foreign matters—remembering, of course, to have previously well and thoroughly washed your hands. You then cut the combs horizontally into pieces of an inch wide, and lay them on the sieve over the glazed earthen vessels; when they have dropped all the honey that they will yield without squeezing, put them in the cloth already mentioned, and *wring it* over another crock; this will furnish the

*second class* honey—that *spontaneously* yielded is called virgin honey, and is equal in purity to that obtained from the bell glass.

Some have recommended heating the combs in order to procure an inferior, a *third*, description of honey; but this is bad. When you have obtained all that you can *squeeze* through the cloth or bag, carefully cover up the two sorts, put the combs, also well covered, into a vessel by themselves, and remove all the other cloths, vessels, and other utensils, to the *apiary*, that the bees may *lick them clean*.

Your next object is to obtain the *wax*; for this purpose, put the combs into a clean vessel, and add as much *soft* water as they will float in—*distilled* water would be best—but *rain* will answer nearly as well. Place the vessel on a clear and not too hot fire, and watch it, stirring occasionally until the combs be completely liquefied. You then strain this through a fine canvas bag, into a tub of cold water. The water first flows through, and then the bag requires *pressure* to make it yield the wax. The simplest *press* is that recommended in Mr. Nutt's book:—“Have ready then a piece of smooth board of such a length that, when one end of it is placed in the tub of cold water, the other end may be conveniently rested against, and securely stayed, by your breast. Upon this inclined plane lay your dripping, reeking strainer, and keep it from slipping into the cold water by bringing its upper part over the top of the board, so as to be held firmly between it and your breast. If the strainer be made with a broad hem round its top, a piece of strong tape or cord passed through such hem will draw it close, and should be long enough to form a stirrup for the foot, by which an additional power will be gained of keeping the scalding hot strainer in its proper place on the board; then, by compressing the bag, or rather its contents, with any convenient roller, the wax will ooze through and run down the board into the cold water, on the surface of which it will set in thin flakes. When this part of the operation is finished, collect the wax, put it into a clean saucepan, in which is a little water, to keep the wax from being burned to the bottom; melt it *carefully*, for should it be neglected, and suffered to boil over, serious mischief might ensue, liquid wax being of a very inflammable nature; therefore, melt it *carefully* over a *slow fire*, and skim off the dross as it rises to the top; then pour it into such moulds or shapes as your fancy may direct, having first well rinsed them. in order that you may be able to get the



wax, when cold and solid, out of them, without breaking either the moulds or the wax; place them, covered over with cloths or with pieces of board, where the wax will cool slowly; because the more *slowly it cools*, the *more solid will it be*, and free from flaws and cracks."

You may *bleach* your wax by re-melting it, and running it several times into very thin cakes, suffered to cool, and exposed to the influence of the air and sun. This will render the wax perfectly white.

You will find the separation of the honey from the wax, and the sale of these substances separately, much more profitable than the sale of the honey in the comb. The larger the cakes of wax are, and the better, the higher price it brings. The same may be said as to the *purity* of the honey. Honey may be CLARIFIED by placing the vessel containing it in hot water, and continuing to skim as long as any scum arises. In order to *preserve* honey, it should be stored in jars, well *bladdered*, and otherwise secured. It should also be kept in a dry place.

MEAD.—Some persons may feel desirous of making for themselves this once famous drink, and I shall accordingly furnish them with simple directions for so doing. Common mead is formed by mixing two parts of water with one of honey, boiling them together, and taking off the scum.

*Fermented* mead is formed of *three* parts of water to one of honey, boiled as before, skimmed, and casked. The cask is to be left unbunged and exposed to the sun, or in a warm room, until it ceases to *work*. It is then bunged, and in about three months is fit for use. The addition of a *ferment* is of course necessary, taking care that it be *sound, sweet, and good*.

Hops are an improvement to mead, taking from its extreme sweetness; and so is the addition of chopped raisins boiled with it, at the rate of six pounds of honey to each half pound of raisins; also some lemon peel; a few glasses of brandy, &c.

METHEGLIN is only another name for mead, altered by the addition of various ingredients, according to the taste of its preparers. These liquors may be *racked, fined, &c.*, like other wines, and will, if properly managed, keep for years.

It now only remains for me to conclude my account of the hive and the honey-bee with a few parting directions, forming a sort of summary of the instructions I have already endeavored to convey:—

I.—Never suffocate your bees.

II.—Do not take too much honey from them at the honey harvest.

III.—Keep them in such receptacles as will admit of extending their accommodation when desirable, and thus preventing the necessity of unwished-for swarming.

IV.—Unite weak hives in autumn, and leave the bees a sufficiency of food for the winter, so shall they be strong in store and in numbers in the spring.

V.—During winter keep them *confined, cool, dry, and quiet*; and in spring again examine and feed *liberally* such stocks as require it; and

VI.—If you, by attending to the advice I have endeavored, through the medium of this little volume, to convey to you, succeed in the culture, and discover how profitable as well as how interesting a pursuit it is, when judiciously conducted, communicate your experience to your neighbors. Abjure selfishness, and so may you prosper; and in after years you will, perhaps, congratulate yourself on having bestowed your attention on the  
HIVE AND THE HONEY-BEE.

**THE END.**

THE  
PESTS OF THE FARM;

BEING AN ACCOUNT OF THE VARIOUS  
DEPREDATING ANIMALS, BIRDS, AND INSECTS

WHICH

ANNOY THE AMERICAN FARMER.

WITH

DIRECTIONS FOR THEIR DESTRUCTION.

WITH ILLUSTRATIONS ON WOOD.

NEW YORK:  
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1856.

REPORT OF THE BOARD

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Entered according to act of Congress, in the year 1852, by

C. M. SAXTON,

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District of New York.

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## EDITOR'S PREFACE.

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THE title and purpose of this little book, were suggested by the English one of Richardson. Beside the name, this has little connection with that, as it is wholly American, some trifling portion only having been taken from it. The pests of the American farm being nearly all American, it was necessary to draw its matter from American sources. The Editor is indebted mainly to Godman and Audubon for the portion relating to Quadrupeds; to Wilson, Bonaparte, Ord and Audubon for that relating to Birds; and to Harris and Miss Morris for that relating to Insects. .

The matter contained in this little book is nowhere else accessible in one volume, nor in popular shape. To obtain the information here given, many expensive ones, without this, must have been consulted; and while these circumstances should commend it to every farmer, the subject matter should command his attention and secure his interest.

A. S.

## PUBLISHER'S ADVERTISEMENT.

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THE Publisher, having found the want of small, cheap Books, of acknowledged merit, on the great topics of farming economy, and meeting for those of such a class a constant demand, offers, in his Rural Handbooks, of which this is one, works calculated to fill the void.

He trusts that a discerning Public will both buy and read these little Treatises, so admirably adapted to all classes, and fitted by their size for the pocket, and thus readable at the fireside, on the road, and in short everywhere.

C. M. SAXTON,

*Agricultural Book Publisher.*

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## THE PESTS OF THE FARM.

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ANY scientific mode of arrangement, in the treatment of such a very diversified subject as the present, would only prove a source of unnecessary toil and mystification to the practical reader. The principal *living* pests from whose annoyances farmers, or those *holding land*, whether as farmers or mere country gentlemen, are likely to suffer, are easily divisible into three great sections—viz., quadrupeds, birds, and *insects*. I adopt the latter term in its old and widest sense—viz., as applying not merely to *insecta*, but to worms, slugs, and other land molluscs infesting plants and fruits. Under the first head, of *Quadrupeds*, will be the WILD CAT, the SKUNK, the WEASEL, the OTTER, the HEDGEHOG or PORCUPINE, the MOLE, the RABBIT, the HARE, the RAT, the MOUSE, the FOX, the OPOSSUM, the MINK, the MUSKRAT, the WOLF, and the RACCOON. Under the second head will be Predacious Birds, such as the Eagle, the Raven, the Owl, the Kite, the Hawk, &c., whose predatory habits tend usually towards the same quarter, and which may to a great extent be destroyed, or their ravages guarded against, in the same manner and by the same means. Under the third, will be *Insects*, properly so called, as *Beetles*, *Weevils*, *Wasps*, *Flies*, the WIREWORM, the TURNIP-FLY, the BEETLE, the various CATERPILLARS, and other ravenous *larvæ*; nor shall I omit some account of the *aphis vastator*, to whose devastation many persons attribute the loss of the potato; and, observe, I shall not confine my observations to such creatures as *I know* to be pests, but shall further describe such as are only *suspected*, and also those which are *calumniated*, which *I know not to be* pests, many of which, indeed, are on the contrary *serviceable*, and to be regarded as friends rather than as foes, to be preserved rather than extirpated.

## SECTION I.

## QUADRUPEDS.

THE WILD CAT.—In form, the Wild Cat closely resembles its domesticated namesake ; it is, however, more compactly built, is of larger size, and its tail is not only shorter, but blunter at the point. From the latter circumstance has arisen the not yet obsolete fable of wild, demon-like cats, being found, with *hooks* or *spikes* at the extremity of the tail ; for, in the common Wild Cat, the extremity of the tail is usually destitute of hair, and is not unfrequently furnished with a hard and nail-like process, proceeding from a sort of unaccountable exposure of the last joint of the tail. The domestic cat will also occasionally become wild. This is not, as might be supposed, the descendant of the Wild Cat, but is of Egyptian origin. It will, however, breed with the Wild Cat, and I have ascertained that the progeny are fertile. The young are also fertile among themselves ; and, hence, according to the admitted theory of zoologists, they are of the *one species*.

When the domestic cat becomes wild, it is, by many degrees, a more troublesome and more crafty enemy than the naturally wild animal. Whether naturally wild, or only having been rendered so by circumstances, however, both animals present the same characteristics of disposition, habit, and place of abode. Their prey is the same, their habitudes are the same, and, consequently, the same mode of destruction will be found to apply to both. The principal specific difference between the wild and the common Cat is the length of the intestines—those of the Wild Cat being considerably shorter.

The Wild Cat exceeds the common cat in size, standing usually upwards of eighteen inches in height. The body is shorter in proportion ; the lips are always black, and the prevailing color of the fur a rusty or reddish grey. This fur will be found to make a warm and comfortable lining for winter shoes.

Now, as to the destruction of the cat, either traps or poison will effect it with facility. A steel spring-trap is best, and I prefer the square to the round form. Chain it firmly to some fixed object ; bait with a dead fowl or piece of meat, smeared or rubbed with *valerian*. The cat is so very fond of the odor of this substance, hence familiarly termed “cat-mint,” that it will go anywhere for

the purpose of *rolling upon it*. The annexed cut represents the best form of trap for this purpose. You should proceed with cau-



tion to release the captive felon. Should any blood be spilled upon the trap, wash it off, and change the bait every night.

**NORTHERN or CANADIAN LYNX.**—The northern lynx is a fierce and subtle creature, exhibiting most of the traits of character which distinguish animals of the cat kind. To the smaller quadrupeds, such as rabbits, hares, lemmings, &c., it is exceedingly destructive, never leaving the vicinities they frequent until their numbers are altogether destroyed, or exceedingly thinned. But the ravages of the northern lynx are not confined to such small game; it drops from the branches of trees on the necks of deer, and clinging firmly with its sharp hooked claws, ceases not to tear at the throat and drink the blood of the animal until it sinks exhausted and expires. It attacks sheep and calves in the same manner, and preys upon wild turkeys and other birds, which it is capable of surprising, even on the tops of the highest trees.

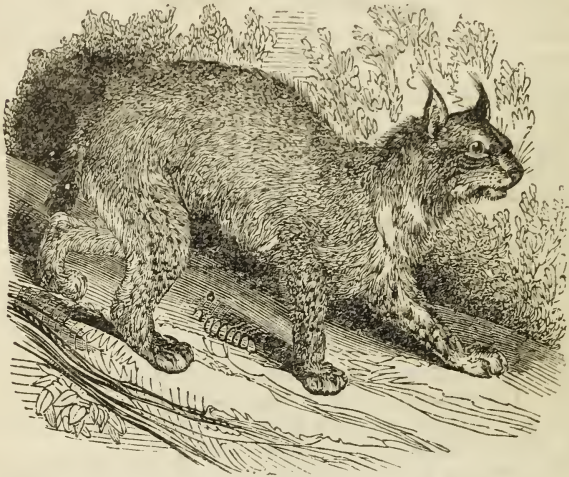
The northern lynx is fearful of man, offers very little resistance when attacked, and is easily killed by a smart blow over the back. This animal is not often found to approach closely to settlements, though occasionally it does, when it is destructive to sheep and calves, but frequents the plains and woods where the animals on which it subsists are obtained in the greatest abundance.

The northern lynx has a large body and strong legs, and measures about three feet from the tip of its nose to the end of its tail, which is about six or seven inches long, and black for half its length towards the extremity. The head is thick and round, and the ears sharp and tipped with a tuft of black hair. There are four or five small undulating bands on the cheeks, and the labial whiskers are white. The animal is about sixteen inches high.

The general color of the northern lynx is deep reddish, marked on the flanks with small oblong spots of a reddish brown, with small round spots of the same color on the limbs. The ears are black externally, but covered by an angular space of shining

ash color; the eyes are surrounded by a whitish circle to a black longitudinal mark above them, running from each side toward the front. The back is never marked by a black band along its middle.

In summer dress the pelage is short, the hair being brown at



THE LYNX.

the base and of a bright red at the point. In winter the hairs are longer and all their points are whitish; the silky hairs, which are most numerous and long in winter, render the color of the animal ash or whitish, which in summer gives place to the more decided red, marked with brown spots. The lynx is to be shot or caught by traps, like the wild cat.

**THE SKUNK.**—Pedestrians, called by business or pleasure to ramble through the country during the morning or evening twilight, occasionally see a small and pretty animal a short distance before them in the path, scampering forward without appearing much alarmed, and advancing in a zig-zag or somewhat serpentine direction. Experienced persons generally delay long enough to allow this unwelcome fellow-traveler to withdraw from the path: but it often happens that a view of the animal arouses the ardor

of the observer, who in his fondness for sport thinks not of any result but that of securing a prize. It would be more prudent to rest content with pelting this quadruped from a safe distance, or to drive it away by shouting loudly; but almost all inexperienced persons, the first time such an opportunity occurs, rush forward with intent to run the animal down. This appears to be an easy task; in a few moments it is almost overtaken; a few more strides, and the victim may be grasped by its long and waving tail—but that tail is now suddenly curled over the back, its pace is slackened, and in one instant the condition of things is entirely reversed;—the lately triumphant pursuer is eagerly flying from his intended prize, involved in an atmosphere of stench, gasping for breath, or blinded and smarting with pain, if his approach were sufficiently close to allow of his being struck in the eyes by the pestilent fluid of the skunk. Should the attack on this creature be led by a dog, and he be close at hand when the disgusting discharge is made, he runs with tail between his legs howling away, and by thrusting his nose into the soil as he retreats, tries to escape from the horrible effluvia which renders the air in the immediate vicinity of the skunk too stifling to be endured. Thus is an animal, possessed of very trifling strength and no peculiar sagacity, protected by the hand of nature against the most powerful and destructive enemies. A few glands secrete a most noisome and intolerably stinking fluid, and this scattered with peculiar force upon the body of his enemies, or even in the air, is sufficient to disarm the violence of most quadrupeds, and induce man himself rather to avoid than to seek an encounter.

The organs by which this fluid is formed, are placed near the termination of the digestive tube, and the ducts from the glands open into the rectum, by the aid of whose muscles the fluid is ejected with astonishing force, and is aimed with great accuracy, rarely missing the object, if discharged while within the proper distance. The faculty this animal possesses of annoying its enemies by the discharge of the fluid just mentioned, causes it rather to be shunned than hunted, which the value of its skin would otherwise be sure to occasion.

The skunk inhabits the whole of North America, and is also found throughout a considerable part of the southern portion of the continent. As the colored markings vary exceedingly in different individuals, it is not surprising that naturalists have made several species of this animal, though without any foundation in

nature. All the species proposed by systematic writers are reducible to one, the subject of this article, *Mephitis Americana*, or American skunk.

The fetor produced by the skunk is especially characterized by all who have experienced it as suffocating or stifling, which is owing to its peculiar concentration. The predominant odor is that of muskiness, but in so condensed and aggravated a form as to render it almost insupportable, even at a considerable distance from the spot where it is first discharged. A very good idea may be formed of this stench by breaking and smelling a leaf or stalk of the plant called skunk cabbage (the *Dracontium fetidum*, or *ptothos fetidum*), resembling it in every respect except in strength, which perhaps no artificial accumulation of this vile scent could ever equal.

The fluid ejected by the skunk is not merely offensive by its stench, but also in consequence of its highly stimulating and acrimonious qualities. When any of it is thrown into the eyes, it is productive of very violent and dangerous inflammation; we must suppose that this peculiar acrimony, rather than any mere offensiveness of odor, is the cause of the marked repugnance evinced by dogs, as these animals show not the slightest sign of uneasiness from the presence of the most nauseous and putrid effluvia from animal or vegetable substances, yet run howling and trying to thrust their noses into the ground after having been exposed to this pungent perfume from the skunk.

In its extreme volatility it bears a considerable resemblance to true musk. The smallest drop is sufficient to render a garment detestable to the wearer and his companions for a great duration of time, and without any perceptible diminution of intensity. Washing, smoking, baking and burying articles of dress, and in fact every effort short of destroying the materials of which they are made, seem to be equally inefficient for its removal. This scent is not only thus enduring when the fluid is sprinkled upon clothing, but the spot where the animal is killed, or where the matter was ejected, retains it for a great length of time.

If the skunk be killed while unsuspecting of the approach of danger, or before time has been allowed for the discharge of his artillery of perfume, the animal is not in any way disagreeable, and may be approached closely or even eaten without the least unpleasantness, if the glands be carefully taken out. Its flesh, when the oocorous parts have been carefully removed, is said to be

well flavored, and resembles that of a pig considerably. It is eaten by the Indians, and occasionally by hunters, with much relish.

The skunk is most generally found in the forests or their immediate vicinity, having its den either in the hollow of an old tree or stump, or an excavation in the ground. It feeds upon the young and eggs of birds, and on small quadrupeds, wild fruits, &c. Occasionally the skunk gains access to the poultry-yard, where it does much mischief by breaking and sucking the eggs, or by killing the fowls. When resident in the vicinity of farm-houses, it remains for a long time without giving notice of its presence by emitting its offensive fluid, which proves how ridiculous is the notion that the urine of this animal is the source of its disgusting fetor; for were this the fact, the whole country it inhabits would be rendered almost insupportable to every other creature.

We have already stated that the color of the hair is various in different individuals of this species at different seasons and periods of life. Very commonly it is of a blackish brown over the whole of the body, except on the top of the head, or immediately between the ears where there is a white spot, and the tip of the tail, also, is white. Some individuals have a slight white mark on the breast. The hairs of the tail are long and bushy, and, with the exception of their tips, are of a dark brown color. But, as heretofore stated, scarcely two of them are colored precisely in the same way. The length of a full-grown skunk is about eighteen inches, and the tail about seven, the long hair at the extremity making nearly one-half of this length.

The best way of destroying the skunk is the trap. The same form of trap recommended for the wild cat will answer, but it should be of smaller size. Box-traps have been recommended; but I have little confidence in them, and prefer the steel. A few leaves or grass should be cast over the trap, in order to disguise its character. The skunk is not a very sagacious animal, however, and his want of cunning renders his capture, by the preceding method, very easy. If a box-trap be used at all, let it be a long one, open at both ends; cast bushes over it; bait and trail the bait for some distance along the path at both extremities of the trap.

**THE WEASEL.**—Among the small quadrupeds inhabiting America, few are to be found equaling the weasel or ermine in

beauty—perhaps none that excel it in the qualities of courage, graceful celerity of movement, and untiring activity. Its whole aspect inspires the beholder with an idea of its character which is well supported by its actions. The long and slender body, bright and piercing eyes, keen teeth and sharp claws, clearly show that, however diminutive the animal may appear, it is destined by nature to destroy other creatures more numerous and less powerful than those of its own race; this length and slenderness of body are accompanied by a peculiar degree of flexibility, and by a strength of limb, which, in so small an animal, may be fairly esteemed surprising. There is scarcely an opening through which its prey can enter, where the weasel cannot follow, and having once gained access, its instinctive destructiveness is only allayed when no other victim remains to be slaughtered.

In the northern parts of this continent, and the northern portions of Asia, the ermine is found in the greatest abundance; yet it is by no means limited to northern regions, since it is found throughout a vast expanse of country, reaching from the highest northern latitudes to the middle states of the Union. In the middle and eastern states it is most generally known as the *weasel*; farther north it is called *stoat* in its summer, and *ermine* in its winter pelage of pure white.

The habits of the ermine weasel are very analogous to those of the common weasel of Europe, and as its general configuration is so nearly similar, it is not surprising that this animal should have been confounded with the European species. This weasel frequents the barns and out-houses of plantations, and its retreat is generally well secured beneath the floors or rafters, amid accumulations of timber or stone, or in similar situations. Mice and various other depredators on the granary are the special objects of its pursuit, and the rapid multiplication of many of these devourers of grain could scarcely be sufficiently restrained, were it not that the weasel is capable of tracing them throughout their labyrinths, and possesses the disposition to destroy all that come within its reach. If the efforts of this weasel were confined to the destruction of these little depredators, we might consider it as the best friend to the husbandman; but occasionally a contribution is levied on the hen-roost, and the morning's light exhibits an universal slaughter of the poultry, whose throats are cut, or heads eaten off. It is scarcely possible to prevent such occurrences when these animals are resident in the vicinity, as they can gain access



where few other creatures can enter; then their swiftness of motion and keen bite soon render the escape of their victims impossible.

Still it must be acknowledged that there are many situations in which the services of this little animal may be esteemed a positive good; for such is the fecundity of many of the depredators on the grain, that nothing short of the destruction of the whole crop would ensue, were it not that the weasel is continually thinning their ranks and killing greater numbers than are required for its mere subsistence.

The disposition which makes this weasel so useful under ordinary circumstances, forbids an attempt to increase its usefulness by domestication, for the purpose of freeing our houses from mice, &c. Notwithstanding it might be so far tamed as to take up its residence about our dwellings, it would be exceedingly dangerous to expose the lives of the inmates to the blood-thirstiness of this quadruped, which is rendered doubly dangerous from the circumstance of seeking its prey during the hours devoted by man to sleep.

The weasel is found in greater abundance on barren grounds or open plains than in the woods, which in all probability is owing to the greater number of mice that frequent the former situations.

While pursuing their prey, weasels are said to resemble little hounds running upon a trail; their tails are carried horizontally, while with eager haste and most agile movements they follow their prey by the scent. Except when in their summer dress, it is very difficult to distinguish their actions, as in winter their pure white pelage is so nearly the color of the snow, as to render it almost impossible to see them. When the weasel is hunted and closely pursued, like other species of this genus, it has the faculty of ejecting from a peculiar glandular apparatus, a fluid of a powerful musky odor; this, though it may serve to retard the pursuit of some of its enemies, is too harmless a resource to save the weasel from the hands of man.

There is but little probability of taming the weasel unless it be captured very young, and even then the period of its mildness would pass away with its early youth. When caught in a trap and subsequently kept in a cage, it exhibits every sign of the most unappeasable disposition to kill or injure every being it is able to master. Various attempts have been made to domesticate the weasel, but all without success, and frequently the restlessness and

impatience of the animal has appeared to increase with the duration of its imprisonment.

We have mentioned that in the eastern and middle part of the United States the ermine weasel frequents out-houses, stone-heaps, piles of timber, &c., and though capable of following its prey into small holes, does not burrow in the earth.

The ermine weasel, in its summer dress, is of a light ferruginous or chestnut-brown color over the whole of the head; this color extends in a rounded spot below the angle of the jaw; the whole back, sides, and half of the tail next the body being of the same color. The other portion of the tail is blackish, becoming gradually darker as it approaches the extremity, where it is quite black, and the hairs terminate in a point resembling that of a camel's hair pencil. The external and anterior half of the fore-legs are of the same color as the upper part of the body, and there are three small spots of white over the base of the toes of the right foot, and one on the left, over the first or shortest digit.

The under part of the animal is nearly of a pure white, beginning at the extremity of the under jaw and spreading broadly as it passes over the throat, where it forms a point on each side, almost reaching to the base of the ear. The white then narrows slightly in descending the neck, spreads broadly upon the breast, and then suddenly growing narrower, passes down the inner and posterior part of the fore legs. Thence it passes along the belly, where it is again narrowed, and then spreading out widely at the groin, it terminates at the upper and anterior part of the thigh, becoming visible for a short distance on its outside.

The fur in summer is short, soft and silky to the touch, not varying perceptibly in length except on the snout, where it is quite short, and covering the digits of the fore and hind feet, where it is rather longer than on the other parts, and conceals the nails entirely. On the tail the hairs are longer and coarser than on the rest of the body, though still soft.

The ermine weasel, in its winter pelage dress, is of a pure white over the whole head, body, and limbs; half of the tail to its extremity only retaining its black color. This white color is so pure in the northern regions as to render it almost impossible to distinguish these animals upon the snow, when the ends of their tails are not in sight. The whiteness is not always thus pure, but the fur is slightly tinted with pale yellow on the tip.

The ear of the ermine weasel is broad at its base, and the orifice leading to the internal ear large; the ears are not covered with fur on their posterior surface, but by a very short down. On the superior and anterior part of the external ear, there is some hair of considerable length growing from that part of the ear which would correspond with the helix and anti-helix of the human ear, and almost covering the concha. The eyes of this animal are small and black, yet prominent, clear, and lustrous.

The fur of the ermine becomes longer, thicker, and finer in winter than in summer; this effect seems to be a general consequence of rigorous seasons on all animals, without reference to the permanence or mutability of their coloring.

To take these pests, use such square steel traps as are already described, but smaller; bait with small birds, their tails dipped in *musk* and *aniseed*; the weasel displaying as strong a predilection for this substance as the cat does for valerian.

THE COMMON OTTER varies in size—some adult specimens measuring no more than thirty-six inches in length, tail inclusive; while others, again, are to be found from four and a half to five feet long. The head of the otter is broad and flat; its muzzle is broad, rounded, and blunt; its eyes small and of a semicircular form; the body is long, rounded, and very flexible; legs short and muscular; feet furnished with five sharp clawed toes, webbed to three-quarters of their extent; tail long, muscular, somewhat flattened, and tapering to its extremity. The color of the otter is a deep blackish brown; the sides of the head, the front of the neck, and sometimes the breast, brownish grey or dusky white. The belly is usually, but not invariably, darker than the back; the fur is short, and of two kinds; the inferior or woolly coat is exceedingly fine and close; the longer hairs are soft and glossy, those on the tail rather stiff and bristly. On either side of the nose, and just below the chin, are two small light-colored spots. So much for the appearance of the otter; we now come to its dwelling.

The native haunt of the otter is the river bank, where, amongst the reeds and sedge, it forms a deep burrow, in which it brings forth and rears its young. Its principal food is fish, which it catches with singular dexterity. It lives almost wholly in the water, and seldom leaves it except to devour its prey; on land it does not usually remain long at any one time, and the slightest alarm is sufficient to cause it to plunge into the stream. Yet, natural as seems a watery residence to this creature, its burrow is per-

fectly dry ; were it to become otherwise, it would be quickly abandoned. The entrance, indeed, is invariably under water, but its course then points upwards into the bank, towards the surface of the earth, and it is even provided with several lodges or apartments at different heights, into which it may retire in case of floods, throwing up the earth behind it as it proceeds into the recesses of its retreat ; and when it has reached the last and most secure chamber, it opens a small hole in the roof for the admission of atmospheric air, without which the animal could not of course exist many minutes ; and should the flood rise so high as to burst into this last place of refuge, the animal will open a passage through the roof, and venture forth upon land, rather than remain in a damp and muddy bed. During severe floods, otters are not unfrequently surprised at some distance from the water, and taken.

In a wild state, the otter is fierce and daring—will make a determined resistance when attacked by dogs—and being endued with no inconsiderable strength of jaw, it often punishes its assailants terribly. I have myself seen it break the fore-leg of a stout terrier.

The otter is easily rendered tame, especially if taken young, and may be taught to follow its master like a dog, and even to fish for him, cheerfully resigning its prey when taken, and dashing into the water in search of more.

The common otter is only to be regarded as a pest when fishponds or rivers are concerned. His habits are interesting, and of a gentle and inoffensive description, and his race is not so numerous as to require or deserve extirpation.

**THE AMERICAN PORCUPINE.**—The American Porcupine exhibits none of the long and large quills which are so conspicuous and formidable in the European species, and the short spines or prickles which are thickly set over all the superior parts of its body are covered by a long coarse hair, which almost entirely conceals them. These spines are not more than two inches and a half in length, yet form a very efficient protection to our animal against every other enemy but man. Too slow in its movements to escape by flight, on the approach of danger the porcupine places his head between his legs, and folds his body into a globular mass, erecting his pointed and barbed spines. The cunning caution of the fox, the furious violence of the wolf, and the persevering attacks of the domestic dog, are alike fruitless. At every attempt to bite the porcupine, the nose and mouth of the aggressor are severely wound-

ed, and the pain increased by every renewed effort, as the quills of the porcupine are left sticking in the wounds, and the death of the assailant is frequently the consequence of the violent irritation and inflammation thus produced.

In the remote and unsettled parts of Pennsylvania the porcupine is still occasionally found, but south of this state it is almost unknown. According to Catesby it never was found in that direction beyond Virginia, where it was quite rare. In the Hudson's Bay country, Canada, and New England, as well as in some parts of the western states, throughout the country lying between the Rocky Mountains and the great western rivers, they are found in great abundance, and are highly prized by the aborigines, both for the sake of their flesh and their quills, which are extensively employed as ornaments to their dresses, pipes, weapons, &c.

The porcupine passes a great part of its time in sleep, and appears to be a solitary and sluggish animal, very seldom leaving its haunts, except in search of food, and then going but to a short distance. The bark and buds of trees, such as the willow, pine, ash, &c., constitute its food during the winter season; in summer, various wild fruits are also eaten by it.

The porcupine is only a pest, as he may occasion the death of a valuable dog. The method of destroying him is by the gun and by traps.

**THE MOLE.**—The mole is, by most agriculturists, ranked among the most troublesome pests of their farm; while others again deny that it deserves this bad character, and are even disposed to expatiate on its utility. It is certain that the mole is of carnivorous, nay, I should perhaps say, of insectivorous habits—its food consisting chiefly of worms, slugs, snails, beetles, cockchafers, grubs, and other such creatures. In destroying these there can be no doubt but that the mole does good service to the farmer, and deserves so far to be looked on with some degree of favor. On the other hand, however, it is no less true that in forming its burrow, the mole throws up a heap of earth, known as a molehill, which is apt to interfere with the progress of the mowers. Some say that the holes also are serviceable to the soil, by throwing up the subsoil, and thus renewing the surface, but it must be at the same time admitted that this burrowing loosens and often disinters the roots of grain. Whether, therefore, this animal is to be regarded as a pest or not, depends on the opinion of the individual farmer on whose lands he may make his appearance.

There are two kinds of moles that are pests—viz., the shrew-mole and the star-nose mole.

The shrew-mole is found abundantly in North America, from Canada to Virginia; often living at no great distance from water-courses, or in dykes thrown up to protect meadows from inundation. But so far from exclusively inhabiting such places, as stated in various books, I have found them in far greater numbers at a very considerable distance from any water-course, and in high oftener than low grounds. In the country they frequent the gardens, where their subterranean galleries are sometimes productive of vexation to the farmer, especially as the animal occasionally courses along the rows of pea-vines, &c., apparently for the purpose of feeding on their roots. This, we shall hereafter learn, is most probably an error, and we may find good reasons for believing that the shrew-mole should be considered rather as a benefactor than a depredator.

The shrew-mole burrows with great quickness, and travels under ground with much celerity: nothing can be better constructed for this purpose than its broad and strong hands, or fore-paws, armed with long and powerful claws, which are very sharp at their extremities, and slightly curved on the inside. These are thrust forward so as to be even with the extremity of the flexible snout, and the earth to be removed is pressed outwards, and at the same time thrown backwards with remarkable quickness. The soft and polished fur with which this animal is covered, preventing a great degree of friction, tends to facilitate its subterranean march.

Numerous galleries, communicating with each other, enable the shrew-mole to travel in various directions, without coming to the surface, which they appear to do very rarely, unless their progress is impeded by a piece of ground so hard as to defy their strength and perseverance. The depth of their burrows depends very materially on the character of the soil, and the situation of the place: sometimes we find them running for a great distance, at a depth of from one to three inches, and again we trace them much deeper; after following such a gallery for several yards, it occasionally communicates with another going deep into the earth.

The most remarkable circumstance connected with these burrows is the number of hills of loose dirt which are frequently formed over the surface of them. These hills of loose earth are usually found in considerable numbers, at a distance of two feet or a little more apart, being from four to six inches high, and about

the same in diameter. I have often examined these eminences, and have never been able fully to understand how they are formed; a slight motion is observed at the surface, and presently this loose earth is seen to be worked up through a small orifice, whence, falling on all sides, by its accumulation the hills just mentioned are produced. It seems to be brought from some distance, for on breaking up the gallery, it is evident that more earth had been thrown out than could have been removed in excavating the immediately adjoining portions of the burrow. In one instance I have seen the shrew-mole show the extremity of its snout from the centre of one of these loose hills, where it had come at mid-day, as if for the purpose of enjoying the sunshine, without exposing its body to the full influence of the external air.

Under ordinary circumstances the burrows are simply oval-arched galleries, running forward either straight or in gentle curvatures, at the depth heretofore mentioned, and they are most regular in soils abounding in earth-worms. In the dry and sandy soil I have found them very irregular in direction and depth, and in the woods, uniformly leading round the roots of trees, under which large excavations are frequently to be traced. We can readily understand the object of these excavations when we recollect that the ants very often have their nests in such situations, and their larvæ or eggs constitute a favorite food of the shrew-mole. The burrows made by this animal are sometimes found to terminate under large stones, where it resorts to gather the insects, which are numerous in such situations. I have traced a burrow of this sort close to a barn wall, and then following it nearly around the whole house, have found that it passed under every large stone in its vicinity, although not directly in the general course of the gallery, the cavity being much larger beneath the stones than elsewhere.

The favorite food of the shrew-mole is the earth-worm; grubs and insects of various kinds he destroys in great quantities, and it may fairly be questioned whether the good done in this way does not more than overbalance any evil attendant on its presence. It is true that this animal is accused of eating grass roots, and roots of succulent vegetables, and may thus be productive of some mischief in gardens, but scarcely to so great a degree as to constitute a serious evil. The presence of the shrew-mole in fields of Indian corn appears to be decidedly advantageous from the destruction of great numbers of slugs and worms; but in dry seasons these animals, if numerous, may injure small grain or grasses to a consider-

able extent, not only by the wounds they inflict on the root with their sharp claws, but by raising the sod while forming their burrows, so as to withdraw the roots from the influence of the moist soil below.

THE STAR-NOSE MOLE frequents the banks of rivulets, and the soft soil of adjacent meadows, where their burrows are most numerous, and apparently interminable; in many places it is scarcely possible to advance a step without breaking down their galleries, by which the surface is thrown into ridges, and the surface of the green sward in no slight degree disfigured. The excavations which are most continuous, and appear to be most frequented, are placed at a short distance below the grass roots, on the banks of small streams; these are to be traced along their margins, following every inflexion, and making frequent circuits in order to pass large stones or roots of trees, to regain their usual proximity to the surface nearest the water.

The form of the burrow does not perceptibly differ from that made by the shrew-mole; but very few hills are to be found in the localities inhabited by the star-nose. The chamber-cell resembles that described in the last chapter, being a space of several inches dug out of some spot where the clay is tenacious, and the cell least exposed to injury from the weather or other accidents.

The system of dentition peculiar to this genus, would lead to the inference that the quality of its food must in some respects differ from that used by the shrew-mole; but on this point it is not easy to say more, than that as the star-nose prefers moist and low situations, and the shrew-mole is most frequently found in dry, and rather elevated spots, they feed on the larvæ and insects proper to such places, which are doubtless of dissimilar kinds. In a state of captivity both animals feed readily on flesh, either raw or cooked, and neither seem to show any fondness for, nor willingness to eat, vegetable matter.

My duty consists merely in pointing out the most efficacious method of destroying the animal: those farmers who think he should be rather protected than warred against, are not obliged to use the means I merely place within their reach.

Few dogs will kill or even mouth the mole, and if a dead one be presented to a dog, he will usually curl up his lips, and turn from it in apparent disgust. I have heard this asserted of cats also, but am not positive of the correctness of the idea, never having myself made the experiment. Traps and poison are the means



best calculated to effect their extirpation. The ordinary mole-trap is to be obtained from any of the agricultural implement-makers, or any of the farm seed-shops. The principle of its construction depends on a spring formed of some elastic sort of twig, stuck in the ground, and bent until its other extremity is attached to the trap. The trap is placed in the mole's *run*, and is baited with earth-worms or a bit of raw meat. On the mole entering the trap and setting the spring at liberty, it is suddenly caught up, a noose drawn tight by the reaction of the twig, and the mole suspended by the neck.

I recently met with what I conceive to be a far more efficacious, and less troublesome mode of destroying moles.

Take a quantity of fresh worms, put them in a wooden box, with a small quantity of carbonate of barytes in powder, and let them remain for an hour or two; then find out the runs where the moles leave the fences for the land, lay in every run five or six worms, and continue doing so as long as the worms are taken away by the moles. I was infested with moles before I used this remedy, which was about fifteen years since, but have never been injured since, by giving a little attention to them in the spring.

THE EUROPEAN RABBIT has been introduced into America, and will soon be spread widely.

The rabbit is unquestionably, when left to its own unrestrained devices, a very serious pest, but an animal which may, nevertheless, with proper management, be rendered a very considerable source of emolument, while the annoyance they have occasioned will be, at the same time, abated.

If you would have rabbits and only profit, never suffer by them; keep them in *enclosures*, and provide them with well-sheltered huts. The hutches should stand on dry ground, and be well ventilated. If *sloping*, so much the better, as this allows the wet to run, and let there be *tanks* placed in front to receive it. It is, when mixed with straw, valuable as manure.

Be careful while you have your rabbit-house well ventilated, that it at the same time afford them sufficient shelter, and be carefully preserved from damp. Do not give green food in a wet state; it is apt to produce the *rot*. If, however, a proportionate quantity of *oats* or other *hard food* be given, you need have no fear on this head. Keep them *clean*. Let the breeding-boxes have two apartments—one for day, and the other, furnished with a bed, for night. Do not give more food than will be consumed

at one time, and keep the *bucks* apart. The doe will breed at five or six months old, and she carries her young thirty days. But the buck should not be again admitted to her until about four days after kindling, and he should be kept from her during her pregnancy, or he will cause her to cast her young. The young may be weaned at the age of from four to five weeks. The number of young produced at each litter is from ten to thirteen. If the doe be weak after parturition, she may be given beer caudle, which she will drink greedily, or warm grains, or tepid milk and water. Oats may be given daily.



THE RABBIT.

Now as to the Rabbit in the character of a nuisance: you can never be fully on your guard against his visits, and one is destroyed only to make room for another. Nooses placed in the paths he is known to frequent are recommended by some.

The Rabbit commits but little mischief amongst the green crops in comparison with its ravages amongst young trees, and growing plants; and they may be prevented from injuring these by a very simple process. Mix common coal tar with equal portions of cow-dung and lime, and with a brush smear the stems to the height of

about thirty inches from the ground. The repetition of this treatment annually will effectually preserve the trees from their attacks, while the numbers of the rabbits must, of course, be kept within proper bounds by shooting or ferreting. There are also different descriptions of net used for taking rabbits, some account of which may prove useful. The *fold-nets* are so laid as to form an enclosure between the burrows and the usual place of feeding; into these the rabbits are driven by dogs at night. The entrance is then closed, and in the morning the rabbits are secured.

The spring-net is so constructed, as to close on pressure; it is laid round a grain or hay-stack, and numbers will be thus taken. The best mode of taking rabbits is by means of the *trap*. For this purpose dig a pit in the run most commonly frequented, and have it considerably wider at the bottom than at the top; across this lay a board, so nicely balanced upon a central pin, that the weight of the rabbit is sufficient to weigh it down at the extremity, while, at the same time, that weight removed, the board will resume its former position. Numbers will be taken by this method. It may be useful to remark that a rabbit is very tenacious of life, and that it will frequently, if shot in the rear, succeed in making its escape; in shooting them, aim, therefore, always for the head; if there be an earth near, and it be only struck behind, it will be sure to escape into it, and perish and rot uselessly in its burrow.

**THE HARE.**—This is the true name, but the animal is frequently in America called the rabbit.

In various parts of the Union the American hare is exceedingly common, and large numbers are annually destroyed for the sake of their flesh and fur.

The timidity and defencelessness characteristic of the genus, are well illustrated in this species, which has no protection against its numerous enemies, and can escape by flight alone. Its peculiar color must, however, minister to its safety, as it is so similar to the general color of the soil as to require a close attention to distinguish the animal, which is usually passed without being observed by such as are not especially in search of it. Yet the swiftness and other natural advantages of the hare, insufficient to secure it from the artifices of man, or from being preyed upon by various beasts and birds, would not prevent the species from soon being extinguished, were it not for its remarkable fecundity.

During the day-time the hare remains crouched within its form, which is a mere space of the size of the animal, upon the surface

of the ground, cleared of grass, and sheltered by some over-arching plant; or else its habitation is in the hollowed trunk of a tree, or under a collection of stones, &c.

It is commonly at the earliest dawn, while the dew-drops still glitter on the herbage, or when the fresh verdure is concealed beneath a mantle of glistening frost, that the timorous hare ventures forth in quest of food, or courses undisturbed over the plains. Occasionally during the day, in retired and little frequented parts of the



THE HARE.

country, an individual is seen to scud from the path, where it has been basking in the sun; but the best time for studying the habits of the animal is during moon-light nights, when the hare is to be seen sporting with its companions in unrestrained gambols, frisking with delighted eagerness around its mate, or busily engaged in cropping its food. On such occasions the turnip and cabbage fields suffer severely, where these animals are numerous, though in general they are not productive of serious injury. However, when food is scarce, they do much mischief to the farmers, by destroying the bark on the young trees in the nurseries, and by cutting valuable plants.

The hare is not hunted in this country as in Europe, but is generally roused by a dog, and shot, or is caught in various snares and traps. In its movements our hare closely resembles the common hare of Europe, bounding along with great celerity, and would no doubt, when pursued, resort to the artifices of doubling, &c.,

so well known to be used by the European animal. The American hare breeds several times during the year, and in the southern states even during the winter months, having from two to four or six at a litter.

In summer dress the American hare is dark brown on the upper part of its head, a lighter brown on the sides, and of an ash color below. The ears are wide and edged with white, tipped with brown, and very dark on their back parts; their sides approach to an ash color. The inside of the neck is slightly ferruginous; the belly and the tail are small, dark above, and white below, having the inferior surface turned up. The hind legs are covered with more white than dark hairs, and both fore and hind feet have sharp pointed, narrow, and nearly straight nails.

In winter the fur is nearly twice the length of what it is in summer, and is altogether, or very nearly, white. The weight of the animal is about seven pounds.

This species is about fourteen inches in length. The hind legs are ten inches long, by which circumstance it is most strongly distinguished from the common rabbit of Europe.

The use of coal tar, as described in reference to the rabbit, will be found equally efficacious in preserving *trees* from the attacks of this animal, and the painting of gate-posts and palings of a *white color* at *intervals*, will, to a great degree, scare them from the more valuable crops. Hares are to be destroyed by the gun, by snares, traps, nets, &c.

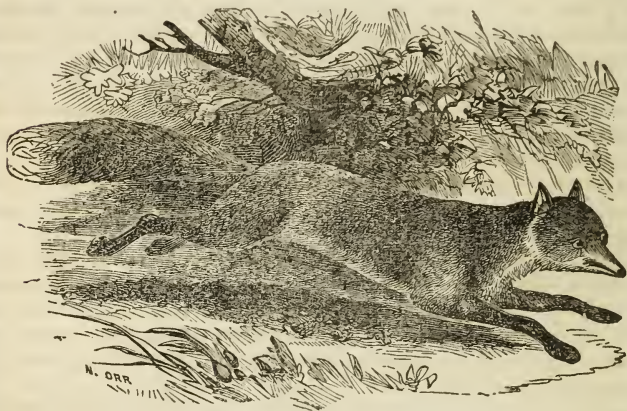
**THE FOX.**—The Fox is a serious pest of the farm; and though of service in the destruction of other pests, yet his depredations far exceed his usefulness in the destruction of rabbits, hares, mice, moles, &c.

There are several varieties of foxes. Those which are mainly farm depredators are the Red Fox and the Gray Fox.

The red fox is found throughout North America, and is the species which frequently has been thought identical with the common fox of Europe, to which it bears a resemblance sufficiently striking to mislead an incidental observer. But by the fineness of its fur, its liveliness of color, length of limbs and slenderness of body, as well as the form of its skull, it is obviously distinguished.

Red foxes are very numerous in the middle and southern states of the Union, and are everywhere notorious depredators on the poultry-yards. Their haunts are most commonly in exceedingly dense thickets, where they can scarcely be followed, even by dogs.

Like all his kindred species, the red fox is distinguished by the possession of keen senses and great sagacity or craftiness, which enables him a most to bid defiance to traps, while his strength and swiftness of foot render it extremely difficult to capture him in the chase. Once fairly roused by the hounds, this animal dashes off with great speed, and soon far outstrips pursuit, and did he not lose the advantage of his celerity by remitting his efforts, might soon render the exertions of the sportsman nugatory. But the



THE FOX.

persevering hounds again and again drive him to his utmost speed, and eventually wear him down, though not until a wide extent of country has been traversed, and huntsmen, horses and dogs have suffered severely from fatigue.

The general color of this fox when in full summer pelage, is bright ferruginous on the head, back and sides, but less brilliant towards the tail. Beneath the chin it is white, while the throat and neck are a dark gray, which color is continued along the anterior part of the belly in a narrower stripe that passes along the breast. The under parts of the body towards the tail are very pale red; and the anterior parts of the fore legs and feet, as well as the fronts of the inferior part of the hind legs, are

black. The tail is very bushy, but less ferruginous than the body, the hairs being mostly terminated with black, which is more obvious toward the extremity than at the origin of the member, giving the whole a dark appearance. A few of the hairs are lighter at the end of the tail, but not sufficiently to allow us to state that it is tipped with white.

In summer the fur of the red fox is long, fine, brilliant in color, and lustrous over the whole body. In winter its length and denseness is considerably increased. The red fox is nearly two feet long and about eighteen inches high: the tail is about sixteen inches long. The peltry is of considerable value, and employed in various ways by the manufacturers.

The gray fox is very common throughout this country, and is found more immediately in the vicinity of human habitations than either of the other species. It is pursued by our sportsmen with more pleasure than the red fox, because it does not immediately forsake its haunts and run for miles in one direction, but, after various doublings, is generally killed near the place whence it first started.

The gray fox, like all the species we described, exhibits considerable differences of color at different ages and in different states of pelage. The length of the head and body is about twenty-four, and of the tail eleven inches. The general color of the animal is grizzly, becoming gradually darker from the fore shoulders to the posterior parts of the back, produced by the intermixture of fulvous hairs with those constituting the mass of the pelage, which are thus colored; near the body the hair is rather plumbeous, then yellowish, then white, and then uniformly tipped with lustrous black. The front, from the top of the head to the edge of the orbits, is gray, while the rest of the face, from the internal angle of the eye to within half an inch of the extremity of the snout, is blackish; at the extremity on each side of the granulated black tip of the nose it is of a yellowish white. A fine line of black tipped hairs extends upwards and outwards, from half an inch below the internal angle of the eyes until it is intersected by a similar black line about half an inch beyond the external angle of the eye, thus forming a very acute triangle, whose base is on the side of the face. This blackish gray triangle, joined to the peculiar sharpness of the face, and the line produced by the black whiskers on the sides of the nose, singularly increase the appearance of slyness and cunning expressed in the physiognomy of this animal.

The face below this triangle is white, and the latter color is continued semicircularly upon the upper part of the throat.

The under jaw is blackish, this color extending along the line of the mouth, and passing about half an inch beyond the junction of the lips at the angle. The inner surface of the ears is clothed with short light yellowish hair; their tips on the outside are blackish gray, and the whole of the rest of their posterior surface is yellow which color descends encircling the neck, and is the only color on the anterior parts, with the exception of a white spot on the breast. The inferior parts of the body are white, tinted slightly in some individuals with faint reddish brown. The tail is thick and bushy, and the fur on the upper side is pale yellow, slightly tipped with black; the under parts are rust colored, and the end entirely black.

The most common method of destroying foxes is by hounds and the gun. If near his burrow, to avoid the dogs, he will take to the earth, and has then to be dug out; he will sometimes ascend an inclined tree, and is then to be shot or the tree felled, when the dogs will dispatch him. He may be taken by traps and snares, but of these he is very wary. The most easy means are poisoned meats, prepared and used as pointed out for the destruction of wolves.

**WOLVES.**—There are several varieties of wolves, viz.:—The **COMMON WOLF**,—the **PRAIRIE** or **BARKING WOLF**,—the **DUSKY WOLF**—and the **BLACK WOLF**. The common, prairie, and black ones are those only which are pests of the farm. In all new settlements, and in the prairie region of our country, these species are dangerous enemies to the domestic animals of the farmer.

**THE COMMON WOLF.**—When the aboriginal Americans first gave place to European adventurers, and the forests which had flourished for ages undisturbed, began to fall before the unsparing axe, the vicinity of the settler's lonely cabin resounded with the nightly howlings of wolves, attracted by the refuse provision usually to be found there, or by a disposition to prey upon the domestic animals. During winter, when food was most difficult to be procured, packs of these famished and ferocious creatures were ever at hand, to run down and destroy any domestic animal found wandering beyond the enclosures, which their individual or combined efforts could overcome, and the boldest house-dog could not venture far from the door of his master without incurring the risk of being killed and devoured. The common wolf was then to be



found in considerable numbers throughout a great extent, if not the whole of North America; at present it is only known as a resident of the remote wooded and mountainous districts where man has just commenced to fix his abode.

The common wolf of America is considered to be the same species as the wolf of Europe, and in regard to habits and manners, gives every evidence of such an identity. Like all the wild animals of the dog kind, they unite in packs to hunt down animals which individually they could not master, and during their sexual season, engage in the most furious combats with each other for the possession of the females.

The common wolf is possessed of great strength and fierceness, and is what is generally called a cruel animal, tearing the throat of his victim, drinking its blood, and rending it open for the purpose of devouring its entrails. The great strength of its jaws enables the wolf to carry off with facility an animal nearly as large as itself, and makes its bite exceedingly severe and dangerous. Aged or wounded animals, as well as the hinds and fawns of the deer, sheep, lambs, calves and pigs, are killed by these wolves, and the horse is said to be the only domestic animal which can resist them with success. They gorge with much greediness upon all sorts of carrion, which they can discover at great distances; and where such provision is to be obtained in great plenty, they become very fat and lose their ferocity to a singular degree.

When this wolf has been caught in a trap, and is approached by man, it is remarked to be exceedingly cowardly, and occasionally suffers itself to be beaten without offering the slightest resistance. If a dog be set upon a wolf thus captured, the assault is patiently endured so long as his master is present; but as soon as the wolf is freed from the restraint imposed by the presence of his captor, he springs upon and throttles the dog, which, if not speedily assisted, pays the forfeit of his presumption and temerity with his life. The voice of this wolf is a prolonged and melancholy howl, which, when uttered by numerous individuals at once, is discordant and frightful. The period of gestation, &c., in this species is in every respect analogous to that of the common dog.

Animals exposed to so much suffering from hunger, we may readily believe, are in no way exclusive in their preference of food, and these wolves may be said to feed on every creature they can master, or on the remains of any animal left by the natives.

The common wolf is about four feet and a half in length,

including the tail, which is rather more than a foot long. The height, before, is two feet three inches; behind, it is two feet four inches. The tail is bushy and bending downwards, having upon it hairs upwards of five inches in length.

The general color of this wolf is reddish brown, intermixed with ferruginous and black; but a great variety is to be observed in the coloring of the wolf, as found in the northern, middle, and southern regions, exhibiting gradations from grizzly white to pure black.

**THE PRAIRIE OR BARKING WOLF.**—This wolf frequents the prairies or natural meadows of the west, where troops or packs containing a considerable number of individuals are frequently seen following in the train of a herd of buffalo or deer, for the purpose of preying on such as may die from disease, or in consequence of wounds inflicted by the hunters. At night they also approach the encampments of travelers, whom they sometimes follow for the sake of the carcasses of animals which are relinquished, and by their discordant howlings, close to the tents, effectually banish sleep from those who are unaccustomed to their noise. According to Say's observation they are more numerous than any of the other wolves which are found in North America.

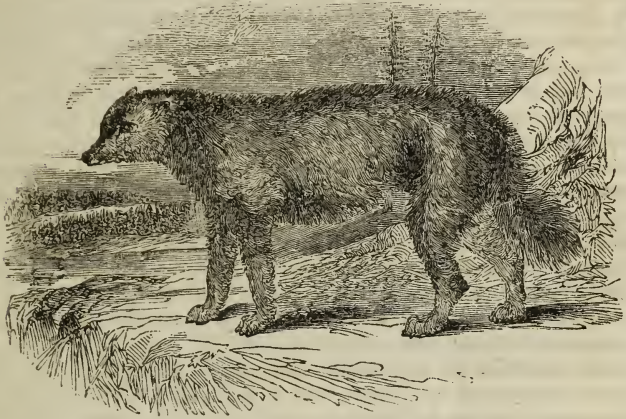
The barking wolf closely resembles the domestic dog of the Indians in appearance, and is remarkably active and intelligent. Like the common wolf, the individuals of this species frequently unite to run down deer, or a buffalo calf which has been separated from the herd, though it requires the fullest exercise of all their speed, sagacity and strength, to succeed in this chase. They are very often exposed to great distress from want of food, and in this state of famine are under the necessity of filling their stomachs with wild plums, or other fruits no less indigestible, in order to allay in some degree the inordinate sensations of hunger.

This wolf barks in such a manner as to resemble the domestic dog very distinctly; the first two or three notes are not to be distinguished from those produced by a small terrier, but differs from that of the dog by adding to these sounds a lengthened scream.

The barking wolf is about three feet and a-half in length, of which the tail forms thirteen and a-half inches, exclusive of the hair at its extremity. The ears are four inches long from the top of the head, and the distance from the anterior canthus of the eye to the end of the snout is three inches and three-fourths.

The general color of the barking wolf is cinerious, or gray intermingled with black, and dull fulvous or cinnamon above. The

hair is of a dusky lead color at base, of a dull cinnamon in the middle of its length, and gray or black at tip, being of greater length along the middle of the back and other parts of the body. The ears are erect and rounded at tip, having the hair on the back part of a cinnamon color, and dark plumbeous at base, while that on the inside is gray.



#### THE BLACK WOLF.

**THE AMERICAN BLACK WOLF.**—The American black wolf, although less common than the other varieties, is considered more dangerous and ferocious, sometimes making sad havoc among sheep and lambs. It is found more or less abundant throughout the wooded districts of the Canadas, the northern states, and of the entire Alleghany range, to their termination in Georgia.

The length of this animal is about five feet eight inches, of which the tail occupies one foot eight inches; the height at the fore shoulders about two feet three inches, and the girth of the body about two feet seven inches. The general color of the body is brownish-black, somewhat mottled with darker shades; the belly much lighter, with a broad stripe of black, undefined at the edges, running up the breast; the back blackish, very slightly mottled with white, caused by the intermixture of different hairs; the body is covered with a soft, thick down, light gray at the roots,

and brownish gray at the end ; besides this fur, there is likewise a longer hair which is the general color of the animal ; this hair on the back is white at the roots, then black, then pure white, then black again at the tip, giving a speckled appearance to the back. The tail is large and bushy ; the hair long, loose, and nearly black, as also is the throat and breast. The feet and legs are black ; the hair on the front of the legs close, bristly, and shining. The head is black with the face covered with short, close hair ; the nose pointed, small, and black ; the ears short, pointed, and upright.

The black wolf is much stronger than a dog of the same size, and his mode of biting is very different from that of a dog. Instead of retaining his hold, like a dog, when he seizes his enemy, he bites by repeated snaps, given, however, with great force, often lacerating the flesh a foot or more to each jerk. Like all carnivorous animals, his thirst for blood is irresistible, and he often kills his victim without devouring the carcass, drinking the blood, the only part agreeable to his palate. When pressed with hunger, he destroys every other creature he can master, and it is believed that, during the year, he consumes at least thirty times his own weight of animal food, which, in cultivated countries, renders his injurious character more apparent, from the large number of domestic animals he necessarily must slay. In winter, when the ground is covered with snow, and he finds his prey to be scarce in his natural haunts, he becomes exceedingly bold, intrudes into the sheep-folds and pig-sties, and even into villages or populous towns, in quest of food.

The ordinary method of capturing wolves is in winter, by means of a steel trap. It has been found, however, that the most successful method of destroying them is, to drug small sausages with strychnine, or nux vomica, and hang them on the boughs of trees, at such a height, that the wolf must leap to obtain them. Under these circumstances the animal swallows the bait at once, and has not time to find out that it contains any suspicious admixture, which he often does, if the poison be applied to the carcasses of sheep, horses, &c. Another mode of poisoning them is this : The kernels of nux vomica are grated or powdered, then mixed up with three or four times their bulk of fat or grease, and honey (wolves are very fond of the latter), and made into balls about as large as a hen's egg. These are placed in the woods, covered with a piece of flesh or tripe, and some offal is hung on a tree near the spot, to

attract the wolves by its scent. The poison once taken is sure to prove fatal, before the animals can proceed many rods.

The common and the black wolf are usually destroyed in two ways. When annoyed by them the farmers frequently unite, and by a general battue destroy them. This is effected, by forming about the observed retreats of the wolf, a large circle of two or three miles in diameter. The hunters gradually close in on the point of hiding, and hedge the wolf in, when he is easily destroyed.

A frequent means of destruction is a deep pit. This is dug so deep as to prevent the wolf from jumping out, once he is in. The pit is baited with a dead sheep or animal or carrion. The wolf jumps down for his prey, gorges himself, and then seeks to escape, but in vain. His howlings soon inform the farmer or hunter of his imprisonment, when the pit is visited and the prisoner killed.

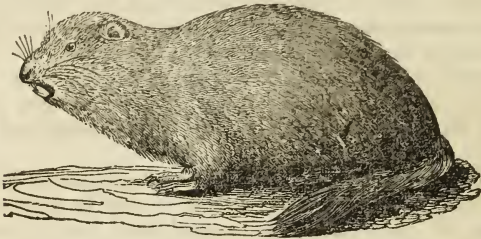
The prairie wolf is too sagacious to be caught by traps. He may be poisoned like the other varieties. He is frequently shot. Occupying the open prairie he is good game for the grayhound, and is often chased by him. Once the grayhound sights him, if in the open prairie, the wolf must be near the cover of a wood, or he has not the least chance of an escape. Being small, a brace of grayhounds soon dispatch him. He may be taken in pits, but is very shy of them.

**THE WOODCHUCK.**—This animal is the *arctomys monax* or marmot. Among the country people it bears the name of *woodchuck* and ground-hog, the latter being expressive of its habits of burrowing and peculiar voracity.

The woodchuck is the cause of great injury, especially to the farmers engaged in the cultivation of clover, as their numbers become very considerable, and the quantity of herbage they consume is really surprising. They are more capable of doing mischief from the circumstance of their extreme vigilance and acute sense of hearing, as well as from the security afforded them by their extensive subterranean dwellings.

When about to make an inroad upon a clover-field, all the woodchucks resident in the vicinity quietly and cautiously steal toward the spot, being favored in their march by their gray color, which is not easily distinguished. While the main body are actively engaged in cropping the clover-heads and gorging their ample cheek-pouches, one or more individuals remain at some dis-

tance in the rear as sentinels. These watchmen sit erect, with their fore-paws held close to their breast, and their heads slightly inclined to catch every sound which may move the air. Their extreme sensibility of ear enables them to distinguish the approach of an enemy long before he is sufficiently near to be dangerous, and the instant the sentinel takes alarm he gives a clear shrill whistle, which immediately disperses the troop in every direction, and they speedily take refuge in their deepest caves. The time at which such incursions are made is generally about mid-day, when



THE WOODCHUCK.

they are less liable to be interrupted than at any other period, either by human or brute enemies.

The habitations of the woodchuck are formed by burrowing into banks, the sides of hills, or other similar situations, by which the access of water is prevented. In forming the burrow, where the ground is soft, the fore-paws are the principal agents; the strength of the animal's fore limbs is very great. Where the soil is hard and compact, the long cutting teeth are very freely and efficiently employed, and we have been surprised to see large stones and lumps of hardened clay dug out in this way.

The burrows extend to great distances under ground, and terminate in various chambers, according to the number of inhabitants. In these, very comfortable beds are made by the woodchuck, of dry leaves, grass, or any soft dry rubbish to be collected. It is really surprising to see the vast quantity of such material an individual will cram into his mouth to carry off for this purpose. He first grasps with the teeth as much as he possibly can; then sitting erect, with both fore-paws he stuffs the mass projecting on each side deeper into the mouth, and having arranged it satisfactorily, takes up successive portions, which are treated in like man-

ner; during the whole time the head is moved up and down to aid in filling the mouth to the very utmost. This is repeated until every fragment at hand is collected, and the whole transferred to the sleeping apartment, into which the woodchuck retires towards the decline of the day, and remains there until the morning is far advanced. At some seasons of the year the woodchuck is seen out on moonlight nights at a considerable distance from the burrow, either in search of better pasture or looking for a mate; on such occasions, when attacked by a dog, the woodchuck makes battle, and when the individual is full-grown, his bite is very severe. The teeth of the dog give him vast superiority in the combat, as when once he seizes, he is sure of the hold until the parts bitten are torn through, while the woodchuck can merely pinch his foreteeth together, and must renew his attempts very frequently. The fight is also soon ended by the dog seizing the woodchuck by the small of the back, and crushing the spine so as to disable his antagonist effectually.

The woodchuck is to be destroyed by dogs. The most of farm dogs are very fond of pursuing them. If the woodchuck escape to his hole, the dog will readily dig him out. But a speedier way is to smoke his hole, and drive him out, when the dog readily catches and destroys him. He is easily shot, and may be handily taken in traps.

**THE RACCOON.**—There are few parts of the American continent in which the Raccoon has not, at some period, been found native, from the borders of Nootka Sound to the forests of Mexico, and still more southern regions.

Were we to form an opinion of this animal's character solely from external appearances, the mingled expression of sagacity and innocence exhibited in his aspect, his personal neatness and gentle movements, might all incline us to believe that he possessed a guileless and placable disposition. But in this, as in most other cases, where judgments are formed without sufficient examination, we should be in error, and find, that to the capricious mischievousness of the monkey, the racoon adds a blood-thirsty and vindictive spirit, peculiarly his own. In the wild state, this sanguinary appetite frequently leads to his own destruction, which his nocturnal habits might otherwise avert; but as he slaughters the tenants of the poultry-yard with indiscriminate ferocity, the vengeance of the plundered farmer speedily retaliates on him the death so liberally dealt among the feathered victims. This destructive propensity of

the raccoon is more remarkable, when we observe that his teeth are not unsuited for eating fruits. When he destroys wild or domesticated birds, he puts to death a great number without consuming any part of them, except the head, or the blood which is sucked from the neck.

Being peculiarly fond of sweet substances, the raccoon is occasionally very destructive to plantations of sugar cane, and of Indian corn. While the ear of the Indian corn is still young, soft and tender, "in the milk," it is very sweet, and is then eagerly sought by the raccoons; troops of them frequently enter fields of maize, and in one night commit extensive depredations, both by the quantity of grain they consume, and from the number of stalks they break down by their weight.

The raccoon is an excellent climber, and his strong sharp claws effectually secure him from being shaken off the branches of trees. In fact, so tenaciously does this animal hold to any surface upon which it can make an impression with its claws, that it requires a considerable exertion of a man's strength to drag him off; and as long as even a single foot remains attached, he continues to cling with great force.

The conical form of the head, and the very pointed and flexible character of the muzzle or snout, are of great importance in aiding the raccoon to examine every vacancy and crevice to which he gains access; nor does he neglect any opportunity of using his natural advantages, but explores every nook and cranny, with the most persevering diligence and attention, greedily feeding on spiders, worms, or other insects which are discovered by the scrutiny. Where the opening is too small to give admittance to his nose, he employs his fore-paws, and shifts his position or turns his paws sidewise, in order to facilitate their introduction and effect his purpose. This disposition to feed on the grubs or larvæ of insects must render this animal of considerable utility in forest lands, in consequence of the great numbers of injurious and destructive insects he consumes. He is also said to catch frogs with considerable address, by slyly creeping up, and then springing on them, so as to grasp them with both paws.

The size of the raccoon varies with the age and sex of the individual. A full grown male may be stated to have the body a foot, or a few inches more, in length; the highest part of the back is about a foot from the ground, while the highest part of the shoulder is ten inches. The head is about five, and the tail rather



more than eight inches long. The female is larger than the male in every respect, at least such is the fact in relation to the raccoons now in my possession, which, however, have not yet attained their full growth. They are of the same age, and the female is strongly distinguished from the male by the black markings on all parts of the body being more purely black, and the fur and hair longer, thicker, and more glossy than that of the male; these peculiarities, in addition to her greater size, uniformly lead strangers to suppose this individual to be the male, instead of the female. The pelage of the male is not only less purely black at the extremities of the hairs, but there is a much greater intermixture of fawn-colored hair than in the female, giving more of a rusty appearance to the whole surface of his body. A young raccoon of thirty days old is about the size of a common cat of a year old, though the greater length of its legs and the bushiness of its pelage, make it at first sight appear much larger.

The general color of the body is a blackish gray, which is paler on the under part of the body, and has over considerable part of the neck, back and sides, some fawn or light rust-colored hair intermixed. The general gray color is owing to the manner in which the hairs are alternately ringed with black and dingy white. The tail is very thickly covered with hair, and is marked by five or six black rings round it, on a yellowish white ground.

The head, which is about five inches long, is very triangular, and from its pointed snout reminds us of the aspect of the fox: the snout terminates in a smooth and shining black membrane, through which the nostrils open, having the slit to rise slightly at the sides. The nose is prolonged considerably beyond the upper jaw, and this, together with its great flexibility, gives the animal great advantages in exploring little crevices and crannies for insects, &c. The pupils of the eyes are round; the ears are oval, or rather elliptic, and of a yellowish white color on their extremities and anterior edges. The face is whitish, in front, but there is a black patch surrounding the eye, that descends entirely to the lower jaw, over the posterior part of which it is diffused, and a black line running from the top of the head down the middle of the face, ending below the eyes. The rest of the hair between the eyes, the ears, and eye-brows, is almost entirely white, and directed downwards. The hair on the muzzle is usually very short; on the feet also, and on one-half of the legs; the short hair of the

feet and legs is of a dirty whitish color. The upper lip are long and strong.

All the feet have five toes each, terminated by strong curved and pointed claws; and each foot is furnished with five thick and very elastic tubercles beneath. The first toe or thumb of the fore-foot is the shortest of all; the little or external finger is next in length, and then the fore-finger; the remaining two are equal. The first tubercle, which is a very strong one, is situated near the wrist; the second is at the base of the little finger; the third at the root of the inner finger or thumb; the fourth opposite the second digit, and the fifth opposite the two longest. The hind feet are throughout similar, except that the first tubercle is farther distant from the heel.

The pelage of the raccoon is subject to considerable variations of color at different periods of life, and in different individuals. The rings on the tail and the patches around the eyes are, however, uniform and constant. The tail of the raccoon is not affected by the coldest weather; hence this quadruped is never known to gnaw his tail, as has been observed of animals closely allied to it in configuration and habits.

As the habits of the raccoon are nocturnal he is not easily shot. He may readily be taken by snares and traps. He is frequently hunted at night in August and September, during the period of green corn, with dogs. He escapes to a tree, which is cut down, and the dogs seize him as he comes to the ground.

**THE BLACK BEAR.**—There are three varieties of the Bear in America, viz.: the American or Black Bear, the Grizzly Bear, and the Polar Bear. The Black Bear alone is a pest of the farm.

This bear is found throughout North America, from the shores of the Arctic Sea to its most southern extremity.

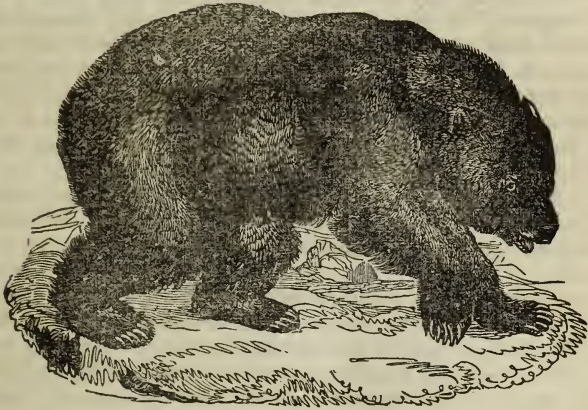
The black bear, under ordinary circumstances, is not remarkably ferocious, nor is he in the habit of attacking man without provocation. But when wounded, he turns on the aggressor with great fury, and defends himself desperately. This disposition is more fully manifested during the coupling season, because the males are then highly excited, and are not so inert and clumsy as in the autumn, when they are exceedingly fat.

When the winters are severe at the north, and they find a difficulty of procuring food, they travel to the southern regions in considerable bodies.

The sight and hearing appear to be the most acute of the

senses in this bear. Although he kills many small animals, he does not follow them by the smell. When he walks, his gait is heavy and apparently awkward, and when running is not much less so, but his strength of body enables him to move with considerable celerity, and for a long time.

The females bring forth their young in the winter time, and exhibit for them a degree of attachment which nothing can surpass. They usually have two cubs, which are suckled until they are well grown. The fondness existing between the mother and cubs seems to be mutual, and no danger can separate her from them, nor anything, short of death itself, induce her to forsake them.



THE BEAR.

Black bears are still numerous in the wooded and thinly settled parts of the States of the Union, and where their favorite food is plenteous they grow to a great size, and afford a large quantity of oil.

The food of this animal is principally grapes, plums, whortleberries, persimmons, bramble and other berries; they are also particularly fond of the acorns of the live oak. They are also very fond of the different kinds of nuts and esculent roots, and often ramble to great distances from their dens in search of whortleberries, mulberries, and indeed all sweet flavored and spicy fruits: birds, small quadrupeds, insects, and eggs, are also devoured by

them whenever they can be obtained. They are occasionally very injurious to the frontier settlers, by their incursions in search of potatoes and young corn, both of which are favorite articles of food; their claws enable them to do great mischief in potato grounds, as they can dig up a large number in a very short time, and where the bears are numerous their ravages are occasionally very extensive.

In the north, the flesh of the black bear is fittest for the table after the middle of July, when the berries begin to ripen, though some berries impart a very disagreeable flavor to their flesh. They remain in good condition until the following January or February; late in the spring they are much emaciated, and their flesh is dry and disagreeable in consequence of their long fasting through the season of their torpidity. Their flesh is also rendered rank and disagreeable by feeding on herring spawn, which they seek and devour with greediness, whenever it is to be obtained. The southern Indians kill great numbers of these bears at all seasons of the year, but no inducement can be offered to prevent them from singeing off the hair of all that are in good condition for eating, as the flesh of the bear is as much spoiled by skinning as pork would be; the skins these people bring the traders are consequently only such as are obtained from bears that are too poor to be eaten.

The black bear is in fact very indiscriminate in his feeding; and though suited by nature for the almost exclusive consumption of vegetable food, yet refuses scarcely anything when pressed by hunger. He is moreover voracious as well as indiscriminate in satisfying his appetite, and frequently gorges until his stomach loathes and rejects its contents. He seeks, with great assiduity, for the larvæ or grub-worms of various insects, and exerts a surprising degree of strength in turning over large trunks of fallen trees, which, whenever sufficiently decayed to admit of it, he tears to pieces in search of worms.

The usual residence of the black bear is in the most remote and secluded parts of the forest, where his den is either in the hollow of some decayed tree, or in a cavern formed among the rocks. To this place he retires when his hunger is appeased, and in the winter he lies coiled up there during the long period of his torpidity. The female of the black bear, during the period of gestation, which commences in the month of October, and continues for

about one hundred and twelve days, leads a retired and concealed life.

In the northern parts of this continent, the subterraneous retreats of the black bear may be readily discovered by the mist which uniformly hangs about the entrance of the den, as the animal's heat and breathing prevent the mouth of the cave from being entirely closed, however deep the snow may be. As the black bear usually retires to his winter quarters before any quantity of snow has fallen, and does not again venture abroad, if undisturbed, until the end of March or beginning of April, he must consequently spend at least four months in a state of torpidity, and without obtaining food. It is therefore not surprising that, although the bear goes into his winter quarters in a state of excessive fatness, he should come out in the spring of the year extremely emaciated.

The northern Indians occasionally destroy the bear by blocking up the mouth of the cave with logs of wood, and then breaking open the top of it, kill the animal with a spear or gun. Sometimes they throw a noose round his neck, draw him up to the top of the hole, and kill him with a hatchet.

The black bear is occasionally captured in large and strong steel traps, well secured by a chain to a neighboring tree, and laid in a path over which a freshly-killed carcass has been drawn along,—or he is taken in a noose suspended from a strong sapling. A common mode of hunting this animal is to follow him with two or three well-trained dogs. When he finds that he is pursued, he generally pushes directly forward for eight or ten miles, or farther, if not overtaken; as the dogs come up with him their repeated attacks cause him to turn for the purpose of striking at them, and if they do not dexterously avoid his blows they will be killed, as he strikes with very great force. To avoid the vexation produced by the dogs, he mounts a tree, ascending for twenty or thirty feet, but is allowed very little rest, for the hunter now approaching, he throws himself to the earth, and hurries onwards, being still pursued and worried by the dogs. Again he is obliged to take refuge in a tree, and sometimes climbs as near as possible to the top, endeavoring to conceal himself among the foliage. The hunter now strikes against the trunk of the tree, as if engaged in cutting it down; the poor bear soon betrays his hiding-place, and slipping to the end of the longest branch, gathers his body up, and drops from a vast height to the ground, whence he often appears to re-

bound for several feet, and then runs off as actively as he can. At length, worn out by frequently repeated exertions to escape, he is finally shot, while attempting to screen himself by aid of the trunk of a tree, or while employed in resisting the attacks of the dogs.

Among other modes of killing the black bear the Indians employ a trap composed of logs, which, when the animal attempts to remove the bait, either falls on his body and kills him outright, or secures him until he is put to death by the proprietor of the snare.

The black bear, like all the species of this genus, is very tenacious of life, and seldom falls unless shot through the brain or heart. An experienced hunter never advances on a bear that has fallen, without first stopping to load his rifle, as the beast frequently recovers to a considerable degree, and would then be a most dangerous adversary. The skull of the bear appears actually to be almost impenetrable, and a rifle ball, fired at a distance of ninety-six yards, has been flattened against it, without appearing to do any material injury to the bone. The best place to direct blows against the bear is upon his snout; when struck elsewhere, his dense, woolly coat, thick hide and robust muscles, render manual violence almost entirely unavailing.

When the bear is merely wounded, it is very dangerous to attempt to kill him with such a weapon as a knife or tomahawk, or indeed anything which may bring one within his reach. In this way hunters and others have paid very dearly for their rashness, and barely escaped with their lives.

The black bear, in common with other species of this genus, endeavors to suffocate an adversary by violently hugging and compressing its chest. A man might end such a struggle in a few instants, if one hand be sufficiently at liberty to grasp the throat of the animal with the thumb and fingers, externally, just at the root of the tongue, as a slight degree of compression there will generally suffice to produce a spasm of the glottis, that will soon suffocate it beyond the power of offering resistance or doing injury.

The black bear differs from other species of the genus by having the nose and forehead nearly on the same line, though the forehead is slightly prominent. The palms of the hands and soles of the feet are very short, and the whole body is covered with long, shining, straight black hair, which is by no means harsh to the touch. The sides of the face are marked with fawn color, and a small spot of the same exists in some individuals in front of the

eye; others have the muzzle of a clear light yellow, with a white line commencing on the root of the nose and reaching to each side of the angle of the mouth. This continues over the cheek to a large white space, mixed with a slight fawn color, covering the whole of the throat, whence a narrow line descends upon the breast.



THE SQUIRREL.

SQUIRRELS.—There are several varieties of Squirrels.

The Fox Squirrel is common in the southern States, and is not troublesome.

The Cat Squirrel is found in great abundance throughout the oak and chesnut forests of this country, and is not to any extent a depredator.

The Black Squirrel is very common, and at times very destructive in the Indian corn fields. The black squirrel, in summer, is rather gray on the back and sides, though the whole color of the body is black, with some gray interspersed, and of a reddish brown on the under parts. In winter the color is a pure black all over the body.

The Common Gray Squirrel.—This species, still exceedingly

common throughout the United States, was once so excessively multiplied as to be a scourge to the inhabitants, not only consuming their grain, but exhausting the public treasury by the amount of premiums given for their destruction.

The gray squirrel prefers the oak, hickory and chesnut woods, where it finds a copious supply of nuts and mast, of which it provides large hoards for the winter. Their nests are placed chiefly in tall oak trees at the forks of the branches; these nests are very comfortable, being thickly covered and lined with dried leaves. During cold weather the squirrels seldom leave these snug retreats, except for the purpose of visiting their store-houses, and obtaining a supply of provisions. It has been observed that the approach of uncommonly cold weather is foretold when these squirrels are seen out in unusual numbers, gathering a larger stock of provisions, lest their magazines should fail. This, however, is not an infallible sign, at least in vicinities where many hogs are allowed to roam at large, as these keen-nosed brutes are very expert at discovering the winter hoards of the squirrel, which they immediately appropriate to their own use.

If the gray squirrels confined themselves to the diet afforded by the forest trees, the farmers would profit considerably thereby. But, having once tasted the sweetness of Indian corn and other cultivated grains, they leave acorns and such coarse fare to the hogs, while they invade the corn fields, and carry off and destroy a very large quantity. This species is remarkable among all our squirrels for its beauty and activity.

The gray squirrel varies considerably in color, but is most commonly of a fine bluish gray, mingled with a slight golden hue. This golden color is especially obvious on the head, along the sides, where the white hair of the belly approaches the gray of the sides, and on the anterior part of the fore and superior part of the hind feet, where it is very rich and deep. This mark on the hind feet is very permanent, and evident even in those varieties which differ most from the common color. There is one specimen in the Philadelphia Museum of a light brownish red on all the superior parts of the body.

The Common Red Squirrel, or Hudson's Bay Squirrel of Naturalists.—This beautiful species is very common in the northern and western parts of this country, and, where seldom disturbed, are so fearless as to allow themselves to be approached almost within reach.



The common red squirrel is, perhaps, more remarkable for its neatness and beauty than any of its kindred species, which, in habits and manners, it closely resembles. It is between seven and eight inches long, having a tail five inches in length. Its whiskers are very long and black; the superior parts of the body are of a reddish brown color, varying in intensity, and shaded with black. On the inferior parts the general color is a tarnished or yellowish white; the under part of the head and front of the fore limbs are reddish brown, like the back; the insides of the thighs are colored like the belly; on each flank there is a distinctly marked black line, separating the colors of the back and belly. The tail is of a reddish brown color, and is very beautiful.

The red squirrel is a great pest in orchards. He will frequently destroy a hundred pears in a day to get the seeds, which alone he eats.

The Ground Squirrel (commonly called the Chipmunk, Hacky or Hackee, Ground, or Striped Squirrel).—Few persons have traveled without becoming acquainted with this pretty animal, which, though very different in its general appearance from its kindred tenanting the lofty forest-trees, still approaches to them so closely in personal beauty and activity, as always to command the attention of the most incidental observer.

This squirrel is most generally seen scudding along the lower rails of the common zig-zag or "Virginia" fences, which afford him at once a pleasant and secure path, as in a few turns he finds a safe hiding-place behind the projecting angles, or enters his burrow undiscovered. When no fence is near, or his retreat is cut off, after having been out in search of food, he becomes exceedingly alarmed, and runs up the nearest tree, uttering a very shrill cry or whistle, indicative of his distress, and it is in this situation that he is most frequently made captive by his persecuting enemies, the mischievous school-boys.

The ground squirrel makes his burrow generally near the roots of trees, along the course of fences and old walls, or in banks adjacent to forests, whence he obtains his principal supplies of food. The burrows frequently extend to very considerable distances, having several galleries or lateral excavations, in which provisions are stored for winter use. The burrow has always two openings, which are usually far distant from each other; it very rarely happens that the animal is dug out, unless it be accidentally during the winter season.

The ground squirrel is rather more than five inches in length, from the nose to the root of the tail; the last is about two inches and a half long. The general color of the head and upper parts of the body is reddish brown, all the hairs on these parts being gray at base. The eyelids are whitish, and from the external angle of each eye a black line runs towards the ear, while on each cheek there is a reddish brown line. The short rounded ears are covered with fine hairs, which are on the outside of a reddish brown color, and within of a whitish gray. The upper part of the neck, shoulders, and base of the hair on the back, are of a gray brown, mingled with whitish.

On the back there are five longitudinal black bands, which are at their posterior parts bordered slightly with red. The middle one begins at the back of the head, the two lateral ones on the shoulders; they all terminate at the rump, whose color is reddish. On each side two white separate the lateral black bands. The lower part of the flanks and sides of the neck are of a paler red; the exterior of the fore feet is of a grayish yellow; the thighs and hind feet are red above. The upper lip, the chin, throat, belly, and internal face of the limbs are of a dirty brown. The tail is reddish at its base, blackish below, and has an edging of black.

The ground squirrel is sadly injurious to corn or grain fields, just planted or sown, when the fields are near woods. The squirrel digs up the grain, and renders planting or sowing again necessary.

The gun is the main means for the destruction of the various squirrels.

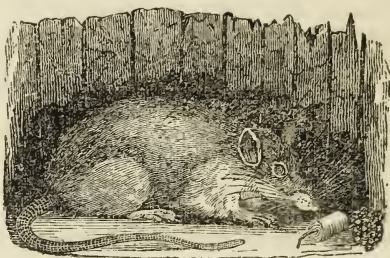
#### RATS, MICE, AND THEIR KIND.

WE have hitherto been discussing subjects, presenting rather a doubtful aspect, as affording the possibility of the query arising as to the positive or actual title which they hold to rank amongst the "*Pests*" of "the Farm." The present article is designed to embrace an inquiry into the character of a class of animals relative to which no possible mistake can exist,—a class of animals whose depredations are universally felt—animals noxious to all, and possessed of no single redeeming quality which can elicit the defence of any one advocate. As to *extermination* meaning *extirpation*, that is an end that, even with the greatest assiduity on the part of man, it would be next to hopeless to expect to arrive at; none will question

the right which man, as the heaven-appointed lord of the creation, possesses to protect his property from the inroads of the invaders, and to check, by every means within his power, the *extension* of any race of animals, who, if they are to live, must live to his detriment, upon the fruit of his labor. Of all four-footed vermin, perhaps, rats and mice, with their varieties, are the greatest foes to the agriculturist, nay, to man generally. It is, in short, but a choice between their extermination and his; for if suffered to increase in numbers, unchecked, the time would not be far distant when the entire globe would but suffice to furnish food for their rapacious appetites, to the exclusion of the human race, created by our Divine Maker himself its legitimate sovereign and lord. Sentimental theorists need not fear the *extinction* of this troublesome tribe; let us proceed with all our vigor—let us call into exercise every resource of human cunning, and we shall still find ourselves, to a great extent, baffled by these diminutive marauders, who, despite of all our efforts, continue to thrive, to multiply, to grow fat upon the products of our toil. The utmost that we can effect is to decimate their ranks; we may diminish their numbers, but extirpate them—never! I am far from blaming the poor creatures for their predatory habits. I am fully aware, that in following them, they do but follow certain instincts implanted for wise purposes in their natures, and which, when the earth was yet scantily peopled, and artificial culture comparatively unknown, must have conduced greatly to utility. So it was at creation—so it has been. But many tribes of animals were then created by the Almighty with a view to *so many special purposes*. According as man advances in knowledge and consequent improvement, so does the necessity for the intervention of brutal aid decrease, until at length what was at first a blessing, will if suffered to remain, become a *pest*. So it was with the Rat. In earlier ages, when man had no settled habitation, but roved to and fro upon the earth, killing, eating, and *wasting*, the aid of such animals, as *scavengers*, was most necessary, in order to maintain the atmosphere in such a pure and healthful condition as was necessary for his support. As cultivation of the soil commenced and progressed, and as the nomadic habits to which I allude ceased, so did the necessity cease for these animals to exist in their wonted numbers. We may, therefore, legitimately conclude, I think, that when it becomes, as it has become, a positive battle between the rats and man for the produce of the ground, and when that produce owes its existence to the labor of the latter, that

he possesses every legitimate right to exterminate, if he can, his vermin foes, root and branch, and to cry, with the clearest of consciences, "War—war to the—" trap!

There are three descriptions of Rat generally known as a nuisance to the farmer or merchant: the common Brown or Norway Rat, the indigenous Black Rat, and the Water Rat. The last mentioned is seldom a true rat; for what is usually known as *Water Rat* is not a rat at all, but an animal of an allied genus, properly to be called *Vole*. The common Brown Rat sometimes also presents *Albino* characters, that is to say, it is occasionally to be found of a white color, with red eyes. It is not my intention, neither would it suit the purpose of the present work, to enter at any length into the natural history of these animals; a brief description will therefore suffice.



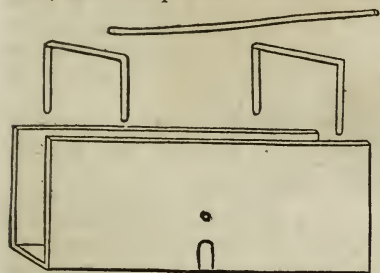
THE COMMON BROWN RAT.

The most formidable is the common Brown Rat (*mus decumanus*), an animal for whose importation we are indebted to the Norwegians, and which has now almost wholly extirpated our indigenous variety, the Black Rat (*mus rattus*). These animals require no description;—very little to our satisfaction, we are too well acquainted with their appearance. The Black Rat is smaller than the now common variety; its color is a slaty blue, sometimes a jet black, and its tail is longer and more scaly than that of its Norwegian conqueror. The White Rat is rare, and is merely an accidental variety of the Brown. These animals are all equally mischievous, and resemble each other in their habits, so that the same mode of destruction will answer for all. Various plans for the destruction of rats have been suggested, but I confess that I am not a little surprised that the adoption of some effectual means should be so little general as it is; for I am prepared to assert that were all who

suffer from the ravages of these pests to apply themselves energetically to the task of getting rid of them, they would—not, certainly, be wholly exterminated, but would become so reduced in numbers as to be no longer formidable—cease, in short, to occupy a position among the “Pests of the Farm.”

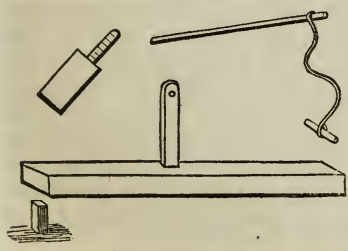
There are two methods by which rats can be effectually destroyed—TRAPS and POISON. Some writers have recommended the former; others have been in favor of the latter. My own experience induces me to state, that neither is to be adopted to the exclusion of the other, both being equally good under certain circumstances; it must, however, be admitted, that trapping is only suited to instances where the vermin are *few in number*; where they swarm, wholesale measures must be resorted to, and the trapping of individuals would be idle and useless. When traps are to be employed a small steel spring-trap, similar to that which I have described when treating of the wild cat, &c., but of course much smaller, is that to be preferred. It must be washed after each capture, and the person who sets it should disguise the natural odor

of his person, by using a little malt, impregnated slightly with a mixture of equal parts of the oils of rhodium and caraway. The proportions are 1 part of the mixed oils to 5,000 parts of malt. A portion of this should be rubbed between the hands at each manipulation; this is one of the great secrets of professional

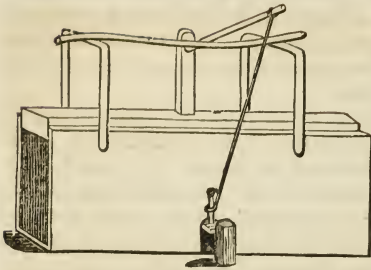


al rat-catchers. The above is one

of the most attractive baits for rats that can be used, and may be either employed in baiting traps, or in acting as a vehicle for using poison. There is another very good description of trap, already described, open at both ends, the doors closing on the rats running upon a bridge in the middle. We have endeavored to explain the construction of this



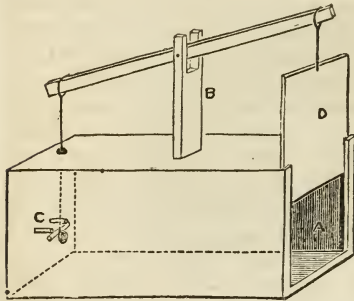
trap in the three accompanying wood-cuts, the two first of



which represent the parts of the trap in a detached state—the third as it appears when set.

There is also a very simple description of trap, which any rustic can make, and which, in the absence of better, may be used with effect: it consists of a long box, open at one end, having the sides grooved to admit a sliding

door. The better to enable the reader to understand the construction of this trap, we subjoin the accompanying wood-cut:



A—Represents the entrance.

B—An upright, supporting a horizontal beam, attached at C to a string fastened to a bit of meat, which, passing between the two wires represented in the wood-cut, is thus held in that position.

D—Is the door, formed of heavy material, and running freely in grooves.

When the horizontal beam is drawn downwards, the bit of meat placed between the wires at C, the door D rises, and the trap is set. The rat, entering at D, bites the meat at C; the weight of the door, no longer restrained, brings it suddenly down, and the animal is trapped. There cannot be a better trap than this, when the nuisance is confined to a few solitary rats; but, as it only catches one at a time, it is comparatively useless where these pests exist in any number: the fact is, that poison is then the only method to be relied on. There are many objections to the use of poison; amongst others, the obvious one of the danger of poultry, dogs, or other animals, eating the fatal mess, and falling victims to their error. To obviate this and other objections, I shall show how the desired end can be attained by means of a substance *fatal to the rats alone*—the basis of that substance is phosphorus.

“The following recipe for the destruction of rats has been com-

municated by Dr. Ure to the Council of the English Agricultural Society, and is highly recommended as the best known means of getting rid of these most obnoxious and destructive vermin. It has been tried by several intelligent persons, and found perfectly effectual. Melt hog's lard in a bottle plunged in water, heated to about 150 degrees of Fahrenheit; introduce into it half an ounce of phosphorus for every pound of lard; then add a pint of proof-spirit or whiskey; cork the bottle firmly after its contents have been heated to 150 degrees, taking it at the same time out of the water, and agitate smartly till the phosphorus becomes uniformly diffused, forming a milky-looking liquid. This liquid, being cooled, will afford a white compound of phosphorus and lard, from which the spirit spontaneously separates, and may be poured off to be used again, for none of it enters into the combination, but it merely serves to comminute the phosphorus, and diffuse it in very fine particles through the lard. This compound, on being warmed very gently, may be poured out into a mixture of wheat flour and sugar incorporated therewith, and then flavored with oil of rhodium, or not, at pleasure. The flavor may be varied with oil of aniseed, &c. This dough, being made into pellets, is to be laid in rat-holes. By its luminousness in the dark, it attracts their notice, and being agreeable to their palates and noses, it is readily eaten, and proves certainly fatal. They soon are seen issuing from their lurking-places to seek for water to quench their burning thirst and bowels, and they commonly die near the water. They continue to eat it as long as it is offered to them, without being deterred by the fate of their fellows, as is known to be the case with arsenical doses. It may be an easy guide for those who are desirous of following Dr. Ure's prescription, and may not have a thermometer at hand to know that a temperature of 150 degrees of Fahrenheit is equivalent to a degree of heat midway between that at which white of egg coagulates, and white wax melts."

I have little to offer in addition, except to suggest that the vehicle with which the compound of lard and phosphorus is to be used may be *fresh malt*, instead of a mixture of sugar and wheaten flour; and I would also suggest the following preparation to be added, as an *allurement*, to induce the rats to eat freely :

Oil of Rhodium	..	..	1 scruple.
Oil of Caraway	..	..	1 drachm.
Oil Lavender	..	..	5 drops.
Oil of Aniseed	..	..	10 drops.
Tincture of Musk	..	..	2 drops.

This is to be added to the compost, in the proportion of about 10 drops to the ounce. If kept in a well-stopped bottle, and a bit of bladder tied over the stopper, it will retain its strength for a length of time. The compound of phosphorus and lard was known to professional rat-catchers before Dr. Ure communicated the above formula to the Agricultural Society. A few applications will effect the clearance of the entire premises, and the object then to be desired is to prevent their return. In the "Farmer's Magazine," vol. viii., p. 452, the following receipt is given for this important purpose:—"Take one pound of nitre, and one pound of alum; dissolve them together in two quarts of spring water; get about a bushel of bran, and make a mash thereof, putting in two pints of the above liquid, and mixing all together. When you build your stacks, every second course, take a handful or two of the mash, and throw upon them till they come to the easing. I have never *seen* this tried, but an agricultural friend states he has tried it, and found it so successful that he never has a stack put up in any other manner.

Rats may be destroyed in great numbers in a barn, in the following manner:—Before all the grain is removed, get some common iron chafing-dishes, which fill with lighted charcoal, upon this strew a quantity of broken *stick* brimstone, quit the barn as rapidly as possible, holding your breath the while, close fast the door, and leave the building shut for the next two days. On re-entering the barn, you will then find quantities of rats lying dead round the chafing-dishes. Some may have been stifled in their holes, and their bodies might, if no precautions were taken to prevent it, create for some time an unpleasant smell; to prevent this, you have only to stop up all the holes with mortar. Perform this operation again the following harvest, just previous to storing, and you will no longer have any reason to complain of annoyance from the rats. As to the grain in stacks, *it will be impossible for rats to injure them*, if they be built upon proper *staddles* or *platforms of stone or iron*—the former should be built with an overhanging ledge, which will prevent vermin from ascending—this is unnecessary in the case of the *latter*, the *iron legs* presenting a sufficient obstacle to their ascent.

The water-rat, or more properly, *water-vole*, is somewhat larger than the common rat, has a short tail, and small round ears. This animal rarely exists in numbers sufficient to do any very great amount of mischief; a ferret and a brace of terriers will, at all



events, effectually clear a stream of them in a very short time, and the chase will afford exciting amusement of a summer evening.

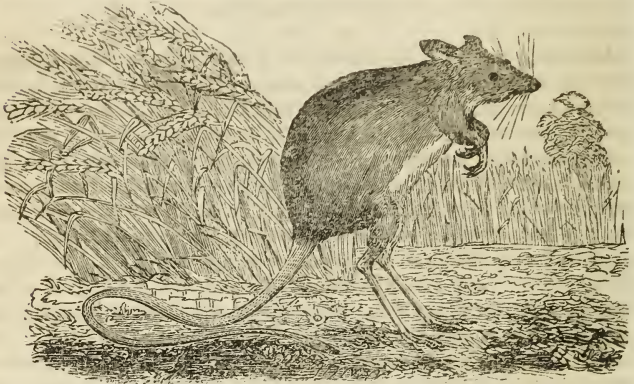
I shall conclude the subject of the destruction of rats with an amusing account of a novel, but apparently, under the circumstances, a most effective mode of accomplishing this object.

#### BARRACK FOR RATS.

An extensive bacon-merchant in Limerick, who kills between forty and fifty thousand pigs in a season, has adopted the following successful method to destroy the rats which abound on his premises, where the abundance of food will always occasion a vast collection of these troublesome and destructive animals. He has erected a quadrangular stone building, eleven feet long, and seven feet wide, with a wall three feet high, having flags laid flat upon the top, but projecting a little over the inside of the wall. All round the wall inside, at the base, are numerous holes, like pigeon holes, which do not go quite through, except a few to allow a free passage to the little animals. Outside of the barrack is a plentiful supply of water and food, such as bones and useless offal. The interior of the walls is occupied by boards, lumber, and straw—just such concealment as these animals are known to prefer, and the whole is covered by a moveable wooden roof. When it is judged proper to destroy them, the passages are stopped at the outside, the roof is lifted off, and the boards are taken out. The frightened animals run up the wall, but their escape is impossible, for they strike against the projecting flags and fall back again. They then run into the small holes below, but these are only just large enough to admit their bodies, whilst the tails remain sticking out, a secure prize to the men who go in over the wall; and by this unlucky appendage they suddenly drag them out, and fling them to a posse of anxious dogs outside of the fortress, or into a barrel of water, where they are soon destroyed. As there are not holes enough in the wall inside, the noise and uproar soon frighten another division of rats into the vacated openings, and these being treated in the same unceremonious manner, the whole garrison is thus speedily destroyed. As many as seven or eight hundred have been killed in one clearing. Rats being fond of straw, they also become very numerous on the lofts where this article is kept, to be used for singing bacon, and they cut it into short pieces with their teeth, which renders it useless for this purpose. The pro-

prietor tried the effect of putting a pet fox to mount guard on the lofts, and it was found that he killed such quantities of the rats, that three or four were procured to garrison the place instead of one.

MICE.—Of this tribe there are several varieties, which some re-



THE JUMPING FIELD MOUSE.

gard as distinct species, while others assert the contrary. I have neither space nor inclination to enter into controversy, and shall confine myself to facts. The common house-mouse, with which all are familiar, is the enemy most to be dreaded in-doors, in the barn, and in the corn-stack. Wherever there are rats, mice will be few in number, the former preying upon the latter. In the field the farmer has both the house-mouse, and two descriptions of field-mice, or *voles* (*arvicola*) to contend with, a long and a short-tailed. These are the principal, and include several sub-varieties. All holes in a dwelling-house should be stopped with lime and pounded glass. The fumigating system will exterminate them from the barn, and if the stacks be built as I have directed, the corn there is safe from their attacks. It is in the field that the battle has to be fought—it is there that mice are really formidable, and require ingenuity to baffle and destroy them. Peason sown in the drills will, of course, destroy mice, but poultry and birds will possibly suffer with them. Our great object, therefore, must be to discover some substance fatal to them, and innocuous to larger animals.

The small size, and delicate constitution of the mouse, renders this no very difficult matter; and if every farmer will follow my advice, his fields will be soon free. In the first instance, lest farmers should suppose that I exaggerate the havoc which these animals perpetrate, much of it possibly without the knowledge of the proprietor of the soil, who vainly speculates mentally in conjectures as to the cause of his grain-crop having proved so light, I shall present them with the following statement, on the authority of Mr. Maxwell, author of "Wild Sports of the West," who, if I mistake not, quotes from Mr. Jesse.—"An extraordinary instance of the rapid increase of mice, and of the injury they sometimes do, occurred a few years ago in the new plantations made, by order of the crown, in Dean Forest, Gloucestershire, and in the New Forest, Hampshire. Soon after the formation of these plantations, a sudden and rapid increase of mice took place in them, which threatened destruction to the whole of the young plants. Vast numbers of these were killed—the mice having eaten through the roots of five-year old oaks and chesnuts, generally just below the surface of the ground. Hollies, also, which were five and six feet high, were barked round the bottom; and in some instances the mice had crawled up the tree, and were seen feeding on the bark of the upper branches.

"The following account will show the numbers of mice caught in the different enclosures in Dean Forest, in three months, from September to January, with the number of acres, and the proportion between the long and the short-tailed mice:—

	Acres.	Short-tailed Mice.	Long-tailed. Mice.	Total.
Haywood enclosure,	418	12,850	8	12,858
Oily Hill do.	41	1,161	11	1,172
Crabtree Hill do.	372	7,851	..	7,851
Park Hill do.	113	2,665	..	2,665
Shut Castle do.	163	484	33	517
Sallow Valley do.	386	1,361	..	1,361
Barnhill do.	50	70	..	70
Birchwood do.	50	3	..	3
Whitemead park do.	100	1,559	15	1,574
Total Acres, 1,693		Total Mice, 28,071"		

Having now satisfied you of the reality of this nuisance, let us consider some of the modes in which it may be removed.

In "British Husbandry," vol. ii., p. 552, it is stated that the tops of last year's shoots of furze, chopped small, and sown with the

corn, will prevent their depredations; and it is added, in a note, that their ravages had run to such a height, in some parts of France, as to have *ruined the farmers!* The mode adopted in that country for their destruction is also given:—"At Angerville, whole farms have been given up to the proprietors, in consequence of their continued devastation; and the only method known of checking them is to defer the sowing any grain until spring, which precaution occasions them to forsake the fields, as it deprives them of the means of winter subsistence." The method adopted in the Forest of Dean, the ravages committed in which we have described above, and which proved efficacious to the fullest extent, after all others had failed, consisted in boring holes in the ground, to the depth of twenty inches, wider at the bottom than at top, in which was dropped some favorite food. The mice willingly entered, and from the form of the hole, being prevented from getting out again, were taken in such numbers as speedily rid the ground of them. One of the best pieces of advice on this subject is the following:—"Let the farmer first consider the nature and quality of his ground, and which fields are, from the nature of their soil, most likely to harbor the intruders, also in what places they are most mischievous. Let him never sow these *under furrow, i. e.*, until the intruders have been expelled; for that method of cropping deprives him of the power of combating his enemies. They work under ground, as it were, and will never come in the way of his poison. When these fields have been sown otherwise, and harrowed over, the mice *must come upon the surface*, and dig down for the corn, and they will then certainly meet with anything he lays on the ground for them." So far, so good. The author proceeds to point out the description of poison to be employed. This is, "a peck of barley meal, a pound of powder of white hellebore root, and four ounces of powder of staves-acre, and when these are all mixed together by sifting through a coarse hair-sieve, add half a pound of honey, and as much milk as will work the whole into a paste. Let this be broken in pieces, and scattered over the field at the time when the mice are known to be coming. They will eat it greedily, and it is certain death to them. There is nothing in any of the ingredients disagreeable to the taste when thus mixed; and every morsel of it will be devoured. The mice will be kept from digging after the corn, and, at the same time, will be killed by the ingredients." I have heard farmers who had tried the above, speak favorably of it. But the most successful remedy of which I have

yet heard is dropping into the *holes*, and on different portions of the field, pellets of the phosphoric compound described when treating of the rat. A little trouble of this kind, taken in the heat of summer, when the holes can most easily be seen, will soon greatly diminish the number of the mice, if not wholly extirpate them.

Before leaving this section, I conceive it advisable to say a few words of two valuable aids in the destruction of many of the *pests* which I have enumerated. I think that a few words of advice as to dogs and ferrets may not be amiss; for, after all, the worst of these four-footed plagues is undeniably the *rat*. There are three *distinct* sorts of terrier—the common Scotch, the Skye, and the English. The Scotch is a strong, wire-haired dog, standing moderately high on his legs, with a thick head and a broad muzzle; the Skye is very short on the legs, long in the back, small head, and narrow-muzzled; his hair is also stiff and coarse; the English terrier is short, close-haired, stands high on his legs, has a thickish head, with a long and fine muzzle, and is usually of a black-and-tan color. It is not, perhaps, very material as to which of these breeds you have, provided you train them properly to their game.

The proper time for breaking your whelps is at the age of six to eight months; if you do it earlier you may *blink* or *cow* them, and if you neglect it to a later period, you may find them unfit, too old for tuition. One great point is to teach your dogs never to *mouth*—this would prevent them from being rapid killers, and would cause the escape of many a rat: teach them to kill a rat in a single chop, and then to drop the carcass. You will readily effect this by putting him into a corn bin with a dozen or two rats; he will then be in a hurry to get at all, and will not waste his time with any individual.

FERRETS are originally natives of Africa; it will, therefore, be obvious that they require warmth and a perfectly dry hutch. These animals are by no means to be trifled with, as they are only half reclaimed. Goldsmith says they have been known to attack and kill children in the cradle. Mr. Jesse relates an incident that occurred a few years since at Kingston in Surrey, of a ferret attacking a child, and having it nearly killed before it could be removed, and even then persevered in its attacks until its back was broken by repeated kicks, and it perished. I myself was one evening looking for a bitch ferret which I missed from her hutch; it was dark, and I had only a candle to aid me in my search, when she

suddenly sprang at my face, as I was stooping over her place of concealment—the gloom had prevented my seeing her—and seized me by the cartilage of the nose, to which she hung with all the obstinacy of a bull-dog. I succeeded in getting her off by plunging my face into a tub of water.

When ratting, some ferrets require *muzzling*, as otherwise they will, if they capture a rat, lie upon the carcase, and, after satiating themselves with the blood, fall asleep there; if they do so, you may get them out by means of *smoke*, but the use of the muzzle is better. This consists of a little round bit of leather, having a hole in the centre, through which the ferret's nose is passed, and attached with side straps to a collar which encircles the neck. Be careful that there be no loose straps or strings about it, as these might become entangled with roots, &c., in the hole, and thus keep the ferret prisoner till starved to death.

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## SECTION II.

### PREDACIOUS BIRDS.

#### EAGLES—KITES AND HAWKS—CROWS, RAVENS, ETC.

OF all birds, it may be said with truth, that they do more good than harm. Did farmers observe their habits closely, they would know this. Even the crow, detested and destructive as he is, is destructive only for a very few days in each year, and his depredations, in a perceptible manner, are ordinarily confined to the corn-field, just at the season of the sprouting of the seed, and the appearance of the blade above the ground. He somewhat infests newly-sown wheat, oats, and barley. And here ends his depredations. The benefit that his race confers is the destruction of myriads of *destroying* worms. Did the crow not eat these, they would do far more injury than he does. They cannot be deterred from destroying—he may. The robin and the woodpecker are pests among the cherries, when ripe, and yet they consume insects, worms, caterpillars, in vast numbers, that living, would destroy far more fruit than the birds. Indeed, it may be said that without birds, we should never grow any fruit. The owl and the hawk, that destroy occasionally a chicken, are mousers, and in the destruction of mice and moles, repay amply the evil they do.

It may reasonably be doubted if any birds, even the eagle, does as much harm as good. We always observe the evil done, rarely the benefit rendered.

Among the birds, the only pests worthy of being noticed are the eagle, the crow and raven, the hawk (or kite, as he is frequently called), and the owl.

**THE EAGLE.**—The eagle is a formidable “pest of the farm,” pouncing from time to time upon the various inmates of the poultry-yard, and carrying away the young in its talons, and even occasionally extending its depredations to a young pig or lamb; besides, being, in some instances, known to attack a sickly or dying beast, and to anticipate death by (vulture fashion) pecking out its eyes. Still it must be admitted that the eagle usually behaves in a nobler manner, and, unless when very hard pinched by appetite, contents himself with such prey as he can convey away to his nest, or, as it is called, his eyrie, on the distant cliff.

There are three sorts of eagle whose depredations are most to be feared by farmers. These are, the Bald Eagle or White-Headed Eagle, the Ring-Tailed Eagle, and the Sea Eagle. A few words relative to the destruction of these birds will suffice, and the one set of directions will equally apply to all. The best mode of protection against the ravages of the eagles is to shoot them where seen, and to have their nests annually robbed. This is best managed by offering a bounty for the capture of young ones, or, as they are called, the *eaglets*.

**BALD EAGLE OR WHITE-HEADED EAGLE.**—This distinguished bird is entitled to particular notice. He has been long known to naturalists, being common to both continents, and occasionally met with from a very high northern latitude, to the borders of the torrid zone, but chiefly in the vicinity of the sea, and along the shores and cliffs of our lakes and large rivers. Formed by nature for braving the severest cold; feeding equally on the produce of the sea and of the land; possessing powers of flight capable of outstripping even the tempests themselves; unawed by anything but man; and, from the ethereal heights to which he soars, looking abroad, at one glance, on an immeasurable expanse of forests, fields, lakes, and ocean, deep below him, he appears indifferent to the little localities of change of seasons; as, in a few minutes, he can pass from summer to winter, from the lower to the higher regions of the atmosphere, the abode of eternal cold, and thence de-

scend, at will, to the torrid, or the arctic regions of the earth. He is, therefore, found, at all seasons, in the countries he inhabits; but prefers such places as have been mentioned above, from the great partiality he has for fish.

In procuring these, he displays, in a very singular manner, the genius and energy of his character, which is fierce, contemplative, daring, and tyrannical,—attributes not exerted but on particular occasions, but, when put forth, overpowering all opposition.

When driven, as he sometimes is, by the combined courage and perseverance of the fish hawks, from their neighborhood, and forced to hunt for himself, he retires more inland, in search of young pigs, of which he destroys great numbers. In the lower parts of Virginia and North Carolina, where the inhabitants raise vast herds of those animals, complaints of this kind are very general against him. He also destroys young lambs in the early part of spring; and will sometimes attack old sickly sheep, aiming furiously at their eyes.

His intrepidity of character may be illustrated by the following fact, which occurred a few years ago, near Great Egg Harbor, New Jersey:—A woman, who happened to be weeding in the garden, had set her child down near, to amuse itself while she was at work; when a sudden and extraordinary rushing sound, and a scream from her child, alarmed her, and, starting up, she beheld the infant thrown down, and dragged some few feet, and a large bald eagle bearing off a fragment of its frock, which being the only part seized, and giving way, providentially saved the life of the infant.

The appetite of the bald eagle, though habituated to long fasting, is of the most voracious, and often the most indelicate kind. Fish, when he can obtain them, are preferred to all other fare. Young lambs and pigs are dainty morsels, and made free with on all favorable occasions. Ducks, geese, gulls, and other sea fowl, are also seized with avidity.

The white-headed eagle is three feet long, and seven feet in extent; the bill is of a rich yellow; cere, the same, slightly tinged with green; mouth, flesh-colored; tip of the tongue, bluish black; the head, chief part of the neck, vent, tail-coverts, and tail, are white in the perfect, or old birds of both sexes,—in those under three years of age these parts are of a gray brown; the rest of the plumage is dark brown, each feather tipped with pale brown, lightest on the shoulder of the wing, and darkest towards its extremities. The conformation of the wing is admirably adapted



for the support of so large a bird ; it measures two feet in breadth on the greater quills, and sixteen inches on the lesser ; the longest primaries are twenty inches in length, and upwards of one inch in circumference where they enter the skin ; the broadest secondaries are three inches in breadth across the vane ; the scapulars are very large and broad, spreading from the back to the wing, to prevent the air from passing through ; another range of broad flat feathers, from three to ten inches in length, also extends from the lower part of the breast to the wing below, for the same purpose ; between these lies a deep triangular cavity ; the thighs are remarkably thick, strong, and muscular, covered with long feathers pointing backwards, usually called the femoral feathers ; the legs, which are covered half way below the knee, before, with dark, brown downy feathers, are of a rich yellow, the color of ripe Indian corn ; feet, the same ; claws, blue-black, very large and strong, particularly the inner one, which is considerably the largest ; soles, very rough and warty ; the eye is sunk under a bony, or cartilaginous projection, of a pale yellow color, and is turned considerably forwards, not standing parallel with the cheeks ; the iris is of a bright straw color, pupil black.

The male is generally two or three inches shorter than the female ; the white on the head, neck, and tail being more tinged with yellowish, and its whole appearance less formidable ; the brown plumage is also lighter, and the bird itself less daring than the female,—a circumstance common to almost all birds of prey.

The eagle is said to live to a great age,—sixty, eighty, and, as some assert, one hundred years. This circumstance is remarkable, when we consider the seeming intemperate habits of the bird, sometimes fasting, through necessity, for several days, and at other times gorging itself with animal food till its craw swells out the plumage of that part, forming a large protuberance on the breast. This, however, is its natural food, and for these habits its whole organization is particularly adapted. Its food is simple, it indulges freely, uses great exercise, breathes the purest air, is healthy, vigorous, and long lived.

**THE RING-TAILED EAGLE.**—This noble bird, in strength, spirit, and activity, ranks among the first of its tribe. It is found, though sparingly dispersed, over the whole temperate and arctic regions, particularly the latter ; breeding on high, precipitous rocks, always preferring a mountainous country.

The ring-tailed eagle measures nearly three feet in length ; the

bill is of a brownish horn color; the cere, sides of the mouth, and feet, yellow; iris of the eye, reddish hazel, the eye turned considerably forwards; eyebrow, remarkably prominent, projecting over the eye, and giving a peculiar sternness to the aspect of the bird; the crown is flat; the plumage of the head, throat, and neck, long and pointed; that on the upper part of the head and neck, very pale ferruginous; fore part of the crown, black; all the pointed feathers are shafted with black; whole upper parts, dark blackish brown; wings, black; tail, rounded, long, of a white, or pale cream color, minutely sprinkled with specks of ash, and dusky, and ending in a broad band of deep dark brown, of nearly one-third its length; chin, cheeks, and throat, black; whole lower parts, a deep dark brown, except the vent and inside of the thighs, which are white, stained with brown; legs, thickly covered to the feet, with brownish white down, or feathers; claws, black, very large, sharp, and formidable, the hind one full two inches long.

The ring-tailed eagle is found in the northern parts of America.

SEA EAGLE OR GRAY EAGLE.—This eagle inhabits the same countries, frequent the same situations, and lives on the same kind of food, as the bald eagle, with whom it is often seen in company. It resembles this last much in figure, size, form of the bill, legs, and claws, and is often seen associating with it both along the Atlantic coast and in the vicinity of our lakes and large rivers.

The sea eagle is said, by Salerne, to build on the loftiest oaks a very broad nest, into which it drops two large eggs, that are quite round, exceedingly heavy, and of a dirty white color. Of the precise time of building, we have no account.

The bird measures three feet in length, and upwards of seven feet in extent. The bill formed exactly like that of the bald eagle, but of a dusky brown color; cere and legs, bright yellow; the latter, as in the bald eagle, feathered a little below the knees; irides, a bright straw color; head above, neck, and back, streaked with light brown, deep brown, and white, the plumage being white, tipped and centred with brown; scapulars, brown; lesser wing-coverts, very pale, intermixed with white; primaries, black, their shafts brownish white; rump, pale brownish white; tail, rounded, somewhat longer than the wings, when shut, brown on the exterior vanes, the inner ones white, sprinkled with dirty brown; throat, breast, and belly, white, dashed and streaked with different tints of brown and pale yellow; vent, brown, tipped with white; femorals, dark brown, tipped with lighter; auriculars, brown, forming a bar

from below the eye backwards ; plumage of the neck, long, narrow, and pointed, as is usual with eagles, and of a brownish color tipped with white.

The sea eagle is said to hunt at night, as well as during the day, and that, besides fish, it feeds on chickens, birds, hares, and other animals. It is also said to catch fish during the night ; and that



THE SEA EAGLE.

the noise of its plunging into the water is heard at a great distance. But, in the descriptions of writers, this bird has been so frequently confounded with the osprey, as to leave little doubt that the habits and manners of the one have been often attributed to both, and others added that are common to neither.

The gun, poisoned meats, or traps baited with meat or fish, are the only means of destroying eagles.

THE CROW.—This is perhaps the most generally known, and least beloved, of all our land birds ; having neither melody of song

nor beauty of plumage, nor excellence of flesh, nor civility of manners to recommend him; on the contrary, he is branded as a thief and a plunderer—a kind of black-coated vagabond, who hovers over the fields of the industrious, fattening on their labors, and, by his voracity, often blasting their expectations. Hated as he is by the farmer, watched and persecuted by almost every bearer of a gun, who all triumph in his destruction, had not Heaven bestowed on him intelligence and sagacity far beyond common, there is reason to believe that the whole tribe (in these parts at least) would long ago have ceased to exist.

The crow is a constant attendant on agriculture, and a general inhabitant of the cultivated parts of North America. In the interior of the forest he is more rare, unless during the season of breeding. He is particularly attached to low flat corn countries, lying in the neighborhood of the sea, or of large rivers; and more numerous in the northern than southern states. A strong antipathy, it is said, prevails between the crow and the raven, insomuch, that where the latter is numerous, the former rarely resides.

The usual breeding time of the crow, is in March, April, and May, during which season they are dispersed over the woods in pairs, and roost in the neighborhood of the tree they have selected for their nest. About the middle of March they begin to build, generally choosing a high tree.

It is in the month of May, and until the middle of June, that the crow is most destructive to the corn-fields, digging up the newly planted grains of maize, pulling up by the roots those that have begun to vegetate, and thus frequently obliging the farmer to replant, or lose the benefit of the soil; and this sometimes twice, and even three times, occasioning a considerable additional expense, and inequality of harvest. No mercy is now shown him. The myriads of worms, moles, mice, caterpillars, grubs, and beetles, which he has destroyed, are altogether overlooked on these occasions. Detected in robbing the hens' nests, pulling up the corn, and killing the young chickens, he is considered as an outlaw, and sentenced to destruction. But the great difficulty is, how to put this sentence in execution. In vain the gunner skulks along the hedges and fences; his faithful sentinels, planted on some commanding point, raise the alarm, and disappoint vengeance of its object. The coast again clear, he returns once more in silence, to finish the repast he had begun. Sometimes he approaches the farm-house by stealth, in search of young chickens, which he is in

the habit of snatching off, when he can elude the vigilance of the mother hen, who often proves too formidable for him.

The crow himself sometimes falls a prey to the superior strength and rapacity of the great owl, whose weapons of offence are by far the more formidable of the two.

Towards the close of summer, the parent crows, with their new families, forsaking their solitary lodgings, collect together, as if by previous agreement, when evening approaches. About an hour before sunset, they are first observed, flying, somewhat in Indian file, in one direction, at a short height above the tops of the trees, silent and steady, keeping the general curvature of the ground, continuing to pass sometimes till after sunset, so that the whole line of march would extend for many miles. This circumstance, so familiar and picturesque, has not been overlooked by the poets, in their descriptions of a rural evening.

Crows form large roosts and dwell in them in immense numbers. A large one appears to be the grand rendezvous, or head-quarters, of the greater part of the crows within forty or fifty miles of the spot. The noise created by these multitudes, both in their evening assembly and reascension in the morning, and the depredations they commit in the immediate neighborhood of a great resort, are almost incredible. Whole fields of corn are sometimes laid waste by thousands alighting on it at once, with appetites whetted by the fast of the preceding night; and the utmost vigilance is unavailing to prevent, at least, a partial destruction of this their favorite grain. Like the stragglers of an immense, undisciplined, and rapacious army, they spread themselves over the fields, to plunder and destroy wherever they alight. It is here that the character of the crow is universally execrated; and to say to the man who has lost his crop of corn by these birds, that crows are exceedingly useful for destroying vermin, would be as consolatory as to tell him who had just lost his house and furniture by the flames, that fires are excellent for destroying bugs.

So universal is the hatred to crows, that few states have neglected to offer rewards for their destruction. In the United States, they have been repeatedly ranked in our laws with the wolves, the panthers, foxes, and squirrels, and a proportionable premium offered for their heads, to be paid by any justice of the peace to whom they are delivered. On all these accounts, various modes have been invented for capturing them. They have been taken in clap-nets, commonly used for taking pigeons; two or three live crows

being previously procured as decoys, or, as they are called, *stool-crows*. Corn has been steeped in a strong decoction of hellebore, which, when eaten by them, produces giddiness, and finally, it is said, death. Pieces of paper formed into the shape of a hollow cone, besmeared within with birdlime, and a grain or two of corn dropped on the bottom, have also been adopted. Numbers of these being placed on the ground, where corn has been planted, the crows attempting to reach the grains, are instantly hoodwinked, fly directly upwards to a great height; but generally descend near the spot whence they rose, and are easily taken. The reeds of their roosting places are sometimes set on fire during a dark night, and the gunners having previously posted themselves around, the crows rise in great uproar, and, amidst the general consternation, by the light of the burnings, hundreds of them are shot down.

Crows have been employed to catch crows, by the following stratagem:—A live crow is pinned by the wings down to the ground on his back, by means of two sharp, forked sticks. Thus situated, his cries are loud and incessant, particularly if any other crows are within view. These, sweeping down about him, are instantly grappled by the prostrate prisoner, by the same instinctive impulse that urges a drowning person to grasp at everything within his reach. Having disengaged the game from his clutches, the trap is again ready for another experiment; and by pinning down each captive, successively, as soon as taken, in a short time you will probably have a large flock screaming above you, in concert with the outrageous prisoners below. Many farmers, however, are content with hanging up the skins, or dead carcasses, of crows in their corn-fields, *in terrorem*; others depend altogether on the gun, keeping one of their people supplied with ammunition, and constantly on the look out.

> The habits of the crow in his native state are so generally known as to require little further illustration. His watchfulness, and jealous sagacity in distinguishing a person with a gun, are notorious to every one. In spring, when he makes his appearance among the groves and low thickets, the whole feathered songsters are instantly alarmed, well knowing the depredations and murders he commits on their nests, eggs, and young. Few of them, however, have the courage to attack him, except the king bird, who, on these occasions, teases and pursues him from place to place, diving on his back while high in the air, and harassing him for a great distance. A single pair of these noble-spirited birds, whose nest was built

near, have been known to protect a whole field of corn from the depredations of the crows, not permitting one to approach it.

The crow is eighteen inches and a half long, and three feet two inches in extent; the general color is a shining glossy blue black, with purplish reflections; the throat and lower parts are less glossy; the bill and legs, a shining black, the former two inches and a quarter long, very strong, and covered at the base with thick tufts of recumbent feathers; the wings, when shut, reach within an inch and a quarter of the tip of the tail, which is rounded; fourth primary, the longest; secondaries scolloped at the ends, and minutely pointed, by the prolongation of the shaft; iris, dark hazel.

The female differs from the male in being more dull colored, and rather deficient in the glossy and purplish tints and reflections. The difference, however, is not great.

Besides grain, insects, and carrion, they feed on frogs, tadpoles, small fish, lizards, and shell fish; with the latter they frequently mount to a great height, dropping them on the rocks below, and descending after them to pick up the contents. Many other aquatic insects, as well as marine plants, furnish them with food; which accounts for their being so generally found, and so numerous, on the sea shore, and along the banks of our large rivers.

THE RAVEN.—The raven is a general inhabitant of the United States, but is more common in the interior. It is a remarkable fact, that where they so abound, the common crow seldom makes its appearance; being intimidated, it is conjectured, by the superior size and strength of the former, or by an antipathy which the two species manifest towards each other.

The food of this species is dead animal matter of all kinds, not excepting the most putrid carrion, which it devours in common with the vultures; worms, grubs, reptiles, and shell fish, the last of which, in the manner of the crow, it drops from a considerable height in the air, on the rocks, in order to break the shells; it is fond of bird's eggs, and is often observed sneaking around the farm-house in search of the eggs of the domestic poultry, which it sucks with eagerness; it is likewise charged with destroying young ducks and chickens, and lambs which have been yeaned in a sickly state.

The raven measures, from the tip of the bill to the end of the tail, twenty-six inches, and is four feet in extent; the bill is large and strong, of a shining black, notched near the tip, and three in-

ches long; the setaceous feathers which cover the nostrils extend half its length; the eyes are black; the general color is a deep glossy black, with steel-blue reflections; the lower parts are less glossy; the tail is rounded, and extends about two inches beyond the wings; the legs are two inches and a half in length, and, with the feet, are strong and black; the claws are long.

This bird is said to attain to a great age; and its plumage to be subject to change from the influence of years and of climate. It is found in Iceland and Greenland entirely white.

The raven may be destroyed in several of the many ways adopted to kill the crow. He is more easily shot than the crow.

OF HAWKS there is a great variety in America. Those only are described that are common and diffused enough to be generally troublesome.

AMERICAN SPARROW HAWK.—This bird is a constant resident in almost every part of the United States, particularly in the states north of Maryland. In the Southern States there is a smaller species found, which is destitute of the black spots on the head; the legs are long and very slender, and the wings light blue.

The nest of this species is usually built in a hollow tree; generally pretty high up, where the top, or a large limb, has been broken off. The female generally lays four or five eggs, which are of a light brownish yellow color, spotted with a darker tint; the young are fed on grasshoppers, mice, and small birds, the usual food of the parents.

The habits and manners of this bird are well known. It flies rather irregularly, occasionally suspending itself in the air, hovering over a particular spot for a minute or two, and then shooting off in another direction. It perches on the top of a dead tree or pole, in the middle of a field or meadow, and, as it alights, shuts its long wings so suddenly, that they seem instantly to disappear; it sits here in an almost perpendicular position, sometimes for an hour at a time, frequently jerking its tail, and reconnoitring the ground below, in every direction, for mice, lizards, &c. It approaches the farm-house, particularly in the morning, skulking about the barn-yard for mice or young chickens. It frequently plunges into a thicket after small birds, as if by random, but always with a particular, and generally a fatal, aim. It is particularly fond of watching along hedge-rows, and in orchards, where those small birds usually resort. When grasshoppers are plenty, they form a considerable part of its food.



Though small snakes, mice, lizards, &c., be favorite morsels with this active bird, yet we are not to suppose it altogether destitute of delicacy in feeding. It will seldom or never eat of anything that it has not itself killed, and even that, if not *in good eating order*, is sometimes rejected.

The female of this species is eleven inches long, and twenty-three from tip to tip of the expanded wings. The cere and legs are yellow; bill, blue, tipped with black; space round the eye, greenish blue; iris, deep dusky; head, bluish ash; crown, rufous; seven spots of black on a white ground surround the head; whole upper parts reddish bay, transversely streaked with black; primary and secondary quills, black, spotted on their inner vanes with brownish white; whole lower parts, yellowish white, marked with longitudinal streaks of brown, except the chin, vent, and femoral feathers, which are white; claws, black.

The male sparrow hawk measures about ten inches in length, and twenty-one in extent; the whole upper parts of the head are of a fine slate blue, the shafts of the plumage being black, the crown excepted, which is marked with a spot of bright rufous; the slate tapers to a point on each side of the neck; seven black spots surround the head, as in the female, on a reddish white ground, which also borders each sloping side of the blue; front, lores, line over and under the eye, chin, and throat, white; femoral and vent-feathers, yellowish white; the rest of the lower parts, of the same tint, each feather being streaked down the centre with a long black drop; those on the breast, slender, on the sides, larger; upper part of the back and scapulars, deep reddish bay, marked with ten or twelve tranverse waves of black; whole wing-coverts and ends of the secondaries, bright slate, spotted with black; primaries and upper half of the secondaries, black, tipped with white, and spotted on their inner vanes with the same; lower part of the back, the rump, and tail-coverts, plain bright bay; tail rounded, the two exterior feathers white, their inner vanes beautifully spotted with black; the next, bright bay, with a broad band of black near its end, and tipped for half an inch with yellowish white; part of its lower exterior edge, white, spotted with black, and its opposite interior edge, touched with white; the whole of the others are very deep red bay, with a single, broad band of black near the end, and tipped with yellowish white; cere and legs, yellow; orbits, the same; bill, light blue; iris of the eye, dark, almost black; claws, blue-black.

**RED-TAILED HAWK.**—This species inhabits the whole United States, and is not migratory. Among extensive meadows, where flocks of larks, and where mice and moles are in great abundance, many individuals of this hawk spend the greater part of the winter. Others prowl around the plantations, looking out for vagrant chickens; their method of seizing which is, by sweeping swiftly over the spot, and, grappling them with their talons, bearing them away to the woods.

The red-tailed hawk is twenty inches long, and three feet nine inches in extent; bill, blue-black; cere, and sides of the mouth, yellow, tinged with green; lores, and spot on the under eyelid, white, the former marked with fine, radiating hairs; eyebrow, or cartilage, a dull eel-skin color, prominent, projecting over the eye; a broad streak of dark brown extends from the sides of the mouth backwards; crown and hind head, dark brown, seamed with white, and ferruginous; sides of the neck, dull ferruginous, streaked with brown; eye, large; iris, pale amber; back and shoulders, deep brown; wings, dusky, barred with blackish; ends of the five first primaries, nearly black; scapulars, barred broadly with white and brown; sides of the tail-coverts, white, barred with ferruginous, middle ones dark, edged with rust; tail, rounded, extending two inches beyond the wings, and of a bright red brown, with a single band of black near the end, and tipped with brownish white; on some of the lateral feathers are slight indications of the remains of other narrow bars; lower parts, brownish white; the breast, ferruginous, streaked with dark brown; across the belly, a band of interrupted spots of brown; chin, white; femorals and vent, pale brownish white, the former marked with a few minute heart-shaped spots of brown; legs, yellow, feathered half way below the knees.

The gun, or traps baited with mice, toads, &c., or a dead fowl, are the proper means to destroy hawks.

**OWLS.**—There is a great variety of owls all over America. Some are so rare as to be of no account as pests; others are common everywhere. The predacious habits of all are the same. Those that are described will, as far as evil habits are concerned, represent the whole variety.

**THE BARRED OWL.**—This is one of our most common owls. It is very frequently observed flying during day, and certainly sees more distinctly at that time than many of its genus.

These birds sometimes seize on fowls, partridges, and young rab-

bits ; mice and small game are, however, their most usual food. The difference in size between the male and female of this owl is extraordinary, amounting sometimes to nearly eight inches in the length. Both scream during day, like a hawk.



THE OWL.

The male barred owl measures sixteen inches and a half in length, and thirty-eight inches in extent ; upper parts a pale brown, marked with transverse spots of white ; wings barred with alternate bands of pale brown, and darker ; head, smooth, very large, mottled with transverse touches of dark brown, pale brown, and white ; eyes, large, deep blue, the pupil not perceivable ; face, or radiated circle of the eyes, gray, surrounded by an outline of brown

and white dots; bill, yellow, tinged with green; breast, barred transversely with rows of brown and white; belly, streaked longitudinally with long stripes of brown, on a yellowish ground; vent, plain yellowish white; thighs and feathered legs, the same, slightly pointed with brown; toes, nearly covered with plumage; claws, dark horn color, very sharp; tail, rounded, and remarkably concave below, barred with six broad bars of brown, and as many narrow ones of white; the back and shoulders have a cast of chestnut; at each internal angle of the eye, is a broad spot of black; the plumage of the radiated circle round the eye ends in long black hairs; and the bill is encompassed by others of a longer and more bristly kind. These probably serve to guard the eye when any danger approaches it in sweeping hastily through the woods; and those usually found on flycatchers may have the same intention to fulfill; for, on the slightest touch of the point of any of these hairs, the nictant membrane was instantly thrown over the eye.

The female is twenty-two inches long, and four feet in extent; the chief difference of color consists in her wings being broadly spotted with white; the shoulder being a plain chocolate brown; the tail extends considerably beyond the tips of the wings; the bill is much larger, and of a more golden yellow; iris of the eye, the same as that of the male.

**LITTLE OWL.**—This is one of the least of its whole genus; but, like many other little folks, makes up, in neatness of general form and appearance, for deficiency of size, and is, perhaps, the most shapely of all our owls. Nor are the colors and markings of its plumage inferior in simplicity and effect to most others. It also possesses an eye fully equal in spirit and brilliancy to the best of them.

This species is a general and constant inhabitant of the middle and northern states; but is found most numerous in the neighborhood of the sea-shore, and among woods and swamps of pine trees. It rarely rambles much during day; but, if disturbed, flies a short way, and again takes shelter from the light; at the approach of twilight it is all life and activity, being a noted and dextrous mouse-catcher.

The little owl is seven inches and a half long, and eighteen inches in extent; the upper parts are a plain brown olive, the scapulars and some of the greater and lesser coverts being spotted with white; the first five primaries are crossed obliquely with five bars of white; tail, rounded, rather darker than the body, crossed with

two rows of white spots, and tipped with white; whole interior vanes of the wings, spotted with the same; auriculars, yellowish brown; crown, upper part of the neck, and circle surrounding the ears, beautifully marked with numerous points of white on an olive brown ground; front, pure white, ending in long blackish hairs; at the internal angle of the eyes, a broad spot of black radiating outwards; irides, pale yellow; bill, a blackish horn color; lower parts, streaked with yellow ochre and reddish bay; thighs, and feathered legs, pale buff; toes, covered to the claws, which are black, large, and sharp-pointed.

**RED OWL.**—This is another of our nocturnal wanderers, well known by its common name, the *little screech owl*; and noted for its melancholy quivering kind of wailing in the evenings, particularly towards the latter part of summer and autumn, near the farmhouse. On clear moonlight nights, they answer each other from various parts of the fields or orchards; roost during the day in thick evergreens, such as cedar, pine, or juniper trees, and are rarely seen abroad in sunshine. In May, they construct their nest in the hollow of a tree, often in the orchard in an old apple tree; the nest is composed of some hay and a few feathers; the eggs are four, pure white, and nearly round. The young are at first covered with a whitish down.

This species is found generally over the United States, and is not migratory.

The red owl is eight inches and a half long, and twenty-one inches in extent; general color of the plumage above, a bright nut brown, or tawny red; the shafts, black; exterior edges of the outer row of scapulars, white; bastard wing, the five first primaries, and three or four of the first greater coverts, all spotted with white; whole wing-quills, spotted with dusky on their exterior webs; tail, rounded, transversely barred with dusky and pale brown; chin, breast, and sides, bright reddish brown, streaked laterally with black, intermixed with white; belly and vent, white, spotted with bright brown; legs, covered to the claws with pale brown hairy down; extremities of the toes and claws, pale bluish, ending in black; bill, a pale bluish horn color; eyes, vivid yellow; inner angles of the eyes, eyebrows, and space surrounding the bill, whitish; rest of the face, nut brown; head, horned or eared, each horn consisting of nine or ten feathers of a tawny red, shafted with black.

**GREAT HORNED OWL.**—This noted and formidable owl is found

in almost every quarter of the United States. His favorite residence, however, is in the dark solitudes of deep swamps, covered with a growth of gigantic timber; and here, as soon as evening draws on, and mankind retire to rest, he sends forth such sounds as seem scarcely to belong to this world, startling the solitary pilgrim as he slumbers by his forest fire, "making night hideous."

It preys on young rabbits, squirrels, rats, mice, partridges, and small birds of various kinds. It has been often known to prowl about the farm-house, and carry off chickens from roost.

The owl being nocturnal, is not easily shot, but may be occasionally. He may be taken in traps baited with mice, fowls, or any of his usual food.

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### SECTION III.

#### INSECTS.

It is in the *larva* state that the ravages of insects are most felt, and this requires a word or two of explanation.

BUTTERFLIES, MOTHS, and many other insects, undergo a succession of changes, or transformations, prior to their assuming their last and frequently gorgeous form, under which we see them fluttering from flower to flower. Of course, I speak now more particularly of the butterfly. The moths are usually, though, no doubt, many of them are extremely beautiful, much more sober in their movements, and less gaudy in their plumage. They are, also, principally of nocturnal habits, and consequently come less frequently, and less strikingly, under our notice.

The female moth or butterfly deposits an egg, which, gradually ripening to maturity, becomes, a maggot, grub, or caterpillar. This is called the *larva*, and it is in this stage that the insects prove most noxious to the farmer's crops. These larvæ are excessively voracious, and their ravages terminate only with their next transformation into the state of *pupa*, or *chrysalis*. Prior to assuming this state, the caterpillar forsakes its food, and seeks some retired and safe retreat, usually burying itself for this purpose underground. The head then gradually bends forward, and the face is embraced by the upper or *thoracic* feet; the body likewise becomes contracted in its dimensions, more particularly in its length, and

also gradually becomes covered with a firm and shell-like coat or case. This is a thickening and induration of the *skin* of the grub, not of the *epidermis* or *cuticle*; for that is gradually *cast* as a slough, in proportion as the work of transformation proceeds. The chrysalis is soon formed; some insects envelop themselves in a web, as the silkworm, &c.; others do not. During this stage, the insect is, of course, perfectly harmless. In course of time, the perfect insect is formed within its shelly sheath; it now commences the work of breaking open its prison, having effected which, it emerges in all the beauty of insect perfection.

CATERPILLARS do not prey indiscriminately on all sorts of herbage or farming produce. Each species has its favorite plant, or plants; and not even *starvation* will induce it to transgress these limits that instinct has assigned to its appetite, or eat of a plant of another sort.



#### THE WIREWORM, AND PARENT BEETLES, MALE AND FEMALE.

One of the most destructive grubs which infests the fields of the agriculturist, or renders futile the care and skill of the gardener, is, perhaps, that well-known larva—the WIREWORM. I may here observe that the general name of *wireworm* is given to the larva of many species of beetle, all, however, very similar in habits and appearance, and so equally gifted as to their destructive powers, that it would be difficult, indeed, to draw any distinction in this respect between them.

Scarcely any land is free from the ravages of some one or other of the wireworms; and there is scarcely any description of crop upon which they will not prey with equal greediness. Wherever grass or any sort of herbage will grow, there will the greedy wireworm be found. The beetles, of which the wireworms are the larvæ, are those called the ELATERS; also spring-beetles, skip-

jacks, and click or snip-beetles, from the power they possess of springing up with a click or snap-like noise when placed upon their backs. The eggs of the wireworm are very minute, and are deposited in the earth at the root of the young plants. When first hatched they are invisible to the naked eye, but attain nearly the length of an inch when full grown, and in this state of larvæ they remain for nearly five years. No wonder, therefore, that, between their longevity and rapacity, they should be deemed by farmers so very pestilent a scourge. During the continuance of their larva state, these worms cast their outer skin several times, being white in color, and very tender for a short period after each sloughing; at other times they are covered with a hard and solid coat of a horny consistence, so firm and impenetrable as to render them proof against most of the ordinary remedies that might be used for their destruction.

Wireworms are somewhat more than half an inch in length, and resemble the meal-worm in appearance, but are more *angular*, less perfectly *cylindrical*, more flattened above and below. Their head is horny and formed for *perforation*, and the mouth, though small, is furnished with a most effective pair of very powerful jaws. There are six feet on the upper portion of the thorax, and one at the extremity or tail. The former are called *pectoral* or *thoracic*, the latter *anal*.

When full-grown, the wireworm buries itself in the ground, where it forms a cell, in which it becomes a chrysalis or pupa; this change takes place early in autumn, and in two or three weeks at farthest it becomes a beetle. The beetles are harmless, feeding only on flowers; they can fly well, and when on the ground can run very fast, with their heads down, and drop when approached. The mouth is not the same in appearance with that which existed in the worm, but will, on examination, be found to be formed of the same organs, only *perfected*.

There are two species of beetle that produce the wireworm, more common in grain-fields than the rest, and therefore the more to be dreaded. These are: the *elater appressifrons*, and the *elater obesus*.

The bug parent is familiarly known as the snapping bug. As before said the worm continues five years before its transmutation to the perfect insect state, during which time it feeds on *the roots* of wheat, barley, oats, corn and grass. Its ravages are sometimes **extensive** and desolating.



The wireworms usually eat into the stalks just about the roots, and sometimes separate it from the root altogether; they seldom, however, remain so long engaged upon the one spot or portion of stalk. When they attack potatoes, they penetrate into their very hearts, and thus frequently wholly destroy the seed potatoes when newly planted; to obviate which it has been recommended to plant whole potatoes.

Amongst the green crops, turnips may be regarded as the greatest sufferers, and the tender young plants are, of course, most victimized in autumn. Multitudes of these ravenous grubs may then be found gnawing at the roots of the young turnips, and even biting off their extremities. They also frequently attack the stalk, bite it across, and when the stems fall, attack the leaves. This is, however, one of the least formidable of the robberies of this persevering pest, and if the *wireworms* were satisfied with the leaves alone, they would not be so injurious.

We should possess some acquaintance with the *natural history* of such animals as we desire to destroy. Such knowledge facilitates our operations, by informing us of their haunts and habits, of their dispositions and predilections, and, consequently, not only of *where* we are to seek for the pests, but of *how* we can best set to work to accomplish their destruction. Recollect, I may remark, in passing that the BEETLES, whence the *wireworms* are produced, are, although not necessarily mischievous themselves, to be regarded as the grand source of your annoyances. Let it be your care, therefore, to have these caught and destroyed; they will be chiefly found, during spring and summer, upon nettles, hemlock, fools' parsley, and other such herbs. Let this be *one* of your cares.

The eggs are chiefly deposited in pastures where the surface has been undisturbed, and in clover layers and fallows. Where, therefore, they make their appearance, you will find it a good plan to have your pasture eaten close by sheep. *Rolling*, in early spring, is also recommended, and is, in my opinion, very likely to prove serviceable, having been preceded by a top-dressing of lime. I recommend a top-dressing of lime, salt, and soot. The proportions recommended are as follows:—Lime, 2 parts; soot, 3 parts; salt, 1 part. The salt may be purchased from salt works, or extensive dealers in that article, as *spoiled* salt—there being accidents which will render it unfit for market as salt, without at all militating against its value as manure, or a top-dressing. The lime should be quick-lime pounded, and the mixture should be applied to the land as

speedily as possible after having been compounded : be it also remembered that this composition will be found a valuable fertilizer, as well as a foe to insects of all sorts. Woad, sweet gale, the refuse of gas-works, spirits of tar, chloride of lime, nitrate of soda, mixed with the manure, will be found very serviceable ; at all events, effecting a sensible diminution in the numbers of the wireworm, and of course a diminution of their ravages in an equal ratio.

The wireworm is found in great numbers, generally on newly cultivated grounds, or meadows, which have been long in repose ; they can be conquered, and should not be suffered to revel on the plants of industrious farmers. Exposure to the frosts of winter will destroy them ; therefore, autumn plowing is essential ; and the course or remedy suggested to destroy the cutworm, is equally effective on the wireworm.

It has been tried to destroy the wireworm by *flooding*, but this is only a useless attempt, it being almost impossible to drown this creature, which will be found as lively as ever after a total immersion for three, or even four, days ; still, however, such flooding, though it will not destroy the worms, interferes with the *laying* of the beetles which produce them, and will consequently, in this point of view, be occasionally found useful.

Soda has been used with success. I have known soda tried by practical men, who were most unwilling, unless actually coerced into it, to listen to any novelty, and they have unanimously asserted the success of their experiments with soda.

Let frogs and toads be encouraged on your lands ; their entire food consists of *insects*, of such creatures as you are most anxious to destroy. Call them in, therefore, to your assistance—protect them, regard them as your friends and laborers, and they will aid you most extensively. The robin, blackbird, wagtail, thrush, together with poultry, and crows, &c., feed on these insects.

IULES.—In various parts of the country the iules is supposed to be, and often is called, the wireworm ; but does not belong to that family ; a sketch of the iules is given to correct this erroneous belief. Each segment of the body is furnished with two pairs of legs, whereas the true wireworm has but six. The iules also, when disturbed or alarmed, rolls itself into a coil which the hardness of the wireworm will not admit of. The iules is perfect in itself, and is oviparous ; the wireworm is a larva and cannot produce ova until its transformation to the beetle or perfect state. The iules

## INSECTS.



## THE IULES.

consumes vegetable substances in a state of decomposition ; the wireworm subsists on living roots in healthful vigor.

MAY-BUGS.—Among the tree-beetles those commonly called dors, chafers, May-bugs, and rose-bugs, are the most interesting to the farmer and gardener, on account of their extensive ravages, both in the winged and larva states. Besides the leaves of fruit-trees, they devour those of various forest-trees and shrubs, with an avidity not much less than that of the locust, so that, in certain seasons, and in particular districts, they become an oppressive scourge, and the source of much misery to the inhabitants.

The May-beetle is our common species. It is of a chestnut-brown color, smooth, but finely punctured, that is, covered with little impressed dots, as if pricked with the point of a needle ; each wing-case has two or three slightly elevated longitudinal lines ; the breast is clothed with yellowish down. The knob of its antennæ contains only three leaf-like joints. Its average length is nine-tenths of an inch. In its perfect state it feeds on the leaves of trees, particularly on those of the cherry tree. It flies with a humming noise in the night, from the middle of May to the end of June, and frequently enters houses, attracted by the light. In the course of the spring, these beetles are often thrown from the earth by the spade and plow, in various states of maturity, some being soft and nearly white, their superabundant juices not having evaporated, while others exhibit the true color and texture of the perfect insect. The grubs devour the roots of grass and of other plants, and in many places the turf may be turned up like a carpet in consequence of the destruction of the roots. The grub is a white worm with a brownish head, and, when fully grown, is nearly as thick as the little finger. It is eaten greedily by crows and fowls. The beetles are devoured by the skunk, whose beneficial foraging is detected in



our gardens by its abundant excrement filled with the wing-cases of these insects. The beetles may be effectually exterminated by shaking them from the trees every evening. The best time, however, for shaking trees on which the May-beetles are lodged, is in the morning, when the insects do not attempt to fly. They are most easily collected in a cloth spread under the trees to receive them when they fall, after which, they should be thrown into boiling water, to kill them, and may then be given as food to swine.



MAY-BUG.

The familiar cock chafer, or May-bug, is the parent of the grub, which is abundant in all pastures or grass fields, especially in soft vegetable soils. The grub is a destructive creature, continuing its devastations for a period of three summers before its transformation. The roots of all grasses and grains are acceptable, but the roots of Indian corn furnish a feast from which they will not turn, until disturbed by the crow, who is too often unfairly abused for mischief unknown to him.

ROSE BUGS.—For some time after they were first noticed, rose-bugs appeared to be confined to their favorite, the blossoms of the rose; but within thirty years they have prodigiously increased in number, have attacked at random various kinds of plants in swarms, and have become notorious for their extensive and deplorable ravages. The grape-vine in particular, the cherry, plum, and apple trees, have annually suffered by their depredations; many other fruit-trees and shrubs, garden vegetables and corn, and even the trees of the forest and the grass of the fields, have been laid under contribution by these indiscriminate feeders, by whom leaves, flowers, and fruits are alike consumed. They come forth from the ground during the second week in June, and remain from thirty to forty days. At the end of this period the males become exhausted, fall to the ground, and perish, while the females enter the earth, lay their eggs, return to the surface, and, after lingering a few days, die also. The eggs laid by each female are about thirty in number, and are deposited from one to four inches beneath the surface

of the soil; they are nearly globular, whitish and about one thirtieth of an inch in diameter, and are hatched twenty days after they are laid. The young larvæ begin to feed on such tender roots as are within their reach. When not eating, they lie upon the side, with the body curved so that the head and tail are nearly in contact; they move with difficulty on a level surface, and are continually falling over on one side or the other. They attain their full size in the autumn, being then three-quarters of an inch long, and about an eighth of an inch in diameter. They are of a yellowish white color, with a tinge of blue towards the hinder extremity, which is thick and obtuse or rounded; a few short hairs are scattered on the surface of the body; there are six short legs, namely a pair to each of the first three rings behind the head; and the latter is covered with a horny shell of a pale rust color. In October they descend below the reach of frost, and pass the winter in a torpid state. In the spring they approach towards the surface, and each one forms for itself a little cell of an oval shape, by turning round a great many times, so as to compress the earth and render the inside of the cavity hard and smooth. Within this cell the grub is transformed to a pupa, during the month of May, by casting off its skin, which is pushed downwards in folds from the head to the tail. The pupa has somewhat the form of the perfected beetle; but it is of a yellowish white color, and its short stump-like wings, its antennæ, and its legs are folded upon the breast, and its whole body is enclosed in a thin film, that wraps each part separately. During the month of June this filmy skin is rent, the included beetle withdraws from it its body and its limbs, bursts open its earthen cell, and digs its way to the surface of the ground. Thus the various changes, from the egg to the full development of the perfected beetle, are completed within the space of one year.

Such being the metamorphoses and habits of these insects, it is evident that we cannot attack them in the egg, the grub, or the pupa state; the enemy, in these stages, is beyond our reach. When they appear as bugs they must be crushed, scalded, or burned, to deprive them of life, for they are not affected by any of the applications usually found destructive to other insects. Experience has proved the utility of gathering them by hand, or of shaking them or brushing them from the plants into tin vessels containing a little water. They should be collected daily during the period of their visitation, and should be committed to the flames, or killed by scalding water.

Our insect-eating birds undoubtedly devour many of these insects, and deserve to be cherished and protected for their services. Rose-bugs are also eaten greedily by domesticated fowls; and when they become exhausted and fall to the ground, or when they are about to lay their eggs, they are destroyed by moles, insects, and other animals, which lie in wait to seize them.

PEA BUG.—In the spring of the year we often find, among seed-pease, many that have holes in them; and, if the pease have not been exposed to the light and air, we see a little insect peeping out of each of these holes, and waiting apparently for an opportunity to come forth and make its escape. If we turn out the creature from its cell, we perceive it to be a small oval beetle, rather more than one-tenth of an inch long, of a rusty black color, with a white spot on the hinder part of the thorax, four or five white dots behind the middle of each wing-cover, and a white spot, shaped like the letter T, on the exposed extremity of the body. This little insect is the *Bruchus Pisi* of Linnæus, the pea-*Bruchus*, or pea-weevil, but is better known in America by the incorrect name of pea-bug. The original meaning of the word *Bruchus* is a devourer, and the insects to which it is applied well deserve this name, for, in the larva state, they devour the interior of seeds, often leaving but little more than the hull untouched. The body is oval, and slightly convex; the head is bent downwards, so that the broad muzzle, when the insects are not eating, rests upon the breast; the antennæ are short, straight, and saw-toothed within, and are inserted close to a deep notch in each of the eyes; the feelers, though very small, are visible; the wing-cases do not cover the end of the abdomen; and the hindmost thighs are very thick, and often notched or toothed on the under-side, as is the case in the pea-weevil. These beetles frequent the leguminous or pod-bearing plants, such as the pea, during and immediately after the flowering season; they pierce the tender pods of these plants, and commonly lay only one egg in each seed, the pulp of which suffices for the food of the little maggot-like grub hatched therein.

When the pods are carefully examined, small, discolored spots may be seen within them, each one corresponding to a similar spot on the opposite pea. If this spot in the pea be opened, a minute whitish grub, destitute of feet, will be found therein. It is the weevil in its larva form, which lives upon the marrow of the pea, and arrives at its full size by the time that the pea becomes dry. This larva or grub then bores a round hole from the hellow in th

centre of the pea quite to the hull, but leaves the latter and generally the germ of the future sprout untouched. Hence these buggy pease, as they are called by seedsmen and gardeners, will frequently sprout and grow when planted. The grub is changed to a pupa within its hole in the pea in the autumn, and before the spring casts its skin again, becomes a beetle, and gnaws a hole through the thin hull in order to make its escape into the air, which frequently does not happen before the pease are planted for an early crop. After the pea-vines have flowered, and while the pods are young and tender, and the pease within them are just beginning to swell, the beetles gather upon them, pierce the pods, and deposit their tiny eggs in the punctures. This is done only during the night, or in cloudy weather. Each egg is always placed opposite to a pea; the grubs, as soon as they are hatched, penetrate the pod and bury themselves in the pease; and the holes through which they pass are so fine as hardly to be perceived, and are soon closed. Sometimes every pea in a pod will be found to contain a weevil grub; and so great has been the injury to the crop in some parts of the country that the inhabitants have been obliged to give up the cultivation of this vegetable. These insects diminish the weight of the pease in which they lodge, nearly one-half, and their leavings are fit only for the food of swine. This occasions a great loss, where pease are raised for feeding stock or for family use, as they are in many places. Those persons, who eat whole pease in the winter after they are raised, run the risk of eating the weevils also; but if the pease are kept till they are a year old, the insects will entirely leave them.

One remedy consists merely in keeping seed-pease in tight vessels over one year before planting them, or putting them, just before they are to be planted, into hot water for a minute or two, by which means the weevils will be killed, and the sprouting of the pease will be quickened. The insect is limited to a certain period for depositing its eggs; late sown pease therefore escape its attacks. Those sown in Pennsylvania as late as the twentieth of May, are entirely free from weevils.

THE APPLE-WORM.—Among the insects, that have been brought to America with other productions of Europe, may be mentioned the apple-worm, as it is here called, which has become naturalized wherever the apple-tree has been introduced. This mischievous creature has sometimes been mistaken for the plum-weevil (*Rhynchanus Conotrachelus Nenuphar*), but it may be easily distinguished

therefrom by its shape, its habits, and its transformations. Although the plum-weevil prefers stone fruit, it is sometimes found in apples also. On the other hand, the apple-worm has never been found here in plums. It is not a grub, but a true caterpillar, belonging to the *Tortrix* tribe, and in due time, is changed to a moth, called *Carpocapsa Pomonella*, the codling-moth, or fruit-moth of the apple. This moth is the most beautiful of the beautiful tribe to which it belongs; yet, from its habits not being known, it is seldom seen in the moth state; and the apple-grower knows no more than the man in the moon to what cause he is indebted for his worm-eaten windfalls in the stillest weather.



APPLE-MOTH.

At various times, between the middle of June and the first of July, the apple-worm moths may be found. They are sometimes seen in houses in the evening, trying to get through the windows into the open air, having been brought in with fruit while they were in the caterpillar state. Their fore-wings, when seen at a distance, have somewhat the appearance of brown watered silk; when closely examined they will be found to be crossed by numerous gray and brown lines, scalloped like the plumage of a bird; and near the hind angle there is a large, oval, dark brown spot, the edges of which are of a bright copper color. The head and thorax are brown mingled with gray; and the hind-wings and abdomen are light yellowish brown, with the lustre of satin. Its wings expand three quarters of an inch. This insect is readily distinguished from other moths by the large, oval, brown spot, edged with copper color, on the hinder margin of each of the fore-wings. During the latter

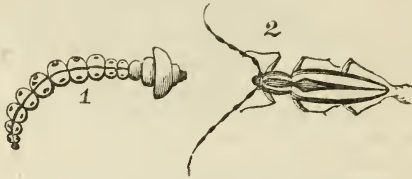


part of June and the month of July, these fruit-moths fly about apple trees every evening, and lay their eggs on the young fruit. They do not puncture the apples, but they drop their eggs, one by one, in the eye or hollow at the blossom-end of the fruit, where the skin is most tender. They seem also to seek for early fruit rather than for the late kinds, which we find are not so apt to be wormy as the thin-skinned summer apples. The eggs begin to hatch in a few days after they are laid, and the little apple-worms or caterpillars produced from them immediately burrow into the apples, making their way gradually from the eye towards the core. Commonly only one worm will be found in the same apple; and it is so small at first, that its presence can only be detected by the brownish powder it throws out in eating its way through the eye. The body of the young insect is of a whitish color; its head is heart-shaped and black; the top of the first ring or collar and of the last ring is also black; and there are eight little blackish dots or warts, arranged in pairs, on each of the other rings. As it grows older its body becomes flesh-colored; its head, the collar, and the top of the last wing, turn brown, and the dots are no longer to be seen. In the course of three weeks, or a little more, it comes to its full size, and meanwhile has burrowed to the core and through the apple in various directions. To get rid of the refuse fragments of its food, it gnaws a round hole through the side of the apple, and thrusts them out of the opening. Through this hole also the insect makes its escape after the apple falls to the ground; and the falling of the fruit is well known to be hastened by the injury it has received within, which generally causes it to ripen before its time.

Soon after the half-grown apples drop, and sometimes while they are still hanging, the worms leave them and creep into chinks in the bark of the trees or into other sheltered places, which they hollow out with their teeth to suit their shape. Here each one spins for itself a cocoon or silken case, as thin, delicate, and white as tissue paper. Most of the insects remain in their cocoons through the winter, and are not changed to moths till the following summer. The chrysalis is of a bright mahogany-brown color, and has, as usual, across each of the rings of its hind body, two rows of prickles, by the help of which it forces its way through the cocoon before the moth comes forth.

As the apple-worms instinctively leave the fruit soon after it falls from the trees, it will be proper to gather up all wind-fallen apples

daily, and make such immediate use of them as will be sure to kill the insects, before they have time to escape. If any old cloth is wound around or hung in the crotches of the trees, the apple-worms will conceal themselves therein; and by this means thousands of them may be obtained and destroyed, from the time when they first begin to leave the apples, until the fruit is gathered. By carefully scraping off the loose and rugged bark of the trees, in the spring, many chrysalids will be destroyed; and it has been said that the moths, when about laying their eggs, may be smothered or driven away, by the smoke of weeds burned under the trees. The worms, often found in summer pears, appear to be the same as those that affect apples, and are to be kept in check by the same means.



APPLE-TREE BORER.

**APPLE TREE BORERS.**—The borers of the apple tree have become notorious for their extensive ravages. They are the larvæ of a beetle called *Saperda bivittata*, the two-striped, or the brown and white striped *Saperda*; the upper side of its body being marked with two longitudinal white stripes between three of a light brown color, while the face, the antennæ, the under-side of the body, and the legs, are white. This beetle varies in length from a little more than one-half to three-quarters of an inch. It comes forth from the trunks of the trees, in its perfected state, early in June, making its escape in the night, during which time only it uses its ample wings in going from tree to tree in search of companions and food. In the day-time it keeps at rest among the leaves of the plants which it devours. Among the trees and shrubs attacked by this borer, are the apple tree, the quince, mountain-ash, hawthorn, and other thorn bushes. In June and July the eggs are deposited, being laid upon the bark near the root, during the night. The larvæ are fleshy whitish grubs, nearly cylindrical, and tapering a little from the first ring to the end of the body. The head is small, horny, and brown; the first ring is much larger than the others, the next

two are very short, and, with the first, are covered with punctures and very minute hairs; the following rings, to the tenth inclusive, are each furnished, on the upper and under side, with two fleshy warts situated close together, and destitute of the little rasp-like teeth, that are usually found on the grubs of the other Capricorn-beetles; the eleventh and twelfth rings are very short; no appearance of legs can be seen, even with a magnifying glass of high power. The grub, with its strong jaws, cuts a cylindrical passage through the bark, and pushes its castings backwards out of the hole from time to time, while it bores upwards into the wood. The larva state continues two or three years, during which the borer will be found to have penetrated eight or ten inches upwards in the trunk of the tree, its burrow at the end approaching to, and being covered only by, the bark. Here its transformation takes place. The final change occurs about the first of June, soon after which, the beetle gnaws through the bark that covers the end of its burrow, and comes out of its place of confinement in the night. Killing it by a wire thrust into the holes it has made, is one of the oldest, safest, and most successful methods. Cutting out the grub, with a knife or gouge, is the most common practice; but it is feared that these tools have sometimes been used without sufficient caution. A third method, which has more than once been suggested, consists in plugging the holes with soft wood. If a little camphor be previously inserted, this practice promises to be more effectual; but experiments are wanting to confirm its expediency.

**TURNIP FLY OR BEETLE.**—The wavy-striped flea-beetle, *Haltica striolata*, may be seen in great abundance on the horse-radish, various kinds of cresses, and on the mustard, and turnip, early in May, and indeed at other times throughout the summer. It is very injurious to young plants, destroying their seed-leaves as soon as the latter expand. Should it multiply to any extent, it may, in time, become as great a pest as the European turnip flea-beetle, which it closely resembles in its appearance, and in all its habits. It is considerably less than one-tenth of an inch in length. It is of a polished black color, with a broad wavy buff-colored stripe on each wing-cover, and the knees and feet are reddish yellow. Specimens are sometimes found having two buff-yellow spots on each wing-cover instead of the wavy stripe.

In England, where the ravages of the turnip flea-beetle have attracted great attention, and have caused many and various experiments to be tried with a view of checking them, it is thought that

“the careful and systematic use of lime will obviate, in a great degree, the danger which has been experienced” from this insect. From this and other statements in favor of the use of lime, there is good reason to hope that it will effectually protect plants from the various kinds of flea-beetles, if dusted over them, when wet with dew, in proper season. Watering plants with alkaline solutions, it is said, will kill the insects without injuring the plants. The solution may be made by dissolving one pound of hard soap in twelve gallons of the soap-suds left after washing. This mixture should be applied twice a day with a water-pot. Köllar very highly recommends watering or wetting the leaves of plants with an infusion or tea of wormwood, which prevents the flea-beetles from touching them. Perhaps a decoction of walnut-leaves might be equally serviceable. Great numbers of the beetles may be caught by the skilful use of a deep bag-net of muslin, which should be swept over the plants infested by the beetles, after which the latter may be easily destroyed. This net cannot be used with safety to catch the insects on very young plants, on account of the risk of bruising or breaking their tender leaves.

POTATO FLY.—Occasionally potato-vines are very much infested by two or three kinds of *Cantharides*, or blistering flies, swarms of which attack and destroy the leaves during midsummer. One of these kinds has thereby obtained the name of the potato-fly. It is the *Cantharis vittata*, or striped *Cantharis*. It is of a dull tawny yellow or light yellowish red color above, with two black spots on the head, and two black stripes on the thorax and on each of the wing-covers. The under-side of the body, the legs, and the antennæ are black, and covered with a grayish down. Its length is from five to six tenths of an inch. The thorax is very much narrowed before, and the wing-covers are long and narrow, and cover the whole of the back. The striped *Cantharis* is comparatively rare in New England; but in the Middle States it often appears in great numbers, and does much mischief in potato-fields and gardens, eating up not only the leaves of the potato, but those of many other vegetables.

Another kind of blistering fly is the ash-colored *Cantharis*. When the insect is rubbed, the ash-colored substance comes off, leaving the surface black. It begins to appear in gardens about the twentieth of June, and is very fond of the leaves of the English bean, which it sometimes entirely destroys. It is also occasionally found in considerable numbers on potato-vines; and it has repeat-

edly appeared in great profusion upon the honey-locust, which has been entirely stripped of foliage by these voracious insects. In the night, and in rainy weather, they descend from the plants, and burrow in the ground, or under leaves and tufts of grass. Thither also they retire for shelter during the heat of the day, being most actively engaged in eating in the morning and evening. About the first of August they go into the ground and lay their eggs, and these are hatched in the course of one month. The larvæ are slender, somewhat flattened grubs, of a yellowish color, banded with black, with a small reddish head, and six legs. These grubs are very active in their motions, and appear to live upon fine roots in the ground.

About the middle of August, and during the rest of this and the following month, a jet-black *Cantharis* may be seen on potato-vines, and also on the blossoms and leaves of various kinds of golden-rod, particularly the tall golden-rod (*Solidago altissima*), which seems to be its favorite food. In some places it is as plentiful in potato fields as the striped and the margined *Cantharis*, and by its serious ravages has often excited attention. These three kinds, in fact, are often confounded under the common name of potato-flies. These insects are taken, in considerable quantities, by brushing or shaking them from the potato-vines into a broad tin pan, from which they are emptied into a covered pail containing a little water in it, which, by wetting their wings, prevents their flying out when the pail is uncovered. The same method may be employed for taking the other kinds of *Cantharides*, when they become troublesome and destructive from their numbers; or they may be caught by gently sweeping the plants they frequent with a deep muslin bag-net. They should be killed by throwing them into scalding water, for one or two minutes, after which they may be spread out on sheets of paper to dry, and may be made profitable by selling them to the apothecaries for medical use.

**GRASSHOPPERS AND LOCUSTS.**—Most grasshoppers are of a green color, and are furnished with wings and wing-covers, the latter frequently resembling the leaves of trees, upon which, indeed, many of these insects pass the greater part of their lives. Their leaf-like form and green color evidently seem to have been designed for the better concealment of these insects. They commit their eggs to the earth, dropping them into holes made for this purpose by their piercers. They lay a large number of eggs at a time, and cover them with a kind of varnish, which, when dry, forms a thin film

that completely encloses them. Their eggs are laid in the autumn, and usually are not hatched till the following spring. They are nocturnal insects, or at least more active by night than by day. When taken between the fingers, they emit from their mouths a considerable quantity of dark-colored fluid, as do also the locusts or diurnal grasshoppers. They devour the leaves of trees, and of other plants, and lead a solitary life, or at least do not associate and migrate from place to place in great swarms, like some of the crickets and the locusts.

LOCUSTS.—The various insects included under the name of locusts nearly all agree in having their wing-covers rather long and narrow, and placed obliquely along the sides of the body, meeting, and even overlapping for a short distance, at their upper edges, which together form a ridge on the back like a sloping roof. Their antennæ are much shorter than those of most grasshoppers, and do not taper towards the end, but are nearly of equal thickness at both extremities. Their feet have really only three joints; but as the under-side of the first joint is marked by one or two cross lines, the feet, when seen only from below, seem to be four or five jointed.

Although the ravages of locusts in America are not followed by such serious consequences as in the Eastern continent, yet they are sufficiently formidable to have attracted attention, and not unfrequently have these insects laid waste considerable tracts, and occasioned no little loss to the cultivator of the soil. Our salt-marshes, which are accounted among the most productive and valuable of our natural meadows, are frequented by great numbers of the small red-legged species (*Acrydium femur-rubrum*), intermingled occasionally with some larger kinds. These, in certain seasons, almost entirely consume the grass of these marshes, from whence they then take their course to the uplands, devouring, in their way, grass, corn, and vegetables, till checked by the early frosts, or by the close of the natural term of their existence. When a scanty crop of hay has been gathered from the grounds which these puny pests have ravaged, it becomes so tainted with the putrescent bodies of the dead locusts contained in it, that it is rejected by horses and cattle. In this country locusts are not distinguished from grasshoppers, and are generally, though incorrectly, comprehended under the same name, or under that of flying grasshoppers. They are, however, if we make allowance for their inferior size, quite as voracious and injurious to vegetation during the young or larva and pupa states, when they are not provided with wings, as they are

when fully grown. During dry seasons, they often appear in great multitudes, and are the greedy destroyers of the half-parched herbage. In many parts of the United States these locusts appear in myriads, and their devastations in dry seasons are horrible. The locusts may be taken by means of a piece of stout cloth, carried by four persons, two of whom draw it rapidly along, so that the edge may sweep over the surface of the soil, and the two others hold up the cloth behind at an angle of forty-five degrees. This contrivance seems to operate somewhat like a horse-rake, in gathering the insects into winrows or heaps, from which they are speedily transferred to large sacks. When these insects are very prevalent, it will be advisable to mow the grass early, so as to secure a crop before it has suffered much loss. The time for doing this will be determined by the period when the most destructive species come to maturity during the latter part of July. If then, the meadows are mowed about the first of July, the locusts, being at that time small and not provided with wings, will be unable to migrate, and will consequently perish on the ground for the want of food, while a tolerable crop of hay will be secured, and the marshes will suffer less from the insects during the following summer. This, like all other preventive measures, must be generally adopted, in order to prove effectual; for it will avail a farmer but little to take preventive measures on his own land, if his neighbors, who are equally exposed and interested, neglect to do the same. Many birds devour them, particularly our domestic fowls, which eat great numbers of grasshoppers, locusts, and even crickets. Young turkeys, if allowed to go at large during the summer, derive nearly the whole of their subsistence from these insects. The great increase of these and other noxious insects may fairly be attributed to the exterminating war which has wantonly been waged upon our insect-eating birds, and we may expect the evil to increase unless these little friends of the farmer are protected, or left undisturbed to multiply, and follow their natural habits. Meanwhile, some advantage may be derived from encouraging the breed of our domestic fowls. A flock of young chickens or turkeys, if suffered to go at large in a garden, while the mother is confined within their sight and hearing, under a suitable crate or cage, will devour great numbers of destructive insects; and our farmers should be urged to pay more attention than heretofore to the rearing of chickens, young turkeys, and ducks, with a view to the benefits to be derived from their destruction of insects.

PLANT LICE. —The Aphidians, in which group we include the insects commonly known by the name of plant-lice, differ remarkably from all the foregoing in their appearance, their formation, and their manner of increase. Their bodies are very soft, and usually more or less oval.

*Aphides*, or plant-lice as they are usually called, are among the most extraordinary of insects. They are found upon almost all parts of plants, the roots, stems, young shoots, buds, and leaves, and there is scarcely a plant which does not harbor one or two kinds peculiar to itself. They are, moreover, exceedingly prolific, for one individual, in five generations, may become the progenitor of nearly six thousand millions of descendants. It often happens that the succulent extremities and stems of plants will, in an incredibly short space of time, become completely coated with a living mass of these little lice. These are usually wingless, consisting of the young and of the females only; for winged individuals appear only at particular seasons, usually in the autumn, but sometimes in the spring, and these are small males and larger females. After pairing, the latter lay their eggs upon or near the leaf-buds of the plant upon which they live, and, together with the males, soon afterwards perish.

The winged plant-lice provide for a succession of their race by stocking the plants with eggs in the autumn. These are hatched in due time in the spring, and the young lice immediately begin to pump up sap from the tender leaves and shoots, increase rapidly in size, and in a short time come to maturity. In this state, it is found that the brood, without a single exception, consists wholly of females, which are wingless, but are in a condition immediately to continue their kind. Their young, however, are not hatched from eggs, but are produced alive, and each female may be the mother of fifteen or twenty young lice in the course of a single day. The plant-lice of this second generation are also wingless females, which grow up and have their young in due time; and thus brood after brood is produced, even to the seventh generation or more, without the appearance or intervention, throughout the whole season, of a single male. This extraordinary kind of propagation ends in the autumn with the birth of a brood of males and females, which in due time acquire wings and pair; eggs are then laid by these females, and with the death of these winged individuals, which soon follows, the race becomes extinct for the season.

The peach-tree suffers very much from the attacks of plant-lice,



which live under the leaves, causing them by their punctures to become thickened, to curl, or form hollows beneath, and corresponding crispy and reddish swellings above, and finally to perish and drop off prematurely. The depredations of these lice is one of the causes, if not the only cause of the peculiar malady affecting the peach-tree in the early part of summer, and called the blight. Plant-lice produce a blight of apple-trees occasionally.

The injuries occasioned by plant-lice are much greater than would at first be expected from the small size and extreme weakness of the insects; but these make up by their numbers what they want in strength individually, and thus become formidable enemies to vegetation. By their punctures, and the quantity of sap which they draw from the leaves, the functions of these important organs are deranged or interrupted, the food of the plant, which is there elaborated to nourish the stem and mature the fruit, is withdrawn, before it can reach its proper destination, or is contaminated and left in a state unfitted to supply the wants of vegetation. Plants are differently affected by these insects. Some wither and cease to grow, their leaves and stems put on a sickly appearance, and soon die from exhaustion. Others, though not killed, are greatly impeded in their growth, and their tender parts, which are attacked, become stunted, curled, or warped. The punctures of these lice seem to poison some plants, and affect others in a most singular manner, producing warts or swellings, which are sometimes solid and sometimes hollow, and contain in their interior a swarm of lice, the descendants of a single individual, whose punctures were the original cause of the tumor.

When trees are infected, scrape off all the rough bark of the infected trees, and make them perfectly clean and smooth early in the spring; then rub the trunk and limbs with a stiff brush wet with a solution of potash as hereafter recommended for the destruction of bark-lice; after which remove the sods and earth around the bottom of the trunk, and with the scraper, brush, and alkaline liquor cleanse that part as far as the roots can conveniently be uncovered. The earth and sods should immediately be carried away, fresh loam should be placed around the roots, and all cracks and wounds should be filled with grafting cement or clay mortar. Small limbs and extremities of branches, if infected, and beyond reach of the applications, should be cut off and burned.

This insect is mischievous and destructive to well grown and ripening grass plants; its minute character has allowed it to escape

the notice of the farmers generally, until recently, when its ravages on grass fields, reserved for hay, have exhibited their depredations, brown spots or areas, the herbage having been destroyed by these voracious creatures; these minute insects are countless in number, and need the observance and study of every careful farmer.

**BARK-LICE.**—These insects vary very much in form; some of them are oval and slightly convex scales, and others have the shape of a muscle; some are quite convex, and either formed like a boat turned bottom upwards, or are kidney shaped, or globular. They live mostly on the bark of the stems of plants, some however, are habitually found upon leaves, and some on roots. Early in the spring the bark-lice are found apparently torpid, situated longitudinally in regard to the branch, the head upwards, and sticking by their flattened inferior surface closely to the bark. On attempting to remove them they are generally crushed, and there issues from the body a dark colored fluid. By pricking them with a pin, they can be made to quit their hold. A little later the body is more swelled, and, on carefully raising it with a knife, numerous oblong eggs will be discovered beneath it, and the insect appears dried up and dead, and only its outer skin remains, which forms a convex cover to its future progeny. Under this protecting shield the young are hatched, and, on the approach of warm weather, make their escape at the lower end of the shield, which is either slightly elevated or notched at this part. They then move with considerable activity, and disperse themselves over the young shoots or leaves. These young lice insert their beaks into the bark or leaves, and draw from the cellular substance the sap that nourishes them. Young apple trees, and the extremities of the limbs of older trees are very much subject to the attacks of a small species of bark-lice. The limbs and smooth parts of the trunks are sometimes completely covered with these insects, and present a very singularly wrinkled and rough appearance from the bodies which are crowded closely together. In the winter these insects are torpid, and apparently dead. These insects have now become extremely common, and infest our nurseries and young trees to a very great extent.

The best application for the destruction of the lice is a wash made of two parts of soft soap and eight of water, with which is to be mixed lime enough to bring it to the consistence of thick white-wash. This is to be put upon the trunks and limbs of the trees with a brush, and as high as practicable, so as to cover the whole

surface, and fill all the cracks in the bark. The proper time for washing over the trees is in the early part of June, when the insects are young and tender. These insects may also be killed by using in the same way a solution of two pounds of potash in seven quarts of water, or a pickle consisting of a quart of common salt in two gallons of water.

PEACH TREE BORER.—The pernicious borer, which, during many years past, has proved very destructive to peach-trees throughout the United States, is a species of *Ageria*, named *exitiosa*, or the destructive. The eggs, from which these borers are hatched, are deposited, in the course of the summer, upon the trunk of the tree near the root; the borers penetrate the bark, and devour the inner bark and sap-wood. The seat of their operations is known by the castings and gum which issue from the holes in the tree. When these borers are nearly one year old, they make their cocoons either under the bark of the trunk or of the root, or in the earth and gum contiguous to the base of the trees; soon afterwards they are transformed to chrysalids, and finally come forth in the winged state, and lay the eggs for another generation of borers. The last transformation takes place from June to October. Hence borers, of all sizes, will be found in the trees throughout the year, although it seems to be necessary that all of them, whether more or less advanced, should pass through one winter before they appear in the winged state.

As a remedy remove the earth around the base of the tree, crush and destroy the cocoons and borers which may be found in it, and under the bark, cover the wounded parts with common clay composition or mortar, and surround the trunk with a strip of sheathing-paper eight or nine inches wide, which should extend two inches below the level of the soil, and be secured with strings of matting above. Fresh mortar should then be placed around the root, so as to confine the paper and prevent access beneath it, and the remaining cavity may be filled with new or unexhausted loam. This operation should be performed in the spring or during the month of June. In the winter the strings may be removed, and in the following spring the trees should again be examined for any borers that may have escaped search before, and the protecting applications should be renewed.

## CATERPILLARS.

**YELLOW BEAR CATERPILLAR.**—Of all the hairy caterpillars frequenting our gardens, there are none so common and troublesome in the Northern States as that called the yellow bear by Harris. Like most of its genus it is a very general feeder, devouring almost all kinds of herbaceous plants, with equal relish, from the broad-leaved plantain at the door-side, the peas, beans, and even the flowers of the garden, and the corn and coarse grasses of the fields, to the leaves of the vine, the currant, and the gooseberry, which it does not refuse when pressed by hunger. This kind of caterpillar varies very much in its colors; it is perhaps most often of a pale yellow or straw color, with a black line along each side of the body, and a transverse line of the same color between each of the segments or rings, and it is covered with long pale yellow hairs. Others are often seen of a rusty or brownish yellow color, with the same black lines on the sides and between the rings, and they are clothed with foxy red or light brown hairs. The head and ends of the feet are ochre-yellow, and the under-side of the body is blackish in all the varieties. They are to be found of different ages and sizes from the first of June till October. When fully grown they are about two inches long, and then creep into some convenient place of shelter, make their cocoons, in which they remain in the chrysalis state during the winter, and are changed to moths in the months of May or June following. Some of the first broods of these caterpillars appear to come to their growth early in summer, and are transformed to moths by the end of July or the beginning of August, at which time I have repeatedly taken them in the winged state; but the greater part pass through their last change in June. The moth is familiarly known by the name of the white miller, and is often seen about houses. Its scientific name is *Arctia Virginica*. It is white, with a black point on the middle of the fore-wings, and two black dots on the hind-wings, one on the middle and the other near the posterior angle, much more distinct on the under than on the upper side; there is a row of black dots on the top of the back, another on each side, and between these a longitudinal deep yellow stripe; the hips and thighs of the fore-legs are also ochre-yellow. It expands from one inch and a half to two inches. Pick off the caterpillars from day to day and crush them, and do not spare "the pretty white millers," frequently found on the fences, or on the plants, laying their golden yellow eggs.

THE SALT-MARSH CATERPILLAR, an insect by far too well known on our sea-board, and now getting to be common in the interior, closely resembles the yellow bear in some of its varieties. These appear toward the end of June, and grow rapidly from that time till the first of August. During this month they come to their full size, and begin to run, as the phrase is, or retreat from the marshes, and disperse through the adjacent uplands, often committing very extensive ravages in their progress. Corn-fields, gardens, and even the rank weeds by the way-side afford them temporary nourishment while wandering in search of a place of security from the tide and weather. They conceal themselves in walls, under stones, in hay-stacks and mows, in wood-piles, and in any other places in their way, which will afford them the proper degree of shelter during the winter. Here they make their coarse hairy cocoons, and change to chrysalids, in which form they remain till the following summer, and are transformed to moths in the month of June. In those cases where, from any cause, the caterpillars, when arrived at maturity, have been unable to leave the marshes, they conceal themselves beneath the stubble, and there make their cocoons. Such, for the most part, is the course and duration of the lives of these insects in the Northern States; but in the Middle and Southern States two broods are brought to perfection annually; and even here some of them run through their course sooner, and produce a second brood of caterpillars in the same season. The full-grown caterpillar measures one inch and three quarters or more in length. It is clothed with long hairs, which are sometimes black and sometimes brown on the back and forepart of the body, and of a lighter brown color on the sides. The hairs grow in spreading clusters from warts, which are of a yellowish color in this species. The body, when stripped of the hairs, is yellow, shaded at the sides with black, and there is a blackish line extending along the top of the back. The breathing-holes are white, and very distinct even through the hairs. These caterpillars, when feeding on the marshes, are sometimes overtaken by the tide, and when escape becomes impossible, they roll themselves up in a circular form, and abandon themselves to their fate. The hairs on their bodies seem to have a repelling power, and prevent the water from wetting their skins, so that they float on the surface, and are often carried by the waves to distant places, where they are thrown on shore, and left in winrows with the wash of the sea. After a little time most of them recover from their half-drowned condition, and begin their depre-

dations anew. In this way these insects seem to have spread from the places where they first appeared to others at a considerable distance.

In order to lessen the ravages of the salt-marsh caterpillars, and to secure a fair crop of hay when these insects abound, the marshes should be mowed early in July, at which time the caterpillars are small and feeble, and being unable to wander far, will die before the crop is gathered in. In defence of early mowing, it may be said that it is the only way by which the grass may be saved in those meadows where the caterpillars have multiplied to any extent; and, if the practice is followed generally, and continued during several years in succession, it will do much towards exterminating these destructive insects. By the practice of late mowing, where the caterpillars abound, a great loss in the crop will be sustained, immense numbers of caterpillars and grasshoppers will be left to grow to maturity and disperse upon the uplands, by which means the evil will go on increasing from year to year; or they will be brought in with the hay to perish in our barns and stacks, where their dead bodies will prove offensive to the cattle, and occasion a waste of fodder. To get rid of "the old fog" or stubble, which becomes much thicker and longer in consequence of early mowing, the marshes should be burnt over in March. The roots of the grass will not be injured by burning the stubble, on the contrary they will be fertilized by the ashes; while great numbers of young grasshoppers, cocoons of caterpillars, and various kinds of destructive insects, with their eggs, concealed in the stubble, will be destroyed by the fire. In the Province of New Brunswick, the benefit arising from burning the stubble has long been proved.

Of the caterpillars which devour the leaves of trees, the most common and destructive are the little caterpillars known by the name of fall web-worms, whose large webs, sometimes extending over entire branches with their leaves, may be seen on our native elms, and also on apple and other fruit trees, in the latter part of summer. The eggs, from which these caterpillars proceed, are laid by the parent moth in a cluster upon a leaf near the extremity of a branch; they are hatched from the last of June till the middle of August, some broods being early and others late, and the young caterpillars immediately begin to provide a shelter for themselves, by covering the upper side of the leaf with a web, which is the result of the united labors of the whole brood. They feed in company beneath this web, devouring only the upper skin and pulpy

portion of the leaf, leaving the veins and lower skin of the leaf untouched. As they increase in size, they enlarge their web, carrying it over the next lower leaves, all the upper and pulpy parts of which are eaten in the same way, and thus they continue to work downwards, till finally the web covers a large portion of the branch, with its dry, brown, and filmy foliage, reduced to this unseemly condition by these little spoilers. These caterpillars when fully grown, measure rather more than one inch in length; their bodies are slender and are very thinly clothed with hairs of a grayish color, intermingled with a few which are black. The general color of the body is greenish yellow dotted with black; there is a broad blackish stripe along the top of the back, and a bright yellow stripe on each side. The warts, from which the thin bundles of spreading, silky hairs proceed, are black on the back, and rust-yellow or orange on the sides. The head and feet are black. Towards the end of August and during the month of September they leave the trees, disperse, and wander about, eating such plants as happen to lie in their course, till they have found suitable places for shelter and concealment where they make their thin and almost transparent cocoons, composed of a slight web of silk intermingled with a few hairs. They remain in the cocoons in the chrysalis state through the winter, and are transformed to moths in the months of June and July. These moths are white, and without spots; the fore-thighs are tawny-yellow, and the feet blackish. Their wings expand from one inch and a quarter to one inch and three eighths. Their antennæ and feelers do not differ essentially from those of the majority of the Arctians, the former in the males being doubly feathered beneath, and those of the females having two rows of minute teeth on the under-side. The only time in which we can attempt to exterminate these destructive insects with any prospect of success, is when they are young and just beginning to make their webs on the trees. So soon, then, as the webs begin to appear on the extremities of the branches, they should be stripped off, with the few leaves which they cover, and the caterpillars contained therein, at one grasp, and should be crushed under foot.

APPLE-TREE CATERPILLARS.—During the months of July and August, there may be found on apple-trees and rose-bushes little slender caterpillars of a bright yellow color, sparingly clothed with long and fine yellow hairs on the sides of the body, and having four short and thick brush-like yellowish tufts on the back, that is on the fourth and three following rings, two long black plumes or

pencils extending forwards from the first ring, and a single plume on the top of the eleventh ring. The head, and the two little retractile warts on the ninth and tenth rings are coral red ; there is a narrow black or brownish stripe along the top of the back, and a wider dusky stripe on each side of the body. These pretty caterpillars do not ordinarily herd together, but sometimes our apple-trees are much infested by them. When they have done eating, they spin their cocoons on the leaves, or on the branches or trunks of the trees, or on fences in the vicinity. The chrysalis is not only beset with little hairs or down, but has three oval clusters of branny scales on the back. In about eleven days after the change to the chrysalis is effected, the last transformation follows, and the insects come forth in the adult state, the females wingless, and the males with large ashen-gray wings, crossed by wavy darker bands on the upper pair, on which, moreover, is a small black spot near the tip, and a minute white crescent near the outer hind angle. The body of the male is small and slender, with a row of little tufts along the back, and the wings expand one inch and three eighths. The females are of a lighter gray color than the males, their bodies are very thick, and of an oblong oval shape, and, though seemingly wingless, upon close examination two little scales, or stunted winglets, can be discovered on each shoulder. These females lay their eggs upon the top of their cocoons, and cover them with a large quantity of frothy matter, which on drying becomes white and brittle. Different broods of these insects appear at various times in the course of the summer, but the greater number come to maturity and lay their eggs in the latter part of August, and the beginning of September ; and these eggs are not hatched till the following summer. The name of this moth is *Orgyia leucostigma*, the white-marked *Orgyia* or tussock-moth. In Hovey's Gardener's Magazine Mr. Ives states, that on passing through an apple orchard in February, he "perceived nearly all the trees speckled with occasional dead leaves, adhering so firmly to the branches as to require considerable force to dislodge them. Each leaf covered a small patch of from one to two hundred eggs, united together, as well as to the leaf, by a gummy and silken fibre, peculiar to the moth." In March he "visited the same orchard, and, as an experiment, cleared three trees, from which he took twenty-one bunches of eggs. The remainder of the trees he left untouched until the tenth of May, when he found the caterpillars were hatched from the eggs, and had commenced their slow but sure ravages. He watched them from



time to time, until many branches had been spoiled of their leaves, and in the autumn were entirely destitute of fruit; while the three trees, which had been stripped of the eggs, were flush with foliage, each limb, without exception, ripening its fruit." These pertinent remarks point out the nature and extent of the evil, and suggest the proper remedy to be used against the ravages of these insects.

**LACKEY CATERPILLAR.**—There is a kind of caterpillars that swarm in the unpruned nurseries and neglected orchards of the slovenly husbandman, and hang their many-coated webs upon the wild cherry trees that are suffered to spring up unchecked by the way-side and encroach upon the borders of our pastures and fields. The eggs from which they are hatched, are placed around the ends of the branches, forming a wide kind of ring or bracelet, consisting of three or four hundred eggs, in the form of short cylinders standing on their ends close together, and covered with a thick coat of brownish water-proof varnish. The caterpillars come forth, with the unfolding of the leaves of the apple and cherry tree, during the latter part of April or the beginning of May. The first signs of their activity appear in the formation of a little angular web or tent, somewhat resembling a spider's web, stretched between the forks of the branches a little below the cluster of eggs. Under the shelter of these tents, in making which they all work together, the caterpillars remain concealed at all times when not engaged in eating. In crawling from twig to twig and from leaf to leaf, they spin from their mouths a slender silken thread, which is a clue to conduct them back to their tents; and as they go forth and return in files, one after another, their pathways in time become well carpeted with silk, which serves to render their footing secure during their frequent and periodical journeys in various directions, to and from their common habitation. As they increase in age and size, they enlarge their tent, surrounding it, from time to time, with new layers or webs, till, at length, it acquires a diameter of eight or ten inches. They come out together at certain stated hours to eat, and all retire at once when their regular meals are finished; during bad weather, however, they fast, and do not venture from their shelter. These caterpillars are of a kind called lackeys. When fully grown they measure about two inches in length. Their heads are black; extending along the top of the back, from one end to the other, is a whitish line, on each side of which, on a yellow ground, are numerous short and fine crinkled black lines, that lower down, become mingled together, and form a broad longitu

dinal black stripe, or rather a row of long black spots, one on each ring, in the middle of each of which is a small blue spot; below this is a narrow wavy yellow line, and lower still the sides are variegated with fine intermingled black and yellow lines, which are lost at last in the general dusky color of the under-side of the body; on the top of the eleventh ring is a small blackish and hairy wart, and the whole body is very sparingly clothed with short and soft hairs, rather thicker and longer upon the sides than elsewhere. From the first to the middle of June they begin to leave the trees upon which they have hitherto lived in company, separate from each other, wander about awhile, and finally get into some crevice or other place of shelter, and make their cocoons. These are of a regular long oval form, composed of a thin and very loosely woven web of silk, the meshes of which are filled with a thin paste, that on drying is changed to a yellow powder, like flour of sulphur in appearance. Some of the caterpillars, either from weakness or some other cause, do not leave their nests with the rest of the swarm, but make their cocoons there, and when the webs are opened these cocoons may be seen intermixed with a mass of blackish grains, like gunpowder, excreted by the caterpillars during their stay. From fourteen to seventeen days after the insect has made its cocoon and changed to a chrysalis, it bursts its chrysalis skin, forces its way through the wet and softened end of its cocoon, and appears in the winged or miller form.

The moth of the lackey-caterpillar is of a rusty or reddish brown color, more or less mingled with gray on the middle and base of the fore-wings, which, besides, are crossed by two oblique, straight, dirty white lines. It expands from one inch and a quarter, to one inch and a half, or a little more. The moths appear in great numbers in July, flying about and often entering houses by night. At this time they lay their eggs, selecting the wild cherry, in preference to all other trees, for this purpose, and, next to these, apple-trees. These insects, because they are the most common and most abundant in all parts of our country, and have obtained such notoriety that in common language they are almost exclusively known among us by the name of *the caterpillars*, are the worst enemies of the orchard. Where proper attention has not been paid to the destruction of them, they prevail to such an extent as almost entirely to strip the apple and cherry trees of their foliage, by their attacks continued during the seven weeks of their life in the caterpillar form. The trees, in those orchards and gardens where they

have been suffered to breed for a succession of years, become prematurely old, in consequence of the efforts they are obliged to make to repair, at an unseasonable time, the loss of their foliage, and are rendered unfruitful, and consequently unprofitable. But this is not all; these pernicious insects spread in every direction, from the trees of the careless and indolent, to those of their more careful and industrious neighbors, whose labors are thereby greatly increased, and have to be followed up year after year, without any prospect of permanent relief.

Many methods and receipts for the destruction of these insects have been published and recommended, but have failed to exterminate them, and indeed have done but little to lessen their numbers. The great difficulty is the neglect to do any thing, till after the caterpillars have covered the trees with their nests. Then the labors of the sluggard commence, and one tree, let his receipt be ever so perfect and powerful, will cost him as much time and labor as ten trees would have required three weeks sooner. The means to be employed may be stated under three heads. The first is, the collection and destruction of the eggs. These should be sought for in the winter and the early part of spring, when there are no leaves on the trees. They are easily discovered at this time, and may be removed with the thumb-nail and fore-finger. Nurseries and the lower limbs of large trees may thus be entirely cleared of the clusters of eggs during a few visits made at the proper season. If a liberal bounty for the collection of the eggs were to be offered, and continued for the space of ten years, these destructive caterpillars would be nearly exterminated at the end of that time. Under the second head are to be mentioned the most approved plans for destroying the caterpillars after they are hatched, and have begun to make their nests or tents. It is well known that the caterpillars come out to feed twice during the day-time, namely, in the forenoon and afternoon, and that they rarely leave their nests before nine in the morning, and return to them again at noon. During the early part of the season, while the nests are small, and the caterpillars young and tender, and at those hours when the insects are gathered together within their common habitation, they may be effectually destroyed by crushing them by hand in the nests. A brush, somewhat like a bottle-brush, fixed to a long handle, a dried mullein head and its stalk fastened to a pole, will be useful to remove the nests, with the caterpillars contained therein, from those branches which are too high to be reached by hand. In-

stead of the brush, we may use, with nearly equal success, a small mop or sponge, dipped as often as necessary into a pailful of refuse soap-suds, strong white-wash, or cheap oil. The mop should be thrust into the nest and turned round a little, so as to wet the caterpillars with the liquid, which will kill every one that it touches. These means, to be effectual, should be employed during the proper hours, that is, early in the morning, at mid-day, or at night, and as soon in the spring as the caterpillars begin to make their nests; and they should be repeated as often at least, as once a week, till the insects leave the trees. Early attention and perseverance in the use of these remedies will, in time, save the farmer hundreds of dollars, and abundance of mortification and disappointment, besides rewarding him with the grateful sight of the verdant foliage, snowy blossoms, and rich fruits of his orchard in their proper seasons. Under the third head, declare war against these caterpillars, a war of extermination, to be waged annually during the month of May and the beginning of June. Let every able-bodied citizen, who is the owner of an apple or cherry tree, cultivated or wild, within our borders, open the campaign in May, and give battle to the common enemy. If every man is prompt to do his duty, the enemy will be completely conquered.

**LOCUST-TREE BORERS.**—The locust-tree, *Robinia pseudacacia*, is preyed upon by three different kinds of wood-eaters or borers, whose unchecked ravages seem to threaten the entire destruction and extermination of this valuable tree within this part of the United States. One of these borers is a little reddish caterpillar, whose operations are confined to the small branches and to very young trees, in the pith of which it lives; and by its irritation it causes the twig to swell around the part attacked. These swellings, being spongy and also perforated by the caterpillar, are weaker than the rest of the stem, which therefore easily breaks off at these places.

The second kind of borer of the locust-tree is larger than the foregoing, is a grub, and not a caterpillar, which finally turns to the beetle named *Clytus pictus*, the painted Clytus. In the month of September these beetles gather on the locust-trees. Having paired, the female creeps over the bark, searching the crevices with her antennæ, and dropping therein her snow-white eggs, in clusters of seven or eight together, and at intervals of five or six minutes, till her whole stock is safely stored. The eggs are soon hatched, and the grubs immediately burrow into the bark, devouring the soft inner substance that suffices for their nourishment till the approach

of winter, during which they remain at rest in a torpid state. In the spring they bore through the sap-wood, more or less deeply into the trunk, the general course of their winding and irregular passages being in an upward direction from the place of their entrance. For a time they cast their chips out of their holes as fast as they are made, but after a while the passage becomes clogged and the burrow more or less filled with the coarse and fibrous fragments of wood, to get rid of which the grubs are often obliged to open new holes through the bark. The seat of their operations is known by the oozing of the sap and the dropping of the saw-dust from the holes. The bark around the part attacked begins to swell, and in a few years the trunks and limbs will become disfigured and weakened by large porous tumors, caused by the efforts of the trees to repair the injuries they have suffered. The grubs attain their full size by the twentieth of July, soon become pupæ, and are changed to beetles and leave the trees early in September. Thus the existence of this species is limited to one year.

White-washing, and covering the trunks of the trees with grafting composition, may prevent the female from depositing her eggs upon them; but this practice cannot be carried to any great extent in plantations or large nurseries of the trees. Perhaps it will be useful to head or cut down young trees to the ground, with the view of destroying the grubs contained in them, as well as to promote a more vigorous growth. Much evil might be prevented by employing children to collect the beetles while in the act of providing for the continuation of their kind. A common black bottle, containing a little water, would be a suitable vessel to receive the beetles as fast as they were gathered, and should be emptied into the fire in order to destroy the insects. The gathering should be begun as soon as the beetles first appear, and should be continued as long as any are found on the trees, and furthermore should be made a general business for several years in succession. I have no doubt, should this be done, that, by devoting one hour every day to this object, we may, in the course of a few years, rid ourselves of this destructive insect.

The third of the wood-eaters, to which the locust-tree is exposed, though less common than the others, and not so universally destructive to the tree as the painted Clytus, is a very much larger borer, and is occasionally productive of great injury, especially to full-grown and old trees, for which it appears to have a preference. It is a true caterpillar, belonging to the tribe of moths under con-

aideration, is reddish above, and white beneath, with the head and top of the first ring brown and shelly, and there are a few short hairs arising from minute warts thinly scattered over the surface of the body. When fully grown, it measures two inches and a half, or more, in length, and is nearly as thick as the end of the little finger. These caterpillars bore the tree in various directions, but for the most part obliquely upwards and downwards through the solid wood, enlarging the holes as they increase in size, and continuing them through the bark to the outside of the trunk. Before transforming, they line these passages with a web of silk, and, retiring to some distance from the orifice, they spin around their bodies a closer web, or cocoon, within which they assume the chrysalis form. The chrysalis measures one inch and a half or two inches in length, is of an amber color, changing to brown on the forepart of the body; and, on the upper side of each abdominal ring, are two transverse rows of tooth-like projections. By the help of these, the insect, when ready for its last transformation, works its way to the mouth of its burrow, where it remains while the chrysalis skin is rent, upon which it comes forth on the trunk of the tree a winged moth. In this its perfected state, it is of a gray color; the fore-wings are thickly covered with dusky netted lines and irregular spots, the hind-wings are more uniformly dusky, and the shoulder-covers are edged with black on the inside. It expands about three inches. The male, which is much smaller, and has been mistaken for another species, is much darker than the female, from which it differs also in having a large ochre-yellow spot on the hind-wings, contiguous to their posterior margin. Professor Peck, who first made public the history of this insect, named it *Cossus Robinia*, the Cossus of the locust-tree. It is supposed by Professor Peck to remain three years in the caterpillar state. The moth comes forth about the middle of July.

Our fruit-trees seem to be peculiarly subject to the ravages of insects, probably because the native trees of the forest, which originally yielded the insects an abundance of food, have been destroyed to a great extent, and their places supplied only partially by orchards, gardens, and nurseries. Numerous as are the kinds of caterpillars now found on cultivated trees, some are far more abundant than others, and therefore more often fall under our observation, and come to be better known. Such, for instance, are certain gregarious caterpillars that swarm on the apple, cherry, and plum-trees towards the end of summer, stripping whole branches of their

leaves, and not unfrequently despoiling our rose-bushes and thorn-hedges also. These caterpillars are of two kinds, very different in appearance, but alike in habits and destructive propensities. The first of these may be called the red-humped, a name that will probably bring these insects to the remembrance of those persons who have ever observed them. Different broods make their appearance at various times during August and September. The eggs, from which they proceed, are laid, in the course of the month of July, in clusters on the under-side of a leaf, generally near the end of a branch. When first hatched they eat only the substance of the under-side of the leaf, leaving the skin of the upper-side and all the veins untouched; but as they grow larger and stronger they devour whole leaves from the point to the stalk, and go from leaf to leaf down the twigs and branches. The young caterpillars are lighter colored than the old ones, which are yellowish-brown, paler on the sides, and longitudinally striped with slender black lines; the head is red; on the top of the fourth ring there is a bunch or hump, also of a red color; along the back are several short black prickles; and the hinder extremity tapers somewhat, and is always elevated at an angle with the rest of the body, when the insect is not crawling. The full-grown caterpillars measure one inch and a quarter, or rather more, in length. The rest close together on the twigs, when not eating, and sometimes entirely cover the small twigs and ends of the branches. The early broods come to their growth and leave the trees by the middle of August, and the others between this time and the latter part of September. All the caterpillars of the same brood descend at one time, and disappear in the night. They conceal themselves under leaves, or just beneath the surface of the soil, and make their cocoons. They remain a long time in their cocoons before changing to chrysalids, and are transformed to moths towards the end of June or the beginning of July. Mr. Abbot states that in Georgia these insects breed twice a year, the first broods making their cocoons towards the end of May, and appearing in the winged form fifteen days afterwards. This, a *Notodonta*, is a neat and trim looking moth, and is of a light brown color; the fore-wings are dark brown along the inner margin, and more or less tinged with gray before; there is a dark brown dot near the middle, a spot of the same color near each angle, a very small triangular whitish spot near the shoulders, and several dark brown longitudinal streaks on the outer hind margin; the hind-wings of the male are brownish or dirty white, with a

brown spot on the inner hind angle; those of the other sex are dusky brown; the body is light brown, with the thorax rather darker. The wings expand from one inch to one inch and three-eighths.

The second kind grow to a greater size, are longer in coming to their growth, their swarms are more numerous, and consequently they do much more injury than the red-humped kind. Entire branches of the apple-trees are frequently stripped of their leaves by them, and are loaded with these caterpillars in thickly crowded swarms. The eggs from which they are hatched will be found in patches, of about a hundred together, fastened to the under-side of leaves near the ends of the twigs. Some of them begin to be hatched about the twentieth of July, and new broods make their appearance in succession for the space of a month or more. At first they eat only the under-side and pulpy part of the leaves, leaving the upper-side and veins untouched; but afterwards they consume the whole of the leaves except their stems. These caterpillars are sparingly covered with soft whitish hairs; the young ones are brown, and striped with white; but as they grow older, their colors become darker every time they cast their skins. They come to their full size in about five weeks or a little more, and then measure from an inch and three quarters to two inches and a quarter in extent. The head is large, and of a black color; the body is nearly cylindrical, with a spot on the top of the first ring and the legs dull orange-yellow, a black stripe along the top of the back, and three of the same color alternating with four yellow stripes on each side. The posture of these caterpillars, when at rest, is very odd; both extremities are raised, the body being bent, and resting only on the four intermediate pairs of legs. If touched or otherwise disturbed, they throw up their heads and tails with a jerk, at the same time bending the body semicircularly till the two extremities almost meet over the back. They all eat together, and, after they have done, arrange themselves side by side along the twigs and branches which they have stripped. Beginning at the ends of the branches they eat all the leaves successively from thence towards the trunk, and if one branch does not afford food enough they betake themselves to another. When ready to transform, all the individuals of the same brood quit the tree at once, descending by night, and burrow into the ground to the depth of three or four inches, and, within twenty-four hours afterwards, cast their caterpillar-skins, and become chrysalids without making cocoons. They



remain in the ground in this state all winter, and are changed to moths and come out between the middle and end of July. These moths belong to the genus *Pygæra*, so named because the caterpillar sits with its tail raised up. The antennæ are rather long, those of the males fringed beneath, in a double row, with very short hairs nearly to the tips, which, however, as well as the whole of the stalk of the antennæ in the other sex, are bare; the thorax is generally marked with a large dark-colored spot, the hairs of which can be raised up so as to form a ridge or kind of crest; the hinder margin of the fore-wings is slightly notched; and the fore-legs are stretched out before the body in repose. Our *Pygæra* was named, by Drury, *ministra*, the attendant or servant. It is of a light brown color; the head and a large square spot on the thorax are dark chestnut-brown; on the fore-wings are four or five transverse lines, one or two spots near the middle, and a short oblique line near the tip, all of which, with the outer hind margin, are dark chestnut-brown. One and sometimes both of the dark-brown spots are wanting on the fore-wings in the males, and the females, which are larger than the other sex, frequently have five instead of four transverse brown lines. It expands from one inch and three quarters to two inches and a half.

There are seen on the oak, the birch, the black walnut, and the hickory trees, swarms of caterpillars slightly differing in color from each other and from those that live on the apple and cherry trees; they are more hairy than the latter, but their postures and habits appear to be the same. They are probably only varieties of the *ministra*, arising from the difference of food.

CORN CATERPILLAR.—Indian corn often suffers severely from the depredations of one of the genus *Nonagrians*, known to our farmers by the name of the spindle-worm. This insect receives its common name from its destroying the spindle of the Indian corn; but its ravages generally begin while the corn-stalk is young, and before the spindle rises much above the tuft of leaves in which it is embosomed. The mischief is discovered by the withering of the leaves, and, when these are taken hold of, they may often be drawn out with the included spindle. On examining the corn, a small hole may be seen in the side of the leafy stalk, near the ground, penetrating into the soft centre of the stalk, which, when cut open, will be found to be perforated, both upwards and downwards, by a slender worm-like caterpillar, whose excrementitious castings surround the orifice of the hole. This caterpillar grows to the length of an

inch, or more, and to the thickness of a goose-quill. It is smooth, and apparently naked, yellowish, with the head, the top of the first and of the last rings black, and with a band across each of the other rings, consisting of small, smooth, slightly elevated, shining black dots, arranged in a double row. The chrysalis, which is lodged in the burrow formed by the spindle-worm, is slender, but not quite so long in proportion to its thickness as are those of most of the Nonagrians. It is shining mahogany-brown, with the anterior edges of four of the rings of the back roughened with little points, and four short spines or hooks, turned upwards, on the hinder extremity of the body. The fore-wings are rust-red; they are mottled with gray, almost in bands, uniting with the ordinary spots, which are also gray and indistinct; there is an irregular tawny spot near the tip, and on the veins there are a few black dots. The hind-wings are yellowish gray, with a central dusky spot, behind which are two faint, dusky bands. The head and thorax are rust-red, with an elevated tawny tuft on each. The abdomen is pale brown, with a row of tawny tufts on the back. The wings expand nearly one inch and a half.

In order to check the ravages of these insects they must be destroyed while in the caterpillar state. As soon as our corn-fields begin to show, by the withering of the leaves, the usual signs that the enemy is at work in the stalks, the spindle-worms should be sought for and killed; for, if allowed to remain undisturbed until they turn to moths, they will make their escape, and we shall not be able to prevent them from laying their eggs for another brood of these pestilent insects.

**CUT WORMS.**—Numerous complaints have been made of the ravages of cut-worms among corn, wheat, grass, and other vegetables, in various parts of the country. These insects and their history are not yet known to some of the very persons who are said to have suffered from their depredations. Various cut-worms, or more properly subterranean caterpillars, wire-worms and grub-worms, or the young of May-beetles, are often confounded together or mistaken for each other; sometimes their names are interchanged, and sometimes the same name is given to each and all of these different animals. Hence the remedies that are successful in some instances are entirely useless in others. The name of cut-worm seems originally to have been given to certain caterpillars that live in the ground about the roots of plants, but come up in the night, and cut off and devour the tender stems and lower leaves



THE CUT WORM.

of young cabbages, beans, corn, and other herbaceous plants. These subterranean caterpillars are finally transformed to moths belonging to a group which may be called Agrotidians (AGROTIDIDÆ), from a word signifying rustic, or pertaining to the fields. Some of these rustic moths fly by day, and may be found in the fields, especially in the autumn, sucking the honey of flowers; others are on the wing only at night, and during the day lie concealed in chinks of walls and other dark places. Their wings are nearly horizontal when closed, the upper pair completely covering the lower wings, and often overlapping a little on their inner edges, thus favoring these insects in their attempts to obtain shelter and concealment. The thorax is slightly convex, but smooth or not crested. The antennæ of the males are generally beset with two rows of short points, like fine teeth, on the under-side, nearly to the tips. The fore-legs are often quite spiny. Most of these moths come forth in July and August, and soon afterwards lay their eggs in the ground, in plowed fields, gardens, and meadows. In Europe it is found that the eggs are hatched early in the autumn, at which time the little subterranean caterpillars live chiefly on the roots and tender sprouts of herbaceous plants. On the approach of winter they descend deeper into the ground, and, curling themselves up, remain in a torpid state till the following spring, when they ascend towards the surface, and renew their devastations. The caterpillars of the Agrotidians are smooth, shining, naked, and dark-colored, with longitudinal pale and blackish stripes, and a few black dots on each

ring; some of them also have a shining, horny, black spot, on the top of the first ring. They are of a cylindrical form, tapering a little at each end, rather thick in proportion to their length, and are provided with sixteen legs. They are changed to chrysalids in the ground, without previously making silken cocoons.

It is chiefly during the months of June and July that they are found to be most destructive. Whole grain-fields are sometimes laid waste by them. Cabbage-plants, till they are grown to a considerable size, are very apt to be cut off and destroyed by them. Potato-vines, beans, beets, and various other culinary plants suffer in the same way. The products of our flower-gardens are not spared; asters, balsams, pinks, and many other kinds of flowers are often shorn of their leaves and of their central buds, by these concealed spoilers.

There are several species of *Agrotis*, the larvæ of which are injurious to culinary plants; but the chief culprit is the same as that which is destructive to young corn. The corn-cut worms make their appearance in great numbers at irregular periods, and confine themselves in their devastations to no particular vegetables, all that are succulent being relished by these indiscriminate devourers; but, if their choice is not limited, they prefer corn-plants when not more than a few inches above the earth, early sown buckwheat, young pumpkin plants, young beans, cabbage-plants, and many other field and garden vegetables. When first disclosed from the eggs they subsist on the various grasses. They descend in the ground on the approach of severe frosts, and reappear in the spring about half grown. They seek their food in the night or in cloudy weather, and retire before sunrise into the ground, or beneath stones or any substance which can shelter them from the rays of the sun; here they remain coiled up during the day, except while devouring the food which they generally drag into their places of concealment. Their transformation to pupæ occurs at different periods, sometimes earlier, sometimes later, according to the forwardness of the season, but usually not much later than the middle of July. The moths, as well as the larvæ, vary much in the depth of their color, from a pale ash to a deep or obscure brown. The ordinary spots of the upper wings of the moth are always connected by a blackish line; where the color is of the deepest shade these spots are scarcely visible, but when the color is lighter they are very obvious. This moth is very abundant in the New England States, from the middle of June till the middle or end of August. The fore-wings are

generally of a dark ash-color, with only a very faint trace of the double transverse wavy bands that are found in most species of *Agrotis*; the two ordinary spots are small and narrow, the anterior spot being oblong oval, and connected with the oblique kidney-shaped spot, by a longitudinal black line. The hind wings are dirty brownish white, somewhat darker behind. The head, the collar, and the abdomen are chestnut-colored. It expands one inch and three quarters. The wings, when shut, overlap on their inner edges, and cover the top of the back so flatly and closely that these moths can get into very narrow crevices. During the day they lie hidden under the bark of trees, in the chinks of fences, and even under the loose clapboards of buildings. When the blinds of our houses are opened in the morning, a little swarm of these insects, which had crept behind them for concealment, is sometimes exposed, and suddenly aroused from their daily slumber.

Among the various remedies that have been proposed for preventing the ravages of cut-worms in wheat and corn-fields, may be mentioned the soaking of grain, before planting, in copperas-water and other solutions supposed to be disagreeable to the insects; rolling the seed in lime or ashes; and mixing salt with the manure. These may prevent wire-worms and some insects from destroying the seed; but cut-worms prey only on the sprouts and young stalks, and do not eat the seeds. Such stimulating applications may be of some benefit, by promoting a more rapid and vigorous growth of the grain, by which means the sprouts will the sooner become so strong and rank as to resist or escape the attacks of the young cut-worms. Fall-plowing of sward-lands, which are intended to be sown with wheat or planted with corn the year following, will turn up and expose the insects to the inclemency of winter, whereby many of them will be killed, and will also bring them within reach of insect-eating birds. But this seems to be a doubtful remedy, against which many objections have been urged. The most effectual, and not a laborious remedy, even in field-culture, is to go round every morning, and open the earth at the foot of the plant, and you will never fail to find the worm at the root, within four inches. Kill him, and you will save not only the other plants of your field, but, probably, many thousands in future years.

**PLUM WEEVIL OR CURCULIO.**—It is now well known that the falling of unripe plums, apricots, peaches and cherries, is caused by little whitish grubs, which bore into these fruits. The loss of fruit, occasioned by insects of this kind, is frequently very great; and,

in some of our gardens and orchards, the crop of plums is often entirely ruined by the depredations of grubs, which are the larvæ or young of a small beetle called the Nenuphar or plum-weevil, or *Curculio*. These beetles are found as early as the thirtieth of March, and as late as the tenth of June, and at various intermediate times, according with the forwardness or backwardness of vegetation in the spring, and have frequently been caught flying in the middle of the day. They are from three twentieths to one fifth of an inch long, exclusive of the curved snout, which is rather longer than the thorax, and is bent under the breast, between the fore-legs, when at rest. Their color is a dark brown, variegated with spots of white, ochre-yellow, and black. The thorax is uneven; the wing-covers have several short ridges upon them, those on the middle of the back forming two considerable humps, of a black color, behind which there is a wide band of ochre-yellow and white. Each of the thighs has two little teeth on the under-side. They begin to sting the plums as soon as the fruit is set, and, as some say, continue their operations till the first of August. After making a suitable puncture with their snouts, they lay one egg in each plum thus stung, and go over the fruit on the tree in this way till their store is exhausted; so that, where these beetles abound, not a plum will escape being punctured. The irritation arising from these punctures; and from the gnawings of the grubs after they are hatched, causes the young fruit to become gummy, diseased, and finally to drop before it is ripe. Meanwhile the grub comes to its growth, and, immediately after the fruit falls, burrows into the ground. This may occur at various times between the middle of June and of August; and, in the space of a little more than three weeks afterwards, the insect completes its transformations, and comes out of the ground in the beetle form.

This same weevil attacks all our common stone-fruits, such as plums, peaches, nectarines, apricots, cherries and apples; and it is not at all improbable that the transformations of some of the grubs may be retarded till the winter has passed, analogous cases being of frequent occurrence. The plum, still more than the cherry tree, is subject to a disease of the small limbs, which shows itself in the form of large irregular warts, of a black color, as if charred. Grubs, apparently the same as those that are found in plums, have often been detected in these warts, which are now generally supposed to be produced by the punctures of the beetles, and the residence of the grubs. The seat of the disease is in the bark. The sap is di-

verted from its regular course, and is absorbed entirely by the bark, which is very much increased in thickness; the cuticle bursts, the swelling becomes irregular, and is formed into black lumps, with a cracked, uneven, granulated surface. The wood, besides being deprived of its nutriment, is very much compressed, and the branch above the tumor perishes.

The final transformation of the grubs, living in the fruit, appears to take place at various times during the latter part of summer and the beginning of autumn, when the weevil, finding no young fruit, is probably obliged to lay its eggs in the small branches. The larvæ or grubs from these eggs live in the branches during the winter, and are not perfected till near the last of the following June. Should the fall of the fruit occur late in the autumn, the development of the beetles will be retarded till the next spring; and this is supposed to be the origin of the brood which stings the fruit.

The following, among other remedies that have been suggested, may be found useful in checking the ravages of the plum-weevil. Let the trees be briskly shaken or suddenly jarred every morning and evening during the time that the insects appear in the beetle form, and are engaged in laying their eggs. When thus disturbed they contract their legs and fall; and, as they do not immediately attempt to fly or crawl away, they may be caught in a sheet spread under the tree, from which they should be gathered into a large wide-mouthed bottle or other tight vessel, and be thrown into the fire. All the fallen wormy plums should be immediately gathered, and, after they are boiled or steamed, to kill the enclosed grubs, they may be given as food to swine. The diseased excrescences should be cut out and burned every year before the last of June. The moose plum-tree (*Prunus Americana*), seems to escape the attacks of insects, for no warts are found upon it, even when growing in the immediate vicinity of diseased foreign trees. It would, therefore, be the best of stocks for budding or engrafting upon. It can easily be raised from the stone, and grows rapidly, but does not attain a great size.

This plum-weevil, an insect unknown in Europe, when arrived at maturity, is a little, rough, dark brown or blackish beetle, looking like a dried bud, when it is shaken from the trees, which resemblance is increased by its habit of drawing up its legs and bending its snout close to the lower side of its body, and remaining for a time without motion and seemingly lifeless. In stinging the fruit,

before laying its eggs, it uses its short curved snout, which is armed at the tip with a pair of very small nippers; and by means of this weapon, it makes, in the tender skin of the young plum or apple, a crescent-shaped incision, similar to what would be formed by indenting the fruit with the finger nail. Very rarely is there more than one incision made in the same fruit; and in the wound, the weevil lays only a single egg. The insect hatched from this egg is a little whitish grub, destitute of feet, and very much like a maggot in appearance, except that it has a distinct, rounded, light brown head. It appears, furthermore, that the tumors on plum and on cherry trees are infested not only by these insects, but also by another kind of grub, provided with legs, and occasionally by the wood-eating caterpillars of the *Ageria exitiosa*, or peach-tree borer. When the grubs of the plum-weevil are fully grown, they go into the ground, and are there changed to chrysalids of a white color, having the legs and wings free and capable of some motion; and finally they leave the ground in the form of little beetles, exactly like those which had previously stung the fruit. Further observation seems to be wanting before it can be proved that the cankerous warts on plum and cherry trees arise from the irritating punctures of the plum-weevils and of the other insects that occasionally make these warts their places of abode; although it must be allowed that the well-known production of galls by insects on oak-trees and on other plants, would lead us to suppose that those of the plum-tree have a similar origin.

**CANKER-WORMS.**—The insects called canker-worms are of a kind called Span-worms, or Geometers, and of the group Hybernians. The moths, from which they are produced, belong to the genus *Anisopteryx*.

It was formerly supposed that the canker-worm moths came out of the ground only in the spring. It is now known that many of them rise in the autumn and in the early part of the winter, and in mild and open winters in every month from October to March. They begin to make their appearance after the first hard frosts in the autumn, usually towards the end of October, and they continue to come forth, in greater or smaller numbers, according to the mildness or severity of the weather after the frosts have begun. Their general time of rising is in the spring, beginning about the middle of March, but sometimes before, and sometimes after this time; and they continue to come forth for the space of about three weeks. It has been observed that there are more females



than males among those that appear in the autumn and winter, and that the males are most abundant in the spring. The sluggish females instinctively make their way towards the nearest trees, and creep slowly up their trunks. In a few days afterwards they are followed by the winged and active males, which flutter about and accompany them in their ascent, during which the insects pair. Soon after this, the females lay their eggs upon the branches of the trees, placing them on their ends, close together in rows, forming clusters of from sixty to one hundred eggs or more, which is the number usually laid by each female. The eggs are glued to each other, and to the bark, by a grayish varnish, which is impervious to water; and the clusters are thus securely fastened in the forks of the small branches, or close to the young twigs and buds. Immediately after the insects have thus provided for a succession of their kind, they begin to languish, and soon die. The eggs are usually hatched between the first and the middle of May, or about the time that the red currant is in blossom, and the young leaves of the apple-tree begin to start from the bud and grow. The little canker-worms, upon making their escape from the eggs, gather upon the tender leaves, and, on the occurrence of cold and wet weather, creep for shelter into the bosom of the bud, or into the flowers, when the latter appear. Where these insects prevail, they are most abundant on apple and elm trees; but cherry, plum, and lime trees, and some other cultivated and native trees, as well as many shrubs, often suffer severely from their voracity. The leaves first attacked will be found pierced with small holes; these become larger and more irregular when the canker-worms increase in size; and, at last, the latter eat nearly all the pulpy parts of the leaves, leaving little more than the midrib and veins. A very great difference of color is observable among canker-worms of different ages, and even among those of the same age and size. It is possible that some of these variations may arise from a difference of species; but it is also true that the same species varies much in color. When very young, they have two minute warts on the top of the last ring; and they are generally of a blackish or dusky brown color, with a yellowish stripe on each side of the body; there are two whitish bands across the head; and the belly is also whitish. When fully grown, these individuals become ash-colored on the back, and black on the sides, below which the pale yellowish line remains. Some are found of a dull greenish yellow and others of a clay color, with slender interrupted blackish lines on the sides, and small spots

of the same color on the back. Some are green, with two white stripes on the back. The head and the feet partake of the general color of the body; the belly is paler. When not eating, they remain stretched out at full length, and resting on their fore and hind legs, beneath the leaves. When fully grown and well fed, they measure nearly or quite one inch in length. They leave off eating when about four weeks old, and begin to quit the trees; some creep down by the trunk, but great numbers let themselves down by their threads from the branches, their instincts prompting them to get to the ground by the most direct and easiest course. When thus descending, and suspended in great numbers under the limbs of trees overhanging the road, they are often swept off by passing carriages, and are thus conveyed to other places. After reaching the ground, they immediately burrow in the earth, to the depth of from two to six inches, unless prevented by weakness or the nature of the soil. In the latter case, they die, or undergo their transformations on the surface. In the former, they make little cavities or cells in the ground, by turning round repeatedly and fastening the loose grains of earth about them with a few silken threads. Within twenty-four hours afterwards, they are changed to chrysalids in their cells. The chrysalis is of a light brown color, and varies in size according to the sex of the insect contained in it; that of the female being the largest, and being destitute of a covering for wings, which is found in the chrysalis of the males. The occurrence of mild weather after a severe frost stimulates some of these insects to burst their chrysalis skins and come forth in the perfected state; and this last transformation, as before stated, may take place in the autumn, or in the course of the winter, as well as in the spring; it is also retarded, in some individuals, for a year or more beyond the usual time. They come out of the ground mostly in the night, when they may be seen struggling through the grass as far as the limbs extend from the body of the trees under which they had been buried. As the females are destitute of wings, they are not able to wander far from the trees upon which they had lived in the caterpillar state. Canker-worms are therefore naturally confined to a very limited space.

In order to protect our trees from the ravages of canker-worms, where these looping spoilers abound, it should be our aim, if possible, to prevent the wingless females from ascending the trees to deposit their eggs. This can be done by the application of tar around the body of the tree, either directly on the bark, as has

been the most common practice, or, what is better, over a broad belt of clay-mortar, or on strips of old canvass or of strong paper, from six to twelve inches wide, fastened around the trunk with strings. The tar must be applied as early as the first of November, and perhaps in October, and it should be renewed daily as long as the insects continue rising; after which the bands may be removed, and the tar should be entirely scraped from the bark. When all this has been properly and seasonably done, it has proved effectual. The time, labor, and expense attending the use of tar, and the injury that it does to the trees when allowed to run and remain on the bark, have caused many persons to neglect this method, and some to try various modifications of it, and other expedients. Among the modifications may be mentioned a horizontal and close-fitting collar of boards, fastened around the trunk, and smeared beneath with tar; or four boards, nailed together, like a box without top or bottom, around the base of the tree, to receive the tar on the outside. These can be used to protect a few choice trees in a garden, or around a house or a public square, but will be found too expensive to be applied to any great extent. Collars of tin-plate, fastened around the trees, and sloping downwards like an inverted tunnel, have been proposed, upon the supposition that the moths would not be able to creep in an inverted position, beneath the smooth and sloping surface. This method will also prove too expensive for general adoption, even should it be found to answer the purpose. A belt of cotton-wool, which it has been thought would entangle the feet of the insects, and thus keep them from ascending the trees, has not proved an effectual bar to them. Little square or circular troughs of tin or of lead, filled with cheap fish oil, and placed around the trees, three feet or more above the surface of the ground, with a stuffing of cloth, hay, or sea-weed between them and the trunk, have long been used with good success; and the only objections to them are the cost of the troughs, the difficulty of fixing and keeping them in their places, and the injury suffered by the trees when the oil is washed or blown out and falls upon the bark. These troughs ought not to be nailed to the trees, but should be supported by a few wooden wedges driven between them and the trunks. A stuffing of cloth, cotton, or tow, should never be used; sea-weed and fine hay, which will not absorb the oil, are much better. Before the troughs are fastened and filled, the body of the tree should be well coated with clay-paint or white-wash, to absorb the oil that may fall upon it. Care should be taken to renew the

oil as often as it escapes or becomes filled with the insects. These troughs will be found more economical and less troublesome than the application of tar, and may safely be recommended and employed, if proper attention is given to the precautions above named. Some persons fasten similar troughs, to contain oil, around the outer sides of an open box enclosing the base of the tree, and a projecting ledge is nailed on the edge of the box to shed the rain; by this contrivance, all danger of hurting the tree with the oil is entirely avoided. Let a piece of India rubber be burnt over a gallipot, into which it will gradually drop in the condition of a viscid juice, which state, it appears, it will always retain. Having melted the India rubber, let a piece of cord or worsted be smeared with it, and then tied several times round the trunk. The melted substance is so very sticky, that the insects will be prevented, and generally captured, in their attempts to pass over it. It has been suggested that the melted rubber might be applied immediately to the bark without injuring the trees. A little conical mound of sand surrounding the base of the tree is found to be impassable to the moths, so long as the sand remains dry; but they easily pass over it when the sand is wet, and they come out of the ground in wet, as often as in dry weather.

Some attempts have been made to destroy the canker-worms after they were hatched from the eggs, and were dispersed over the leaves of the trees. It is said that some persons have saved their trees from these insects by freely dusting air-slacked lime over them while the leaves were wet with dew. Showering the trees with mixtures that are found useful to destroy other insects, has been tried by a few, and, although attended with a good deal of trouble and expense, it may be worth our while to apply such remedies upon small and choice trees. A mixture of water and oil-soap (an article to be procured from the manufactories where whale oil is purified,) in the proportion of one pound of the soap to seven gallons of water has been used; this liquor, when thrown on the trees with a garden engine, will destroy the canker-worm and many other insects, without injuring the foliage of the fruit. Jarring or shaking the limbs of the trees will disturb the canker-worms, and cause many of them to spin down, when their threads may be broken off with a pole; and if the troughs around the trees are at the same time replenished with oil, or the tar is again applied, the insects will be caught in their attempts to creep up the trunks. In the same way, also, those that are coming down the trunks to go into

the ground will be caught and killed. If greater pains were to be taken to destroy the insects in the caterpillar state, their numbers would soon greatly diminish.

Even after they have left the trees, have gone into the ground, and have changed their forms, they are not wholly beyond the reach of means for destroying them. In orchards, in the autumn, root up and kill great numbers of the chrysalids of the canker-worms. Some persons have recommended digging or plowing under the trees, in the autumn, with the hope of crushing some of the chrysalids by so doing, and of exposing others to perish with the cold of the following winter. If hogs are then allowed to go among the trees, and a few grains of corn are scattered on the loosened soil, these animals will eat many of the chrysalids as well as the corn, and will crush others with their feet.

Apple, elm, and lime-trees, are sometimes injured a good deal by another kind of span-worm, larger than the canker-worm, and very different from it in appearance. It is of a bright yellow color, with ten crinkled black lines along the top of the back; the head is rust-colored; and the belly is paler than the rest of the body. When fully grown, it measures about one inch and a quarter in length. It often rests with the middle of the body curved upwards a little, and sometimes even without the support of its fore-legs. The leaves of the lime seem to be its natural and favorite food, for it may be found on this tree every year; but is seen in considerable abundance, with common canker-worms, on other trees. It is hatched rather later, and does not leave the trees quite so soon as the latter. About or soon after the middle of June it spins down from the trees, goes into the ground, and changes to a chrysalis in a little cell five or six inches below the surface; and from this it comes out in the moth state towards the end of October or during the month of November. More rarely its last transformation is retarded till the spring. The females are wingless and grub-like, with slender thread-shaped antennæ. As soon as they leave the ground they creep up the trees, and lay their eggs in little clusters, here and there on the branches.

As these span-worms appear at the same time as canker-worms, resemble them in their habits, and often live on the same trees, they can be kept in check by such means as are found useful when employed against canker-worms.

**THE HOP CATERPILLAR.**—The hop-vine is often infested by great numbers of caterpillars called Herminians, of the group *Pyrilides*.

They eat large holes in the leaves, and thereby sometimes greatly injure the plant. Caterpillars of this kind have also been observed on the hop in Europe, from whence ours may have been introduced; but until specimens from Europe and this country are compared together, in all their states, it will be well to consider the latter as distinct. Our hop-vine caterpillars are false-loopers, bending up the back a little when they creep, because the first pair of prop-legs, found in other caterpillars, is wanting in them. The rings of their bodies are rather prominent, the cross-lines between them being deep. They are of a green color, with two longitudinal white lines along the back, a dark green line in the middle between them, and an indistinct whitish line on each side of the body. The head is green, and very regularly spotted with minute black dots, from each of which arises a very short hair. There are similar dots and hairs arranged in two transverse rows on each of the rings. When disturbed they bend their bodies suddenly and with a jerk, first on one side and then on the other, each time leaping to a considerable distance, so that it is difficult to catch or hold them. They make no webs on the leaves, and do not suspend themselves by silken threads like the Geometers; but they are very active, creep fast, and soon get upon the leaves again after leaping off. When fully grown they are about eight-tenths of an inch long. They then form a thin, imperfect, silky cocoon within a folded leaf, or in some crevice or sheltered spot, and are changed to brownish chrysalids, which present nothing remarkable in their appearance. Three weeks afterwards the moths come forth from these cocoons. There are two broods of these insects in the course of the summer. The caterpillars of the first brood appear in May and June, and are transformed to moths towards the end of June, and during the early part of July. Those of the second brood appear in July and August, and are changed to moths in September. The insects of the second brood are much the most numerous usually, and do much more damage to the hop-vine than the others.

The means for destroying the hop-vine caterpillars are showering or syringing the plants with strong soap-suds, or with a solution of oil-soap in water, in the proportion of two pounds of the soap to fourteen or fifteen gallons of water.

**THE BEE-MOTH.**—The bee-moth belongs to the group of Crambians of the Tineæ. Doubtless it was first brought to this country, with the common hive-bee, from Europe, where it is very abundant, and does much mischief in hives. Very few of the *Tineæ* exceed

or even equal it in size. In its perfect or adult state it is a winged moth or miller, measuring, from the head to the tip of the closed wings, from five eighths to three quarters of an inch in length, and its wings expand from one inch and one tenth to one inch and four tenths. The feelers are two in number; and the tongue is very short, and hardly visible. The fore-wings shut together flatly on the top of the back, slope steeply downwards at the sides, and are turned up at the end, somewhat like the tail of a fowl. The male is of a dusty gray color; his fore-wings are more or less glossed and streaked with purple-brown on the outer edge, they have a few dark brown spots near the inner margin, and they are scalloped or notched inwardly at the end; his hind-wings are light yellowish-gray, with whitish fringes. The female is much larger than the male, and much darker colored; her fore-wings are proportionally longer, not so deeply notched on the outer hind margin, and not so much turned up at the end; they are more tinged with purple-brown, sprinkled with darker spots; and the hind-wings are dirty or grayish white. There are two broods of these insects in the course of a year. Some winged moths of the first brood begin to appear towards the end of April, or early in May; those of the second brood are most abundant in August; but between these periods, and even later, others come to perfection, and consequently some of them may be found during the greater part of the summer. By day they remain quiet on the sides or in the crevices of the beehouse; but, if disturbed at this time, they open their wings a little, and spring or glide swiftly away, so that it is very difficult to seize or to hold them. In the evening they take wing, when the bees are at rest, and hover around the hive, till, having found the door, they go in and lay their eggs. Those that are prevented by the crowd, or by any other cause, from getting within the hive, lay their eggs on the outside, or on the stand, and the little worm-like caterpillars hatched therefrom easily creep into the hive through the cracks, or gnaw a passage for themselves under the edges of it. These caterpillars, at first, are not thicker than a thread. They have sixteen legs. Their bodies are soft and tender, and of a yellowish white color, sprinkled with a few little brownish dots, from each of which proceeds a short hair; their heads are brown and shelly, and there are two brown spots on the top of the first ring. Weak as they are, and unprovided with any natural means of defence, destined, too, to dwell in the midst of the populous hive, surrounded by watchful and well-armed enemies, at whose expense

they live, they are taught how to shield themselves against the vengeance of the bees, and pass safely and unseen in every direction through the waxen cells, which they break down and destroy. Beeswax is their only food, and they prefer the old to the new comb, and are always found most numerous in the upper part of the hive, where the oldest honeycomb is lodged. It is not a little wonderful, that these insects should be able to get any nourishment from wax, a substance which other animals cannot digest at all; but they are created with an appetite for it, and with such extraordinary powers of digestion, that they thrive well upon this kind of food. As soon as they are hatched they begin to spin; and each one makes for itself a tough silken tube, wherein it can easily turn around and move backwards or forwards at pleasure. During the day they remain concealed in their silken tubes; but at night, when the bees cannot see them, they come partly out, and devour the wax within their reach. As they increase in size, they lengthen and enlarge their dwellings, and cover them on the outside with a coating of grains of wax mixed with their own castings, which resemble gunpowder. Protected by this coating from the stings of the bees, they work their way through the combs, gnaw them to pieces, and fill the hive with their filthy webs; till at last the discouraged bees, whose diligence and skill are of no more use to them in contending with their unseen foes, than their superior size and powerful weapons, are compelled to abandon their perishing brood and their wasted stores, and leave the desolated hive to the sole possession of the miserable spoilers. These caterpillars grow to the length of an inch or a little more, and come to their full size in about three weeks. They then spin their cocoons, which are strong silken pods, of an oblong oval shape, and about one inch in length, and are often clustered together in great numbers in the top of the hive. Some time afterwards, the insects in these cocoons change to chrysalids of a light brown color, rough on the back, and with an elevated dark brown line upon it from one end to the other. When this transformation happens in the autumn, the insects remain without further change till the spring, and then burst open their cocoons, and come forth with wings. Those which become chrysalids in the early part of summer are transformed to winged moths fourteen days afterwards, and immediately pair, lay their eggs, and die.

Bees suffer most from the depredations of these insects in hot and dry summers. Strong and healthy swarms, provided with a con-



stant supply of food near home, more often escape than small and weak ones. When the moth-worms have established themselves in a hive, their presence is made known to us by the little fragments of wax and the black grains scattered by them over the floor. Means should then be taken, without delay, to dislodge the depredators and invigorate the swarm. Köllar states that there is but one sure method of clearing bee-hives of the moth, and this is to look for and destroy the caterpillars or moth-worms and the chrysalids; and he advises that the hives should be examined, for this purpose, once a week, and that all the webs and cocoons, with the insects in them, should be taken out and destroyed. At all events, the examination ought to be made every year, early in September, when the cocoons will be found in greater numbers than at any other time, and should be carefully removed and burned. The winged moths are very fond of sweets; and if shallow vessels, containing a mixture of honey or sugar, with vinegar and water, are placed near the bee-house in the evening, the moths will get into them and be drowned. In this way great numbers may be caught every night. Several kinds of hives and bee-houses have been contrived and recommended, for the purpose of keeping out the bee-moth; but it does not appear that any of them entirely supersede the necessity for the measures above recommended.

**GRAIN MOTHS.**—The various kinds of destructive moths, found in houses, stores, barns, granaries, breweries, and mills, are mostly very small insects; the largest of them, when arrived at maturity, expanding their wings only about eight tenths of an inch. The ravages of some of these little creatures are too well known to need a particular description. Among them may be mentioned the grain-moth (*T. grunella*), with some others belonging to a group, which may be called Tineans (TINEADÆ), and the Angoumois grain-moth (*Anacamptis cerealella*), both of which are to be included among the Yponomeutians.

Stored grain is exposed to much injury from the depredations of two little moths, in Europe, and is attacked in the same way, and apparently by the same insects, in this country.

The European grain-moth (*Tinea grunella*), in its perfected state, is a winged insect, between three and four tenths of an inch long from the head to the tip of its wings, and expands six tenths of an inch. It has a whitish tuft on its forehead; its long and narrow wings cover its back like a sloping roof, are a little turned up behind, and are edged with a wide fringe. Its fore-wings are glossy

like satin, and are marbled with white or gray, light brown, and dark brown or blackish spots, and there is always one dark square spot near the middle of the outer edge. Its hind-wings are blackish. Some of these winged moths appear in May, others in July and August, at which times they lay their eggs; for there are two broods of them in the course of the year. The young, from the first laid eggs come to their growth and finish their transformations in six weeks or two months; the others live through the winter, and turn to winged moths in the following spring. The young moth-worms do not burrow into the grain, as has been asserted by some writers, who seem to have confounded them with the Angoumois grain-worms; but, as soon as they are hatched, they begin to gnaw the grain and cover themselves with the fragments, which they line with a silken web. As they increase in size they fasten together several grains with their webs, so as to make a larger cavity, wherein they live. After a while, becoming uneasy in their confined habitations, they come out, and wander over the grain, spinning their threads as they go, till they have found a suitable place wherein to make their cocoons. Thus, wheat, rye, barley, and oats, all of which they attack, will be found full of lumps of grains cemented together by these grain-worms; and when they are very numerous, the whole surface of the grain in the bin will be covered with a thick crust of webs and of adhering grains. These destructive grain-worms are really soft and naked caterpillars, of a cylindrical shape, tapering a little at each end, and are provided with sixteen legs, the first three pairs of which are conical and jointed, and the others fleshy and wart-like. When fully grown, they measure four or five tenths of an inch in length, and are of a light ochre or buff color, with a reddish head. When about six weeks old they leave the grain, and get into cracks, or around the sides of corn-bins, and each one then makes itself a little oval pod or cocoon, about as large as a grain of wheat. The insects of the first brood, as before said, come out of their cocoons, in the winged form, in July and August, and lay their eggs for another brood: the others remain unchanged in their cocoons, through the winter, and take the chrysalis form in March or April following. Three weeks afterwards, the shining brown chrysalis forces itself part way out of the cocoon, by the help of some little sharp points on its tail, and bursts open at the other end, so as to allow the moth therein confined to come forth.

There is another grain-moth, which, at various times, has been

found to be more destructive in granaries, in some provinces of France, than the preceding kind. It is the Angoumois moth (*Anacampsis*? *cerealella*), an insect evidently belonging to the family of Yponomeutians. The winged moths of this group have only two visible feelers, and these are generally long, slender, and curved over their heads. Their narrow wings most often overlap each other, and cover their backs horizontally when shut. The Angoumois grain-moth probably belongs to the modern genus *Anacampsis*. In the year 1768, Colonel Landon Carter, of Sabine Hall, Virginia, communicated to the American Philosophical Society at Philadelphia, some interesting "Observations concerning the Fly-weevil that destroys wheat." The Angoumois moth, or *Anacampsis cerealella*, in its perfected state, is a four-winged insect, about three eighths of an inch long, when its wings are shut. It has a pair of tapering curved feelers, turned over its head. Its upper wings are narrow, of a light brown color, without spots, and have the lustre of satin; they cover the body horizontally above, but droop a little at the sides. The lower wings and the rest of the body are ash-colored. This moth lays its eggs, which vary in number from sixty to ninety, in clusters, on the ears of wheat, rye, and barley, most often while these plants are growing in the field, and the ears are young and tender; sometimes also on stored grain in the autumn. Hence it appears that they breed twice a year; the insects from the eggs laid in the early part of summer, coming to perfection and providing for another brood of moth-worms in the autumn. The little worm-like caterpillars, as soon as they are hatched, disperse, and each one selects a single grain, into which it burrows immediately at the most tender part, and remains concealed therein after the grain is harvested. It devours the mealy substance within the hull; and this destruction goes on so secretly, that it can only be detected by the softness of the grain or the loss of its weight. When fully grown this caterpillar is not more than one fifth of an inch long. It is of a white color, with a brownish head; and it has six small jointed legs, and ten extremely small wart-like prolegs. Duhamel has represented it as having two little horns just behind the head, and two short bristles at the end of its tapering body. Having eaten out the heart of the grain, which is just enough for all its wants, it spins a silken web or curtain to divide the hollow, lengthwise, into two unequal parts, the smaller containing the rejected fragments of its food, and the larger cavity serving instead of a cocoon, wherein the insect undergoes its transformations. Before turning to a chry-

salis it gnaws a small hole nearly or quite through the hull, and sometimes also through the chaffy covering of the grain, through which it can make its escape easily when it becomes a winged moth. The insects of the first, or summer brood, come to maturity in about three weeks, remain but a short time in the chrysalis state, and turn to winged moths in the autumn, and at this time may be found, in the evening, in great numbers, laying their eggs on the grain stored in barns and granaries. The moth-worms of the second brood remain in the grain through the winter, and do not change to winged insects till the following summer, when they come out, fly into the fields in the night, and lay their eggs on the young ears of the growing grain. When damaged grain is sown it comes up very thin; the infected kernels never sprout, but the insects lodged in them remain alive, finish their transformations in the field, and in due time come out of the ground in the winged form.

It has been proved by experience that the ravages of the two kinds of grain-moths, whose history has been now given, can be effectually checked by drying the damaged grain in an oven or kiln; and that a heat of one hundred and sixty-seven degrees, by Fahrenheit's thermometer, continued during twelve hours, will kill the insects in all their forms. Indeed the heat may be reduced to one hundred and four degrees, with the same effect, but the grain must then be exposed to it for the space of two days. The other means, that have been employed for the preservation of grain from these destructive moths, it is unnecessary to describe; they are probably well known to most of our farmers and millers, and are rarely so effectual as the process above mentioned.

**HESSIAN FLY.**—Under the name of **DIPTERA**, signifying two-winged, are included all the insects that have only two wings, and are provided with two little knobbed threads in the place of hind-wings, and a mouth formed for sucking or lapping. Various kinds of gnats and of flies are therefore the insects belonging to this order. The proboscis or sucker, wherewith they take their food, is placed under the head, and sometimes can be drawn up and concealed, partly or wholly, within the cavity of the mouth.

The young insects, hatched from the eggs of gnats and of flies, are fleshy larvæ, usually of a whitish color, and without legs. They are commonly called maggots, and sometimes are mistaken for worms. They vary a good deal in their forms, structure, habits, and transformations, so that it is somewhat difficult to give any general description of them. Most insects are hatched from eggs

which are laid by the mother on the substances that are to serve for the food of her young.

The far-famed Hessian fly and the wheat-fly of Europe, and of this country, are small gnats or midges, and belong to the family called *CECIDOMYIADÆ*, or gall-gnats. The insects of this family are very numerous, and most of them, in the maggot state, live in galls or unnatural enlargements of the stems, leaves, and buds of plants, caused by the punctures of the winged insects in laying their eggs. The Hessian fly, wheat-fly, and some others differ from the majority in not producing such alterations in plants. The proboscis of these insects is very short, and does not contain the piercing bristles found in the long proboscis of the biting gnats and musquitos. Their antennæ are long, composed of many little, bead-like joints, which are larger in the males than in the other sex; and each joint is surrounded with short hairs. Their eyes are kidney-shaped. Their legs are rather long and very slender. Their wings have only two, three, or four veins in them, and are fringed with little hairs around the edges; when not in use, they are generally carried flat on the back. The hind-body of the females often ends with a retractile, conical tube, wherewith they deposit their eggs. Their young are little, footless maggots, tapering at each end, and generally of a deep yellow or orange color. They live on the juices of plants, and undergo their transformations either in these plants, or in the ground.

The Hessian fly was scientifically described by Mr. Say, in 1817, under the name of *Cecidomyia destructor*. It obtained its common name from a supposition that it was brought to this country, in some straw, by the Hessian troops under the command of Sir William Howe in the war of the Revolution.

The head and thorax of this fly are black. The hind-body is tawny, and covered with fine grayish hairs. The wings are blackish, but are more or less tinged with yellow at the base, where also they are very narrow; they are fringed with short hairs, and are rounded at the end. The body measures about one tenth of an inch in length, and the wings expand one quarter of an inch, or more. It is a true *Cecidomyia*, differing from *Lasioptera* in the shortness of the first joint of its feet, and in the greater length of its antennæ, the bead-like swellings whereof are also most distant from each other. Two broods or generations are brought to maturity in the course of a year, and the flies appear in the spring and autumn, but rather earlier in the Southern and Middle States than

in New England. The transformations of some in each brood appear to be retarded beyond the usual time, as is found to be the case with many other insects; so that the life of these individuals, from the egg to the winged state, extends to a year or more in length, whereby the continuation of the species in after years is made more sure. It has frequently been asserted that the flies lay their eggs on the grain in the ear; but whether this be true or not, it is certain that they do lay their eggs on the young plants, and long before the grain is ripe; for many persons have witnessed and testified to this fact. In the New England States and New York, winter wheat is usually sown about the first of September. Towards the end of this month, and in October, when the grain has sprouted, and begins to show a leaf or two, the flies appear in the fields, and, having paired, begin to lay their eggs, in which business they are occupied for several weeks. The Hessian fly lays her eggs in the small creases of the young leaves of the wheat. If the weather be warm, the eggs commonly hatch in four days after they are laid. The maggots, when they first come out of the shells, are of a pale red color. Forthwith they crawl down the leaf, and work their way between it and the main stalk, passing downwards till they come to a joint, just above which they remain, a little below the surface of the ground, with the head towards the root of the plant. Having thus fixed themselves upon the stalk, they become stationary, and never move from the place till their transformations are completed. They do not eat the stalk, neither do they penetrate within it, as some persons have supposed, but they lie lengthwise upon its surface, covered by the lower part of the leaves, and are nourished wholly by the sap, which they appear to take by suction. They soon lose their reddish color, turn pale, and will be found to be clouded with whitish spots; and through their transparent skins a greenish stripe may be seen in the middle of their bodies. As they increase in size, and grow plump and firm, they become imbedded in the side of the stem, by the pressure of their bodies upon the growing plant. One maggot thus placed seldom destroys the plant; but, when two or three are fixed in this manner around the stem, they weaken and impoverish the plant, and cause it to fall down, or to wither and die. They usually come to their full size in five or six weeks, and then measure about three twentieths of an inch in length. Their skin now gradually hardens, becomes brownish, and soon changes to a bright chestnut color. This change usually happens about the first of December, when the

insect may be said to enter on the pupa state, for after this time it takes no more nourishment. The brown and leathery skin, within which the maggot has changed to a pupa or chrysalis, is long egg-shaped, smooth, and marked with eleven transverse lines, and measures one eighth of an inch in length. In this form it has been commonly likened to a flax-seed. The maggots of the Hessian fly do not cast off their skins in order to become pupæ, wherein they differ from the larvæ of most other gnats, and agree with those of common flies; neither do they spin cocoons, as some of the Cecidomyians are supposed to do. The pupa gradually cleaves from the dried skin of the larva, and, in the course of two or three weeks, is wholly detached from it. Still inclosed within this skin, which thus becomes a kind of cocoon or shell for the pupa, it remains throughout the winter, safely lodged in its bed on the side of the stem, near the root of the plant, and protected from the cold by the dead leaves. Towards the end of April and in the forepart of May, or as soon as the weather becomes warm enough in the spring, the insects are transformed to flies. They make their escape from their winter quarters by breaking through one end of their shells and the remains of the leaves around them. Very soon after the flies come forth in the spring, they are prepared to lay their eggs on the leaves of the wheat sown in the autumn before, and also on the spring-sown wheat, that begins, at this time, to appear above the surface of the ground. They continue to come forth and lay their eggs for the space of three weeks, after which they entirely disappear from the fields. The maggots hatched from these eggs, pass along the stems of the wheat, nearly to the roots, become stationary, and turn to pupæ in June and July. In this state they are found at the time of harvest, and, when the grain is gathered, they remain in the stubble in the fields. To this, however, as Mr. Havens remarks, there are some exceptions; for a few of the insects do not pass so far down the side of the stems as to be out of the way of the sickle when the grain is reaped, and consequently will be gathered and carried away with the straw. Most of them are transformed to flies in the autumn, but others remain unchanged in the stubble or straw till the next spring. In the winged state, these flies, or more properly gnats, are very active, and, though every small and seemingly feeble, are able to fly to a considerable distance in search of fields of young grain. Their principal migrations take place in August and September in the Middle States, where they undergo their final transformations earlier than in New

England. There, too, they sometimes take wing in immense swarms, and, being probably aided by the wind, are not stopped in their course either by mountains or rivers. On their first appearance in Pennsylvania they were seen to pass the Delaware like a cloud. Being attracted by light, they have been known, during the wheat harvest, to enter houses in the evening in such numbers as seriously to annoy the inhabitants.

The old discussion, concerning the place where the Hessian fly lays her eggs, has lately been revived by Miss Margaretta H. Morris, of Germantown, Pennsylvania. Miss Morris believes she has established that the ovum (egg) of this destructive insect is deposited in the seed of the wheat, and not in the stalk or culm. She has watched the progress of the animal since June, 1836, and has satisfied herself that she has frequently seen the larva within the seed. She has also detected the larva, at various stages of its progress, from the seed to between the body of the stalk and the sheath of the leaves. According to her observations, the recently hatched larva penetrates to the centre of the straw, where it may be found of a pale greenish white semitransparent appearance, in form somewhat resembling a silk worm. From one to six of these have been found at various heights from the seed to the third joint. From the foregoing, we are led to infer, that the egg, being sowed with the grain, is hatched in the ground, and that the maggot afterwards mounts from the seed through the middle of the stem, and, having reached a proper height, escapes from the hollow of the straw to the outside, where it takes the pupa or flax seed state. The fact that the Hessian fly does ordinarily lay her eggs on the young leaves of wheat, barley, and rye, both in the spring and in the autumn, is too well authenticated to admit of any doubt. If, therefore, the observations of Miss Morris are found to be equally correct, they will serve to show, still more than the foregoing history, how variable and extraordinary is the economy of this insect, and how great are the resources wherewith it is provided for the continuation of its kind.

Various means have been recommended for preventing or lessening the ravages of the Hessian fly; but they have hitherto failed, either because they have not been adapted to the end in view, or because they have not been universally adopted; and it appears doubtful whether any of them will ever entirely exterminate the insect. Miss Morris advises obtaining "fresh seed from localities in which the fly has not made its appearance," and that "by this



means the crop of the following year will be uninjured ; but in order to avoid the introduction of straggling insects of the kind from adjacent fields, it is requisite that a whole neighborhood should persevere in this precaution for two or more years in succession." The stouter varieties of wheat ought always to be chosen, and the land should be kept in good condition. If fall wheat is sown late, some of the eggs will be avoided, but risk of winter-killing the plants will be incurred. If cattle are permitted to graze the wheat fields during the fall, they will devour many of the eggs. A large number of the pupæ may be destroyed by burning the wheat-stubble immediately after harvest, and then plowing and harrowing the land. This method will undoubtedly do much good. As the Hessian fly also lays its eggs, to some extent, on rye and barley, these crops should be treated in a similar manner. It is found that luxuriant crops more often escape injury than those that are thin and light. Steeping the grain and rolling it in plaster or lime tends to promote a rapid and vigorous growth, and will therefore prove beneficial. Sowing the fields with wood ashes, in the proportion of two bushels to an acre, in the autumn, and again in the first and last weeks in April, and as late in the month of May as the sower can pass over the wheat without injury to it, has been found useful. Favorable reports have been made upon the practice of allowing sheep to feed off the crop late in the autumn, and it has also been recommended to turn them into the fields again in the spring, in order to retard the growth of the plant till after the fly has disappeared. Too much cannot be said in favor of a judicious management of the soil, feeding off the crop by cattle in the autumn, and burning the stubble after harvest ; a proper and general attention to which will materially lessen the evils arising from the depredations of this noxious insect.



# DOMESTIC FOWL

AND

## ORNAMENTAL POULTRY;

THEIR

NATURAL HISTORY, ORIGIN, AND TREATMENT IN HEALTH AND  
DISEASE.

BY

H. D. RICHARDSON,

Author of "The Horse," "The Pests of the Farm," "The Hog,"  
"The Hive and the Honey-Bee," etc., etc.

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# DOMESTIC FOWL.

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“How grateful 'tis to wake  
While raves the midnight storm, and hear the sound  
Of busy grinders at the well-filled rack ;  
Or flapping wing or crow of chanticleer,  
Long ere the lingering morn ; or bouncing flails  
That tell the dawn is near ! Pleasant the path  
By sunny garden wall, when all the fields  
Are chill and comfortless ; or barn-yard snug,  
Where flocking birds, of various plume and chirp  
Discordant, cluster on the leaning stack  
From whence the thresher draws the rustling sheaves ”

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## CHAPTER I.

### VIEW OF THE IMPORTANCE OF THE SUBJECT.

POULTRY KEEPING is an amusement in which every body may indulge. The space needed is not great, the cost of food for a few head, insignificant, and the luxury of fresh eggs or home-fatted chickens and ducks not to be despised. In a large collection of poultry may be read the geography and progress of the commerce of the world. The Peacock represents India ; the Golden Pheasant and a tribe of Ducks, China ; the Turkey, pride of the yard and the table, America ; the Black Swan, rival of the snowy monarch of the lakes, reminds us of Australian discoveries ; while Canada and Egypt have each their Goose. The large fat white Ducks—models of what a duck should be—are English, while the shining green black ones come from Buenos Ayres. And when we turn to the fowl varieties, Spain and Hamburgh, Poland and Cochin China, Friesland and Bantam, Java and Negroland, beside Surrey, Sussex, Kent, Suffolk, and Lancashire, have each a cock to crow for them.

But we may derive other useful lessons besides those of geography and commerce from the poultry yard. The same principles, the same close attention to food, warmth, and symmetry of form, which have produced perfection in short-horned cattle, Leicester sheep, and thorough-bred horses,

have, in a minor degree, afforded us Bantams, "true to a feather," as we as size and beauty in Spanish, Dorking, and Poland Fowl.

Whether poultry keeping can be rendered profitable, is a question which depends on a variety of circumstances, which cannot be alike in two localities; because they depend on the cost of food, and the nett price which can be obtained for the produce in eggs or birds; thus, one person with the free run of a fine dry upland warm common, with a ready market near, may make an excellent profit; while another, bestowing equal care, but confined to a small field of cold soil, may lose nine out of ten of the most valuable young poultry.

Poultry may be converted into money either while living or when dead; or they may be bred, partly for the market, and partly with a view to the disposal of their eggs.

First, as to the profit arising from the disposal of superfluous stock. This depends, of course, in a great measure, upon the quality and character of the birds kept, and hence the breeder should confine his fancy to the more valuable varieties. The expense of feeding and rearing a valuable fowl will not be found to exceed that required for a comparatively worthless one; at least, if at all, only as regards comfort and warmth, which, if properly procured, are not very costly. Poultry of very superior quality and fashionable varieties, especially such as have obtained prizes at any of the first-rate agricultural exhibitions, will fetch a high price. Prize fowl, of extraordinary excellence, bring double price frequently; but of course this is a price given for the *breed*, and not for killing. In all these cases the producer must, of course, allow a fair profit to the *dealer*; he cannot, therefore, reckon on more than two-thirds of the price, yet this will amply remunerate him.

But although there may be doubts about the profits, there can be none about the amusement to be derived from a well chosen collection of domestic birds, and, whether for profit or amusement, the rules to insure success are the same. It will be my endeavor to lay these down as plainly as possible.

Certainly the present, if any, is the time for making a profit by poultry, since all the inferior kinds of grain are cheap and likely to be cheaper. The demand for poultry increases rather than diminishes, and railroads have opened up cheap conveyances to market. The fact is that the great drawback on poultry rearing arises from loss by disease; while the greatest profits are derived from successfully rearing the birds which are most subject to disease at inclement periods of the year.

Ducks and geese are more easily raised than fowl, turkeys, or guinea-fowl, if there be conveniences of grass and water; but then fine turkeys and fat young guinea-fowl in due season are sure of a sale at a good price. With respect to the poultry of farm houses, which are fed on what would other-

wise be wasted or what is collected by the industry of children;—warmly housed, they often thrive better and prove more prolific than the expensively tended inmates of ornamental poultry houses.

In the following pages the most esteemed varieties of poultry and water-fowl will be described. The poultry keeper will find it to his advantage to keep a good breed in preference to a bad one. Some of the more beautiful or valuable kinds of poultry are too delicate to prove profitable; but size, early maturity, and prolific hens, will, under the most unfavorable circumstances, be of more advantage than small, ugly, rarely-laying birds.

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## CHAPTER II.

### POULTRY HOUSES.

BEFORE purchasing your poultry have your house all ready to receive them, or you may do your stock more harm in a few days, by close cooping or cold roosting them, than you can repair in a year. I design showing here how very readily, and at how small a cost, a sufficiently good, and in every respect suitable poultry-house may be erected. I cannot, of course, desire to recommend any restrictions to those whom Providence has favored with wealth. There exists no reasonable objection to such as can afford it gratifying their taste, either as to extent of accommodation or elegance of structure. The poor man, on the other hand, need not lay out one penny, and still may be as successful in his operations as his more wealthy neighbor. It is my object to write for all classes. I shall, accordingly, describe several sorts of poultry-houses, from that on the most perfect and extended scale, to that which can only boast of *barely* answering the purposes for which it is designed.

In nine cases out of ten some outhouse is appropriated to the purpose, without preparation or alteration. But, if consistent with your means, by all means build a proper house. Choose a piece of gravelly soil well drained on a slight declivity, near trees which will afford shade and shelter from winds. The building should be lofty enough to admit the poultry keeper without stooping, because, if it be inconvenient to enter, the chances are that regular cleaning will be neglected. Let the roof be kept weather tight. If slates or tiles are employed, the house should be ceiled in order to protect the fowls from draughts and rapid variations of temperature; in default of lath and plaster a piece of asphalted felt closely nailed makes a cheap and efficient ceiling.

The best perch is made in the shape of a broad double ladder, stretched out so as to form a wide angle; the bars being placed so far apart that one

fowl shall not overhang another. If roosting bars be used across the fowl-house, care should be taken that a convenient hen-ladder is always attached to them, and that they are not placed too high. Heavy fowl are apt to break their breast bones in trying to fly down from high perches.

The careful poultry keeper should take a view of the fowl at night after they have gone to roost, and see that they are all comfortable, not too crowded, with room enough for the weak ones to get away from the strong, who are apt to tyrannize. The floor must be dry, and covered with fine gravel or sand, and it should be swept clean every day. Nothing injures the health of fowl more than bad smells. To obviate this always keep a basket of slacked lime or old mortar in a corner with a shovel, so that you may shake some over any dirt. The sweepings, if kept quite dry, form most valuable manure. For the same reason have the interior walls frequently white-washed, and the window open in fine weather. If the window can be filled with a venetian blind so much the better. The door should have a hole at the bottom with a sliding panel to admit the poultry during the day—by keeping † locked you have a better chance of gathering plenty of eggs. If you have no windows, movable loose boards fitted to the door may be useful to admit air.

As warmth is so requisite to poultry, it will be an advantage if one side of the poultry house be against the outside wall of a kitchen or boiler-house, or a hot water pipe running through it from the hot-house will well repay the outlay. With a sweet clean warm poultry house you will have plenty of eggs long before more careless neighbors.

As to the nests, the great point is that they should be near to the ground, easily cleaned, and not too large. If they are too large two fowls will often try to sit in the same nest at the same time. If there is any difficulty in getting into them, hens are apt to drop their eggs on the ground. Nests may be made of wood, or basket-work; there should be a small ledge to prevent the eggs from rolling out. A little old mortar or wood ashes laid at the bottom will tend to keep the nests clean. Straw and hay both make good lining for nests.

If the nests are arranged in two stories there should be a broad ledge wide enough for a hen to walk on in front of the top row, like the platform of a drawing-room verandah, and a hen-ladder should be placed at each end, but nests are better on the ground.

It is very advantageous to place fowl which are sitting in a retired situation where they will not be annoyed by other fowl, and where, when the hatching takes place, they can be cooped with their young out of danger, with a dry yard or close cropped lawn in front to run on. Many hens, as well as peafowl and turkeys, are vicious, and will try to destroy a rival brood.

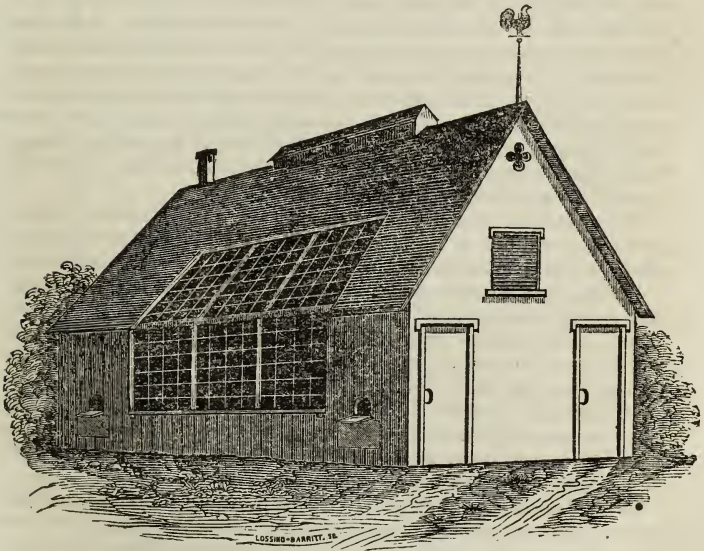
A small box, about a yard square, with a hard dry floor, and a movable

wooden top, is excellent as a *sitting-room* for hens. I have seen an old cucumber frame covered with wooden slabs successfully arranged for bringing up early broods.

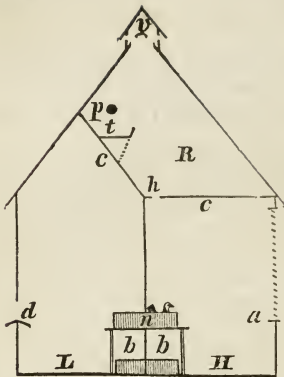
Be sure before you put a fowl to set that the nest is perfectly clean; if the hen becomes infested with vermin she pines and cannot set close.

It will often be found cheaper to make a good fowl-house at first, than to be continually adding and patching.

Of course if you have more than one breed of fowl, they must be kept separate, if you intend to keep the race pure. Where this is attempted, an enclosure adjoining the poultry-house, with three divisions of iron wire, will be found useful, if the space and cost can be spared. In these enclosures in wet cold weather, the poultry can be confined, with room to scratch and feed. The largest division will be for your laying hens and turkeys, and miscellaneous stock. In this space you can muster them, accustom them to be fed, and see that all are in health, and make the close observations which are needful for success. In the second you can place hens with young broods before they are strong enough to mix with the other fowl. In the third, and smallest, poultry for fattening. If just large enough for them to enjoy the air



POULTRY HOUSE.



TRANSVERSE SECTION.

*L*, the laying apartment; *H*, hatching-room  
*n*, nest boxes; *b*, *b*, boxes and troughs for water  
 feed, sand, &c.; *d*, an opening, or door, for en-  
 trance and going out; *a*, latticed window, for  
 ventilation; *R*, roosting-place, separated from  
 apartments below by the ceilings *c*, *c*; *h*, ven-  
 tilating hole; *v*, ventilator on roof; *p*, roosting  
 pole; *t*, trough for dung.

without being able to run about much, with shade, sun, plenty of clean water, and food, they will generally thrive better than when cooped. A few good coops, either of wood and wire, or wicker, with the top thatched, should always be at hand. These should be made so as to shut up the chickens if necessary, as well as the hens. If the fowl-house is large enough have a small sink in one corner where it is light, and if it is not large enough, put in the yard, under shade, a large glazed earthenware pan, and fill it with fine sand, or ashes, or slacked lime, or burned oyster shells, as a dust bath for the fowl. By placing the stuff in a pan it is easily changed from time to time.

If you are obliged to put up with a small lean-to or other confined place, for your fowl-house, at any rate take care to keep it clean, for warmth, cleanliness, and judicious feeding are the cardinal maxims for poultry management.

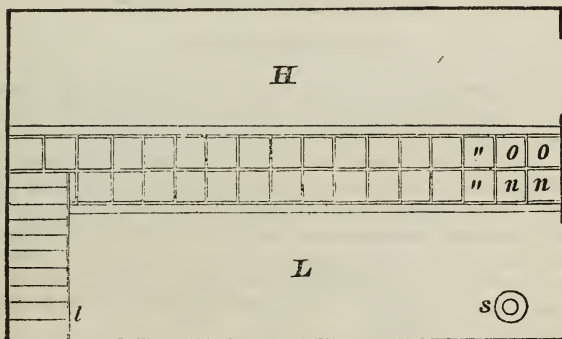
Nothing more is necessary for the keeping poultry with profit and advantage, beyond having a small shed or light building, formed in some warm, sunny, and at the same time, sheltered situation, fitted up with proper divisions, boxes, lockers, or other contrivances for the dwelling of the different sorts of birds, and places for their laying in. This and *cleanliness* suffice.

"Cleanliness," says Mr. Beatson, "with as free a circulation as possible, and a proper space for the poultry to run in, is essential to the rearing of this sort of stock with the greatest advantage and success, as in narrow and confined situations they are never found to answer well."

In every establishment for poultry rearing there ought to be some separate crib or cribs, into which to remove fowl when laboring under disease; for not only are many of the diseases to which poultry are liable highly contagious, but the sick birds are also regarded with dislike by such as are in

health; and the latter will generally attack and maltreat them, thus at the very least aggravating the sufferings of the afflicted fowl, even if they do not actually deprive them of life. The moment, therefore, that a bird is perceived to droop or appear to be pining, it should be removed to one of these infirmaries.

Separate pens are also necessary to avoid quarreling among some of the highly-blooded breeds, more particularly the game fowl. They are also necessary when different varieties are kept, in order to avoid improper or undesired commixture from accidental crossing. These lodgings may be most readily constructed in rows, parallel to each other; the partitions may be formed of lattice work—they will be rather ornamental than otherwise, and the cost of their erection will be but trifling. Each of these lodgings should be divided into two compartments, one somewhat larger than the other. One compartment is to be close and warm for the sleeping-room; the other, and the larger one, should *be airy* and open, that the birds may enjoy themselves in the day-time; both should be kept particularly dry and clean, and be well protected from the weather.



GROUND PLAN.

*L*, laying-room; *H*, hatching-room; *n, n*, nests for laying; *o, o*, nests for hatching; *l*, ladder; *s*, stove.

Attached to the house should be a well-drained yard, with a division of wire or trellis work for every ward, with water in each; and it will be advantageous to have outside of this yard a wider range of turf and gravel, where the fowl can be more at large. When different broods are kept, and it is desired to keep them apart, the larger yard must be shared in turn by the inhabitants of the different wards. The hatching-ward and the feeding-ward should be kept separate. A roosting and hatching-ward for ducks and

geese, with a small pond, accessible to all the inhabitants of the poultry yard, should be added.



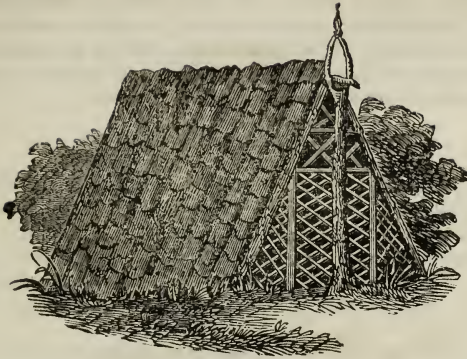
WATER DISH AND TANK.

Every poultry-house should be provided with a sufficient quantity of small sand; or, if such cannot be procured, clean ashes are a good substitute; pieces of chalk are also a useful, nay, necessary adjunct; *crude lime* acts, however, as a poison. Some horse-dung or chaff, with a little corn through it, is also a source of much amusement to the birds; and it should be borne in mind that *amusement*, even in the poultry-yard, is materially conducive to health. The ashes and litter should be frequently changed, and had better also be kept in little *trenches*, in order that they may not be scattered about, giving a dirty or untidy appearance to the yard. When, however, your fowl have a run in a garden or field, of average extent, this *artificial* care will be replaced by nature.

If the court be not supplied with a little grass-plot, a few squares of fresh grass sods should be placed in it, and changed every three or four days. If the court be too open, some bushes or shrubs will be found useful in affording shelter from the too perpendicular beams of the noon-day sun, and probably in occasionally screening the chicken from the rapacious glance of the kite or raven. If access to the sleeping-room be, as it ought, denied during the day, the fowl should have some shed or other covering, beneath which they can run in case of rain: this is what is termed "*a storm house*;" and, lastly, there should be a constant supply of *pure, fresh water*.

Fowl frequently suffer much annoyance from the presence of vermin, and a hen will often quit her nest, when sitting, in order to get rid of them. This is one of the uses of the *sand* or *dust* bath; but a better remedy, and

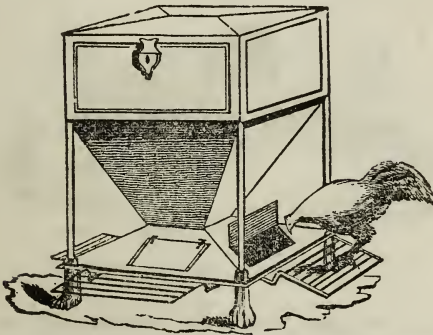




RUSTIC POULTRY-HOUSE.

one is far speedier and more certain efficacy, is to have the laying nests composed of dry heather and small branches of hawthorn, covered over with white lichen. These materials, rubbed together by the pressure and motion of the hen, emit a large powder, which, making its way between the feathers to the skin, is found to have the effect of dislodging every sort of troublesome parasite.

The fowl-house should also be frequently and thoroughly cleaned out, and it is better that the nests be not fixtures, but formed in little flat wicker baskets, or sieves, which can be frequently taken down, the soil and straw



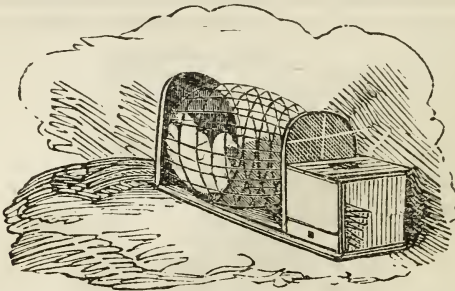
FEEDING-BOX.

thrown out, and themselves thoroughly washed: or formed of wooden boxes, with a sliding bottom. In either case, hay is objectionable, as tending to the production of these vermin. Fumigation, at no very remote intervals, is also highly to be commended. Nothing is of more importance to the well-being of your poultry than a good, airy walk. These maxims cannot be too often impressed on the poultry keeper.

#### A COTTAGE POULTRY-HOUSE.

As good a mode of rearing fowl as can be adopted is the old custom of suffering them to roost on the rafters of the room in which the cottier keeps his fire; and it is, perhaps, owing to the warmth thus afforded to the birds, that, during winter, when eggs are scarce, and consequently at a high price, they will be procurable from the humble cabin, when they have long vanished from the elaborately constructed, but less *warm* poultry-house of the more affluent fancier.

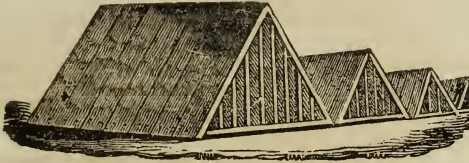
Should circumstances, however, render the keeping poultry in the cabin objectionable or unadvisable, a very sufficient place may be erected for them against the outside of the cabin wall; and, if possible, the part of the wall against which the little hut is erected should be that opposite to the fire-place within—thus securing the necessary warmth. If shelter be required, it can be obtained by means of a few bushes, or a wall of sods; the neighboring roads will serve as an ample walk; the nearest stream will slake their thirst. A few laying-nests may be placed in a warm corner of the cabin, and the poultry of the poor cottier will thrive as well, and yield great a profit, as those kept in the best appointed establishments.



COOP AND FEEDING-BOX.

By confining a hen some hours in the day to the coop, she is prevented from rambling into danger, and yet has the liberty of enjoying fresh air,

and the pleasure of seeing her chicks run in and out through the bars, returning to her when her voice warns them to seek shelter with her in the friendly coop, on the approach of a shower or of any other danger. The instincts of the young birds will generally lead them to obey her voice, even though it be that of a step-mother.



TENT-SHAPED COOPS.

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### CHAPTER III.

#### HOW TO FEED POULTRY.

Do NOT feed your hens too highly before they begin to lay, or while laying, or immediately after ceasing to lay, unless you wish to fatten them for table use; for as soon as a fowl begins to fatten she stops laying. You must, therefore, separate the two classes of fowl, layers and fatteners, at all events at feeding time. Make some separate provision for your cocks; if they are only fed in company with the hens, they are apt to think too much of their mistresses and to neglect their own appetites; and recollect that to have *strong* chickens, you must have strong cocks, which an ill-fed bird cannot be expected to prove.

You should also make separate provision for such fowl as are bullied or oppressed by the rest. Fowl are much given to *jealousy*; the *cock's favor* is sometimes the cause of this, but by no means invariably so, and, indeed, the cause is not at all times to be ascertained; however obscure the *cause*, it is incumbent on the poultry fancier to prevent the *effect*, by adopting the separative system at the times I have indicated. I myself have met with instances of a cock forming a partiality for a particular hen. In such an occurrence, which is easily recognizable by the cock's continually running at that particular bird, to the neglect, or comparative neglect of the others, it is better to remove the favorite *at once*; if you do not do so, quarrels will ensue; this hen will nearly always be made a victim, and in many cases the quarrels on her account will give rise to other and more general affrays. On such occasions the cock usually interferes and endeavors to establish peace; he almost invariably does so when the contest is carried on *per duello*

when, however, a number of his mistresses fall upon one, his interference is of little avail; and, as if he were conscious of this, in such cases he usually leaves the poor favorite to her fate. I have also known a cock to take a *dislike* to a particular hen. This is a much more rare case than the preceding, and I have no doubt of its cause; it is this: when a vigorous, healthy cock is mated with *very few* hens, he is very persevering in his attentions to them: when hens are in *moult* they will not accept of any such attentions. In most instances of this kind that have fallen under my own observation, I have found the hen thus victimized by her lord to have been moulting, and to have incurred his hatred by a refusal of conjugal rights. The cock will sometimes fall upon a hen newly introduced into your yard, especially if of a different color from his other mates.

Fowl about a farm-yard can usually pick up a portion of their subsistence, and that probably the largest portion, and, of course, in such situations poultry-keeping decidedly *pays best*. I must, however, particularly caution my readers against *depending* for the support, even of their *non-fattening* poultry, wholly upon such precarious resources, and I shall, accordingly, proceed in my advice as if no such resources existed.

The substances that may be used in poultry feeding are very numerous and various—cabbage, turnips, carrots, parsnips, mangelwurzel, oats, wheat, barley, rye, indian corn, and other grains, substances too well known to require, and too numerous to be worth the trouble of enumerating. It will not answer to feed fowl wholly upon *any one variety* of food; neither will it be found advisable to feed wholly upon any one *class* of food. I must speak of the latter point first. Fowl require a mixture of *green* food with *hard* food, fully as much as horses or cattle do. When the birds have the advantage of an extensive walk, they will find this for themselves; when they do not possess such an advantage, you must provide green food for them. Some do so by providing the birds with cabbages or other greens *chopped small*. My plan is to *fasten* heads of cabbages, lettuce, rape, or other green herbs, to some fixture, by means of their roots, and to let the fowl peck for themselves. This practice not merely prevents waste, but is, in consequence of the *amusement* it affords, decidedly conducive to health. When you find it difficult to obtain green food, you will find that *turnips* will answer equally well. To prepare these they should be sliced one way, and then sliced across, so as to be cut into small *dice*. This is *troublesome*—granted; but no man deserves to have a good stock of poultry, or anything else, if he declines taking trouble. If it be necessary to employ hired labor for the purpose, the stock must be very large, and will unquestionably pay. The same yellow turnips, boiled soft, and mixed with bran or pollard, or given by themselves, are also capital feeding, especially for a *change*. Carrots and parsnips may be used for this purpose, prepared in either of the modes recommended for yellow turnips. Of *mangel*, as food for poultry, I cannot

may much, valuable though it decidedly is for other purposes; the birds do not generally like it, and I have found that, even where they do eat it, it does anything but promote their laying; oats are useful as forming a *portion* of fowl's feeding; but it will not answer for keeping them upon altogether; the *hulls* are very indigestible, and this food is, besides, of too *stimulating* a nature; yet a few handfuls are well spent on your fowl. When *damaged* wheat can be bought at a low price, it may be used for the feeding of poultry with much profit and advantage; when no such thing can be procured, however, and when it is proposed to feed them upon the sound, marketable article, it will not pay. The same may be said of *barley*, which is also objectionable as acting in a *purgative* manner—it is useful as an occasional feed, when fowl are over fed. *Rye* is usually a cheaper description of grain than any other, and *damaged rye* may be used, to a limited extent, with impunity, even when affected with the *ergot* which exercises so powerful an influence upon the systems of all female animals possessing a uterus. As this same *ergot*, however, is frequently the cause of severe illness when human beings happen to eat bread made of rye tainted with it, poultry should not be suffered to eat *too freely* of it. Indian corn is a most capital food both for store and fattening fowl, and may be used in larger quantities than any other.

The sweepings of grain warehouses, consisting of all kinds of grain, may frequently be purchased on cheap terms, and are well suited for poultry, but, if given to fowl, the peas and beans must be sifted out.

One circumstance connected with the feeding of poultry, and that a most important one, is not sufficiently well known—I allude to the necessity they are under of obtaining *animal food*. Of course, when the birds possess the advantage of an extensive run, they can themselves peck up insects, worms, snails, or slugs; and as in the case of ducks, &c., frogs and other small reptiles; but in cases where they do not possess this advantage, it is necessary that you cater for them. I have always experienced the best effects, especially as manifested in greatly increased *laying*, of giving scraps of animal food about twice or thrice a-week to the fowl; the best mode is throwing down a bullock's liver, leaving it with them and permitting them to peck at it *ad libitum*. This is better in a raw than in a cooked state.

In winter, in order to supply the place of the insects and other animal food they can pick up in summer, I give them once a week fat meat, together with any meat bones to peck, and also barley made hot in a saucepan without water and given warm. Hot potatoes are always good food, small potatoes may be picked out, and steamed for the purpose, if you keep a garden. But meat is indispensable, if you wish to have eggs in winter.

Several substances have been at different times recommended as calculated to increase the fecundity of the various classes of the feathered inhabitants of the farm-yard, amongst these, perhaps, hempseed and buckwheat are pre-eminent. There can exist no doubt of the peculiar efficacy of these

seeds in this respect when *properly used*, but neither can it be denied that in some cases this *objectionableness* is undoubted.

When a hen *pines*, or seems disposed to be *thin*, you need not hesitate in giving buckwheat with even a liberal hand; but you must so manage as not to permit such hens as are disposed to become *too fat* to share in this department of your bounty. According as hens take on fat they usually fall off in laying, and this should be particularly kept in mind in feeding. When hens are disposed to flesh, you will find *hempseed* the best promoter of laying; at the same time it will be necessary that you restrict them as respects other descriptions of food, fattening and laying being nearly always incompatible with each other.

Fowl of all kinds require *sand, gravel*, as an aid to digestion, being, in fact, necessary to promote *trituration* in the gizzard, as well as to supply calcareous matter for their egg-shells. You should, therefore, always have a supply placed within their reach. This, I must admit, applies more immediately to such fowl as are kept in a confined yard; when the walk is at all extensive, the birds can usually peck up enough for themselves. Fresh-water gravel is the best; and if you live near the sea, and wish to use sand so easily obtainable from the beach, you should first wash it in two or three waters. Where no sand of any kind can be obtained, as in towns, you can use chalk, bruised oyster shells, or freestone; if the latter, you had better wash it well first: you will, of course, pound before placing it in the yard.

I have observed that fowl require a varied dietary.

In the morning, about seven o'clock, in spring and autumn, but at six in summer, let the fowl out, and permit them to roam about till nine, when give grain, to the amount of about a handful to every three birds; they will then amuse themselves about the place, during which time they will peck up a good deal; about three o'clock feed them again on grain to about the same amount, besides which give whatever potato, turnip, or other refuse is going. The liver should lie in the yard, and they can get green feed for themselves. In winter the affair assumes another aspect; all feeding, but more particularly the grain, must be greatly increased in quantity. As you now cannot procure green food, or at least can only do so with difficulty, and at an expense that will seldom pay, you should resort to the chopped turnips.

Cayenne pepper, indeed, all descriptions of pepper, especially the cayenne in pods, will be found a favorite with fowl, and will be greedily devoured by them; it acts as a powerful stimulant and remarkably promotes laying, and, when mixed in a ground state, with boiled meal, will be found productive of the best effects. In this, however, as in every thing else, let moderation be your ruling principle.

A different system should be adopted in treating poultry for the table, and for the laying and breeding department. The great secret of having fat

chickens, is never to let them be thin. But, to fatten, you may either enclose them in a small space, or absolutely coop them up. Coops should be placed in a warm—rather dark place; be high and large enough for each fowl to be comfortable without moving about, not more than three fowl in each division, so that they can see without touching each other; the back part of the floor should be grated to allow the dung to fall through, and this must be removed every morning. The troughs are generally made too low; they would be better, raised an inch; and, instead of wood, should be of coarse pottery or glass, both of which are very cheap, and can be easily kept clean. Starve the fowl for a few hours after cooping, and then supply them frequently, and at regular intervals, with as much food as they will eat, and no more, clearing the trough each time after they have fed. Rice boiled will be found very fattening; and by a constant variety of food, the fowl will be induced to eat, and ought to be quite fat in a fortnight.

But above all, it must be remembered, that to do any good, chickens put up for fattening, require regular attention, and at stated hours.

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## CHAPTER IV.

### THE ORIGIN OF OUR DOMESTIC FOWL.

THE Domestic Fowl, styled by zoologists *Gallina*, from the Latin word *gallus*, a cock—is distinguished by having the crown of the head usually naked and the skin raised in a fleshy protuberance, called a comb—a protuberance varying in size and form in different varieties. The base of the lower mandible (beak) is likewise furnished with fleshy, lobular appendages, called *wattles*; the tail is carried erect, and is composed of two planes folded together at acute angles. In the male, the central feathers of the tail are elongated, and fall gracefully over the others. The feathers of the neck are ample in quantity, are either long and hackled or short and truncated. The plumage of the male bird is characterized by considerable brilliancy and beauty; that of the female is unobtrusive, matronly, and comparatively dull. The cock tribe is extremely hardy, and endures all changes of temperature and climate with impunity, as is proved by these birds being found to exist in nearly every country of the world, from the warmest to the coldest zone.

The domestic cock appears to have been known to man from the very earliest period. Of his real origin little appears to be known, and the period or manner of his first introduction into Greece, or southern Europe, is involved in the greatest obscurity. The cock has certainly ever held a prominent position among birds; he occupied a conspicuous place at the shows

of the Greeks and Romans in the days of old; his effigy was engraved, and is still to be seen upon many of the medals and coins; and he has been expressly dedicated to several of their favorite deities—as Apollo, Mercury, Mars, and Æsculapius.

At a Roman banquet this bird formed a principal dish, and poultry were even then carefully reared and fattened, as well as *crammed*. Nor was the pugnacious disposition of the cock even then unknown, or lost sight of, as a means of amusing man; for cock-fighting was seriously entertained and encouraged as at once a religious and a political ceremony. The islands of Rhodes and Delos are said to have furnished the fattest birds for the table, as well as the most enduring and unflinching champions of the ancient cock-pit.

It is strange that a practice so barbarous as that of cock-fighting should owe its origin to classic times, and to one of the most learned and enlightened nations of antiquity—the GREEKS. It was introduced into these islands by the Romans, and it was, perhaps, the occasion of making us acquainted with the domestic fowl. For a long period cock-fighting was practiced in England as a royal pastime, and exhibited as such before public assemblies with pomp and show, and it continued to be sanctioned, both by law and custom, until about 1730. Up to this time it was—I suppose in allusion to the well-known connection this bird had with St. Peter's denial of our Savior—a favorite amusement at or about Shrovetide, and was even in vogue at public schools, with the express sanction of the schoolmaster, who furnished the boys with cocks for the purpose.

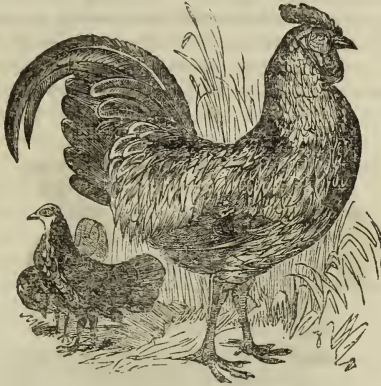
However much the cock has occasionally suffered, he has, on the other hand, to boast of having ever been regarded as a bird of the very highest consequence and respectability. From time immemorial his “shrill clarion” has “ushered in the morn;” and he has likewise had consigned to him the important power of dismissing ghostly visitants to their more appropriate dwelling in the tomb. The ghost of Hamlet's father, about to make a most important disclosure to his loving son, suddenly hears the *crowing* of the *cock*, on which he announces no less abruptly that he “snuffs the morning air;” and leaving half his say unsaid, returns incontinent to all the gloomy and unrevealed horrors of his mysterious prison-house. As Shakspeare so beautifully writes, too, the office of cock-crowing is likewise, at a certain season, rendered still more important—

“Some say that ever against that season comes,  
Wherein our Savior's birth is celebrated,  
The bird of dawning singeth all night long;  
And then, they say, no spirit walks abroad.  
The nights are wholesome—then no planets strike,  
No fairy takes, nor witch has power to harm;  
So hallowed, and so gracious is the time.”

As I have already observed, to pronounce with any degree of certainty



as to the original country of the domestic cock, or to refer *positively* to what *known* wild species we are to look for his primitive type, would prove a labor equally difficult and presumptuous, the date of his original domestication belonging to so remote a period as to be now wholly lost; but nevertheless, there are races of poultry that, still possessing a wild and apparently truly feral type, would seem to afford the strongest evidence of originality



SONNERAT'S JUNGLE FOWL.

Several authors of the highest respectability and most unquestionable erudition—among whom Buffon and Sonnerat—have endeavored to show that all the varieties of domestic fowl with which we are now acquainted sprang originally from one primitive stock. This opinion has obtained many advocates. Zoologists are, in general, apparently possessed with an anxious desire to curtail, as much as possible, the number of primitive types whence the several races of animals have sprung; with poultry, however, this desire must be frustrated. Dampier saw wild hens at Puloncondar, Timor, and St. Jago. Sonnini describes wild cocks which he saw in the forests of South America. Temminck procured wild cocks from Java, Sumatra, and Ceylon; and all these birds differed essentially, in character and appearance, from all our then known domestic races—from those found by Sonnerat in the Indies—and, finally, from each other. This statement, like many other novelties, though scouted at the time by Sonnerat and others, who, bigoted to their own pre-declared opinion, were, of course, interested in their contradiction, have since been amply and authoritatively confirmed.

I have neither the wish nor the intention to waste my own time, or that

of my readers, by entering upon the useless, unsatisfactory, and often interminable paths of controversy.

It has been very generally supposed, and most commonly asserted, that the domestic cock owes his origin to the Jungle fowl of India. I hold that he does not—that he, in fact, differs as much from that bird as one fowl can well differ from another; they will certainly breed together, but so will the hare and rabbit. Read, however, the following description of the Jungle fowl, and, if you can, point out its counterpart among our domestic stock:—

It is about one-third less than our common dunghill cock, being (the comb not included in the measurement) about twelve or fourteen inches in height. The comb is indented, and the wattles certainly bear some slight resemblance to those of our common cock; but the naked parts of the head and



JAVANESE JUNGLE FOWL.

throat are much more considerable. The feathers of the head and neck are longest on the lowest parts, and differ both in structure and aspect from those of other cocks, whether wild or tame. The Jungle hen is smaller than the cock, has neither comb nor wattles, and the throat is *entirely covered with feathers*—a very remarkable distinction from our domestic hens. The space round the eye is naked, and of a reddish color; the under parts are furnished with plumage, similar to that of the same parts of the cock: but, in addition to these peculiarities, the Jungle cock possesses still another, which, however, the hen does not share with him—viz., the mid-rib, and stem of a portion of the feathers is considerably expanded, forming a white stripe along the whole feather, as far as the tip, where it expands, becomes broader, and forms a gristly plate of a rounded form, whitish, thin, and highly polished; this gristly substance is still more remarkable on the wing feathers than on

any other part, the tip, indeed, of the wing feathers forming a less brilliant plate, solid as horn, and as firm and unyielding to the touch. These plates are of a deep red color, and by their union, form a plate of red maroon which looks as if it were varnished.

There are, however, two wild-cocks in which we find sufficient points of resemblance to our domestic varieties, and these answer the purpose of terminating our somewhat unsatisfactory search. I allude to the gigantic bird or Jago fowl of Sumatra, and to the diminutive denizen of the wilds of Java. The reasons for supposing these two birds to be the veritable originals of our domestic poultry, may be summed up briefly thus:—

I.—The close resemblance subsisting between their females and our domestic hens.

II.—The size of our domestic cock being intermediate between the two, and alternating in degree, sometimes inclining towards the one, and sometimes towards the other.

III.—The nature of their feathers, and their general aspect, the form and mode of distribution of their barbs being the same as in our domestic fowl.

IV.—In these two birds do we alone find the females provided with a crest and small wattles, characteristics not to be met with in any other known wild species. You will meet with these characteristics in the highly bred Spanish fowl.

Notwithstanding these analogies, however, domestication has so changed the form of the body, and of its fleshy appendages, that we might find it rather a difficult task to refer any modern individual variety to its primitive stock: we must, in order to understand fully the causes that produce this difficulty, recollect the constant, and frequently careless, crossing one bird with another, and the very frequently *promiscuous* intercourse that takes place in a state of domesticity, taking, likewise, into consideration changes of climate, variety of treatment, and numerous other causes.

We cannot, however, find any difficulty in at once recognizing the large and powerfully-limbed bird of Sumatra (called also the Jago fowl), the appropriately styled "Gigantic Cock," or *Gallus giganteus* of zoologists, as the original type to which we owe the Paduan and Sancevarre varieties.

To the more diminutive Bankiva cock, we are, on the other hand, indebted for the smaller varieties, improperly designated Bantams, and the, so-called, Turkish fowl. By crossing, peculiarities of climate, management, &c., have been produced from these:—

I.—The cock with small crest and wattles, furnished, also, with a tuft of feathers, which some writers have supposed to be produced by the juices that ordinarily go to furnish nourishment for the comb taking another form, and developing themselves in the production of the tuft. These approximate most nearly to the original Sumatra stock, and we may recognize their domestic representative in the varieties of the Polish breed.

II.—The ordinary cock, provided with comb and wattles, but no crest or tuft of feathers; this seems the intermediate variety.

III.—Diminutive cocks, ordinarily known as Bantams, with, in some varieties, the tarsi and toes covered with feathers; but this is not invariably the case.

I should here describe the two races to which I have stated it as my opinion, that we are indebted for our domestic varieties.

The wild cock, justly termed the "*Gallus giganteus*," and called by Marsden the "*Jago Fowl*," is frequently so tall as to be able to peck crumbs without difficulty from an ordinary dinner-table. The weight is usually from ten to thirteen or fourteen pounds. The comb of both cock and hen is large, crown shaped, often double, and sometimes, but not invariably, with a tufted crest of feathers, which occurs with the greatest frequency, and grows to the largest size in the hen. The voice is strong and very harsh, and the young do not arrive at full plumage until more than half grown.

There was, some years ago, in the Edinburgh Museum of Natural History, a very fine specimen of the *Jago fowl*; it was said to have been brought direct from Sumatra, and, in most respects, closely resembled the common large varieties of domestic cock. In this specimen the comb extended backwards in a line with the eyes; was thick, slightly raised, and rounded on the top, almost as if it had been cut; the throat bare, and furnished with two small wattles. The neck and throat hackles of a golden reddish color, some of them also springing before the bare space of the throat; the hackles about the rump, and base of the tail, pale reddish yellow, long and pendent; the center of the back, and smaller wing coverts, of a deep chestnut brown, the feathers having the webs disunited; the tail very full, and of a glossy green color. The greater wing coverts of a glossy green, with the secondaries and quills of a faint golden yellow; under parts of a deep, glossy, blackish green, with the base of the feathers a deep chestnut brown, occasionally interrupted, so as to produce a mottled appearance. This bird measured very nearly thirty inches in height, comb included, and making allowance for the shrinking of the skin; the living bird must have been upwards of thirty-two inches high.

The *Bankiva fowl* is a native of Java, and is characterized by a red, indented comb, red wattles, and ashy-grey legs and feet. The comb of the cock is scolloped, and the tail elevated a little above the rump, the feathers being disposed in the form of tiles or slates; the neck feathers are gold color, long, dependent, and rounded at the tips; the head and neck are of a fawn color; the wing coverts a dusky brown and black; tail and belly black. The color of the hen is a dusky ash-grey and yellow; her comb and wattles much smaller than those of the cock, and, with the exception of the long hackles, she has no feathers on her neck. These fowl are exceedingly wild.

and inhabit the skirts of woods, forests, and other wild and unfrequented places. These Bankiva fowl are very like our Bantams, and, like those pretty little birds, are also occasionally to be seen feathered to the feet and toes.

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## CHAPTER V.

### SELECTION OF STOCK, AND CHOICE OF COCK AND HENS FOR SITTING.

COLUMELLA is, perhaps, among the earliest authorities we can cite on the subject of the breeding and management of poultry, and he thus delivers himself on a very important subject, viz., the number of hens to be allotted to each individual cock:—

“Twelve hens shall be enough for one good cock, which will cause the progeny to be more of a color; but yet our ancestors used to give only five hens to one cock, thus producing a diversity of color. To have the hens all of one color is preferable, some white, and these are considered the best layers.”

Bradly, in his *Farmers' Director*, advises one cock to be left with seven or eight hens, and hints that if a greater number be allowed him, the eggs will not prove fertile. The author of the *Complete Farmer*, and the writer of the article on poultry, in *Rees' Encyclopedia*, recommend the same number.

M. Parmentier, a very eminent French writer, says, that one cock is *much more* than sufficient for fifteen, or even twenty hens, provided he be a young, vigorous and healthy bird.

Those who breed game fowl for combat, and whose object is, of course, the production of strong chickens, limit the number to four, or at most five. Mr. Mowbray says, that in winter, or cold and damp weather, a cock should only have four hens. M. Bose (*Encyclopedia Methodique*) says, that in spring alone should any cock have fewer than twenty hens. M. Dickson says, that the number of hens allowed to one cock should vary with the object you have in view; and Mr. Nolan, a most excellent judge, thinks that in order to secure a prime breed, a cock two years old should not have more than five hens.

If you look for profit to the production of eggs alone, I should say that one cock—if a stout, young, and lively bird—may have as many as twenty-four hens. If, however, you want to obtain strong and thriving chickens, you must restrict him to six, or at most, eight. If your object be the improvement of a worn-out or degenerate breed, the fewer hens you allow to one cock the better, and you should not, at any rate, allow him more than three.

As to the selection of a good cock, Columella thus instructs us:—“It is

not good to keep a cock if he be not stout, hot and knavish, and of the same color as the hens are, and with as many claws; but in his body to be higher raised, his comb to be high and red as blood, and straight withal; his eyes black or azure color; his beak short and crooked, with a grey crest, shining like red or white, and all his feathers, from the head to the breast, to be of a changeable color, varying like gold or yellow; his heart large and big; his muscles on his wings big like one's arm, with long wings; his tail fair and long, with two ranks of crooked and rising feathers; and to be oft crowing is a sign of lusty courage. The red color is thought to be the best cock; his legs short and strong, his thighs great and thick, and well covered with feathers, and his legs armed with long spurs, rough and pointed—straight in body, light, fierce, eager in battle, vigilant, ready, and often crowing, and not easily feared."

Markham, in "*Cheap and Good Husbandrie*," almost repeats the directions of Columella *verbatim*, and guarantees their correctness with the authority of his own opinion.

M. Parmentier recommends the cock to be chosen of a middling size, carrying the head high, having a quick, animated look, strong, shrill voice, short bill, very red comb, large wattles, broad breast, strong wings, black or dull red plumage, thighs muscular, spurs strong, claws bent and sharp, free in his action, a frequent crower, and frequently scratching the ground in search of worms, not, however, for himself, but to treat the hens.

Not to weary my readers with an unnecessary citation of too many authorities, I may just observe, for their direction, that the cock should be *in perfect health*; feathers close and rather short, chest compact and firm; full in the girth; lofty and elastic gait; thigh large and firm; beak short, and thick at its insertion.

Next to health and strength, age is to be duly considered. Neither select a cock that is too old, nor one that is too young; let the age be from a year and a half to three years and a half. Some cocks retain their vigor till they are even past six years old, and some make a display of unquestionable virility at the premature age of five or six months. It is far better, however, for the fancier "to be sure than sorry." Secure a young and vigorous bird at the summit of his prime, steer equally clear of premature and often deceptive developments, and of incipient age and decrepitude—avoid all extremes.

Mascall, following Columella and Stephanus, says—"The signs of a good hen are these—a tawny color or a russet are accounted the chiefest colors; and next, those hens which have the pens of their wings blackish, not all black, but partly so. As for the grey and the white hens, they are nothing so profitable."

Markham tells us that we must lay even more stress on the selection of a hen than on the choice of a cock, and insists on "grey, grissel, speck, or yellowish—black or brown is not amiss."

These directions may have been all very well in olden times, ere the many new and valuable varieties of fowl now known were familiar to the poultry-yard, but as far as color is concerned, they can no longer be followed, unless with respect to the common Dunghill breed. Among these latter you may, of course, make what selection you please as to color, but the more valuable and distinctly marked varieties have each its own hue, and you must, consequently, just take them as you get them. Perhaps the best mode of forming a conclusion as to the most profitable color would be to keep a memorandum-book, and to enter regularly the age, color, and every other particular connected with your hens; and, of course, keep also a correct account of their proceeds, whether as to eggs or chickens. The average of a year's experience might lead to some satisfactory conclusion.

The *disposition* of the cock and hens should likewise become a subject of careful observation. Some cocks are of an unsocial, *unconjugal* disposition—will persecute and maltreat their hens, and will, if even they leave *them* alone, direct their domineering practices towards the younger inmates of the poultry-yard.

It is often necessary to change the cock, or replace one removed by death, and I must caution my readers to manage this with the utmost possible circumspection. Poultry, although naturally gregarious, are by no means indiscriminate in their attachments, and hens will not, in every instance, admit the company of a new husband when his predecessor has been removed.

Sometimes you will suffer annoyance from the pugnacity of your cocks. This pugnacity is said to arise from an unusually amorous temperament, and a consequent jealousy of disposition. Mascall, or rather his original, Columella, recommends, as a cure for this—"To slake that heat of jealousy, he shall slitte two pieces of thick leather, and put them on his legges, and those will hang over his feete, which will correct the vehement heat of jealousies within him." And M. Parmentier confirms this direction, adding, that "such a bit of leather will cause the most turbulent cock to become as quiet as a man who is bound hand and foot."

Although the cock can by no means boast much of the melody of his voice, he will on no account suffer himself to be *out-crowed* if he can help it; hence, you may observe a cock pause after each crow, in order to ascertain if he be answered by a rival, and the succeeding vocal attempt will, if possible, be yet louder and more discordant.

Cocks and hens are both fond of cleanliness and order in their *plumage*, and are, especially the former, constantly pecking and pruning their feathers. It was formerly, but erroneously, supposed, that during this process an oily fluid, secreted in the gland near the tail, was extracted from its receptacle by the pressure of the beak, and then disseminated over the remainder of the plumage, as a process necessary to render the feathers waterproof. In order to dissipate this illusion, I need only observe, that the *tail-less* fowl, though

they are destitute of that part of the body where this gland is situated, and have, consequently, no oil to extract, go through precisely the same process of pecking and pruning, and their feathers are just as much waterproof as those of any other fowl. In my opinion, this fondness of pecking and pruning is partly a provision of nature, designed to relieve some irritation in the skin, and thus conduce to health, and partly proceeds from a pure love of cleanliness and regularity in the plumage, inherent in all varieties of fowl.

In the choice of a hen for sitting, look for a large bird, with large, wide-spreading wings. Though *large*, however, she must not be heavy, nor *leggy*. No one of any judgment would set a Malay hen, as, in such case, not only would many eggs remain uncovered, but many, also, would be trampled upon and broken. Elderly hens will be found more willing to sit than young and giddy pullets; indeed, the latter should never be allowed to sit, until, at least, the second year of their laying.

The Spanish fowl are not generally good sitters; but they are excellent layers. The Dorking reverse the order, being better sitters than layers; and these qualities will also be found to extend pretty generally to hens partaking of the prevailing colors of these two varieties, the black being usually the best layers, and but careless or indifferent sitters; while grey or checkered hens (especially such as have light colored legs) are the best you can procure for sitting hens.

You will be informed of a hen's anxiety to sit, by a peculiar change in her voice to a distinctive *cluck*, which continues after hatching, until the chickens no longer require her maternal care. The heat of the hen's body is also materially increased; hence, when it is desired to check a hen's anxiety to sit, the common practice for allaying this heat is immersion in cold water.

If you entertain doubts of the steadiness of the hen you desire to set, try her constancy by placing her for a few days on some pieces of chalk shaped so as to resemble eggs, or put her on three or four eggs of little or no value.

If you desire to have chickens produced at some particular time, when you have no hen ready to sit, you may induce the desire of incubation by stimulating food—such as toast, or dry bread steeped in good ale, well-boiled oatmeal porridge, with a little Cayenne pepper mixed through it, or hard-boiled eggs, and fresh raw meat, cut small. Fomenting the belly with vinegar, in which pepper has been steeped, is a good practice. But do not suffer any one to persuade you to pluck off the feathers, or to use nettles—practices more cruel than efficacious. Artificial warmth is also never to be lost sight of.

If you find a hen soon tire, or become impatient of sitting, only give her about half the usual quantity of food, and then, when she returns to the nest, feed from the hand with such dainties as you have found to be her favorites. Some will recommend the food to be placed within the hen's reach, in order



that hunger, at all events, may not be a means of inducing her to leave her important post. It is not, however, hunger that induces the impatience to which I have alluded; and this total deprivation of exercise is most prejudicial to the poor bird's health. For the first and last week of incubation, however, the hen should only be allowed to quit the nest once daily, and should not be longer than ten minutes absent from the eggs.

Some hens, on the other hand, are as obstinately constant in their sitting as those I have been describing are the reverse; and birds possessing this temperament, will frequently sit until they half starve themselves, if not prevented. Mr. Lawrence says, that he has had hens which, under these circumstances, reduced themselves to such a pitch of weakness as even to *faint*; and, after the chickens were hatched, to be so weak as to be scarcely able to attend them.

Markham scouts the idea of any hen sitting too long, but he is in error. I would not, as some do, recommend such a hen to be fed upon her nest, but I would remove her at proper intervals, and coax her to eat by presenting her with delicacies. If she consent to eat a sufficiency, drinking will be sure to follow. I may here observe, that if a hen acquire the evil habit of breaking and eating her eggs, boil an egg hard, break away a little of the shell, and give it to her while hot. If she peck at it, and, of course, burn herself, you may reckon upon having cured her of her vicious propensity; but should the first painful lesson prove ineffectual, try a second. You will seldom or never have to resort to a third. I think that experience justifies me in arriving at the conclusion that this habit originates in a craving for *calcareous* matter, which I have already stated to be necessary to the well-being of fowl. If your hens be supplied with chalk and sand your eggs will not be touched.

To preserve eggs for hatching, pack them with the small end downward in sand, wood ashes, turf, oats, or other material, for excluding air. But if they are to be kept any length of time, dip them, when new laid, in oil or pure hog's-lard warm—not hot; rub the greasy substance into the pores with the finger, and then pack them with the small end downwards in a box or barrel. For a sea voyage, a coat of varnish would be an experiment worth trying. Care should be taken to push them closely, so that they may be shaken as little as may be.

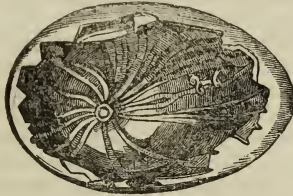
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## CHAPTER VI.

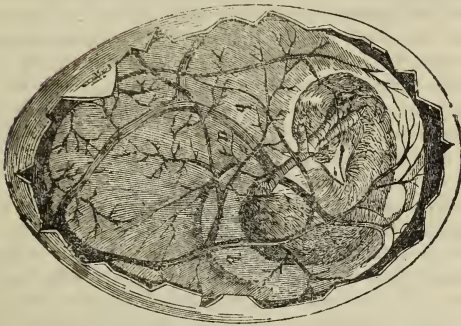
## SELECTION OF EGGS FOR SETTING—THEIR MANAGEMENT DURING INCUBATION—AND TREATMENT OF THE CHICK AFTER HATCHING.

IN selecting eggs for setting, bear in mind what I have said as to the number of hens that the cock should associate with; and choose such eggs as you have reason to believe have been rendered productive. Those of medium size, that is to say, the average size that the hen lays, are most apt to prove prolific. Sketchley tells us that he has always found the round egg to contain the female chick, and that of oblong shape, the male. This, however, though it may have been newly discovered by Sketchley, was known to Columella and Stephanus. If you examine the egg between your eye and a candle, you will be able to discern the position of the vacancy caused by the little air-bag at the blunt end of the shell. If this be in the center, say these authors, the egg will produce a cock; if at one side, a hen. This doctrine, however, has long been abandoned by physiologists, and upon the best authority; nevertheless, though I have no faith in those who pretend to tell the sex of the chickens from the eggs, you may form a very fair judgment if your eggs are impregnated, from their specific gravity. Put them into a bowl of tepid water, and reject such as do not sink to the bottom. Choose, also, such as present a marked disparity of size between the two ends; and while collecting, keep the eggs dry, clean, and in a well ventilated part of the house. Such as are equal in size at both ends, usually contain two yolks and these, be it observed, instead of producing twin-chickens, as might naturally be expected, commonly produce monstrosities: reject them. The number of eggs to be placed under a hen is from nine to eleven. The number is, however, of course, dependent on the size of both eggs and hen; an *odd number* is to be preferred, as being better adapted for *covering* in the nest. Be sure that they are all fresh; and carefully note down the day on which you place them beneath the hen. Never turn the eggs; the hen can do that better than you. About the twelfth day of incubation, you may be enabled to reject such eggs as are unfruitful. For this purpose, hold the egg between your hands in the sunshine; if the shadow which it forms, waver, keep the egg, as the wavering of the shadow is occasioned by the motion of the chick within; if it remain stationary, throw it away. If your eggs have been recently laid, the chick will be developed earlier than otherwise; if they have been very fresh, you will, about the sixteenth day, if you apply your ear to the egg, hear a *gentle piping noise* within; if the eggs have been stale, this will not be perceptible until about the eighteenth day; and, at this time, the yolk, which had previously lain outside and around the chicken, will be gradually entering into the body of the bird. This serves as nourishment to

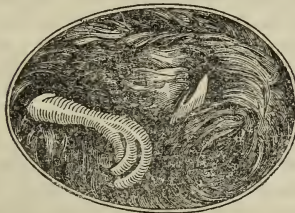
the little prisoner until his subsequent efforts shall have set him free. From this period let your attention be assiduous, but, at the same time, *cautious*; for the hen has heard this cry before you have, and all her maternal anxieties and tenderness are, from that moment, so greatly augmented, that any unnecessary interference will only tend to irritate her.



FIRST STAGE IN INCUBATION.



MIDDLE STAGE IN INCUBATION.



CHICK JUST BEFORE HATCHING.

Eggs during the process of hatching, broken to show the means for supplying nutriment to the chick.

The position which the chick holds within the egg, is apparently anything but advantageous for the work of breaking forth; and, hence, if the youngling be weakly, artificial aid is sometimes necessary. This position would, indeed, almost induce one to regard the liberation of the chick by its own unassisted efforts, as an impossibility. I shall describe it briefly:—The neck slopes toward the belly, to about the centre of which comes the head; the head lies beneath the right wing, just as that of a sleeping bird; the feet are gathered up somewhat like those of a fowl trussed for the spit, and the claws bend backwards, till they almost touch the head; and it is in this confined position that the shelly wall of the prison has to be broken through. It must, therefore, be anything but easy work for the little chick. The process of effecting the breaking of the shell, is a succession of taps from the beak, by which first a crack or *star*, with many cracks diverging from it, takes place; a hole is soon effected, the sides gradually chip away, and the chicken emerges from its new sphere of being. Sometimes the little bird, on proceeding to leave the broken shell, unexpectedly finds itself retained in its place by some accidental or irregular circumstance. The shell may, for instance, have been well cracked, and yet its lining membrane may be so tough as to defy all the efforts of the inmate to rupture it, and thus still present a barrier, and often, without assistance, an insurmountable one. Some chickens *waste their time* striving to tear this membrane before they have made a sufficient crack in the shell. These had better not receive assistance; they will speedily find out their error, and go to work in a proper manner.

In every case *look through the egg* before helping the chick. That chicken which comes out before the *whole of the yoke* has been absorbed, will assuredly prove to be an unhealthy, weakly, little wretch, and will speedily die. A chicken must, previous to leaving the shell, have imbibed such a portion of nutriment as will, at least, serve it for four and-twenty hours afterward: it is for this that the yolk is designed. Any unusual excess of light, or any injudicious interference with the eggs toward the close of incubation, will nearly always result in causing the chicken to strive to get out too soon, and thus often occasion the loss of numbers.

Neither are all shells, nor all membranes, of an equal thickness, and some are even preternaturally obstinate; hence another difficulty the chick has to experience.

Some poultry keepers will dip the eggs into warm water the day before they think they will be pecked at. This produces no perceptible difference in the consistence of the shell; and I object to the practice, not only on the score of its total inutility, but as being likely to injure the present health of the chick; and the warmth is likewise specially calculated to produce another difficulty connected with its egress, *viz.*, that of being *glued* to the shell,

the white of egg—the *albumen* which surrounds the chicken in the shell—being convertible by heat into a kind of GLUE.

The following is, perhaps, the only case in which interference can prove useful:—When you find the fracture on the outside of the shell remaining the same for five or six hours, and when, on examining the edges of this fracture, you find them dry and unmoistened by any fluid, you may conclude that assistance is called for, and may proceed to render it, but, of course, with all possible caution. The best mode to be adopted on such occasions is to imitate, as nearly as possible, the natural efforts of the chicken itself, which may be done by sharp, short strokes with the back of a knife or key; or, what is better than either, the point of a pair of scissors. Be, however, gentle, firm, and deliberate, and take care lest you penetrate the cavity of the egg. Having succeeded in making a sufficient opening in the shell, you may, by a careful and tender use of your fingers, extricate the chick. Sometimes a few scales of albumen, or of the lining membrane of the egg, may remain on the bird's plumage for some days. Do not be uneasy about them. Leave them alone, and as they dry they will fall off themselves. In affording your assistance to the embarrassed chick, be extremely tender with your fingers. You may otherwise often kill when your intention is only to cure. I would be disposed to permit at least *eight hours* to elapse before I resorted to mechanical means of interference. A chick so weak as to perish before that time, is not worth striving to extricate; and, on the score of humanity, its death within the shell will be less painful than after quitting it.

For about twenty-four hours after birth, the chick not only can do well enough without any extraneous nourishment, but will positively be far more likely subsequently to thrive if left alone. The next day they may be fed with crumbs of bread, eggs boiled hard and chopped fine, or cold oatmeal porridge well boiled. After that period, no harm can arise from turning your new brood in among older chicks that already feed themselves. They will then ordinarily follow the example of the rest, and peck away at whatever is going. In the first four days they require food at least hourly, to supply the rapid increase in bulk and feathers. Damp is fatal to them. If the breed is a fine one, however, they will do better with the hen, partaking of the natural food she scrapes together for them.

Although I have mentioned yolks of eggs, boiled hard, and broken down with crumbs of bread, as food for young chickens, I consider this treatment to be needlessly expensive, except in particular cases; and I have found plain crumbs, or cold meal porridge, that has been very well boiled, and not burned, do nearly as well. Small grained meal, given raw, or slightly scalded, and suffered to cool down to a very low degree of tepidity, will also be found useful and good. Do not forget that, in all probability, thirst will be present before hunger, and there ought, therefore, always to be a flat, shallow pan or plate of

clean spring water left within reach, and the hen herself, glad of a little refreshment after so long a task, will usually lead the way to it.

If the chickens be hatched during cold weather they will require artificial warmth, or, at the very least, comfortable housing. The kitchen of a farmhouse will afford this in perfection. Recollect that setting your hen in, or at the approach of, winter, is stark folly; freedom from annoyance, comfortable housing, and a sheltered walk, are all that they require—an hour's sunshine is worth more than a year's wrapping up in tow. If your chicks be very weakly you may cram them with crumbs of good white bread steeped in milk; but at the same time recollect that their little crops are not capable of holding more than the bulk of a pea—so rather under than over feed. If your hen have been much exhausted by hatching, you will do well to cram her with crumbs of bread steeped in diluted spirits or ginger cordial.

The following hatching table exhibits the period of incubation with the denizens of the poultry yard:—

	Number of eggs.	Days.
Swan . . . . .	5 to 10 . . . . .	42
Goose . . . . .	12 to 15 . . . . .	30
Duck . . . . .	12 to 15 . . . . .	30.
Turkey . . . . .	15 to 20 . . . . .	31.
Peafowl . . . . .	5 to 7 . . . . .	29.
Guinea Fowl . . . . .	7 to 9 . . . . .	30.
Hen . . . . .	9 to 13 . . . . .	21

## CHAPTER VII

### VARIETIES OF THE DOMESTIC FOWL.

THE varieties of the Domestic Fowl most desirable in an amateur's collection may be classed as follows:—

1. THE MALAY FOWL, from its size and strength, is admirably adapted for crossing with the Dorking and other native breeds.
2. THE JAVA FOWL, nearly resembling, and in the opinion of some, identical with, the Malay.
3. THE COCHIN CHINA breed, equal in most respects, and more prolific than the Malay.
4. THE SPANISH FOWL, perhaps the best breed known for laying.
5. THE POLISH FOWL, a noble and very beautiful bird, and an excellent layer.
6. THE SPANGLED VARIETIES, including the whole class of GOLD and SILVER SPANGLED, known in different coun-
- tries as Spangled Hamburgs, Every day Dutch, Bolton Bays, Bolton Greys, Chittyprats, Creoles, Corals, &c.
7. THE SPECKLED and WHITE DORKING, the most delicate of all the varieties for the table.
8. THE SUSSEX FOWL, most probably a variety of the Dorking.
9. THE GAME FOWL, graceful of form and plumage, with undying courage, and excellent for crossing with common varieties.
10. THE PHEASANT FOWL, erroneously said to originate in a cross with the Cock Pheasant.
11. THE BANTAMS, more remarkable for their beauty than any other quality.

## I. THE MALAY FOWL.

The Malay Fowl has, as its name implies, been brought originally from the peninsula of that name at the southern point of the continent of India. He stands very high on the legs, is long-necked, serpent-headed, and is in



color usually dark brown, streaked with yellow, sometimes, however, white; his form and appearance are grand and striking in the extreme, and he is no small embellishment to the poultry-yard. This fowl is also frequently called the *Chittagong*.

The kind of Malay fowl, however, that were originally imported, were by no means such birds as I could recommend to the notice of the breeder, their size possessing too much offal, as neck, legs, and thighs, and the flesh, moreover, being dark-colored and oily. Another variety has been since introduced, which is well worthy of our attention. As a cross, this Malay has, indeed, proved a most valuable addition to our poultry-yard, the cross-breed possessing all the hardiness of our native domestic fowl, with the gigantic size of the foreign stock.

## II. THE JAVA FOWL.

Resembling the Malay in shape, but presenting, in portions of its plumage, the coloring of the Dorking. I hold this, its common appellation, to be a misnomer, and regard it as the result of a cross between a Malay and

Dorking or Spanish. In qualities it resembles the Malay, but is not so valuable as a cross with other breeds.

#### THE SHAKEBAG.

A good many years ago, there used to be a variety of fowl much in request in England, called the "shakebag," or the "Duke of Leeds' fowl," his grace, of that name, about 60 or 70 years ago, having been a great amateur breeder of them. These fowl were as large as the Malays, but differed from them in the superior whiteness and tenderness of their flesh, as also in their very superior fighting abilities. The name of this fowl seems to have arisen from the old practice of cock-fighting, when *the fancy* used to challenge *all comers* having their cocks concealed in a bag, and the tremendous size and power of the Duke of Leeds' fowl proving so far superior to all competitors, thus usually insuring conquest, and eventually obtaining for it the name, *par excellence*, of *shakebag*, since corrupted into SHACKBAG.

This fine bird was not unfrequently substituted for a turkey, and this to the great convenience of poulterers and inn-keepers.

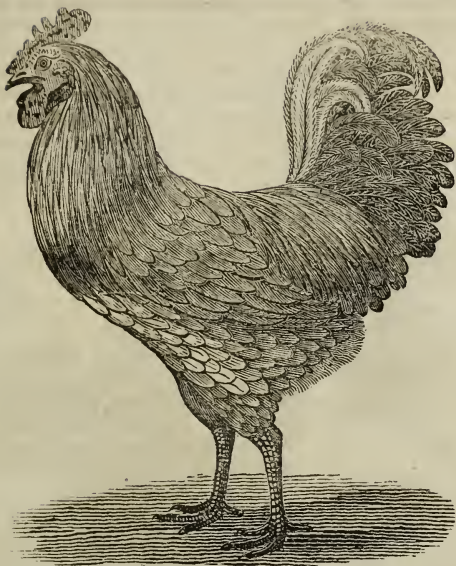
This "shakebag" or "shackbag" fowl, so lauded by Mowbray, but with the real origin of which he has confessed himself unacquainted, unless, indeed, as an improved breed of dunghill, would appear, if we can judge from the description of Dixon and other writers on poultry, to have been neither more nor less than an offshoot of the great Paduan, Polish, or Jago fowl, the immediate domesticated descendant of the "*Gallus giganteus*," already described; and I have particularly to request my readers on no account to confound it with the Malay. This fowl would, indeed, seem to have been almost identical with the great wild bird of Sumatra, but it is now altogether unknown to the London dealers. This same fowl was described, about two centuries and a half ago, by Aldrovand, as "very handsome, adorned with five different colors—viz., black, white, green, red, and yellow; body black, tinged with green, tail of the same color; base of the feathers white; some quill feathers of the wings white above; the head adorned with a black crest."

#### III. THE COCHIN CHINA FOWL.

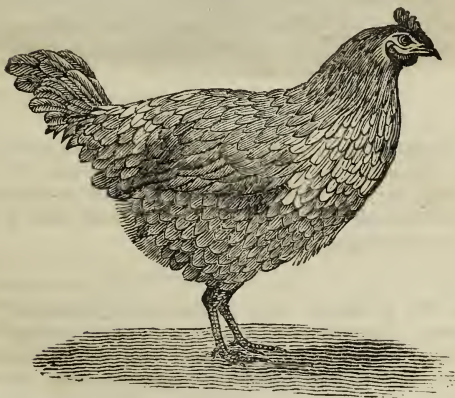
This gigantic bird has been only very recently introduced into Great Britain and America. The breed have since become comparatively well known and diffused.

This variety of fowl so far surpasses, both in size and power, all that we have ever yet seen in the shape of poultry, as to have led many persons not conversant with zoology, on first viewing them, to refer them to the family of BUSTARDS. They are, however, genuine poultry. Their general color is rich glossy brown, or deep bay; on the breast is sometimes found a marking of a blackish color, and of the shape of a horse-shoe. The horse-shoe mark on the breast is not an infallible sign of the breed. The comb is of a



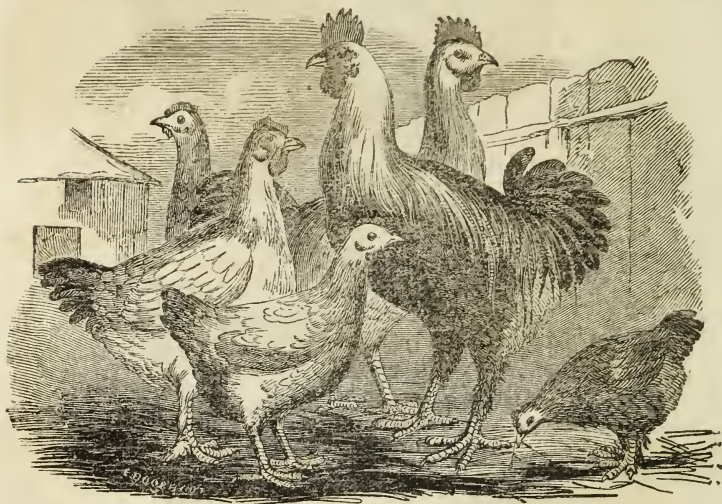


THE COCHIN CHINA COCK.



THE COCHIN CHINA HEN.

medium size, sometimes, but not always, serrated—but not deeply so; and the wattles are double. Besides their gigantic size, however, these fowls possess other distinctive characteristics, among which I may mention, as the most striking, that the wing is jointed, so that the posterior half can at pleasure be doubled up and brought forward between the anterior half and the body. The birds can do this at pleasure; and the appearance the manœuvre imparts to their form has procured for them the title of “ostrich fowl.” The flesh is white and delicate. The eggs laid by the hen of this variety are



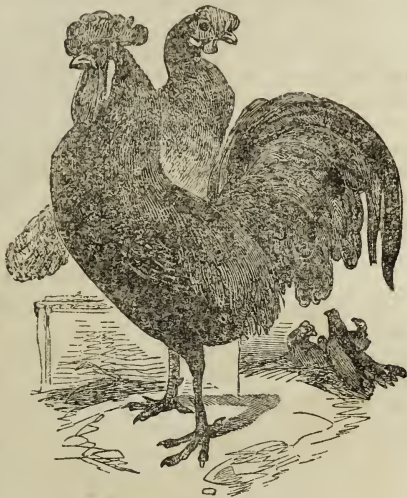
SHANGHAIS.

large, of a light chocolate color, and possess a very delicate flavor. They are very prolific, not unfrequently laying two and occasionally even three eggs on the same day, and within a few moments of each other. The Cochin China fowl is well known in America under the name of Shanghai, being the same fowl with another name.

#### IV. THE SPANISH FOWL.

This fowl is clad in black plumage, but possesses quite the reverse of black flesh. I regard these birds as the result of the highest possible artificial culture, and adduce, in support of my opinion, their unusually large comb and wattles, characteristics not commonly to be met with among the primitive varieties.

The Spanish fowl is, perhaps, a little inferior in size to the old "shake-bag," but in every other quality, wherein excellence and value are to be looked for, it is more than that bird's equal. The color of the Spanish fowl is a glossy black, and the feathers of the legs, thighs, and belly are particularly decided in their hue, and of a velvety aspect. It is a stately bird, and of a grave and majestic deportment, and is, in either utility or beauty, to be surpassed by none of its congeners. One of the most striking characteristics of this fowl is a white cheek, and the comb and wattles are singularly large, simple, and of a very high color; the feet and legs are of a leaden color, except the soles of the feet, which are of a dirty fleshy hue. A full grown cock will weigh about  $7\frac{1}{2}$



THE SPANISH FOWL.

lbs.; the hen about  $6\frac{1}{2}$ . This is a fowl well deserving the attention of the breeder, and present no peculiarities of constitution that would suggest difficulties in either hatching or rearing. As table birds they hold a place in the very first rank, their flesh being particularly white, tender and juicy, and the skin possessing that beautifully clear white hue, so essential a requisite for birds designed for the consumption of the gourmand. The hens are likewise layers of the first order; and of all naturalized or indigenous varieties of fowl, with the exception of the Columbian, these lay the largest and the best flavored eggs. They are, besides, prolific, extremely easily fed, and, in short, I know of no fowl I would rather recommend to the notice of the breeder; but let me here observe, that spurious specimens of this fowl are often in the market, which will occasion, perhaps, an equal outlay at their original purchase—will decidedly cost as much to feed—be, perhaps, harder to rear, but will most unquestionably not bring in an equal return in the way of profit. By applying, in the first instance, to a breeder of known respectability, you will avoid much disappointment; and though you may conceive the price demanded of you to be high, it may not, perhaps, at the same time be higher than what you might have foolishly paid for a bad article; and

even should you have to pay an extra price, do so willingly, and, recollecting the old proverb, avoid being "penny wise and pound foolish."

#### THE COLUMBIAN.

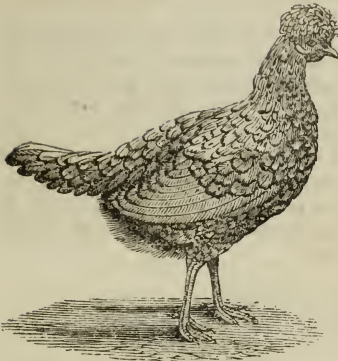
A very noble fowl, presenting the appearance of a cross between Spanish and Malay, but possessing so much nobility and stateliness of aspect that I am loth to regard it otherwise than as a distinct and very primitive variety. The eggs are particularly large. My fowl, of this breed, lay eggs averaging in weight from  $4\frac{1}{4}$  oz. to  $4\frac{1}{2}$  oz., seldom, however, laying more frequently than every second day. These fowl are natives of Columbia, on the Spanish main in South America; and I think it not improbable that they are the origin of the breed now known as "Spanish."

#### V. THE POLISH FOWL.

The *Golden Spangled* is one of no ordinary beauty; it is well and very neatly made; has a good body, and no very great offal. On the crest, immediately above the beak, are two small fleshy horns, resembling, to some extent, an abortive comb. Above this crest, and occupying the place of a comb, is a very large brown or yellow tuft, the feathers composing it darkening towards their extremities. Under the insertion of the lower mandible, or that portion of the neck corresponding to the chin in man, is a full, dark-colored tuft, somewhat resembling a beard. The wattles are very small. In the golden variety, the hackles on the neck are of a brilliant orange, or golden yellow; and the general ground-color of the body is of the same hue, but somewhat darker. The thighs are of a dark brown, or blackish shade, and the legs and feet are of a bluish gray. The full grown cock weighs about six pounds, and the hen five and a-half pounds; the eggs moderate in size, and very abundant.

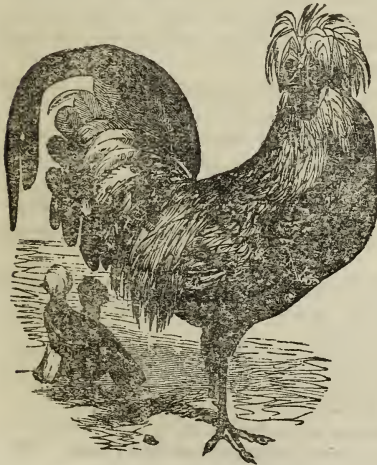
In the *Silver Spangled* variety, the only perceptible difference is that the ground-color is a silvery white. The extremity, and a portion of the extreme margin of each feather, are black, presenting, when in a state of rest, the appearance of regular semicircular marks or spangles; and hence the name of "Spangled," the varieties being termed gold or silver, according to the prevailing color being bright yellow, or silvery white. In mere excellence of flesh, and as layers, they are inferior to the Dorking or Spanish varieties.

Of the Polish fowl there are several subvarieties. The Polish fowl is, perhaps, the most unchanged from the primitive stock of any we are now acquainted with, being beyond doubt the immediate and almost unmixed descendant of the "*Gallus giganteus*," or great wild cock of Sumatra. The varieties of Polish fowl are—



GOLD SPANGLED POLISH HEN.

black and golden yellow. The hinder end of the body is furnished with green and orange-brown hackles, and the tail is carried well up. The flesh of these birds is of good quality, and they are very prolific. They also fatten quickly, and have, by some, been compared to the Dorking for similarity of flesh and other excellences of quality.



WHITE-CRESTED BLACK POLANDS.

I.—*The Spangled Polish.*—A bird of extraordinary beauty, extremely scarce, and very difficult to be procured. This fowl presents a symmetrical and regular combination of the following colors, viz.:—A bright orange, a clear white, a brilliant green, and a jetty black, softened down with a rich and pure brown, every feather being tipped with white, so as to produce the effect whence has been derived the term of SPANGLED. The color of the hen is a prevailing golden yellow, with white spangles, like the cock. In the cock the thighs are black, and are, likewise, though in a less degree, marked and spangled with

II.—The second variety of the Polish fowl is the well-known black fowl, with a white tuft on the crown. These birds were brought from St. Jago by the Spaniards, to whom they owe their first introduction into Europe. Their color is a shining black, and both cock and hen have the white top-knot. The head is flat, surmounted by a fleshy protuberance, out of which spring the crown feathers constituting the tuft. These are remarkably good layers, and will, if kept warm, lay nearly throughout the year; and it is this cause, probably, that has induced Mowbray and other writers to confound them

with the Dutch breed, which, from a similar circumstance, have been styled "Every-day layers."

III.—This variety of Polish fowl is the most pure and unmixed of the three: it is, indeed, to all appearances, the uncontaminated descendant of the great fowl of St. Jago. Its color is a brilliant white, with a jet black top-knot. This variety was described by Aldrovande, and more recently by Dr. Bechstein. I have never myself seen a specimen of the breed, and have every reason to suppose it to be extinct, or very nearly so. Applications have been made to several persons in both Germany and Poland, connected with the poultry fancy, for the purpose of procuring specimens of these birds at any cost, but the answers returned were, without one exception, that they were no longer to be had.

#### VI. SPANGLED VARIETIES.

Gold and Silver Spangled Hamburgs.	Gold and Silver Dutch.
Dutch Penciled.	Gold Bolton Bays.
Dutch Every-day Layers.	Chittiprats.
Bolton Greys.	Creoles.
	Prince Albert Fowl.

Much confusion seems to exist with regard to the spangled varieties of the Domestic Fowl. The truth seems to be that the spangled fowl have been introduced without much attention being paid to their origin, and breeders have given them the names they thought most descriptive of their appearance and qualities—and thus run hastily through the description of the spangled varieties, as given by Mr. Dixon and other writers;—in the south of England a variety exists called the *Coral*, or *Creoles*, to which the Penciled Patch of Dixon is the nearest approach.

In the neighborhood of Keighley, in Yorkshire, and on the borders of Lancashire, the Bolton Greys are called "Chittiprats," or "Cheteprats," and prizes given to them as handsome, hardy, and excellent layers. In other parts of the kingdom they are known by the name of "Moonies." The so-called Prince Albert's breed are Bolton Greys, said to be crossed with game blood, and not easily to be distinguished from the Silver Spangled Hamburg. Bolton Bay is another provincial term for the Golden Hamburg, as Bolton Grey is for the Silver.

It is obvious, from these confused statements, that the various spangled races of Domestic Fowl have been so intermingled as to render it next to impossible to discriminate between them.

DUTCH EVERY-DAY LAYERS.—Frequently confounded with the preceding. Instead of being destitute of comb, and carrying in its place a tuft of feathers on the crown, the cock of this interesting variety possesses what is called a rose comb; that is to say, a comb formed of a great number of folds of single comb, united into one broad, serrated, and fleshy mass. The

color of the cock is, as usually occurs, more brilliant than that of the hen. His body is of a fine, reddish-brown hue, with neck hackles of a bright and rather deep golden yellow. These birds present, likewise, two distinctly-marked varieties, the difference, however, depending chiefly on color. When, as I have described, the color of the body is a golden yellow, streaked or spangled with blackish, or deep brown markings—an appearance caused by the dark color of the ends of the feathers—the bird is styled the “Golden Spangled;” and when the ground color is white (the other circumstances of shading remaining the same), the bird is styled the “Silver Spangled.”

These fowl have received the name of “Every-day” or “Everlasting Layers,” from the circumstance of their unwillingness to hatch, in consequence of which they lay an egg nearly all the year through, and, if properly cared for, and warmly housed, even amid the frost and snow of the most inclement winter. Some say that the eggs of these fowls are not in general so large as those of ordinary poultry, nor equally substantial and nutritious. This might, indeed, considered theoretically, seem a very obvious consequence of so unsound a demand upon the bird’s natural resource; but I think that there is really no such remarkable difference.

**THE BOLTON GREYS.**—In general form they resemble the Dorking, except that they are longer in the body; the color elegantly penciled in black. A variety called Bolton Bays, from that color, have precisely similar pencilings upon the bay color. Mowbray, quoting the Rev. Mr. Ashworth, vicar of Tamworth, says of the Bolton Greys :—“They are small in size, short in the leg, and plump in the make; the color of the genuine kind invariably pure white in the whole lappel of the neck; the body white, thickly spotted with bright black, sometimes running into grizzle, with one or more black bars at the extremity of the tail. They are chiefly esteemed as very constant layers, though their color would also mark them for good table fowl.” Mowbray also calls them Corals—why, does not appear, unless they are synonymous with the Creole of other parts of the country. In Yorkshire, the same birds are called Chittiprats.

**THE BARBARY FOWL.**—Now naturalized in Spain; the specimen that I describe was brought recently from that country. It is very tall, remarkably heavy, with not much offal, and a firm, muscular quality of flesh. The comb presents a most singular appearance—viz., that of two large and fleshy combs growing up together, and enclosing a smaller and apparently abortive comb between their folds. The color is a prevailing black with some green and brown markings upon the wings; it is booted and feathered upon the legs, like the Bantam, and thus clothed to the very toes; the cheek or ear-piece is white, like the Spanish breed. It is a bird of vast body, and almost gigantic proportions, displaying great boldness of carriage and confidence of demeanor.

## VII. THE DORKING FOWL.

The Dorking would appear to owe its name to its having been chiefly bred in a town of Surry, of the same appellation. That the peculiarity of five toes, or, in other words, of two hind toes instead of one, is to be regarded as a distinctive character of the breed, is by some writers questioned, and by others wholly denied. For my part, I should say, that whenever this characteristic is absent, a cross has been at work.



WHITE DORKINGS.

I do not, however, mean to assert that this possession of two hind toes instead of one, has never occurred in any other family of fowl except those bred at Dorking, in Surry, for Aristotle has mentioned the existence of a similar peculiarity among certain fowl in Greece, and both Columella and Pliny assert the existence of such in their time in Italy, so also does Aldrovand; and these authors lived hundreds of years ago; and, oddly enough, these breeds were remarkable, as are our own Dorking, for being good layers and good sitters.

The color of the Dorking is usually pure white, or spotted or spangled with black; these colors sometimes merge into a grey or grizzle. The hens weigh from seven to nine pounds; stand low on their legs; are round, plump, and



short in the body; wide on the breast, with abundance of white juicy flesh. The hens are generally good layers, and their eggs, though smaller than the egg of the Spanish and Polish breeds, are of good size and well



COLORED DORKINGS.

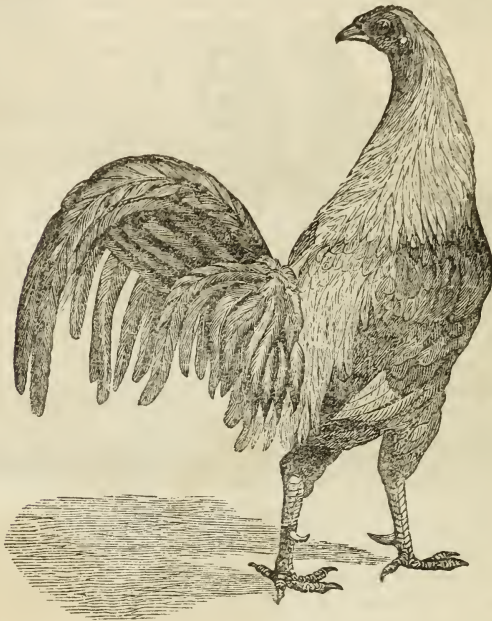
flavored. These birds have been long prized, and it is now many years since their superiority over our ordinary domestic varieties was originally discovered and appreciated; they were first noticed, and the variety adopted, by the Cumberland breeders, whence they were soon brought into Lancashire and Westmoreland, and gradually spread over all England. Whether, however, from injudicious treatment, or imperfect feeding, or change of climate, or from whatever cause, it is certain that, when met with far from their native place, they appear greatly to have degenerated from their original superiority of character. In this, and all other varieties of fowl, fresh blood should be introduced from time to time, or the breed degenerates.

#### VIII. THE SUSSEX.

This is but an improved variety of Dorking, similar in shape and general character, usually of a brown color, but possessing the advantage of wanting the fifth toe: I say advantage, for the Dorking fowl frequently becomes diseased in the feet, the cocks especially, in consequence of breaking the supplementary toe in fighting.

## IX. THE GAME FOWL.

The Game fowl is one of the most gracefully-formed, and most beautifully-colored of our domestic breeds of poultry; in its form and aspect, and in the extraordinary courage which characterizes its natural disposition, it



exhibits all that either the naturalist or the sportsman recognizes as the *beau idéal* of high blood; embodying, in short, all the most indubitable characteristics of gallinaceous aristocracy.

We do not possess any very satisfactory record of the original country of the Game fowl; but I am disposed to cede that honor to India, the natives of which country have always been remarkable for their love of cock-fighting; and we also know that there still exists in India an original variety of game cock, very similar to our own, but inferior in point of size. As to the date or occasion of their first introduction into the British islands, we know nothing certain; but it is probable that we owe it to the invasion of Julius Cæsar, the Romans having been very fond of the sport of cock-fighting.

The Game fowl is somewhat inferior in size to other breeds, and in his shape he approximates more closely to the elegance and lightness of form usually characteristic of a pure and uncontaminated race. Amongst poultry he is what the Arabian is amongst horses, the high-bred short-horn amongst cattle, and the fleet greyhound amongst the canine race.

The flesh of the Game fowl is beautifully white, as well as tender and delicate. The hens are excellent layers, and although the eggs are somewhat under the average size, they are not to be surpassed in excellence of flavor. Such being the character of this variety of fowl, it would doubtless be much more extensively cultivated than it is, were it not for the difficulty attending the rearing of the young, their pugnacity being such, that a brood is scarcely feathered before at least one-half is killed or blinded by fighting.

The beauty of form and brilliancy of color displayed in the Game fowl, renders the breed very desirable; they are of all colors, and each variety seems to have had its patrons, the rule being to mate the cock with hens of the same feather. The brood cock for purposes of battle, says this authority, "should have every feature of health; such as a ruddy complexion, feathers close and short, flesh firm and compact, breast full, yet taper, and thin behind, full in the girth, well coupled, lofty and spring, a good well-developed thigh, the beam of the leg strong, a large quick eye, beak strong and crooked."

"In the choice of your hens," says Spetchly, "let them be rightly plumed to the cock; nor let your choice fall upon those that are large, but rather suffer the cock to make up for the deficiency of the hen in size. In shape they should be similar to the cock, lofty necks, short and close feathered. A true blood hen is clean and sinewy in the leg, the body compact and well proportioned, a well-set thigh, with long, clean, and taper toes." Having selected a cock, place with him from four to six hens, bringing them together in November or December. If he is young, the hens may be full-grown—if a two year's old, then the hens may be young pullets, supposing



GAME-COCK.

a strong and vigorous breed is desired. Have, however, a marked attention how he bears himself to all his hens, as it frequently happens that one or other of them falls under his displeasure, in which case she should be removed.

In selecting eggs for setting avoid the earliest ones, as well as the last; choose the best shaped eggs and mark them to avoid mistakes, and place them under an old game hen if you can procure one, the old being excellent mothers. Their place for sitting should be private, and free from all annoyance or intrusion.

When hatched, the young should be regularly fed, and often, after the first day or two, but in small quantities. Let their food be:—Macerated eggs, boiled hard; crumbs of white bread; lettuce leaves and meadow ants; maggots from grains; steeped oats and small wheat, curds, with new milk; bread, toasted, and steeped in chamber-lye.

The variety of Game fowl are very numerous, and to the uninitiated their designations very unintelligible. For the purposes of combat, a sport now rarely followed by amateurs, the black-reds have been the favored variety. The recognized breeds are, according to Spetchly:—

- |                                 |                 |
|---------------------------------|-----------------|
| 1. Black Reds.                  | 8. Furnaces.    |
| 2. Silver black breasted ducks. | 9. Pole cats.   |
| 3. Birchen ducks.               | 10. Cuckoos.    |
| 4. Dark greys.                  | 11. Gingers.    |
| 5. Mealy greys.                 | 12. Red duns.   |
| 6. Blacks.                      | 13. Duns.       |
| 7. Spangles.                    | 14. Smoky duns. |

“In all these,” says Spetchly, “good birds may be found; from them, however, have been raised crosses innumerable, and it is the aim of the fine breeders of the present day to have their birds as much as possible uniform in feather, blood, and constitution. Piles,” he says, “have originated from a variety of crosses, which have constituted many of the shades of color; they are not,” he adds, “of my selects.”

Buffon, and other continental writers, have given this fowl the not unappropriate title of the “English Fowl;” and truly it is in England that the very best specimens of the breed are to be met with.

A correspondent well acquainted with rearing and breeding of game fowl, says, “Four or five hens are quite sufficient to keep company with one game cock; perhaps, it is right to observe, that as hens lay at various seasons of the year, there never should be at any one particular season more than eleven or thirteen eggs collected for hatching. When this is done the chickens will prove to be more spirited and resolute. The month of March is the best month to bring forth game chickens. It is generally understood that when hatched in that month they prove to be the most hardy and constitutional birds. In putting game hens with a cock for breeding, great care should be taken to match the feather as near as possible. You may breed

from a cock until he is four years old—that is, if not previously cut up by fighting a battle. One battle, or even two, if easily won, will not injure a cock for breeding; some say it will, but I think not. Pullets should at all times be put to aged cocks, and *vice versâ*, stags to aged hens. The greatest of care should be taken in gathering the eggs, that those of each hen be kept separate, and hatched accordingly.

We should state, in conclusion, that however interesting for their beauty and high courage, game fowl will be very troublesome in a poultry yard of various breed, especially if any other cock is kept; for although their smaller size might lead to the supposition that they would not be the aggressors, this would be a mistake; their indomitable spirit leads them to quarrel with every other bird, and their activity and muscular strength render them dangerous to the largest adversary.

#### X. PHEASANT FOWL.

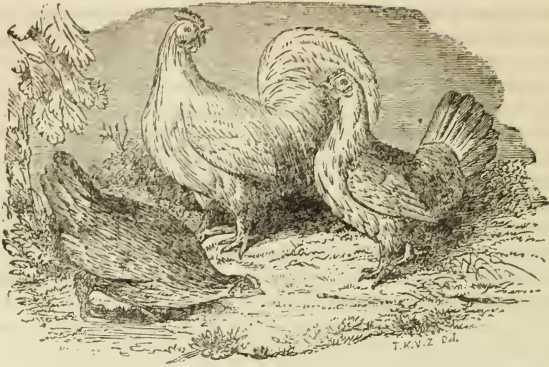
Much has been written upon this bird and its origin, and a candid consideration of the entire subject, leads to the conclusion that this is another case of intermingling of different varieties. Certain it is, that no established instance exists, where a cross between the pheasant of the woods and the domestic fowl have ever reached a second generation.

Mr. Whittaker of Beckington, Somerset, describes a breed of what he calls PHEASANT MALAY, which he has kept for seven years. The cock he describes as a large sized bird, of a dark red color, with a small comb; but the beauty of the breed is with the hens, which are of a pheasant color in all parts of the body, with a velvety black neck, the shape of both cock and hen being very good; the neck in both, long and high crested; the legs, and also the skin, is white. The hens have scarcely any comb; the cocks have one extending only a little way backwards. The chickens of this breed hatched in June, succeed better than when hatched earlier; that they are small at first, and being scantily supplied with down, have a naked appearance, and are very susceptible of cold, circumstances which lead him to suspect them to be a recent introduction, and from some warmer climate.

#### XI. THE BANTAMS.

The original of the Bantam is the Bankiva fowl, a native of Java, several specimens of which are kept by the Queen of England. These are very beautiful, of a perfectly white color, and exceedingly small size, and they exhibit some peculiar traits of habit and disposition that we cannot overlook. Amongst other strange propensities, the cocks are so fond of sucking the eggs laid by the hen, that they will often drive her from the nest in order to obtain them—nay, they have even been known to attack her, tear open the ovarium, and devour its shell-less contents.

As might be inferred, when such a propensity to devour the eggs exists



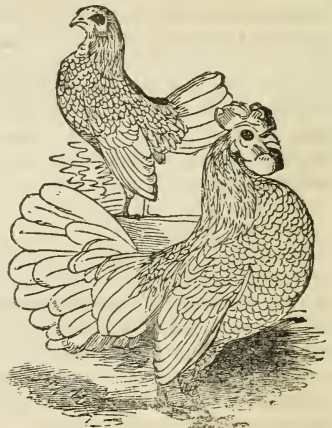
WHITE BANTAMS.

in the male bird, the female is a secret layer. In this respect these fowl show their identity with the original bird of Java—the Bankiva cock. These birds are both good layers and good sitters.

The fowl commonly known as the Bantam, is a small, elegantly-formed, and handsomely-tinted variety, evidently not remotely allied to the game breed. This bird is furnished with feathers to the toes. There is another variety ordinarily known as Sir John Sebright's fowl, which has its legs



ORDINARY BANTAM.



SEBRIGHT BANTAMS.

perfectly naked to the toes, and approaches in form more nearly to the game breed. The high-bred cock of this breed should have a rose comb, full hackles, a well-feathered and well-carried tail, a stately, courageous demeanor, and should not be quite a pound weight. The favorite color is a golden yellow, the feathers edged with black, the wings barred with purple, tail feathers and breast black. The Bantam possesses high courage, and will fight with great resolution. The attitude of the cock is singularly proud and haughty; his head thrown back so as to nearly touch the upper feathers of his tail. Pure birds of this blood are very rare.

THE CREEPER is also a very small variety of "Bantam," with short legs.

#### XII. THE TURKISH FOWL

Is another variety of "Bantam," having a whitish body, with black belly and wings, the body streaked with gold and silver, and the legs bluish. The hen is, as usual, of a less showy plumage, her color being white, speckled here and there with black, the neck yellowish, and tail of one color.

#### XIII. THE JUMPER.

In addition to these diminutive races, there is another mentioned by Buffon, as being so short-legged that they are compelled to progress by *jumps*. These are, however, somewhat larger than the common Bantam, and approach more nearly in size to the Dunhill. They are prolific, as well as excellent sitters, the hen having been known to hatch two broods in succession, without even an intermediate day of rest. These dwarf fowl were described by Aldrovand more than two hundred years ago, and also, much farther back, by the celebrated Roman naturalist, Pliny, under the designation of the *Adrian breed*.

#### XIV. THE RUMPKIN OR TAIL-LESS FOWL.

This bird is distinguished by the total absence of the caudal extremity. Some suppose it to be a distinct species descended from the wild breed of Ceylon. Among the wild birds the comb is not incented; it is so with the tame; and is, in the latter case, frequently double. Buffon supposed this fowl to be a native of America, but Dixon declares him to have been in error, having been misled by the circumstance of these birds being domesticated very commonly in Virginia. Others have supposed this fowl to be a native of Persia, and Latham even names it the "Persian Cock." It is, however, of very little practical importance whence the rumpkin originally came, the bird possessing neither good flesh nor affording good eggs.

#### XV. THE SILKY FOWL.

This fowl, remarkable for the silky texture of its plumage, is a native of China, but is likewise to be found in Japan: it is nearly always of a white or cream color. Some modern writers have sought to establish for the silky

fowl a claim to be considered a distinct species; but their opinion is evidently erroneous. These fowl are good layers, but the eggs are small. For any practical purpose they are quite useless, and are also carefully to be excluded from the poultry yard, on account of the rapidity with which a cross from them lowers the value of our common poultry, darkening the color of the skin, and causing our birds to deteriorate both in appearance and utility.

#### XVI. THE SIBERIAN OR RUSSIAN FOWL,

Called by some the Russian, and said to be a native of that country, is distinguished by tufts of dark-colored feathers springing from each jaw, others, longer and fuller, springing from the lower mandible, in the form of



RUSSIAN FOWLS.

a beard. The color varies; some are white, some blue or black, and others are colored like the game fowl. The flesh of this variety is white and good. They are, likewise, good layers, are hardy, and easily fed. This fowl is sometimes colored like the Spangled Hamburgh—some gold and some silver spangled. When thus colored, they are deemed valuable.

#### XVII. THE FRIZZLED FOWL

Is so called from the crisped and frizzled appearance of its feathers, and not, as some have erroneously asserted, from a corruption of Friesland, at one time improperly conceived to be its native country. It is a native of Java, and other parts of Eastern Asia: it is smaller than our common fowl, is very susceptible of cold, and is, on that account, very difficult to rear. These fowl are particularly sensible of wet, the chickens especially; they are very



shy and wild, and, like the Rumpkin, are objects for the attention of the showman rather than of the poultry breeder.

#### XVIII. THE DUTCH FOWL

Is of a white or grey color, streaked or spangled with black, and excellent fowl, whether as layers or for the table; originally imported from Holland. This is called by Dixon the "Pencilled Dutch Fowl," from its marking. It is not the same as the birds I have already described under the name of "Every-day layers."

#### XIX. THE NEGRO FOWL

Is a native of Africa, but by no means to be confounded with the "Barbary fowl." The Negro fowl is distinguished by having black comb, wattles, skin, bones, and feathers. The flesh is, however, white and tender. This bird is another good specimen for the curious, but anything but a desirable inmate of the poultry-yard, as, besides being ugly and unprofitable, he has the objectionable quality of speedily causing deterioration among poultry.

#### XX. THE BARN-DOOR FOWL.

I describe these fowl separately; for, although the designation of "Barn-door fowl" may be applicable also to the Dunghill, I regard the former appellation as possessing a far more extended signification.

The Barn-door fowl embrace, of course, several sub-varieties. Few of our high-priced breeds, except in some places the Dorking and the Polish, have, as yet, become so common as to be included in the list; but crosses of the common Dunghill bird with the Malay, Dorking, Polish, or Spanish, are very frequently to be met with.

Dr. Bechstein enumerates eight distinct varieties of barn-door fowl, viz:—

- |                                  |  |
|----------------------------------|--|
| 1. The fowl with the small comb. | 6. The ermine-like fowl.                             |
| 2. The crowned fowl.             | 7. The widow; with tear-like spots on a dark ground. |
| 3. The silver-colored fowl.      | 8. The fire and stone-colored fowl.                  |
| 4. The slate-blue fowl.          |  |
| 5. The chamois-colored fowl.     |  |

The distinction will be perceived to consist almost solely in color; but the Doctor has omitted another and very ordinary inmate of the farm-yard—viz., the *booted* fowl, represented by the bantam. It will then be seen that the Barn-door fowl, whatever marks of being an original variety it may have formerly exhibited, is now likely soon to lose all such marks from the effect of crossing.

#### XXI. THE DUNGHILL FOWL.

The Dunghill fowl occupies in the poultry-yard precisely the position of the cur dog in the kennel, being, in fact, the produce of a miscellaneous intermixture of most of the ordinary domestic varieties, and constantly differing in its appearance with the accidents which may have influenced its parentage

## CHAPTER VIII.

## THE TURKEY.

## THE WILD ORIGINAL.

LINNÆUS and others have given the turkey the erroneous appellation of "Maleagris gallipavo," under the strange impression that this bird and the Maleagris of the ancients are identical—a very strange error indeed, inasmuch as the descriptions of the Maleagris, given by Athenæus and other classic writers, refer with the most minute accuracy, to the *Guinea fowl*; and in scarcely any single particular can be traced a resemblance to the turkey. The mistake was first observed and pointed out by the French academicians, and is now universally admitted.

Various opinions have been promulgated relative to the original country of the turkey, but it is now ascertained beyond a doubt to have been America; and it is in that country alone that the true original of our domestic turkey is yet to be met with in all its primitive wildness, clothed in its natural plumage, genuinely wild in all its habits, the unreclaimed denizen of the wilderness. As to the medium through which this bird was first introduced into Europe much doubt still exists, and we have, indeed, no authentic proof as to either the period of time, or by what agency that event took place; it is, however, not unreasonable to suppose that the Spaniards, after their discovery of Mexico, where the turkey is known to be indigenous, brought specimens away with them on their return to their own country; and Oviedo, the earliest describer of this bird, speaks of it having been domesticated by the Christian inhabitants of New Spain and the Spanish Main. This proves that the turkey was domesticated by the Spaniards before the year 1526, for in that year was Oviedo's "Natural History of the Indies" published at Toledo. The discovery of Mexico took place in 1518: and when Hernandez shortly afterward described the natural productions of that country, he enumerated amongst them the turkey, distinguishing also the *wild* from the *tame*. In 1530, the turkey was introduced into England; but it seems more probable that we owe its introduction to Cabot's having brought it direct from America, than that we obtained it from Spain; for if the latter were the case, I think it likely that some record of its transmission would remain.

In 1541, we find turkeys enumerated amongst the delicacies of the table, and classed with the crane and swan; but the bird was too important an addition to our stock of domestic poultry to remain very long a rarity. Attention was drawn towards it,—it was bred extensively; and in 1573, we find it mentioned in "Five Hundred Points of Good Husbandry" as forming the staple of the farmer's ordinary Christmas dinner.

The origin of the popular name "Turkey" appears to be the confusion

that at first so unaccountably subsisted relative to the identity of the bird with the Guinea fowl, which is really a native of that country, and which was introduced into England from the Levant, and at the time of the introduction of the turkey was still scarce. Some say it arose from the proud and Turkish strut of the cock. An old writer on agriculture, named Googe, (A.D. 1641,) asserts that the turkey and Guinea fowl were unknown in Britain in 1530; but he evidently suffered himself to be misled by a German author, Heresbach, whose treatise seems to have been the basis of Googe's work. Hakluyt (A.D. 1582) mentions their having been introduced "about fifty years back." In 1555, two turkeys and four turkey poults formed part of the inauguration dinner of the serjeants-at-law in London: they cost only four shillings each, while the swans were rated at ten shillings, and capons at half a crown: turkeys could not, therefore, have been very scarce at that time.—*Dugdale, Orig. Jud.* Thus, the turkey would appear to have been introduced into England about the year 1530, and we may conclude that it was brought into France about the same period; for, in "Champier's Treatise on Diet," published in 1560, the turkey is described, and the work is said to have been written upwards of thirty years prior to its publication. In this book, also, the bird is said to have been brought from the "newly discovered Indian islands;" and my readers are well aware that the newly discovered continent of America was at first conjectured to be a portion of India, or an island belonging to it. In 1556, twelve turkeys formed the present offered to the King of France by the burgesses of Amiens. Heresbach states that they were introduced into Germany about 1530, and a sumptuary law made at Venice, in 1557, indicates the rank of those at whose tables they were permitted to be eaten. The turkey was then early appreciated, and his value duly estimated; yet strange to say, not a record remains to lead us to a knowledge of the person to whom the natives of Europe are indebted for so very important a benefit. The turkey has long enjoyed the reputation it now holds, and has been deemed worthy of a place at the most luxurious festivals.

No one who has seen only the domesticated inhabitant of the poultry-yard can form any idea of its wild original. The cock measures about three feet and a half, or nearly four feet, in length, and almost six in expanse of the wings. The skin of the head is of a bluish color, as is also the upper part of the neck, and is marked with numerous reddish, warty elevations with a few black hairs scattered here and there. On the under part of the neck the skin hangs down loosely, and forms a sort of wattle; and from the point where the bill commences and the forehead terminates, arises a fleshy protuberance, with a small tuft of hair at the extremity, which becomes greatly elongated when the bird is excited; and at the lower part of the neck is a tuft of black hair, eight or nine inches in length.

The feathers are, at the base, of a light dusky tinge, succeeded by a brilliant

metallic band, which changes, according to the point whence the light falls upon it, to bronze, copper, violet, or purple; and the tip is formed by a narrow, black, velvety band. This last marking is absent from the neck and breast. The color of the tail is brown, mottled with black, and crossed with numerous lines of the latter color. Near the tip is a broad black band, then a short mottled portion, and then a broad band of dingy yellow. The wings are white, banded closely with black, and shaded with brownish yellow, which deepens in tint towards the back. The head is very small in proportion to the size of the body; the legs and feet are strongly made, and furnished with blunt spurs about an inch long, and of a dusky reddish color; the bill is reddish, and horn-colored at the tip.

The hen is less in size than the cock; her legs are destitute of spurs; her neck and head are less naked, being furnished with short, dirty, gray feathers. The feathers on the back of the neck have brownish tips, producing, on that part, a brown, longitudinal band. She also frequently, but not invariably, wants the tuft of feathers on the breast. Her prevailing color is a dusky grey, each feather having a metallic band, less brilliant than that of the cock; then a blackish band and a greyish fringe. Her whole color is, as usual among birds, duller than that of the cock; the wing feathers display less white, and have no bands: the tail is similarly colored to that of the cock. When young, the sexes are so much alike, that it is not easy to discern the difference between them; and the cock acquires his beauty only by degrees, his plumage not arriving at perfection until the fourth or fifth year.



WILD TURKEY.

The wild turkey was formerly found in Canada, and in several districts of the United States, but has been gradually driven backwards as population increased. It is now chiefly to be found in the wilder regions of Virginia, Kentucky, Ohio, Illinois, and Indiana. The wild turkey is, to a certain extent, migratory in its habits; and about the latter end of autumn large flocks assemble, and gradually desert their barren wilds for richer plains. The cocks associate in parties by themselves, and seek for food apart from the hens. The latter

remain with the poults, which they take care to keep away from the cock, who is very apt to attack and destroy them.

Flocks leaving the same district all move forward in the same direction. They very seldom take wing unless to escape an enemy, or to cross a river, which latter feat they do not perform without great deliberation, and a great deal of noisy "gabbling." The old and strong birds will fly in safety across a river upwards of a mile in breadth; the young and weakly often fall in, unequal to the effort; but nevertheless usually manage to attain the shore by swimming. On reaching the opposite bank, the flock will generally strut about for a length of time, as if bewildered, and may, during this interval, be readily taken. On arriving at the desired district, they disperse in smaller flocks, composed indiscriminately of cocks, hens, and poults. Their food consists of beech-mast, maize, a fruit called the peccan nut, and acorns. They will also devour such beetles, grasshoppers, young frogs, small lizards, &c., as fall in their way. This is about the month of November, at which season they often incautiously venture too near farm-yards and barns, where great numbers are killed, and form a valuable article of traffic to the settler.

Early in March the hens separate again from the herd, roost apart, and carefully shun the cock. They still, however, remain near him; and when a hen utters her call, every cock within hearing responds with his "gobble," "gobble," "gobble." This noisy wooing generally continues for about an hour before sunrise, after which the birds silently alight from their perches, and the cocks strut about with expanded tails, seeking to obtain the favor of their desired mates. They sometimes, while thus employed, encounter each other, in which case desperate conflicts take place, terminated only by the death or flight of the vanquished.

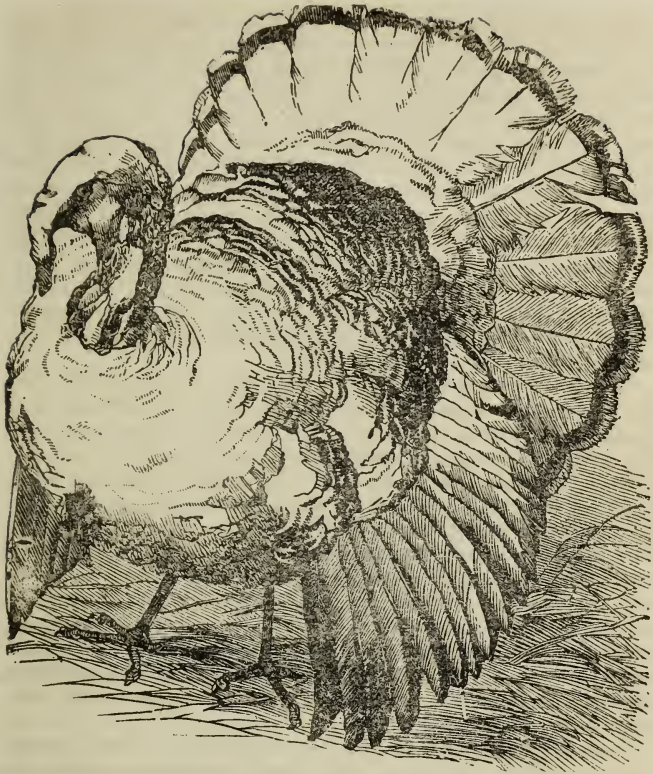
After pairing, the birds remain together for the season, until laying begins, when the hen is again compelled to seclude herself, as the cock would otherwise destroy the eggs. About the middle of April the hen forms her nest of a few dry leaves, on the ground, in some sheltered spot, where it will be concealed from every hostile eye; here she deposits her eggs, to the number of from ten to twenty. They resemble, in size and color, those of the domestic bird. Whenever she leaves the nest, she covers it up with leaves, so as to secure it from observation. She is a very close sitter, and will, also, when she has chosen a spot, seldom leave it on account of its being discovered by a human intruder. Should she find one of her eggs, however, sucked by a snake, or other enemy, she abandons the nest for ever. When the eggs are near hatching, the hen will not forsake her nest while life remains.

The young are very sensible to the effects of damp; hence, after a rainy season, wild turkeys are always scarce. The flesh of the wild turkey is very superior to that of the domestic bird; yet that of such of the latter as have been suffered to roam at large in the woods and plains is in no respect improved by this partially wild mode of life. The wild bird is frequently domesticated in America; but I understand that these individuals are not very steady, and will, on the first opportunity, return to their native haunts.

C. Lucien Bonaparte relates that a gentleman in West Chester County, New York, once procured a young female wild turkey, in order to try the experiment of crossing the breed with the domestic bird; but owing to some accident it did not succeed, and in the ensuing spring the hen disappeared. She returned, however, in the autumn, followed by a large brood, and remained on the farm till the following spring, when she again disappeared, but returned in autumn with a second brood; and this she continued to do for several years.

When the eggs of the wild turkey are hatched under a tame hen, the poults preserve the wild manners of their race, and roost apart from the rest. These are often used as decoy birds, for the purpose of securing the wild ones. The wild turkey is found to thrive better, and fatten sooner, on a given quantity of food, than the tame; and it is well known that the cross between the two is a greatly improved breed as to flesh and capability of taking fat. Some writers have greatly exaggerated the weight of the wild turkey; and some have even asserted that they have met with individuals of sixty pounds weight. M. Bonaparte states the average weight of the hen to be from eight to nine pounds, and that of the cock from fifteen to twenty. A knowledge of the natural habits of the bird is of the greatest importance in guiding us as to its treatment in a state of domestication; and we, accordingly, should avoid condemning to the confinement of close, and often filthy hen-houses, a bird which, in a state of nature, always perches in the open air. Open sheds and high perches are what they require; and their dislike to the mode of housing I speak of may be recognized in the eagerness with which they rush out the instant the door is opened in the morning. The domestic turkey has been known to go wild and remain so for two or more years; and there is no doubt that it would be possible to naturalize them like the pheasant.

Domestication has, in the case of the Turkey, as in that of most reclaimed animals, produced a diversity of color, which by cultivation, whether owing to fancy or some supposed inherent excellence residing in the various tints, has now furnished us with several so-called varieties or breeds, still however, with one exception (the Norfolk), only differing in the prevailing hue of their plumage: thus we have the black, the white, the copper color, the brown, the bronze, and the dusky-grey. They are however, of course, all the descendants of their great American original, of which but one really exists, although F. Cuvier has described (1820) a second species found at Honduras. There is a question whether this actually be a second and distinct species, however, or merely a variety of the wild bird, owing its diversity of aspect to circumstances dependent on locality, and consequent change of habit, combined with difference of climate and other important causes, which we know, in the case of other animals, produce such remarkable effects.



THE DOMESTIC TURKEY.

As to the relative value of the ordinary varieties, it would be almost difficult to offer an opinion; but those who suppose the white turkey to be "the most robust and most easily fattened" are decidedly mistaken, both in theory, as far as analogy may guide us, and in practice, where the certain test of experience has shown to the contrary. The bronze and copper-colored varieties are generally undersized, and are amongst the most difficult of all to rear; but their flesh is certainly very delicate, and perhaps more so than that of other kinds—a circumstance, however, that may partly result from their far greater delicacy of constitution, and the consequent extra trouble devoted to their management.

The brown and ashy-grey are not particularly remarkable; but the black are decidedly superior in every respect, not only as regards greater hardiness, and a consequent greater facility of rearing, but as acquiring flesh more readily, and that being of the very best and primest quality. Those of this color appear to be less far removed than the others from the original wild stock. Fortunately, too, the black seems to be the favorite color of nature, and black turkeys are produced far more abundantly than those of any other hue. M. Parmentier was informed by a French lady, who had devoted much of her attention to rural affairs, that she had in her yard ten black turkey hens and a white cock, and yet, that not one of the chicks was white, or even light-colored. Turkeys will sometimes change their hue. Mowbray states that "A turkey cock, which was black in the year 1821, became afterwards perfectly white, this extraordinary change taking place so gradually, that in the middle of the moulting the bird was beautifully mottled, the feathers being black and white alternately."

With respect to the best mode of keeping turkeys, I have merely to repeat what I have already remarked relative to a due attention to the habits of the original wild breed in its native state. Let them have a large, roomy, open shed, sufficiently protected, of course, from the weather, and, above all, from moisture. Let the perches be high—and here, again, you will do well not to omit the use of the hen ladder; for, although these birds can usually fly well, still, when fat, they become too heavy for their wings, and are apt to injure themselves in their descent from a lofty perch, especially when in confinement: when at full liberty they can take better care of themselves. During warm weather they may be permitted to select their own roosting-places on the trees about a farm; but should be well watched, lest they stray away; and this indulgence should on no account be granted them if frost be anticipated, as their toes are tender and apt to become frost-bitten. Indeed summer is the only time of the year when this out-roosting may, with safety, be permitted.

The turkey is a profitable bird, for it can almost wholly provide for itself about the roads and hedge-rows: snails, slugs, and worms are among the number of its dainties, and the nearest stream serves to slake its thirst. To the farmer, however, it is often a perfect nuisance, from its love of grain; and should, therefore, be kept in the yard until all grain is too strong in the root to present any temptations.

Notwithstanding the separation which, with the exception of certain seasons, subsists, in a wild state, between the cock and hen turkey, they have been brought to feed and live amicably together in a state of domesticity. The former, however, retains sufficient of his hereditary propensities to give an occasional sly blow to a chick, or forward poulter, but that very seldom of a seriously malicious character.

Mascal<sup>l</sup>, in describing a turkey cock (such as the breeder should select)



says, that he should be a "a bird large, stout, proud, and majestic; for when he walketh dejected, he is never good."

M. Parmentier says that both cock and hen should have short legs, full shapes, and general vivacity and energy in all their movements; likewise, that they should be both well shaped and in healthy condition.

Mascall says, that the cock should not be "passing a yere or two yeres old: three yeres is the most, and too much."

For my own part, I hold a turkey cock, at the age of three years, to be only in his prime, and to continue, in every respect, suitable for your purpose until five. The hen is at her prime younger, and, probably, at the second year is as good as ever she will be afterwards.

It has been stated by some, and yet as positively denied by others, that one fecundation will render all the eggs of that laying fertile; still, however, were it my own case, I should prefer making "assurance doubly sure," by allowing one cock to every dozen or fourteen hens.

The approach of the laying season is easily known by the increased liveliness and proud strut of the hen; and she likewise further expresses her feelings by a peculiar self-satisfied cry, that soon becomes familiar to the observer. This usually takes place in the month of March (nearly a month earlier than with the wild bird). When the breeder perceives these symptoms, he should provide a nest, and put an egg, or a bit of chalk formed like one, into it, to induce the hen to commence laying there. Partaking of the retiring propensities of the wild hen (although she has not equal reason to dread the destructive passions of the cock), the turkey is a secret layer, and does her best to elude the vigilance of her keeper and steal away to some secluded spot. The peculiar note of which I have spoken, betrays, however, the fact; and whoever has the care of the fowl, should trace her to her retirement, and bring her back to the nest prepared for her.

The time when the hen turkey lays is usually morning. Some lay daily; others only every second day. The number of eggs laid is commonly from fifteen to twenty; but this varies with the age of the bird, a hen of mature age laying more and larger eggs than one of a year old. When the turkeys are to be let out in the morning, you may examine the hens, and keep in such as are about to lay. This precaution will, of course, prevent the loss of a single egg. When the hen is laying, the cock should be kept from her, as he would ill-treat her and break the eggs. The eggs should be taken away as soon as laid, lest they might be broken through the awkwardness of the hen, or sucked by vermin. They will keep till the hens are done laying, if put in a basket and hung up in a dry place. It is unnecessary to keep the eggs belonging to each in a separate place. The hen turkey is not troubled with any very exclusive feelings, or, rather, her disposition overflows with an excess of maternal love: for she will rear a brood belonging to another quite as carefully as if they were her own. In the second laying,

the eggs are fewer in number, seldom exceeding from ten to thirteen; and on this occasion extra care is requisite.

The sooner that one hen is turned away from her brood, and the brood mixed up with that of another, hatched about the same time, the better chance there is of rearing it, as the hen which is so turned away, will lay again in a fortnight or three weeks, and thus hatch a second time before the month of July is out. Even under these circumstances, the chance of rearing the young ones is very uncertain, as they are hardly strong enough to meet the cold nights in autumn, when they often become what is called *club-footed*, and die. I rather recommend letting the hen lay as many eggs as she will, and turning her off when she becomes broody. Hens thus treated will lay again in the month of August; so that, under all circumstances, they may be called profitable birds.

The turkey hen is a most persevering sitter; and when her eggs are taken away, she would sit upon stones, if she could not procure the eggs of another bird, and would perish before quitting the nest. Eggs should therefore, be left with her, not only to tranquillize her, but because sitting upon eggs fatigues her less than sitting upon an empty nest; but these eggs must be marked in order to distinguish them from those the poor bird continues to lay; for any eggs that seem to her to be slow of hatching, will be abandoned, as she will quit the nest as soon as she perceives the chick; consequently, as soon as the eggs you have placed under her are hatched, she will leave the nest, and the eggs of her own laying will be sacrificed. Remove, therefore, the former; and it is for this reason that I recommend them to be marked. Keep the nest clean while the turkey hen is sitting, as dirt will injure the eggs. No one should go near a hen when sitting, except her keeper; and no one should turn the eggs, or meddle with them further than I have already indicated. The bird will turn her eggs with more judgment than you can do.

On the thirty-first day of sitting, the chicks leave the eggs; but as some quit their prison before others, they must be placed in a basket filled with feathers, and if the weather be cold, placed in some warm spot. When all are out, they may be given to the hen, for six or eight hours before feeding. Sometimes the chick will require assistance in leaving the egg; and, if so, the same caution must be observed that I have insisted upon in the case of the common fowl. Be very sparing of your aid, or you may do far more harm than good.

Many writers recommend a vast deal of quackery in the treatment of the young chicks. Some go the length of ordering them wine, pepper, bathing in cold water! &c. It is far better to let them alone. For a few hours after hatching, the chicks require no food at all; and then, instead of cramming them—a process in which you are likely to break the tender beak of the little chick—chop up a few hard eggs with boiled nettles, parsley, and a little bread or curd; make this into a paste, and present it to the birds in the palm of your hand, or place it before them on a stone, taking care that the hen does

not rob them. In supplying them with water, be careful to put it in such very shallow vessels that they cannot wet themselves; for the least moisture appears fatal to them. As the turkey chick does not seek its food immediately on leaving the egg, as the hen seems incapable of instructing her little offspring how to do so, it is a practice with some to put a few common hen's eggs among the turkey's (which must be done about nine or ten days after sitting), that these, coming out with the little turkeys, may, by force of example, teach them to provide for themselves.

Unless in very warm weather the hen and chicks should be housed for a month. If they appear drooping, put powdered caraway seed, and a little Cayenne pepper into the food. If you mix the food with milk, let it be previously boiled. Unboiled milk will purge the chicks; but, for my own part, I prefer pure water.

At the age of about two months occurs the most critical period in the life of a turkey, called "shooting the red;" or the time when the head and neck acquire the reddish color of the adult. This crisis once past, the birds may be regarded as past danger, and exchange the name of chicks for that of turkey poults. The only treatment necessary when the bird is shooting the red is to furnish nutritive food, with the addition of a small pinch of Cayenne pepper. Bruised hempseed is also found serviceable.

I know no birds better calculated to be profitable to the breeder, than turkeys. They will almost wholly provide themselves with food; and it is only the young chicks that require nourishment at our hands; and how inexpensive, also, is this nourishment! With care you may rear two broods in a year, and have from eight to fifteen survivors in each. Take the average at ten, and, suppose you have three hens, you may bring up thirty chicks. Your hens will cost you nothing for keep; and you must admit that your profit is handsome. This is, however, far below the mark. There is nothing to prevent an individual having more hens, rearing larger broods.

Cobbett, a shrewd and accurate observer, thus writes—"As to the feeding of them when young, many nice things are recommended—hard eggs, chopped fine, with crumbs of bread, and a great many other things; but that which I have seen used, and always with success, and for all sorts of young poultry, is milk turned into curds. This is the food for young poultry of all sorts. Some should be made fresh every day; and if this be done, and the turkeys be kept warm, not one out of a score will die. When they get to be strong they may have meal and grain; but still, they always love the curds. When they get their head feathers, they are hardy enough; and what they then want is room to prow! about. It is best to breed them under a common hen, because she does not ramble like a hen turkey; and it is a very curious thing that the turkeys bred up by a hen of the common fowl, do not themselves ramble much when they get old.

"The hen should be fed exceedingly well, too, while she is sitting, and

after she has hatched; for no man ever saw healthy chickens with a poor hen. This is a matter much too little thought of in the rearing of poultry, but it is a matter of the greatest consequence. Never let a poor hen sit; feed the hen while she is sitting, and feed her most abundantly while she has young ones, for then her labor is very great. She is making exertions of some sort or other during the whole twenty-four hours; she has no rest; is constantly doing something, in order to provide food or safety for her young ones. As to fattening turkeys, the best way is never to let them be poor. Cramming is a nasty thing, and quite unnecessary. Meal mixed with skim-milk, given to them fresh, will make them fat in a short time, either in a coop, in a house, or running about. Boiled carrots and Swedish turnips will help, and it is a change of sweet food."

As observed already, once the turkey chicks *shoot the red* (which takes place at or about eight weeks old), they may be considered out of danger; hence, many persons consider it more profitable to buy lean young poults, after they have got the red, and then fatten them for market, to breeding them. If the mortality among the chicks were greater, and were not so easily to be avoided by a very little care, this might be the preferable mode of going about the matter; but as it is, there can be no doubt of the greater advantage to be derived from rearing your own chicks.

In feeding the poults, after the second month, it will suffice to give them such boiled common plants and herbs as are of a nutritive character—nettles, wild succory, milfoil, turnip tops, cabbage sprouts, or the outside leaves of greens well boiled down—with these, potato skins and an odd potato or two itself may be given, and acorns, if they can be had without expense. The meal of buckwheat, barley, beans, oats, according to whichever is most plenty with you, will, when incorporated as I have described with potatoes, fatten the poults with great rapidity. But, you may also use the meal of Indian corn with the greatest advantage, though it requires treble the boiling of oatmeal. If you desire to meet the market hastily, and with profit, you will be compelled to resort to more expensive feeding than otherwise, but you will be repaid by the result. When the poults are about five months old, or earlier, if it be late in the season and cold weather seems at hand, give them boiled potatoes mashed with meal, and then chopped small, as I have described. Let this be given fresh, and the vessel in which they are fed well washed daily, as otherwise it will speedily contract a sour smell and become repulsive to the birds, for turkeys are both cleanly and nice in their appetite. After having persevered in this feeding, morning and evening, for about a month, during which time the exercise of the poults should be greatly curtailed, and they should likewise be kept much of their time (especially after meals) in the dark, they will be found fit for use, and, if of a good kind, at least eighteen pounds weight.

As damp or cold is fatal to turkey poults, so is intense sunshine. Poults

should not be suffered to stray too far; for, independently of the risk they incur, in case of sudden shower, it must be remembered that they are as yet incapable of encountering any great fatigue, and that their condition will be anything but benefited thereby. Mr. Dixon recommends a mode of diet that I have never seen tried:—"No food makes their flesh whiter and more delicate than kitchen stuff, or the dregs of melted tallow, more or less of which must be boiled according to the number that is to be fed; and being diluted in a boiling kettle, plants (and especially nettles chopped up) and pot-herbs are mixed with it. The whole being well boiled, barley-meal or corn is added to form a kind of paste, which may be given twice a day at least—in the morning and at one o'clock—when it is wished to render them fat. But as the dregs of melted tallow are not everywhere to be procured, the dregs or refuse of the oil of nuts, linseed, or sweet almonds, may be substituted, the greatest care being taken not to fatten them wholly with such oily substances, for their flesh would partake of the flavor and be injured."

From what we know of the value of oil-cake in the fattening of our cattle, I have no doubt of its efficacy in fattening turkeys, but it certainly renders the flesh rank and oily. In reckoning the advantages with the expense attendant on the rearing of these birds, until you want to fatten them for sale or your own consumption, you need be at no pains relative to their food, as they are quite able to provide for themselves, being in this respect superior to any other of our domestic fowl. In thus readily providing for themselves, they are also greatly assisted by the easy character of their appetite—grass, herbs, corn, berries, fruit, insects, and reptiles; in short, hardly anything coming amiss to them.

Audubon says, that in their native forests "they cannot be said to confine themselves to any particular kind of food, although they seem to prefer the peccan nut and winter grape to any other; and where these foods abound, are found in the greatest numbers. They eat grass and herbs of various kinds—corn, berries, and fruits of all descriptions. I have even found beetles, tadpoles, and small lizards in their crops."—*Ornith. Biog.* l. ii. A favorite repast of this bird in its native forests is said also to be the seed of a kind of nettle, and at another season a small red acorn, on which latter food they soon become so fat that they cannot fly, and are easily run down by dogs.

They are dull and stupid at getting the corn out of the ear, unless very ripe, and will walk through a field of peas or beans without opening a single shell, even if they are ripe.

There are many sorts of food which, though nutritious and highly salutary as concerns other fowl, are little short of downright poison to turkeys. Amongst others, I may enumerate vetches or tares, marrowfat peas, and most sorts of pulse.

The weight of turkeys has been much exaggerated by careless, ignorant.

or, perhaps, credulous writers; and 60 lbs. is, by some, mentioned as a common weight. On the contrary, 20 lbs. is a fair weight for any fat yearling bird (and a very great weight for a bird of six months old); 30 lbs. is a fine turkey of any age; and few ever exceed 40 lbs. The greatest weight that these have been known to attain, recorded by such authority as we can rely upon, is 56 lbs. I have never seen a turkey of 60 lbs. weight: nor do I know any one that has. The hen takes fat more readily than the cock, and is, in proportion to her size, a tenderer and better dish.

#### THE GUINEA HEN, OR PINTADO.

The original country of the Guinea fowl is, as its name implies, Africa; but it is likewise common in America, where it is supposed to be indigenous, as well as the turkey.



THE GUINEA FOWL.

The Guinea fowl is slightly larger than the ordinary barn-door fowl, but is inferior in size to the larger foreign breeds, as the Malay and Spanish; in both aspect and character it appears to occupy a position between the pheasant and the turkey. Although long familiarized, the Guinea fowl has never been fully domesticated, still retaining much of the restlessness and shyness of its primitive feral habits. It is very courageous, and will not only frequently attack the turkey, but even prove victorious in the encounter.

The cock and hen are so nearly alike, that it is not easy to distinguish them; there is sometimes a difference of hue in certain parts; but this difference only occurs occasionally, and indeed, it is on gait, voice, and demeanor, that we must chiefly depend. It must be remarked that they pair; therefore a second hen will be neglected and useless except for eggs.

As a source of profit I cannot recommend these fowl: the eggs are very small, and the flesh not being likely to please every palate. Still, however, as the Guinea fowl require but little trouble or attention, and their eggs, though of small size, are well flavored and numerous, they are generally kept wherever there is accommodation for them. The chief objection to them is their cry, or scream; and even this, again, has its advantages, invariably predicting a change of weather: they can hardly, however, be kept with other poultry, on account of their pugnacity.

The Guinea fowl dislikes confinement, and will not thrive unless it has free liberty; where such, therefore, cannot be afforded, it is useless to attempt keeping it.

These fowl are prolific; the hen commences to lay in May, and lays throughout the entire summer. The period of incubation is twenty-eight days; but it is more advisable to keep the Guinea hen entirely for laying, and if you desire to hatch any of the eggs, to do so under the hen of the common fowl. You must keep the male bird away, or he will destroy the eggs.

The chicks, while young, require careful management, and must be constantly fed; in a short time they become perfectly hardy. At nine months they are fit for the table.

PEA-FOWL.



A Peacock in full feather, parading on a green lawn, or from the extremity of a terrace-wall, displaying the full length of his gorgeous tail, is one of the most beautiful of living additions to garden landscape. But of fruit he will prove a devourer, not to be guarded against, and both he and his mate are not unfrequently murderous assassins of the young of other fowl. The

cock does not attain the full splendor of his plumage until he is **three years** old, and the hen does not lay until the same age. She lays from five to seven eggs, and sits twenty-nine days. If the first batch of eggs be taken away, she will lay a second, so that by having a hen turkey foster nurse you may manage to have two broods in one summer. The peahen generally chooses a very retired spot, quite out of the way of the peacock, who is often a cruel unnatural father. The young must be hatched like Guinea fowl and young turkeys: unless amply and regularly fed they are apt to wander. When fat and hung long enough, they make a delicious and splendid roast. They should be larded with slices of fat bacon, the head and neck with the feathers on, carefully wrapped in paper, and tucked under the wing away from the fire, and when ready set up in purple glory, to match the tail adorned with feathers, neatly stuck in at the last moment. If you wish pea-fowl to agree with other poultry, they must be **reared** with them.

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## CHAPTER IX.

### WEB-FOOTED BIRDS.

(ANATIDÆ).

A FAMILY of web-footed birds whose habits are, generally speaking, aquatic, though some of them are more so than others. This family of the Palmipedes of Cuvier have a large and broad bill, the edges of which are beset with *laminæ* placed transversely. They are divided into Swans, Geese, and Ducks. The limits of each, however, are not very well defined.

#### THE SWAN.

Swans (*Cygnus*) are found on the rivers and small pools of fresh water, rather than on the sea or the larger lakes, and, when they do appear on these, they are always found near the shores, and never on the expanse of the broad waters. The chief reason of this is, that they are vegetable feeders, and although their long necks enable them to reach the bottom at considerable depths, they never dive, and they rarely feed upon the land, or in any other mode than by floating on the surface of the water. They are among the most ornamental of all the water birds, on account of their great size, the gracefulness of their forms and motions, and the snowy whiteness of the plumage of those species with which we are most familiar. Swans have, from the remotest antiquity, attracted the attention of poets and other describers, and the ancient fable of their acquiring a musical song when they are dying, instead of the husky voice which they gave when alive, is still repeated, though wholly destitute of foundation.



In some of the species, the swans approach the geese in many of their characters, while the typical ones differ considerably.

The Mute or Tame Swan (*Cygnus olor*) is "the Swan," by way of eminence. The bill of the mute swan is of a red or salmon color, with the margins and the basal cere, which swells into a tubercle of considerable size, black; the whole plumage of the mature bird, when on the water in a pure atmosphere, is beautifully white; and few of the living productions of nature are more beautiful than swans, especially when they are upon small expanses of clear water. Though a majestic creature in its motion upon the water, the appearance of the swan harmonizes best with that which is clear and tranquil, and grasses and green meadows add greatly to the effect.

In a state of nature this species is migratory, where the seasons run into extremes; when wild they are compelled to move southward when the weather is severe; but where the waters are open they continue on the same grounds for the whole year round, and where they are placed upon ornamental waters in pleasure-grounds, or even in the close vicinity of cities, they show no very strong disposition to shift to more sequestered haunts, at any season of the year. In places that are much frequented they soon become very familiar; indeed they are far from being timid birds under any circumstances. They appear to be quite confident in the power which nature has given them; and, as they have little to fear from enemies, they are not much given to be pugnacious, at least in ordinary times of the year. When, however, they have nests, they not only defend them with great bravery, but attack in the most resolute manner, any animal that approaches, not excepting man himself. The female is a close sitter during her incubation, which is forty days; and while the female sits, the male is very assiduous in watching for the safety of the family. He is ready to resist, and by the most vigorous means to repel, every intruder, not excepting his own species, who cannot come within a short distance of the nest without being attacked. Severe contests often take place between the males upon these occasions, more especially if, as is sometimes the case, there is an odd or unpaired male upon the same water. This odd one is not the assailant; for, as he is not in the guardianship of a female and nest, he does not appear to have the same excitement as those which have this trust committed to them; but if he is attacked, he is bold enough in self-defense; and it has been stated that if he should succeed in killing or beating off the legitimate possessor of the ground, even after the incubation is considerably advanced, he takes the place and discharges the duties of watchman and protector, with the same vigilant assiduity as the one which he has vanquished.

The Swan forms one of the finest ornaments of a sufficiently extensive sheet of water, and a pair will keep down weeds much more cheaply and effectually than any mechanical appliance. An island will be found the best



DOMESTIC SWAN.

breeding place. They require feeding during winter, at least; but, it is better to feed them constantly. A fat young cygnet affords a delicious dish. Swans, as well as all kinds of wild or semi-wild water fowl, must be pinioned, or they will be apt to depart without leave at the improving period of the year. To effect this operation, find the joint of the bastard wing, which will include about five flight feathers, introduce a sharp knife between the joints, cut steadily and boldly: no injury will ensue. The Swan begins to lay at three years old.

The nest of the SWAN IN A DOMESTIC STATE is large and wide; the eggs are of a white color, and vary from six to eight in number. The cygnets are grey, and do not acquire their full plumage till the second year, and till then they usually keep in company with each other, which they also do with the old birds, until the time of pairing again comes on. The cygnets while they are in their grey plumage, have very little of the majestic appearance of the adult swans. As articles of food, they are, however, the only ones that are held in much estimation, and there is probably more of the want of rarity than that of nature in them. Taken from the water in their natural condition, they are comparatively of little value; but, when they are artificially fattened, they fetch a high price in the market. When tame, swans are kept with a view to profit as well as ornament; their down and the quills of their wings are pulled twice in the year. This is a very cruel

operation; but then, the feathers pulled from the live bird are better than if they were taken from it when dead; and, if the operation is performed near the time of the moult, and the birds are well fed, it is not so hurtful to them as might at first be supposed.

The Black Swan (*C. niger*), which is a native of Australia, but has been domesticated. It is much more of a tyrant on the waters than the White Swan, and will allow no other swimming bird to live in its vicinity. The whole plumage is black, with the exception of the first six quills, which are white; the bill, and a naked space round the eye, are red; the length is about four feet and a half, and the wings rather shorter in proportion than the White Swan, but they are broad and strong. The plan and structure of the nest are about the same as those of the White Swan, and there does not appear to be much difference either in the food or the general habits. The male is particularly watchful of the female when sitting, and of both female and brood when they are on the water; he not only drives off all other birds, but if any animal, or even a human being approaches, he lands and marches forth to give him battle at a distance from the family; his wings are raised ready for the stroke, his feathers ruffled, and he puts on altogether rather a formidable appearance. The young are produced about the same season as those of the White Swan, and the number in a brood appear also to be the same. They are of a blackish ashen grey, which continues the whole of the first year. As a curiosity the Black Swan is very well, the more especially that it was for such a length of time implicitly looked upon as the impossible bird that was nowhere to be met with; but it has none of the beauty and grace of the White Swan, which must continue to be the favorite as an ornamental bird.

#### THE GOOSE (ANSER).

Geese are very numerous, as well in species as in varieties. They are more abundant in the polar countries than in the southern regions; and, with few exceptions, are completely web-footed, and can swim. Swimming is not, however, their proper and peculiar, or, in general, even their chief motion. If the structure of a goose, and the way in which the legs support the body, are compared with those of a duck, we shall perceive a very remarkable difference in the purposes for which they are best adapted. The bodies of ducks are "boat-built," and evidently formed for getting through the water rapidly at a small expense of effort; their legs are placed far backward, so as to strike against the water which follows in their wake; while the Goose is properly a walker, although the power of swimming is added, and in some of the species the two powers are nearly equal, while there may be some in which the swimming predominates.

Geese are also much more exclusively vegetable feeders than the rest of

the *Anatidæ* ; at least, with the exception of the swans, which are also much more aquatic in their feeding than the geese, for which habit they are well adapted by the greater length of their necks. Geese never dive, nor do they, in many instances, feed below the surface of the water, though they often feed, while swimming, on the seeds and succulent leaves of floating aquatic plants.

The generic characters are : the bill shorter than the head, higher than wide at the base, diminishing towards the tip, and thus having a slightly conical form. The teeth, in the margins and toward the tip of the bill, are conical, and the point of the upper mandible is generally furnished with a nail of harder consistence than the rest, and sometimes differently colored. They are, generally speaking, polygamous ; but there is no great external difference between the sexes. The old males are, indeed, rather larger than the females ; but, before they reach maturity the two sexes are very much alike both in size and color.

The natural habitats of the geese are damp meadows, and tufted marshes which abound with plants, a species of pasture which naturally points out why geese in a state of nature should be very migratory birds.

The goose is a bird of no mean consequence in history. The Roman geese gave warning of the approach of the foe, and saved the Capitol ; and it is from this circumstance, according to some, that this bird has since been a favorite Christmas dish. On account of this valuable service rendered by the goose to the Roman state, it had the honor of being eaten with great pomp at important public festivals ; amongst which were the *Julian* games. The Romans introduced the goose into Britain ; *Yule*, the Scotch term for Christmas, is derived from *Julius*, and hence the goose is a Christmas dish. I confess I think this a little far-fetched, and suspect the true reason to be, that at that period of the year the goose is in the best condition, and fittest for the table.

THE COMMON WILD, OR GREY-LAG GOOSE (*A. palustris*).—This is generally understood to be the parent stock of all the domestic species of Europe.

The Gray-lag is about thirty-five inches in length, the female being somewhat smaller. Its beak is of a pale flesh color, with the nail, or horny tip, white ; the iris is brown ; the head and neck of an ashy gray ; the inner part of the wings pale leaden gray ; belly and under surface of neck white ; legs of a very pale flesh color. The chief characteristics of the Grey-lag are the light ashy-blue color of the outer portion of the wing, and the conspicuous white extremity of the beak. The Gray-lag wild goose is now rarely to be met with.

THE WHITE-FRONTED GOOSE.—The length is about two feet four inches, the extent of the wings about four feet and a half, and the weight about five pounds. The bill is thick at the base, of a yellowish red color, with the nail white. A white patch is extended over the forehead from the base of

the bill and corners of the mouth. The rest of the head, neck, and the upper parts of the plumage in some specimens are dark brown, and each feather is margined more or less with that color; the primary and secondary quill feathers are of the same, but much darker, and the wing-coverts are tinged with ash. The breast and belly are dirty white, barred with irregular patches of very dark brown, and tipped with lighter shades of the same color. The tail is horny ash-colored brown, and surrounded with white at the base; the legs yellow.

Of these four varieties, the Gray-lag and the White-fronted are obviously the originals of our domestic geese. The legs of many of our domestic geese are orange-colored, like those of the White-fronted. The legs of the wild Gray-lag goose are of a pale flesh color.

THE CANADA OR AMERICAN WILD GOOSE.—In the slenderness of its make, and the form of its neck, this bird somewhat approaches the swan. The black and wing coverts are dull brown, each feather having a whitish tip; side pale ashy brown; upper part of head and neck black, with a broad patch of white spreading from the throat over the lower part of cheeks on each side; the bill is black; legs and feet grayish black. This bird is easily naturalized amongst us, and affords good flesh for the table; in captivity it readily pairs with the common gray goose, and the young are superior to either parent in point of size. The principal objection to the breeding of the Canada goose as a member of our poultry establishment, is its not being prolific, and hence not affording promise of being profitable.



CANADA OR AMERICAN WILD GOOSE.

#### DOMESTIC GEESE, AND THEIR MANAGEMENT.

Amongst the varieties of our common domestic goose we must first describe one which, though of comparatively recent introduction, and as yet not generally to be met with as an ordinary inhabitant of farm-yards, bids fair, from its unusual size, and capacity of carrying flesh, shortly to supersede every other in the estimation of the fancier or breeder. This is

#### THE TOULOUSE GOOSE.

This bird was originally imported from the Mediterranean, and is known

indiscriminately by the names of Mediterranean, Pyrenean, or that of Toulouse. This bird is chiefly remarkable for its vast size—a property in which it casts every other known breed far into the shade; it is indeed, the MAMMOTH of geese, and it is to be regarded as a most valuable addition to our stock. The prevailing color of the Toulouse goose is a slaty blue, marked with brown bars, and occasionally relieved with black; the head, neck, as far as the beginning of the breast, and the back of the neck, as far as the shoulders, of a dark brown; the breast is slaty blue; the belly is gray, as also the under surface of the tail; the bill is orange red, and the feet are flesh color. There can be little doubt of this valuable bird being the unmixed and immediate descendant of the Gray-lag, and it was, indeed, at once pronounced to be such by the Royal Zoological Society of London, at their poultry exhibition of June, 1845.

In habit the Toulouse goose resembles his congeners, but appears to possess a milder and more easy disposition, which, greatly conduces to the chance of his early fattening, and that, also, at little cost. Of his other peculiarities, the curl of plumage on the neck comes closer to the head than in the common geese, and the abdominal *pouch*, which, in other varieties is attendant only upon age, exists in these birds from the shell; the flesh of the Toulouse goose is tender and well flavored. As a cross with our common domestic goose, I am certain they will be found most valuable, and we may thus expect eventually to arrive at a degree of perfection not hitherto anticipated. Mr. Dixon considers this to be no species or variety, but merely a well grown specimen of the common goose, raised in warm weather, and amply fed, and he is probably correct; as I have reason to believe that we diminish the size of our geese, and other poultry, by killing them off before their maturity.

Several other species of southern geese are mentioned as being found on the Falkland Islands, on Terra del Fuego, and some other places of the southern lands; there have also been others brought from South America; but all these are too little known, we are too little acquainted with the migration of birds in the southern hemisphere, and those migrations are in themselves on so small a scale compared with the migrations in the north, that all that could be said about those birds would be little else than a description of colors. There are, however, some other species which require a brief notice, because they deviate in some respects from the typical characters of the genus.

These species which deviate from the proper character of the geese in many points, but which still essentially retain that character in others, may be divided into two sections: First, those which form a sort of intermediate link between the geese and the swans; and secondly, those which form a similar link between the geese and the wading birds, more especially the Crane family, or perhaps the Herons. We shall take them in the order now

stated, without being very particular as to the correctness of the names, because, though we are not quite satisfied with the existing ones, we do not feel ourselves called upon to contrive new ones, as our object is not to make systems but to give useful information.

**THE CHINESE GOOSE** (*A. Cygnoides*). This species is not called cygnoides, or swan-like, from any actual resemblance that it has to a swan in any other respect than in color; and that is not constant, for though it is sometimes entirely white, it is subject to great variety of shade. Though specimens have been brought from China, it is perhaps not very correctly styled the Chinese goose, inasmuch as it is found in many other parts of the south-eastern world, from China to the Cape of Good Hope, and it is said, from New Zealand, though it does not appear to be met with in New Holland.



THE CHINESE GOOSE.

In addition to the Chinese Goose, already described, there are three sub-varieties, each presenting striking points of difference, and yet being sufficiently alike to justify me in classing them together. These are—

1. **THE HONG KONG.**—This bird has a large horny knob on the bill and forehead; its prevailing color is gray, with a longitudinal stripe of a deep brown running above the back of the neck. The legs are of a red color, whence it is sometimes distinguished as the “Red-legged China goose.” This is the same long known amongst us under the erroneous name of the “Poland goose.”

2. **THE BLACK-LEGGED CHINESE GOOSE.** Also knobbed, and usually with a white edging round the knob, somewhat similar to that of the wild breed called the “White-fronted goose.”

3. **THE WHITE CHINESE GOOSE.** A very handsome bird, knobbed as the rest, of a snow-white color, and with legs of a bright orange red.

These geese are inferior in size to the Toulouse, but nevertheless very fine birds, and worthy the attention of the breeder. The white variety, especially, with red legs, is very beautiful, and would form an appropriate ornament on a piece of water. The flesh of the Chinese goose is also good; they feed well, fatten easily, and are very prolific.



THE COMMON DOMESTIC GOOSE.

Of our ordinary and well known domestic geese there exist but two sorts, whose only distinction seems to rest in their relative size, they being divided into the large and small; and by some, according to their color, into the white and the gray. These divisions are, to a certain extent, arbitrary; as out of one brood you will generally find the several varieties, both as to size and color, that you seek. I may, however, inform the reader that the best sorts of geese are those which vary least in color. Those approaching most nearly to the primitive stock, are the birds which every

best judge will prefer breeding from. *Gray* is the best color as coming nearest to the original *Gray-lag*; white is not quite so good; but avoid mixed colors; they will not prove so prolific, and the young will be more difficult to feed up to the required standard.

I have heard it recommended to try the experiment of crossing with the original wild stock. This would, no doubt, be a most excellent plan. The *Gray-lag* would be the mark; but it is now scarce. This was doubtless the plan resorted to by the Spaniards, whom we have to thank for our recent invaluable acquisition of the *Toulouse* variety. All we have to do now is to avail ourselves, as far as possible, of the superb cross thus brought within our reach; and we may, ere long, bring up our common breed of gray geese to equal that of the continent.

As to breeding geese. These birds, as has been ascertained by M. St. Genis, will pair like pigeons; and even if the number of ganders exceed that of the geese, no noise or riot takes place, mutual choice being evidently the ruling principle. Amongst other experiments tried by M. St. Genis, he left, besides the patriarch of the flock, two of the young ganders, unprovided with mates, but still those couples that had paired kept constantly together, and the three single ganders never attempted to approach any of the females during the temporary absence of their lords. M. St. Genis also remarked, in the course of his observations, that the gander is more frequently white than the goose.

Some writers recommend a gander to be mated with from four to six geese. As I have already remarked, when treating of poultry, this must en-



tirely depend on the object the breeder may have in view. If he desire eggs, and eggs alone, one gander is plenty for six or even eight geese. He may, indeed, abandon the unnecessary trouble of keeping a gander at all. It, however, so happens, that keeping geese for the produce of their eggs alone, is anything but profitable; and hence these must be rendered duly fertile; and, to effect this, one gander to an almost indefinite number of geese will not answer. For the purpose of hatching, a gander should be mated with, at most, four geese. Let him be, if of the ordinary kinds, amongst which color varies, of a pure white or ash-gray color; but not at all of two colors. Let his size be large, his gait active, his eye lively and clear, his voice ever ready and hoarse, and his demeanor full of boldness and impudence. Select the goose for her weight of body, steadiness of deportment, and breadth of foot—a quality that, however unfeminine it appear, happens, in the instance of geese, to indicate the presence of such other excellence as we require.

The goose deposits from ten to twenty eggs at one laying; but, if you do not desire her to sit, you may, by removing the eggs as fast as they are laid, and, at the same time, feeding her highly, induce her to lay on from forty-five to fifty. This is, however, unusual, and it is unprofitable. When tolerably well cared for, geese may be made to lay, and even hatch, three times in the year. This care consists merely in high feeding and good housing early in the spring, so as to have the first brood early in March; but I would rather have two good broods reared than three bad ones, and I am, therefore, more disposed to recommend patience and moderation.

The goose will, when left to the unassisted promptings of nature, begin to lay about the latter end of February, or the beginning of March. The commencement of the laying may be readily foreseen by marking such geese as run about carrying straws in their mouth. This is for the purpose of forming their nest, and these individuals are about to lay. They should, then, of course, be watched, lest they drop their eggs abroad. Once a goose is shut up, and compelled to lay her first egg of that laying in any particular nest, you need be at no further trouble about her; for she will continue to lay in that spot, and will not stray on any account elsewhere.

We can always detect the inclination of the goose to set or hatch. This is known by the bird keeping in the nest after the laying of each egg longer than usual. The hatching nest should be formed of straw, with a little hay as a lining; and so formed that the goose will not fling the eggs over the side when in the act of turning them. You need not banish the gander; on the contrary, let him remain as near the nest as he chooses: he will do no mischief, but will act the part of a most vigilant guardian. About fifteen eggs will be found as many as a good-sized goose can properly cover. Do not meddle with the eggs during the incubation, and do not meddle with the goose; but, as she is somewhat heavier than the hen, you may leave her food and drink rather nearer to her than is necessary

with common poultry, as, if she chanced to absent herself from the eggs sufficiently long to permit them to cool, she might become disheartened, and desert her task altogether. It is, however, unnecessary to put either vinegar or pepper in her food or water, as recommended by some, or, in short, to meddle with her at all.

The goose will sit on her eggs for nearly two months; but the necessary period of incubation being but one, the early hatched goslings must be removed lest the more tardy might be deserted. About the twenty-ninth day the goslings begin to chip the shell; and if their own powers prove inadequate to their liberation, aid may be rendered them, and that, also, with much less risk than in the case of other young birds, the shell and its membranes being very hard and strong, and the young themselves also hardy, and capable early of enduring hardship. The best plan is to have the eggs set, of as nearly as possible equal freshness, that they may be hatched at the one time.

On first being hatched, turn the goslings out into a sunny walk, if the weather will permit of such procedure; but do not try to make them feed for, at least, twelve hours after leaving the shell. Their food may then be bread soaked in milk, porridge, curds, boiled greens, or even bran, mixed with boiled potatoes, taking care not to give the food in too hot a state, while you equally avoid giving it cold. Avoid rain or cold breezes; and see, therefore, that the walk into which you turn the young goslings be sheltered from both wind and weather. The goslings should also be kept from water for at least a couple of days after hatching. If suffered too early to have free access to water, they are very liable to take cramp—a disease which generally produces permanent lameness and deformity, and but too frequently proves fatal.

Geese should have an enclosed court or yard, with houses in which they may be shut when occasion requires. It is better, however, to confine them as little as possible; and, by suffering them to stroll about, and forage for themselves, the expense of rearing them will fall comparatively lightly on you, so that you will not be conscious of any outlay. Geese require water, and cannot be advantageously kept when they cannot have access to it; still, however, I have known them thrive where they had no access to any pond or river, but had only a small artificial pool, constructed by their owners, in which to bathe themselves. When geese are at all within reach of water, they will, when suffered to roam at liberty, usually go in search of, and discover it, and will, afterwards, daily resort thither. Though the birds are thus fond of water, all damp about their sleeping places must be scrupulously guarded against. Grass is as necessary to the well-being of geese as water; and the rankest, coarsest grasses, such as are rejected by cattle, constitute the goose's delicacy. Such grasses as they prefer, will be found on damp, swampy lands, of which, perhaps, no more profitable use

could be made. The stubble-field is, in its season, an excellent walk for geese; for they there not only find the young grass and other herbage springing up amongst the stubbles, but likewise pick up much corn that would otherwise be lost. When the stubble-field is not to be had, there is usually something in the kitchen-garden that would be wasted if the geese were not turned in; and, observe, that this is the only season when these birds can be suffered to enter a garden; for they are very destructive both to farm and garden crops, and even to young trees. Geese do not answer to be wholly fed on such green food as they can provide for themselves; but if they get a few boiled potatoes occasionally, bruised up with a little bran, and not given too warm, they will be raised for the market at scarcely any cost, and will, consequently, be found very profitable to the farmer. Market gardeners should never be without geese, which would consume all their refuse, and bring money into their pockets, in return for their consumption of what would otherwise be wasted.

Various measures have been adopted for fattening geese. Goslings produced in June or July, will fatten without other food than what they will have afforded them on the stubble-fields, as soon as they are ready to consume it; but, if you are in haste, give potatoes, turnips, or other roots, bruised with meal, at least, once daily. The goose is very voracious, and only requires to get plenty to eat in order to accumulate fat. Geese, fed chiefly on grass and corn, as I have described, do not, perhaps, attain the same bulk with such as are crammed; but their fat is less rank, and they are altogether much more desirable for the table.

When domesticated, highly fed, and left perfectly at ease, geese grow to a much larger size than they ever attain in a state of nature. Various arts, and often very cruel ones, have been, and are still, resorted to for the purpose of fattening them for the table, and especially for enlarging their livers, which, when thus unnaturally enlarged, and consequently diseased, are much prized by a peculiar class of epicures, although it is impossible that any part of animals which are treated in this manner can be wholesome. One mode of managing them is, to nail the webs of their feet to a board on the floor near a strong fire, to sew up the vent, and forcibly to cram them with rich food, until they are at the point of death by suffocation: by this means the liver grows to an enormous size, and the goose itself increases in weight to twenty pounds and upwards. The fat of geese principally accumulates externally; and, generally speaking, it is difficult of digestion, and therefore unwholesome. As an important department of the poultry establishment, the goose, we need hardly observe, is cultivated in almost every civilized quarter of the world, and, when under proper management, forms a profitable article of the farmer's produce, its quills, down, flesh, and even dung, being all turned to account.

Michaelmas, or stubble geese, should immediately after harvest be turned out on the wheat fields, where they pick up flesh very fast; but, when taken up to be fattened, they should be fed with ground malt mixed with water, or boiled barley and water; and, thus treated, they grow fatter than would at first be imagined, and acquire a delicate flavor. The old breeders may be plucked thrice a year, and at an interval of seven weeks, without inconvenience; but, young ones, before they are subjected to this operation, should have attained to the age of thirteen or fourteen weeks, otherwise they will pine and lose their good qualities. It is scarcely necessary to add, that the particular nature of the food, and the care that is taken of the birds, materially contribute to the value of the feathers and the down. In those neighborhoods where there is a good supply of water, they are not so subject as elsewhere to the annoyance of vermin; and they furnish feathers of a superior quality. In regard to down, there is a certain stage of maturity, which may be easily discovered, as it is then easily detached; whereas, if removed too soon, it will not keep, and is liable to be attacked by insects and their larvæ. Again, the feathers ought to be plucked, at the latest, before they are quite cold, else they will contract a bad smell, and get matted. Under proper management, and when unmolested by plucking, &c., the tame goose will live to a great age—even, it is alleged, to fourscore years, or perhaps a century.

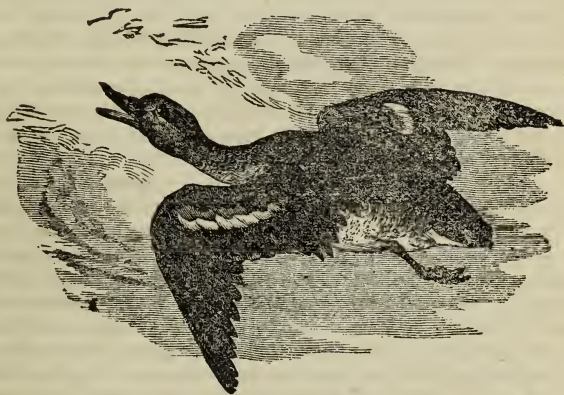
M. Parmentier describes the French process of fattening. This consists in plucking the feathers from the belly, giving them abundance to eat and drink, cooping them up closely, and keeping them clean and quiet. The month of November is the best time to fatten geese. If the process be delayed longer, the pairing season approaches, which will prevent the birds being brought into condition.

In Poland, geese are, with this view, put into an earthen pot without a bottom, and of such a size as not to allow the bird to move; they are then fed on a paste made of ground barley, maize, buckwheat, boiled potatoes, and milk; the pot is so placed that no excrement remains in it: and the birds get very fat in about a fortnight. Even these modes appear to me cruel and unnecessary; and geese may be made fat enough for any purpose (and, indeed, too much so for the taste of most persons) by keeping them in coops in a dark place, and laying before them as much nutritious food as they can eat. This is certainly done by our continental neighbors; but then, as soon as the bird's appetite begins to flag (which is usually in about three weeks), they are forcibly crammed by means of a tin funnel, until, in about a month, the poor birds become enormously and unhealthily fat. They must then be killed, or they would die of repletion. By this process a disease of the liver is induced, in consequence of which that organ attains an unnatural size, and is regarded as a *bonne bouche* by the gourmand. Ordinary geese

may readily be fattened, without cramming, to fourteen or fifteen pounds; cramming will bring up their weight to eighteen or twenty; but the excess consists of rank fat, and the flesh is deteriorated in quality, becoming actually unwholesome. The Toulouse geese readily fatten, without any cramming, up to twenty-five or even occasionally thirty pounds weight.

In some countries, the barbarous custom of plucking live geese for the sake of their feathers is resorted to. I am sorry to have to say that this cruel practice still obtains extensively. Of its barbarity, I presume I need say nothing; but I may observe, that geese so treated usually become unhealthy; many of them die; and even of such as survive, the flesh is rendered tough and unwholesome. If it be ever true, as is asserted, that the quills cast in the natural process of moulting are of inferior quality, why not clip them away close to the skin before that operation of nature begins? Then the geese will only require warmth and housing if the weather be not mild, and you will have the feathers and the geese both unimpaired in quality, and your consciences unburdened by any reminiscence of inhumanity on your part.

#### THE DUCK (ANAS).



THE WILD DUCK.

**WILD DUCKS.**—Ducks properly so called admit of a natural division into three groups, two of which have distinctive characters, while the third, which is intermediate, partakes somewhat of the character of both. This distinction is once structural and strongly indicative of the habits of the bird, the one consisting of species which have the toes webbed together,

the other of those which have the back toe loose or separate from the others. The third group alluded to, partakes more or less of the characters of each ; in common language, however, the General Character Duck founded upon the Mallard or Common Wild Duck, may be considered as typical of the whole three. The older naturalists divided these into SEA DUCKS, being more perfectly web-footed, feeding principally in salt water, diving much in feeding, having a broad bill bending upwards ; and POND DUCKS, haunting ponds and pools, having a straight and narrow bill, a very little hind toe, separated.

The whole tribe of Ducks, whether aquatic or more landward in their habits, find their food more by the sense of touch than by sight, and the bill is a very beautifully organized instrument for that purpose. It is covered by a sentient membrane ; and the edges, which come in contact with foreign substances, are covered with papillæ, and abundantly furnished with nerves, so that when a duck dabbles in the water, the feeling in the bill enables it to distinguish eatable substances from the sludge and pebbles with which they are mixed.

The Duck in a domesticated state is an interesting and valuable bird, and an important object in rural economy. They are more intelligent than most races of ornamental poultry, and from their habit of feeding they are much less destructive, if they do not materially assist the efforts of the husbandman. When kept in a proper situation, having due access to pure water, and are fed with proper food, they are also very profitable animals ; and though the flavor of their flesh is peculiar, and the fat, especially of the aquatic species, is oily and indigestible, yet they are far from unwholesome. If they have access to running streams, or even a pond of clean water, it is to be preferred, though even the ponds usually attached to farms answer very well for ducks. Where ornamental pieces of water exist in parks or pleasure-grounds attached to a gentleman's residence, ducks may be introduced with very pleasing effect, and this not only with the domesticated varieties, but even with those species which are in their natural habits the most aquatic. Even the Migratory Duck may be attracted permanently on ornamental waters and tamed. In the wild state little is known of the duck : the habits of the whole race in the breeding season are retired and silent, and as they breed in places not easily accessible to man, it may be doubted if the accounts of naturalists are to be relied upon. The males are peculiarly retiring and silent after the pairing season, and the female does not come abroad till she can launch her ducklings on the water.

#### THE DOMESTIC DUCK.

The duck should always find a place in the poultry-yard, provided that it can have access to water ; without water it is useless endeavoring to keep these fowl ; but even a very small supply will suffice. I myself have kept them with success, and fattened the ordinary duck to the weight of eight

pounds, with no further supply of water than what was afforded by a large tub sunk in the ground, as I have already described when treating of poultry-yards. It must be remembered, that the flesh of these birds will be found to partake, to a great extent, of the flavor of the food on which they have been fattened; and as they are naturally very foul feeders, care should be taken for at least a week or so before killing, to confine them to select food. Boiled potatoes are very good feeding, and are still better if a little grain be mixed through them; Indian meal will be found economical and nutritive, and the best food.

Some recommend butchers' offal; but I may only warn my readers, that although ducks may be fattened on such food to an unusual weight, and thus made profitable for the market, such feeding will render their flesh rank and gross. In a garden, ducks will do good service, voraciously consuming slugs, frogs, and insects; nothing coming amiss to them; not being scratchers, they do not, like other poultry, commit such a degree of mischief in return as to counterbalance their usefulness.

The duck is very prolific; has been known to lay an egg daily for eighty-five successive days. The egg of the duck is by some people very much relished, having a rich piquancy of flavor, which gives it a decided superiority over the egg of the common fowl; and these qualities render it much in request with the pastry cook and confectioners—three duck eggs being equal in culinary value to six hen eggs. The duck does not lay during the day, but generally in the night: exceptions regulated by circumstances, will, of course, occasionally occur. While laying, the duck requires more attention than the hen, until she is accustomed to resort to a regular nest for depositing her eggs—once, however, that this is effected, she will no longer require your attendance.

The duck is a bad hatcher; she is too fond of the water, and is, consequently, too apt to suffer her eggs to get cold; she will also, no matter what sort of weather it be, bring the ducklings to the water the moment they break the shell, a practice always injurious and frequently fatal; hence the very common practice of setting duck eggs under hens. The eggs of the duck are thirty-one days in hatching; during incubation, they require no turning or other attention; and when hatched only require to be kept from water for a day or two; their first food may be boiled eggs, nettles, and a little meal; in a few days they demand no care, being perfectly able to shift for themselves; but ducks at any age are the most helpless of the inhabitants of the poultry-yard, having no weapon with which to defend themselves from vermin, or birds of prey, and their awkward waddling gait precluding their seeking safety in flight; a good stout courageous cock, and a sharp little terrier dog, are the best protectors of your poultry yard. The old duck is not so brave in the defence of her brood as the hen; but she will, nevertheless, occasionally display much spirit.

## THE AYLESBURY DUCK.

There are many varieties of the Domestic Duck, the origin of which is by no means determined. White ducks have the preference with many; and of all the white ducks, the Aylesbury is the favorite. This is a large handsome bird, with plumage unspotted, and yellow legs and feet, and flesh-colored bill. Until the introduction of the variety called Rhone, or Rohan, but more probably Rouen Duck, from the town of that name on the Seine, the Aylesbury Duck was esteemed the most valuable of all; the latter bird, however, now fairly divides the honor with it, and is by some regarded as superior. The flesh of the Aylesbury duck is of a most delicate flavor, being by many compared to that of the chicken; but it is asserted that a cross between that and the Rouen Duck is superior in flavor to all others.

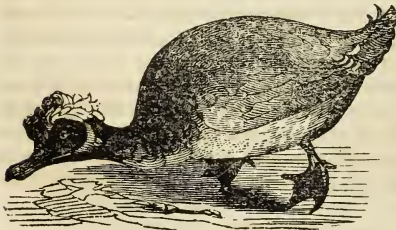
## THE ROUEN DUCK.

The ducks of France are abundant and fine, especially in Normandy and Languedoc, where duck-liver pies are considered a great delicacy.

The Rev. Mr. Dixon seems to consider the Rouen Duck to be merely a dealer's name for the common duck. In this, however, he is scarcely justified, as it certainly possesses qualities not to be found in the common brown duck; these qualities, however, depend not on any specific differences, but on attention to a healthy mode of breeding and rearing them. The bird is very prolific, lays large eggs; and the name suits as well as another.

## THE MUSCOVY OR MUSK DUCK

Does not, as some suppose, derive its name from having been brought from that country, but from the flavor of its flesh, and should more properly be termed the Musk duck, of which its other name is only a corruption; it is easily distinguished by a red membrane surrounding the eyes and covering the cheeks. These ducks, not being in esteem on account of their peculiar odor, and the unpleasant flavor of their flesh, are not worth breeding unless to cross with the common variety, in which case, let it be remarked, that the Musk drake must be put to the common duck; this will produce a very large cross, but *vice versa*, will produce a very inferior one.



MUSK DUCK.

The Musk duck is a distinct species from the common duck; and the hybrid race will, therefore, not breed again between themselves, although they are capable of doing so with either of the species from the commixture of which they sprung.



## THE BLACK EAST INDIAN DUCK.

These ducks are black, and all black, feathers, legs, and bill, with a tinge of deep rich green. On a pond, mingled with the white Aylesburys, they look extremely well, and on the spit they are more like wild duck than any other.

## THE CALL DUCK.

The *bantam* of its race, usually colored like the wild mallard, but often white. This color is preferred by fowlers who use it in the decoys, as it is easily distinguished from the others. These birds have compact and elegantly rounded crests, and are very handsome.

The Aylesbury and Rouen varieties are the most valuable, and the only ones to which it is necessary to call particular attention.

The wild duck pairs strictly with a single mate; the domestic drake does not pair, and should have from four to six mates.

## CHAPTER X.

## THE DISEASES OF FOWL, WITH THEIR SYMPTOMS AND TREATMENT.

I MAY here premise, that when you see a fowl beginning to droop or to exhibit a deficiency of appetite, it is better at once to devote it to table use. If, however, the fowl be of great value—perhaps a Spanish cock—make an attempt to save him.

The most common diseases to which fowl are liable, are as follows:—

- |                  |                 |                  |
|------------------|-----------------|------------------|
| 1. Moulting.     | 5. Diarrhœa.    | 9. Consumption.  |
| 2. Pip.          | 6. Indigestion. | 10. Gout.        |
| 3. Inflammation. | 7. Apoplexy.    | 11. Corns.       |
| 4. Asthma.       | 8. Fever        | 12. Costiveness. |

ACCIDENTS producing fracture, bruises, ulcers, loss of feathers, &c., may, in most cases, be left to nature. When bones are broken, in most cases the patient had better be consigned to the cook. In other cases of accident the good sense of the owner will generally dictate the remedy.

MOULTING, while, as being a natural process of annual occurrence, it can scarcely be called a disease, yet must be treated of as if it really were one, from a consideration of the effects which it produces. It is most dangerous in young chickens. With adult birds, warmth and shelter are usually all that is required, united with diet of a somewhat extra stimulating and nutritious character.

Dr. Bechstein remarks, that, in a state of nature, moulting occurs to wild birds when their food is most plentiful; hence, nature herself points out that

the fowl should, during that period, be furnished with an extra supply of food. After the third year the period of moulting becomes later and later, until it will sometimes happen in January or February. Of course, when this occurs, every care as to warmth should be bestowed. The use of Cayenne pepper alone, administering two or three grains made into a pill with bread, will generally suffice. Do not listen to the recommendation of ignorant or presuming quacks; if this simple treatment do not help them through, they will die in spite of all you may do.

The feathers will at times drop off fowl, when not moulting, to a very considerable extent, rendering them often nearly naked. This is a disorder similar to the mange in many other animals; and the same sort of treatment—viz., alteratives, such as sulphur and nitre, in the proportions of one quarter each, mixed with fresh butter, a change of diet, cleanliness, and fresh air in addition to this—will generally be found sufficient to effect the cure. Be careful not to confound this affection with moulting. The distinction is, that in the latter case the feathers are replaced by new ones as fast as they are cast; in the former this is not so, and the animal becomes bald. Mr. Martin relates an anecdote which would indicate that fear has influences as great upon birds as on the human being. "A cock," he says, "belonging to a friend, was dreadfully frightened by a dog, and became white, but recovered his natural plumage at the next moult. A black Poland cock, being seized near the house by a fox, his screams being heard, he was rescued, desperately wounded, with the loss of half his feathers. In time the remainder of his feathers came off, and he became perfectly white."

**PIP.**—A disease to which young fowl are peculiarly liable, and that, too, chiefly in hot weather.

The symptoms are—a thickening of the membrane of the tongue, especially towards its tip. This speedily becomes an obstruction of sufficient magnitude to impede the breathing; this produces gasping for breath; and at this stage the beak will often be held open. The plumage becomes ruffled and neglected, especially about the head and neck. The appetite gradually goes; and the poor bird shows its distress by pining, moping, and seeking solitude and darkness.

The cause of this disease is want of clean water and feeding too much upon hot exciting food. Dr. Bechstein considers it to be analogous to the influenza of human beings. Theories respecting its nature are numerous and of very little practical importance.

**CURE.**—Most writers recommend the immediate removal of the thickened membrane. I do not like this. Mr. Martin in his excellent work, recommends that the tongue be cleansed by applying a little borax dissolved in tincture of myrrh, by means of a camel-hair pencil, two or three times a-day. We would rather anoint the part with fresh butter or cream. Prick the scab with a needle, if you like; and give internally a pill about the size of a

marble, composed of:—Garlic, and Horse-radish scraped, in equal parts, as much Cayenne pepper as will outweigh a grain of wheat. Mix this with fresh butter, and give it every morning—keeping the fowl warm. Keep the bird supplied with plenty of fresh water; preserve it from molestation, by keeping it by itself, and you will generally find it get well if you have taken the disease in time. Do not let any one, equally ignorant and cruel, persuade you to cram the mouth with snuff after having torn off the thickened membrane with your nail. This is equally repugnant to humanity and common reason. Forcing tobacco-smoke down the bird's throat is advised; and when, as sometimes is the case, the disease depends on the presence of a worm, then it is most successful.

**INFLAMMATION.**—Most of the diseases to which poultry are subject may be traced to inflammation exhibiting itself in some part of the system.

**INFLAMMATION OF THE TRACHEA.**—The disease to which this term is improperly applied is an inflammation of the tail-gland. The true roup is a disease extremely analogous to influenza in man, or even more so to the well-known distemper among dogs; and, in some forms, perhaps, to the glanders of the horse, and is sometimes termed Gapes and sometimes Roup or Croup.

The symptoms are—difficulty of breathing, constant gaping, dimness of sight, lividity of the eyelids, and the total loss of sight; a discharge from the nostrils, that gradually becomes purulent and fetid: appetite has fled; but thirst remains to the most aggravated extent. Sometimes this disease appears to occur independently of any obvious cause; but dirt, too hot feeding, and want of exercise are amongst the most usual.

The remedies recommended are various. Mr. Martin prescribes one grain calomel made up with bread into a pill, or, if preferred, two or three grains Plummer's pills (*pil. hydr. Submur. co.* Lond. Pharm.), after which let flour of sulphur be administered mixed with a little ginger, mixed barley meal reduced to a paste, and the mouth well washed in a weak solution of chloride of lime. In the mean time, let the bird be kept in a dry, warm, well ventilated apartment, and apart from the other fowl. When the bird dies of this disease, the trachea will be found replete with narrow worms about half an inch in length imbedded in slimy mucus. This singular worm is the *distoma lineare*, a long and short body united, the long body being the female, the short the male; they are permanently united, otherwise they are quite perfect in themselves. Mr. Martin is uncertain if these worms are the cause or consequence of the disease; but it is certain when they have once established themselves, their removal is necessary to give the bird a chance of recovery. This is sometimes done by means of a feather, neatly trimmed, which is introduced into the windpipe, and turned round once or twice, and then drawn out; this will dislodge some of the worms if dexterously performed, and with some knowledge of the anatomy of the parts.

Spirit of turpentine in rice, and afterwards a little salt in the water, have been given successfully.

My treatment would merely be warmth and cleanliness, as matters of course; and for pellets—

Powdered gentian,	- - -	1 part,
Powdered ginger,	- - -	1 "
Epsom salts,	- - -	1½ "
Flour of sulphur,	- - -	½ "

Make up with butter, and give every morning.

If the discharge should become fetid, the mouth, nostrils, and eyes may be bathed with a weak solution, composed of equal parts of chloride of lime and acetate of lead. Fomentation with an infusion of chamomile flowers is also highly beneficial.

The other affection—that improperly passed under this name—viz., swelling of the tail-gland—may be treated as a boil. If it become inconveniently hard and ripe, let the pus or matter out with a penknife, and it will soon get well.

INFLAMMATION OF THE LUNGS is attended by quick breathing with a rattle, an audible dullness, disorder of plumage, vacancy in the eye, and general indisposition. Bleeding, the natural remedy for such symptoms, is out of the question, for how is a bird to be bled, and where?

INFLAMMATION OF THE HEART.—A fatal disease among poultry, and only detected by examination after death. The patient appears to droop, refuses to eat, retires to roost, and is found dead in the morning. In this case, the peritoneal membrane exhibits indications of active inflammation.

INFLAMMATION OF THE MUCOUS MEMBRANE.—Generally proceeds from aggravated diarrhœa. The bird is severely purged, and the evacuations become more or less tinged with blood, and death ensues unless a speedy remedy is applied. Damp and improper food are the cause of the disease. The remedy, to be successful, must be administered early; first, give a small quantity of castor oil; this will clear the bowels of irritating secretions; afterwards, give doses of *hydrargyrum cum creta*, (Lond. Pharmacopœia), with rhubarb and laudanum, as follows:—

Hydr. cum creta	- - -	3 grains.
Rhubarb,	- - -	2 or 3 grains.
Laudanum,	- - -	2, 3, or 4 drops.

Mix in a teaspoonful of gruel, and give twice a day.

ASTHMA is characterised by gaping, panting, and difficulty of breathing.

We need not go far to seek for a cause. Our poultry are originally natives of tropical climates; and, however well they may appear climatized, they, nevertheless, require an equable temperature, unaided by artificial means. Hence coughs, colds, catarrh, asthma, pulmonary consumption, arise from variable climate.

CURE.—Warmth with small repeated doses of hippo powder and sulphur

mixed with butter. The addition of Cayenne pepper will be an improvement.

**DIARRHŒA** is occasioned by damp, and sometimes by improper food. Remove the bird into dry quarters; change the food; if it become very severe, give chalk; add a little starch, mixed with Cayenne, to porridge, and give it moderately warm.

**INDIGESTION.**—Caused by over-feeding and want of exercise. Lessen the quantity of food; turn the fowl into an open walk, and give some powdered gentian and Cayenne in the food.

**APOPLEXY.**—Symptoms—Staggering, shaking of the head, and a sort of tipsy aspect. Some persons have, from ignorance of the true cause of this affection, treated it as proceeding from intestinal irritation, and prescribed castor-oil with syrup of ginger, &c. Scanty food, and that of light quality, and the application of leeches to the back of the neck, constitute, in my opinion, the only effectual remedy. Perhaps, however, it is better to have the poor bird at once handed over to the cook.

**PARASITES IN FOWLS.**—The insects which infest animals of all kinds, more especially domesticated ones, are the bane of their existence. In poultry they are particularly obnoxious, and the utmost possible cleanliness and frequent lime-washing and fumigation, are necessary to keep them in proper condition. White precipitate powder, applied with a small camel-hair pencil, in small quantities, will destroy lice and other parasites.

Like the domestic fowl the peacock has also its parasites in the *Goniodes pulcicornis*. After the death of the bird the insect may be found congregated in numbers about the base of the beak and crown of the head. Mr. Denny was induced to examine all the genera of domesticated birds, and he found on the Turkey *Lipeurus polytrapezius* as a common parasite; the *Goniodes stylifer* is also frequent in the head, neck, and breast. Over the domestic fowl he found three species of parasitic *Goniodes dissimilis* of rare occurrence. *Lipeurus variabilis* preferring the primary and secondary feathers of the wing, among the ribs of which they move with great celerity. *Menopon pallidum* he also found in great abundance on the domestic fowl; and, as a general rule, he observed that when two or more species frequented the same species of bird, each had its own locality.

The remedy in all cases is cleanliness, and when the fowls are over infested, fumigation and a plentiful sand bath of clean, dry and rough sand; for the white precipitate powder, named above, is poisonous, and only fit to be used on very young birds, which have not yet learned the art of preening their feathers with their bill.

**FEVER.**—Fowl are frequently subject to febrile affections. The mode of treatment is simple—light food, and little of it; change of air; and, if necessary aperient medicines—such as castor-oil, with a little burnt butter.

**CONSUMPTION** I regard as incurable; but, if anything will do good, it is change of air and warmth.

**GOUT.**—Its effects are obvious. Pellets of Colchicum may be used; but if you had, as you should have done, killed your fowl before they became so old, it would have been more rational. They are now past use. Sulphur may also be found useful.

**CORNS.**—These may generally be extracted with the point of a penknife. If ulcerated, as will often occur when neglected, touch with lunar caustic, and you may thus succeed in establishing healthy granulations.

**COSTIVENESS.**—This affection will, in general, yield to castor-oil and burnt butter. The diet should be sparing. Thin porridge will be found useful.

In the case of fractures, put the fowl to death without loss of time. The same may be said of bruises. By this you not merely avoid some loss, but save the poor bird much suffering.

The accidental stripping of the feathers must not be confounded with the mangy affection already treated of. The difference will be seen by examining the state of the skin where it is exposed.

Ulcers may be kept clean, dressed with a little lard, or washed with a weak solution of sugar of lead, as their aspect indicates. If sluggish, touch with bluestone.

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## CHAPTER XI.

### CAPONIZING.

**THE** objects proposed in converting a cock into a capon are the following:—his natural fierceness is quelled; he becomes placid and peaceful; his pugnacity has deserted him; he no longer seeks the company of the hens; he grows to a far larger size than he otherwise would have done; he acquires flesh with much greater rapidity, and that flesh is peculiarly white, firm, and succulent, and even the fat is perfectly destitute of rankness. To these advantages another may, perhaps, be added—viz., the capon may, by a little management, be converted into an admirable nurse, and will be found particularly valuable, in this respect, to parties using the *eccalobeion*, or hatching-machine.

The process has been made a subject of much unnecessary mystery, and, I regret to add, of much unnecessary cruelty. In point of fact, caponizing is an extremely simple affair, which the country henwives in France perform with facility and certainty. The practice of the French country women is to select the close of the spring, or the beginning of autumn, as well as fine weather, for the performance of their work. The parts necessary to be removed being fixed in the abdomen, and attached to the spine at

the region of the loins, it is absolutely necessary to open the abdominal cavity for the purpose of their extraction. The bird should be healthy, fasting, and about three months old. He is then to be secured by an assistant, upon his back, his belly upwards, and his head down, that the intestines, &c., may fall up towards the breast; the tail is to be towards the operator. The right leg is then carried along the body, and the left brought backwards, and held in this position, so as to leave the left flank perfectly bare, for it is there that the incision is to be made. The said incision is to be directed from before backwards, transversely to the length of the body, at the middle of the flank and slightly to the side between the ends of the breast-bone and the vent. Having plucked away the feathers from the space where it is intended to make the incision, you take a bistoury or a scalpel, and cut through the skin, abdominal muscles, and peritoneum; it is better to do this at two or more cuts, in order to avoid the possibility of wounding the intestines—a casualty that would, in most cases, be attended with fatal results. The intestines present themselves at the orifice; but you must not suffer them to come out; on the contrary, you press them gently aside, so as to have room for action. I may observe, that the incision should have been sufficiently large to admit of the forefinger, previously well oiled, being passed into the abdomen, and carried carefully towards the lumbar region of the spine: you will there find what you are in search of. You first reach the left substance, which you detach with your nail, or with your finger bent hook-fashion; then you arrive at the right, which you treat similarly—bring both substances forth; you finally return the intestines, sow up the wound with a silk thread—a very few stitches will suffice—and smear the place with a little fresh butter. The comb of the capon does not grow to any size, and always retains a pallid color.

The process having been performed as above described, the bird is placed in a warm house, where there are no perches, as, if such appliances were present, the newly-made capon might very probably injure himself in his attempts to perch, and perhaps even tear open the sutures, and possibly occasion the operation, usually simple and free from danger, to terminate fatally. For about a week, the food of the bird should be soft oatmeal porridge, and that in small quantities, alternated with bread steeped in milk; he may be given as much pure water as he will drink; but I recommend that it be tepid, or at least that the chill be taken off it. At the end of a week, or, at the farthest, ten days, the bird, if he has been previously of a sound vigorous constitution, will be all right, and may be turned out into the walk common to all your fowl.

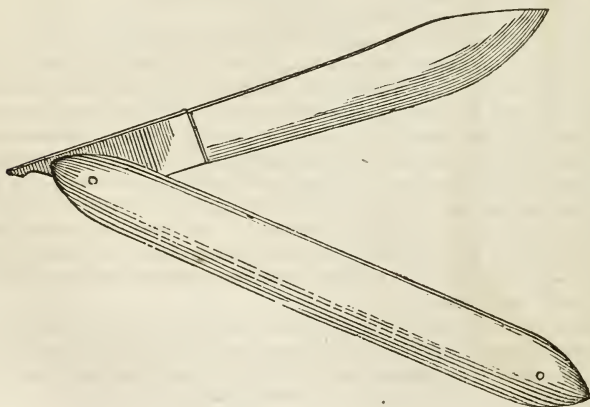
The Malays are particularly adapted for caponizing, and, when properly fattened, at a suitable time after the operation, attain a bulk and weight that would surprise such persons as have never seen a caponized specimen of that breed, the birds, in fact, rivalling the finest turkeys.

An operation of a similar nature is performed upon hens, either before they have begun to lay, or after they have ceased to do so, for the purpose of preventing them from laying in future. This renders them, as the other does the cock, more susceptible of taking flesh, and that of a finer quality than ordinary. It is proper to remind the reader that, of course, when it is deemed advisable thus to deprive a hen of the power of reproduction, such a one should always be selected as presents deformities or other defects that ought to render her unfit for breeding purposes.

The caponizing of pullets is performed in much the same manner as in the case of cocks. The oviduct is found towards the loins, and is extracted in the same manner as already described in the former case. Some French writers, however, and Schreger amongst the first, state, that in the case of pullets or hens the operation is unnecessary, it being only required to make a small incision just above the vent, on a little eminence that will be perceived in that place; then, by repeated pressure, you cause the protrusion of the uterus—a little whitish body; this is cut away, the wound heals of it self, and nothing further is required.

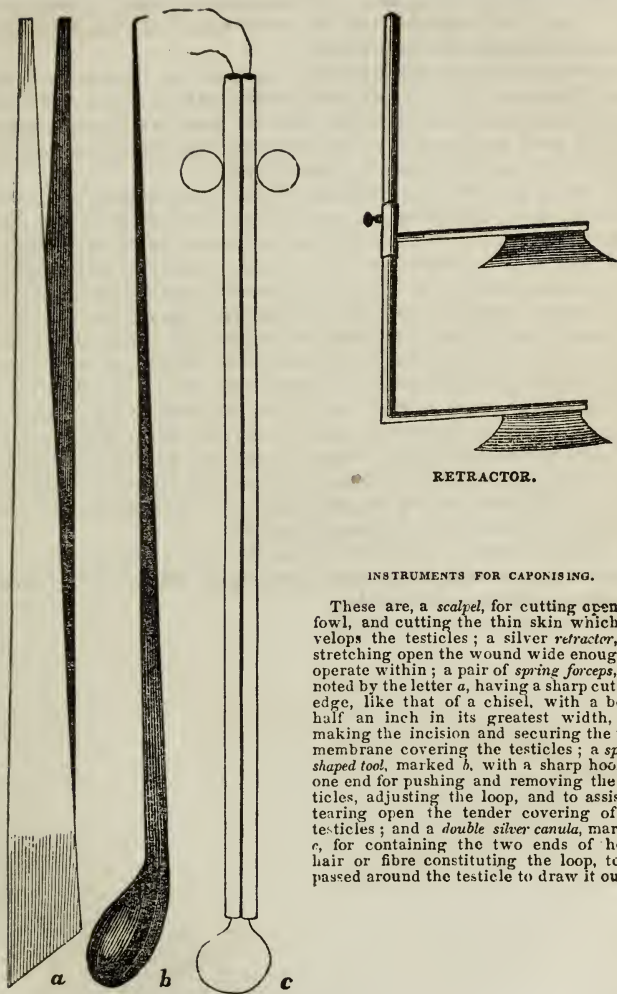
When necessary, in either case, to employ sutures for the purpose of closing the wound, great care must be taken to avoid involving the intestines in the stitches. I warn the operator that, if he be tedious in the performance of his work, the chances are greatly against his success. Whoever proposes to caponize should acquire dexterity of manipulation by practising on the dead bird, before he endeavors to use his knife upon the living: when such

#### INSTRUMENTS FOR CAPONISING.



SCALPEL.





RETRACTOR.

## INSTRUMENTS FOR CAPONISING.

These are, a *scalpel*, for cutting open the fowl, and cutting the thin skin which envelops the testicles; a silver *retractor*, for stretching open the wound wide enough to operate within; a pair of *spring forceps*, denoted by the letter *a*, having a sharp cutting edge, like that of a chisel, with a bevel half an inch in its greatest width, for making the incision and securing the thin membrane covering the testicles; a *spoon-shaped tool*, marked *b*, with a sharp hook at one end for pushing and removing the testicles, adjusting the loop, and to assist in tearing open the tender covering of the testicles; and a *double silver canula*, marked *c*, for containing the two ends of horse hair or fibre constituting the loop, to be passed around the testicle to draw it out.

FORCEPS, SPOON AND CANULA.

precautions are used, the operation will be divested of much of its apparent cruelty; and if to be resorted to at all, every precaution should be taken to outrage humanity as little as possible.

Sometimes, but rarely, this operation is performed on turkeys, geese, and ducks; the reason why it is performed so rarely on these birds is, that, from the great plumpness of their bodies, what we want to arrive at is farther from our reach, the operation, of course, so much the more difficult, and the probability of success so much the more remote.

The capon is so very much disposed of itself to take on-flesh that it will, in general, attain to sufficient condition in the yard, or about the barn door. Sometimes, however, it is deemed advisable to cram him. This practice induces rapid growth in little time, a very delicate quality of flesh (I except the caponized gander from this), and also causes him to fetch a higher price in the market. When it is considered desirable to cram a capon, he is taken and placed in a dark and quiet house, or coop, so small that he shall be unable to exercise; he may then be fed with pellets of meal and milk. Pea-meal or bean-meal will be found to impart a fine flavor to the flesh, but if this description of food be found too binding, let pellets of barley-meal be given, till the undesired effect is removed; the bird should be left as much food as he will eat, and should, besides, be crammed at least three times a day. In three weeks he will be ready for use. It may not be amiss here to remind the reader that the droppings of the bird are almost, if not quite, as valuable as guano for the purpose of manure.

A little dish of fine gravel or coarse sand, left in the feeding trough, will be relished by the birds, will promote digestion, and will, of course, thus aid in conducting to their rapid fattening.





# THE COW :

Dairy Husbandry and Cattle Breeding.

BY M. M. MILBURN,

Author of Prize Essays of the Royal Agricultural Society of England.

EDITED BY AMBROSE STEVENS

Editor of Youatt & Martin on Cattle

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## PUBLISHER'S ADVERTISEMENT.

THE Publisher, having found the want of small, cheap Books, of acknowledged merit, on the great topic of farming economy, and meeting for those of such a class a constant demand, offers, in his Rural Handbooks, of which this is one, works calculated to fill the void.

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C. M. SAXTON,

*Agricultural Book Publisher.*

## EDITOR'S PREFACE.

THE American Publisher placed this little book in the hands of the editor to be Americanized. Mr. Milburn, its author, is a resident of Yorkshire, England, a county whose cattle are almost wholly of the short horn kind. While he does ample justice to the favorite breed of his own region, he much underrates the Devons and Herefords. It is unfortunately the case that in England the breeders of particular races of animals admit little or no merit in other varieties. Due allowance must be made for the author's position in a short horn cattle region, and his consequent partialities.

Cattle, milk, butter, and cheese-making are the same essentially in all countries. Variations of climate and soil make different breeds of beasts preferable in different regions, and the same causes act to somewhat change the processes of producing butter and cheese. Yet a good treatise on these subjects will suit all countries and all varieties of breeds.

This little book contains much valuable matter, in a compact form and at a low price, that is nowhere else so accessible and so reasonable. The American editor has adapted it to the American farmer and breeder, preserving the views and opinions of the author, correcting obvious errors in fact, and rendering this edition of more value to the American reader than the English one.

In America it has been found, that the Devons, while suited to all latitudes, are better fitted for the climate of the extreme south and the extreme north than any other breed of cattle. In Georgia and Canada, they are superior to all others either for milk or feeding. In a few years all New England will be occupied with this breed, as the one best adapted to its pastures and its climate.

The short horn and the Alderney are by experience shown to be adapted only to the more temperate portions of our country. Within this range the short horn has no equal as a whole, for beef and milk.

The American breeder and dairyman should therefore choose his breed in reference to his locality. In doing this he should confine himself to the short horn and Devon races, when he designs to breed with a view to both beef and milk. In merely grazing regions, where the dairy forms no object, he may select also the Herefords as a good beef and feeding race, and adapted to all regions whose pasture and climate suit the short horn. So far as experiments have been tried, the Ayrshire breed may be said, in general, to have failed, and should therefore be avoided. The Alderney is only to be commended to the amateur, or those keeping a single cow; she gives a small quantity of very rich milk, that furnishes a great luxury in its cream and butter; but while these are rich, they are too small in quantity, and the milk is very defective in its cheese-making property.

The American breeder will thus see the propriety of being guided by the experience of those who have tested in their own climate and on their own soils, the different breeds, and shown those which are best fitted for both.

AMBROSE STEVENS.



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# DAIRY HUSBANDRY AND CATTLE FEEDING.

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## CHAPTER I.

### INTRODUCTION.

THERE is not a race of animals to which the community is on the whole more indebted, than to cattle. They not only cultivate the land, but afford food of various kinds, in different circumstances of their existence ; and also at death, supply very important articles of clothing and utility, and are amongst those animals to which we owe by far the most of the comforts and conveniences of life.

Not to mention the use of cattle in many districts of country for the purposes of labor : they supply during life, those most important of necessaries, milk and cream ; they afford the luxuries of cheese and of butter ; and at their death they are the sources of supply of the food which has become associated with our national peculiarities, and which is one of the most nutritious of the necessaries of life.

Nor in death does their utility cease. Their hide provides the protection to our feet and the trappings to our horses—their horns, combs and ornaments—their hoofs even, and their waste, supply glue and gelatine ; while their bones afford the handles for our knives and many useful articles in manufacture ; and the refuse again, of these, returns to our soils as a most valuable manure.

In the very earliest times they seem to have had attached to them a high degree of importance. In very primeval days, in Egypt, then the most civilized country of the earth, divine honors were paid to them, and they had their priests and their obsequies. In ages of more remote antiquity still, they were among the first offered and the first accepted sacrifices ; and the herdsman was a patriarchal king, as well as was the shepherd,—indeed, riches then consisted in possessing cattle and sheep.

We have in this country several very distinct tribes of animals—differing in their features and characteristics in many very important particulars ; some so completely domesticated as to be affectionate and even companion-

able, and others shy and untameable in their nature, as the wild deer of the forest; nor is it easy to say whether these latter are an original race; or whether they are an accidental variety, permitted to live in their native wildness as a contrast to the gentle domesticated creatures such as the short-horns, which have been introduced, and which owe their docility to continental training, probably through a long series of years.

Tracing our domestic breed back to the Bison, or Wild Ox, known to the ancient Greeks and Romans, but driven away from central Europe, we find they now inhabit the wild morasses and forests of Lithuania and Circassia, where they appear so wild and ferocious, as to resemble but little, except by marks too unmistakable to overlook, the quiet and gentle kind, which low around our homes with a social attachment. Attempts made to domesticate these have by no means been successful; and when partially effected, they seem to have an aversion to our domesticated cattle which is highly indicative of their half-educated state. The Bison is found also in British India, in Western Asia, and on the American continent;\* the race is hunted in most of these countries for their skins, and now perhaps for their flesh and bones.

These Bisons are usually very formidable in numbers, associate together for mutual protection, move in rank and file, observing almost military discipline, and are led by the largest and fiercest bull. So dense is their column when migrating, that, if one falls or halts, the whole herd will march over him and trample him to death.

The Buffalo is another species of wild ox, and is also somewhat widely diffused, being common in India, in Africa, and in some of the wilder or more southerly parts of Europe. It seems more tameable than the Bison, and is used for domestic purposes in the East and in Africa. The native African buffalo affords hunting sport of the wildest kind, and, having also a bull leader, will rush headlong against any opposing enemy. Sometimes life is sacrificed in these exciting but terrible engagements.

Now, though differing in conformation, the wild cattle of this country have many habits in common with both these animals. They are kept in their native purity in the park of Lord Tankerville, at Chillingham in Northumberland; a few are also kept in Scotland, in a park of the Duke of Hamilton, at Chatelherault, in Lanarkshire, but the latter have a less certain pedigree. The former nobleman, in a communication to the Society of Arts, gives a very interesting account of their characteristics and habits, and assigns to them the palm of being the aboriginal cattle of the island. That the original breed, or at any rate some early breed of cattle, have been very large in size, is pretty evident from the fossil bones found in bogs; but a smaller kind found in Cornwall also indicates a smaller animal, having a

\* There is no connection between the *American* Bison (Buffalo) and the Bison of Europe and Asia, nor domestic cattle.—AM. FL.

kind of horn more resembling the cattle of the Duke of Hamilton. Fitzstephen, who lived in the twelfth century, alludes to the wild bull of the woods as having its residence in the large forests near London. Guy, Earl of Warwick, whose battle with the wild Dun Cow is commemorated by the animal's skull still preserved in Warwick Castle, evidently had an encounter with a large and monstrous animal of the wild breed; Hollinshed also speaks of Bruce in the fourteenth century being nearly killed by a wild bull in the forest of Caledon.

So recently as the sixteenth century, it seems these wild cattle were common in the Callender or Calder woods.

The Chillingham Park Cattle appear to retain all the characteristics of wildness incidental to the untamed denizens of the forest. They hide their young, feed during the night, and conceal themselves as much as possible during the day in the woods, into which they steal away if they appear to be observed. Their usual mode of retreat is to get up slowly, set off at first in a walk, then a trot, and they seldom begin to gallop till they have placed a hill or rising ground between themselves and the observer. When they come down into the lower part of the park, which they do at stated hours, they move like a regiment of cavalry in single file, the bulls leading the van, as in retreat it is the bulls that bring up the rear. Another peculiarity is, that when confronted closely they will at first dash off—remove a few hundred yards, and then all turn their faces and approach the object of their fear; on any further indications of approach, they rush off, but to a smaller distance, and return nearer the object; and so on every occasion until the cause of the disturbance departs. They do not seem, however, to have any disposition to pursue. Mr. Geo. Cully states a fact related to him by Mr. Bailey, of Chillingham, which shows the native wildness of these cattle. He found a hidden calf two days old, very lean and feeble, but, on stroking its head, it nevertheless got up, pawed with its feet several times, bellowed out, and made a butt at that gentleman, which he evaded, and it fell to the ground with the effort, but was so weak as to be unable to rise up of itself. The whole herd became alarmed, and came to the rescue in great fury. So ferocious are the mothers when they have calves, that they will gore or destroy any one who comes near them.

It is a peculiarity in the wild cattle also, that when any one of their number seems to be irrecoverably ill, the rest immediately fall upon it, and gore it to death.

Now whether all the great difference in conformation, color, characteristics, &c., of cattle be due to climate, breeding in and in, pasturage, crossing, &c., there is no doubt that, as far as man is concerned, by far the greatest victory he has won is in the domestication of the lower animals. To convert a wild, almost worthless animal,—except when secured by the efforts of the chase—into a tame, gentle, willing slave, affording diminution of human

labor, and yielding, besides, a supply of convenience, comfort, and luxury to man, is no ordinary conquest; but to cultivate one variety for the milk, butter and cheese, and another for its beef, is a victory of skill and judgment by far surpassing in wonder the mere taming of an animal to domestic habits.

When we revert back to the origin of the cattle of this country, and ask ourselves if it be possible that the long-horned Craven cow, and the polled Angus—the gentle, quiet short-horn, and the wild and ferocious breed of Chillingham, can be of the same original; let it be remembered that the question is one much wider, and by far more extensive! Is the rough-maned and bristly bison, with his large fore-quarters and his enormous head, of the same original as the neat and sprightly Ayrshire cow? The question is by far too extensive for discussion here; but there does not seem any reasonable doubt of the fact, that within certain limits, changes of circumstances alone will have a great tendency to change the conformations and characteristics of species. Thus, in cold countries whiteness prevails as a color, and fur or wool as a coat. In warmer climates the brown prevails as a color, and the hair as a covering, while in those absolutely hot, the dun seems to obtain as a color, and the down as a clothing; so great is the adaptation of organized beings to the state in which they are placed, and so vast is the expansibility of nature, that she can extend, or shorten, or increase, or diminish conformations so as to be suitable to the wants of the animal, and to its happiness, and comfort, and life.

Thus, though the *bones* of the Bison and the Galloway may present but small distinction, yet the difference of skin, of mane, and of muscle would make an ordinary observer start at the idea that they had a common origin. It is possible that the influence of pasture may lengthen or shorten the horns—that by breeding from long or short-horned, or from hornless animals, the variety may be perpetuated, till they lose, in the course of ages, many of their original characteristics. It is impossible, for instance, in Essex, to grow the ox to the same size, other things being equal, as in the county of Durham; nor on the Ayrshire Hills can he be produced in the same form or stature as in the Devonshire Valleys. The Highland Scot is suited to the cold climate of the exposed and stormy north, the short-horn to the lowland pastures, and who shall say that the God of Nature has not impressed on these created beings the capability of adapting themselves to his plastic handy-work, of developing their tendency to follow the peculiarities of the situation in which they are placed?

In all our stocks of domesticated animals we see profuse and infinite variety, and in the races of wild animals from which they originally descended, we find a uniform color and figure, for the most part, to prevail. Animals in a wild state procure a simple and unvaried food in precarious and deficient quantities, and are exposed to the inclemencies of the seasons. In the improved state, all the stimuli of various food, of warmth, &c., are afforded in

abundance, and the consequence is a luxuriant growth and *evolution of varieties*, and the exhibition of all the perfections of which each species is capable.

The importance of the stock of cattle as affecting the wealth and well-being of this country can hardly be over estimated. Mr. M'Culloch estimates the entire number of cattle in the United Kingdom at 5,220,000 ; if we add to this the number imported in 1847—or 83,000 in round numbers—we shall have as many as 5,303,000 head of cattle in the United Kingdom in one year, which at so small a price as £8 each, will give an aggregate value of £42,424,000. And this number is by no means an extreme one, but quite the reverse. Colquhoun estimated the cattle in England and Wales alone in 1812 at 5,500,000 ; and M'Culloch founded his data from Arthur Young's estimate, made in 1799, and to which he has only added one-third. As early maturity and the extended quantity of food produced by convertible husbandry and improved farming, are also to be taken into account, it is probable that the cattle of the United Kingdom stand nearer seven millions than five, at the present time.

To give an idea of the increased cattle trade of London, it is only necessary to mention that in 1732 there were only 76,210 cattle sold in Smithfield ; in 1830, a period of 98 years, they had increased to 169,907 head ; whereas, in 1846, a period of 16 years more, they reached 210,757 head. If these had but an average weight of 650 lbs., it would give a consumption of the meat slaughtered in London alone of not less than 136,992,050 lbs., not to mention the quantities of meat sent up by the different railways, as carcases, and which trade is now becoming a great source of profit in several parts of the country.

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## CHAPTER II.

### THE MILK-PRODUCING BREEDS OF CATTLE.

It is usual, in works on cattle, to classify them by the length or shortness of their horns ; and, as a matter of natural history, it may be the most correct mode of dividing or classifying the different tribes of animals which prevail in one or other of the districts of Great Britain and Ireland. But for practical purposes, it is by no means either advantageous or convenient. There are certain breeds which have certain peculiar qualities, and as the size of horn has no connection whatever with those qualities, it is by far the most desirable course to classify them according to their properties, rather than by any arbitrary mark of distinction altogether unindicative of their peculiar capabilities. There is, in this country, a great variety of pasturage

from the very rich to the very poor, and from the extremely warm, to the exposed and stormy, and in every gradation of this range is a class of cattle kept and propagated.

The great object for which cattle are kept by the farmer is either to grow beef for the market, or to produce milk, which shall be converted into butter or cheese, or sold as milk, to supply the great towns. Hence the former selects the fat-producing, and the latter the milk-producing, class of animals. Nature, as a general thing, has provided that different races of animals, and different individuals of these races, are, more than others, adapted to the secretion of one or the other of these necessary products. The objects of the two secretions are essentially different, and the tendencies and qualities necessary for both are never active in the same animal at the same time. For while the former is a reservoir of the carbonaceous matter of the food, laid by for subsequent use in the respiratory system, the latter is the secretion of a substance necessary to support the young progeny until it is able to sustain itself, and to procure from the green pastures the food there provided for it. Hence to produce milk is, more or less, the natural quality of all kinds and races of cattle ; but some will produce large quantities, but thin and poor in quality ; some smaller quantities, and rich in oily matter, while others will afford a small quantity, but abundant in solid matter ; and the first class would be selected by the milk-man near the populous city, the second by the dairy-man whose product was intended to be butter, and the third by the maker of cheese. There are some tribes of cattle that are both good fatteners and good milkers, but never at the same time.

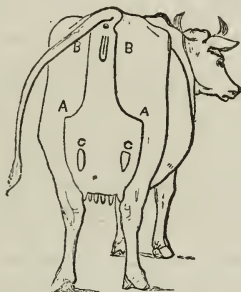
The milk-producing breeds are more widely diffused than any other, because they are capable of being kept to advantage on qualities of herbage which are inadequate profitably to sustain the fat-secreting breeds. Grassland on the clay soils on the sides of the uplands, and even on the poorer sands, is quite adequate to supply the means of making butter or cheese ; but it will very ill repay the person who attempts to feed cattle on herbage so inferior ; while the rich alluvial feeding pastures which generally skirt the rivers are far more profitably employed in raising summer beef, than in the production of milk, of cheese, or of butter. Some races of long-horns, of short-horns, or of middle-horns, or even of polled animals, are to be placed amongst the one class we have alluded to, and some amongst the other, and we prefer arranging the breeds most celebrated for the quantity or quality of their milk under the first head, and reserve the second to the races with special aptitude for fattening.

The question arises very naturally how far it is possible, by external conformations of the individual animal, to detect its capabilities for the secretion of milk. There are instances in every breed where it is evident nature has been more bountiful, or more niggardly, in bestowing the qualities calculated to produce the secretion for which the race may be celebrated ; and there



are, doubtless, marks, well known to the dairy-man, which seldom fail to indicate the power of the animal in the range of qualities peculiar to his race. On the continent of Europe this has been professed to be carried to a very minute extent. Francois Guénon, a Frenchman, professed to have found, by close observation, a mode of deciding authoritatively, not only the quantity and quality of milk which would be given by any particular cow, but also the period for which she would retain her milk after calving, and this he proposed to do by external appearances alone, and these of a somewhat arbitrary kind.

It is not within the compass of this little work to give anything like a description of the mode he adopted, now made public, but the foundation is his classification of all kinds of cattle into eight classes or families; each family is divided into three sections, according to size only, and each section is again subdivided into eight orders.



CLASS I. FLANDRINES OF GUENON'S SYSTEM.\*

The distinguishing marks by which he divides these are—1. The Gravure, commencing at the udder, and extending to the bearing; 2. The Epis, a soft brush of hair upon the animal; and 3, Contrepoil, or hair growing the contrary way. The peculiarities of these marks constitute the distinction between the families and orders. Thus, if the gravure be large, the reservoir

\*The system of Guénon is very extensive and complicated; its extent, however, he claims, only covers the various gravures which exist in cows. The variations of the gravure are twenty-four in number; beside the exceptional ones, denominated bastard, which are indicated by particular marks on the gravures, and the cows are distinguished by the earlier period at which they go dry; more especially if they be got in calf. These gravures are of eight different kinds corresponding to the eight different classes; and there are eight orders of each class, each numbered one to eight. In all the classes, number one is superior, and number eight inferior, and the degree of excellence varies with the number, the higher, the less the excellence. The same variation takes place in the orders, the first being better than the eighth. But the superior orders of the different classes are better milkers than the inferior orders in the superior classes.—AM. ED.

of milk will be large, and the produce abundant; if it be formed of fine hair if the skin be yellowish, and if a kind of bran powder comes off the skin be of that color, they are all signs of a good milker. The rationale of this is, that this gravure is but a continuation of, and corresponds with, the lactiferous vessels under the belly of the animal. These "epis," he states, correspond with the reservoir of milk, and are tufts of hair growing the wrong way on the right or left of the bearing. The largest epis indicates the most rapid loss of milk. The contrepoil, or hair growing the wrong way on the gravure, amidst that which grows upwards, shows a default in the production of milk, even if the gravure be large. We give a fac-simile of his class 1. FLANDRINES. So far is a very general description of a system which he invests with minutæ of no ordinary kind, and it is so precise and prolix that it requires a series of some score of plates to show the variations of family, class, and order.

Without definitively pronouncing that there is no merit in his observations, it seems perfectly clear that many of his indications are of a character generally indicative of a quality, but are pushed far beyond their legitimate objects; for while a wide capacity of upper udder—a fine hair—a yellow scurf, are somewhat too indefinite to classify very precisely, they are just the points which may indicate the fineness of quality, and a large lactiferous capacity, which may add to the physiological signs by which a milking-cow is judged by the practical grazier.\*

Beauty of form is about the last qualification in a good dairy cow. Symmetry to a breeder is no criterion of milking qualities. The parallelogram is the beau ideal of a fattened ox in section, and a cylinder is that of his superficialities—thus exhibiting the essence of *roundness*,—whereas the very converse is the perfection of the milker, *i. e.* "*flatness*."† The following are the best settled marks or characteristics of a milking cow. Head small and fine, eye bright and full, but with a quiet and placid expression, neck thin and deep, which gives it an appearance of hollowness; shoulder and breast narrow, but projecting; ribs flat; rumps broad, and tapering down to the knee-joint, owing to the thighs being thin; tail small; udder large and round, with teats well formed, tapering to the end, and at a moderate distance from each other; thin in its skin, and with plenty of skin above; its fore-teats round and full, and with a large subcutaneous, or milk-vein. There must, above all, be kindness of touch, indicative at once of good breeding and of quiet disposition. This, with a quiet, calm, serene temper, are indications of milk-producing animals, which, where health is present, are almost infallible criterions.

\* Guénon's system has been much spread and tried in America, and has progressively obtained credit and reliance from dairy-men and breeders. His work, translated into English, may be had of C. M. Saxton.—AM. ED.

† A cow of a good fattening tribe, which is a good milker, will show hin and flat in milking, but when dry and fed up will show full and round.—AM. ED.

The next step is to describe some of the most prominent features of the best kind of cattle for milk producing, and but a few of the best will be selected of the many varieties of cattle.

THE AYRSHIRE BREED.

These are a valuable breed of middle-horned cattle, exceeding, perhaps, all in all, any breed of dairy cows in the kingdom. Small in size—their want of symmetry is not so obvious—affording milk of a very rich quality, and somewhat oily; they also fatten tolerably, for when the butyraceous deposit is stopped by drying, the system soon accustoms itself to secrete fat, which they soon acquire on a pasture of inferior quality to that required by more tender animals.

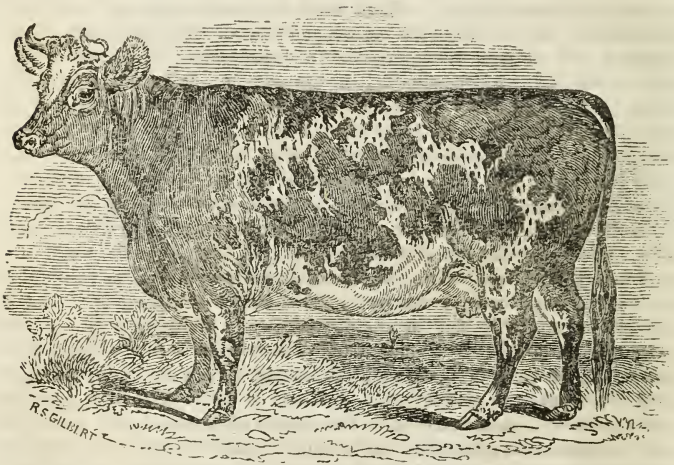
There is no description of the race equal to that of Mr. Aiton, whose work on *Dairy Husbandry* so far exceeds any other, that it is abundantly quoted to the present day. “Head small, but rather long and narrow at the muzzle; the eye small, but smart and lively; the horns small, clear, crooked, and, at their roots, placed at a considerable distance from each other; neck long and slender, tapering towards the head with no loose skin below; shoulders thin; fore-quarters light; hind-quarters large; back straight, broad behind; the joints rather loose and open; carcass deep, and pelvis capacious, and wide over the hips, with round fleshy buttocks; tail long and small; legs small and short, with firm joints; udder capacious, broad and square, stretching forward, neither fleshy, low hung, nor loose; the milk veins large and prominent; teats short, all pointing outwards, and at a considerable distance from each other; skin thin and soft; hair soft and woolly. The head, bones, horns, and all parts of least value small, and the general figure compact and well-proportioned.” Such was Mr. Aiton’s description, and with the exception of thickness of buttock, it will not inappropriately describe the present Ayrshire cow. There are two other characteristics which seem so thoroughly belonging to this breed, as such, that they ought not to be passed over. The one is the black muzzle, and the other is the red, which seems to be the natural color of the race, arranged not in considerable quantities, but in blots or patches, and so the animals generally present a sort of checked aspect of pale red and red and white.

The produce of these cows in milk and butter is very great. An Ayrshire cow will give from 600 to 800 gallons of milk in the course of the year, and as much as five gallons per day is by no means uncommon for three months after calving. This, however, falls from Colonel Fullarton’s estimate, in his *Agriculture of Ayrshire*, when he states that though the Ayrshire cow will not, when fat, weigh more than twenty to forty English stones, “it is not uncommon for these small cows to give from twenty-four to thirty-four English quarts of milk daily during the summer months, while some of them will give as far as forty quarts.”

The milk is also very productive of butter Three gallons and a half of

such milk will yield a pound and a half of butter ; so that as much as 266 lbs. of butter will be yielded by an Ayrshire cow ; and it is no uncommon thing to have eight or nine pounds of butter produced from one of these cows for some weeks after calving. Some twenty-six gallons of milk will afford fourteen pounds of cheese, or a good cow will yield some thirty-five stone of cheese per annum, which, taken at 10s. per stone, will produce in this article alone, as much as £18 per annum.

It has been questioned whether the rich districts of Ayrshire ought to be occupied with this breed of cattle. They are said to be more suitable for cottiers than for graziers, and that the latter ought to direct their attention to feeding the short-horn, while the former should combine dairy-farming only, with the occupation of a laborer. To this it may be answered that with the cold rains so prevalent in that county, it is pretty certain that



THE AYRSHIRE COW.

the second-rate pasturage of much of the grass land is more suitable for the dairy-cow, than for fattening the short-horn.

Nor have the improvements in the breed of Ayrshire cattle increased their milking qualities. To breed what would sell in England, and what would feed as steers, has been too much an object ; and as the larger breed of Ayrshire cattle are more profitable for the market, and the smaller for the dairy, the former have been somewhat more encouraged.

There is another peculiarity of the Ayrshire cows which is deserving of notice. They hold to their milk to a very late period. They are cultivated

and educated to give milk. Nature would teach an animal to give a supply as long as its calf needed that nutritious assistance ; but so far have the milking qualities of the Ayrshire cow been brought out, that in some instances they have been known to yield milk all the year round, and to retain it up to an advanced age, though they are generally removed at four or five years old.\*

## THE ALDERNEY BREED.

Common consent has given the name of Alderney to the Channel Island breed of cattle, so long celebrated for the *quantity* of milk they give in proportion to their size ; but above all, for the extraordinary richness of its *quality*. But there is every probability that these cattle were originally a Norman breed, imported and improved in Jersey, and then sent to Alderney ; and thus a common stock, famous far indeed beyond the milk-cows of Normandy, have been produced, which are considered so valuable in this country, as to produce prices varying from £20 to £30.



THE ALDERNEY COW.

\* As a whole the Ayrshires have failed in America. Here the summers are dry and hot, and the winters cold and frozen. In Ayrshire the summers are moist and cool, and the winters mild and rainy. The Ayrshire cow does not endure heat or extremes.—  
AM. ED.

The produce of these small animals, both in milk and butter, is very great, and may be taken, in fair specimens, at twelve quarts of milk daily, and ten pounds of butter in the week, during the months of April, May, June, July, and August; and instances are recorded of cows giving twenty quarts of milk in the twenty-four hours, and yielding as much as fourteen pounds of butter per week! From this it is clear that the cream is of very rich quality; the milk is itself superior to much of the town-made cream—the cream almost resembles cream cheese. It is considered too rich by many persons for making cheese; but instances are recorded of successful cheese-making from this milk. M. Le Feuvre, of La Hogue, succeeded in making cheese of a very superior quality from this fine milk, equal indeed to double Gloucester. Fourteen quarts of milk would give a pound and a half of cheese; and the whey or drainings of twenty pounds of this cheese would produce four pounds of butter. Compared with the milk of any other cows celebrated for dairy purposes, that of the Alderney is very superior. An experiment was made, in the months of May, June, July, and August, between eight Alderney and eight Kerry cows. In the first month, the Alderneys gave 25 per cent. of cream against 10 per cent. of the Kerrys; in June, 20 per cent. against 10; in July, 23 per cent. against 10; and in August, 16 per cent. against 13; giving an average of some hundred per cent. more cream than the Kerrys—a race of cows somewhat celebrated for dairy qualities.

But more: three pints of cream from the Alderneys produced 1 lb. 8½ oz. of butter; from the Kerrys, 1 lb. 4½ oz. And this was taken in the month of August, when it will be seen the milk of the Alderneys was somewhat falling off. The experiment was made by Mr. White, on the farm of the Hon. R. Clive of Oakley Park, and deserves every credit, as it seems to have been carefully and intelligently made.

We are indebted to Colonel le Couteur for almost all we know of this breed of cattle. In many respects she resembles the Ayrshire cow; and, indeed, so close is the resemblance, that Mr. Quayle, in his "Agricultural Survey of Jersey," communicated to the Board of Agriculture, states that "the Ayrshire was a cross between the short-horned breed and the Alderney."

As the qualities of the Alderney breed of cattle are exclusively milk-producing, we expect to find anything but beauty of form; and, indeed, until within the last twenty years, a more rude, misshapen animal it is difficult to conceive. Possessing cattle superior to others for the richness of their milk, a hardihood and endurance extremely great, and being sustained by the inferior herbage the island produced, the Channel Islanders were satisfied with their ungainly form. They might be thus described:—Large cheeks, thin hollow neck, hollow back, thin hams, flat sides, long between hip and ribs, crooked legs, high shoulders, drooping rump, tapering chest.

The specimens of improved forms of cattle which began to receive the attention of agricultural societies, tended to call attention to the improvement of the Alderney breed ; and hence a society sprang up, under the presidency of General Thornton, and by selecting the best specimens, drew up a scale of nine articles, and to each of these attached a number of points—thirty of which were assumed to be perfection in a cow. These are much more definite, and we think practical, than those of Mr. Guénon ; and we cannot help giving them, because they indicate the proper criterion of the improved Alderney cow. They are for cows and heifers:—

	Points,
I. Breed, on both parents' sides, reputed for producing rich and <i>yellow</i> butter, . . . . .	4
II. Head small, fine, and tapering ; eye full and lively ; <i>muzzle fine, and encircled with white</i> ; horns polished, a little crumpled, tipped with black ; ears small, of an orange color within, . . . . .	8
III. Back straight, from the withers to the setting on of the tail ; chest deep and nearly of a line with the belly, . . . . .	4
IV. Hide thin, movable, but not too loose, well covered with fine soft hair, of good color, . . . . .	2
V. Barrel hooped and deep, well-ribbed home (having but little space between the ribs and hips) ; tail fine, hanging two inches below the hocks, . . . . .	4
VI. Fore-legs straight and fine ; thighs full and long, close together when viewed from behind ; hind legs short, and bones rather fine ; hoop small ; hind legs not to cross in walking, . . . . .	2
VII. Udder full, well up behind ; teats large, and squarely placed, being wide apart ; milk veins large and swelling, . . . . .	4
VIII. Growth, . . . . .	1
IX. General appearance, . . . . .	2
	—
Perfection for cows and heifers, . . . . .	31

The engraving of the perfect Alderney, given, may be taken as a fair specimen not only of the most perfect animal which the above scale aims at indicating, but will also mark the great improvement in the style of this breed of cattle ; and will, so far, incidentally mark the improved character of the *other* breeds of cattle in the country.

## THE YORKSHIRE COW.

Having given instances of milk-producing cows from the middle-horn and crumpled-horn breeds, we place next one of the short-horned class ; not, indeed, the high-bred Durham short-horn, but a large capacious animal

possessing several of its qualities, and giving a large quantity of milk, with as much aptitude to fatten as is consistent with the production of milk, and hence is selected by the dairymen of large towns, and especially of London, for the supply of milk for a given period, and then to be fattened on distillers' refuse, and other waste matters which a town will afford, and thus give a double pay to the dairyman.

The Yorkshire cow is of much larger size than either of those we have been considering, and, when fat, will weigh from sixty to eighty stone. Her head is fine, and somewhat small; there is a serene placidity of eye, which shows a mild and gentle disposition, tending alike to produce fat and milk. The horns are small and white, the muzzle without black spots; the breast deep and prominent, but that and the shoulders thin; the neck somewhat narrow, but full below the shoulders, and without any loose skin; the barrel somewhat round; the belly capacious; milk-vein large; back perfectly straight; rump wide, and flat as a table; tail small, and set on so that there is almost a straight line from the tail to the head. The prevailing color is roan, or red or white; and sometimes white, with the tips of the ears red. The thighs are thin; but the legs are straight and somewhat short. The udder is very large and muscular, projecting forward, well filled up behind, and so broad as to give the cow the appearance of a waddle in her walking. Indeed, her qualities are not inappropriately described in some doggerel lines often quoted; and two of the verses we shall venture to give, as most aptly descriptive of the Yorkshire cow:—

“She's broad in her ribs, and long in her rump,  
A straight and flat back without ever a hump;  
She's wide in her hips and calm in her eyes,  
She's fine in her shoulders, and thin in her thighs.

She's light in her neck, and small in her tail,  
She's wide in her breast, and good at the pail;  
She's fine in her bone, and silky of skin;  
She's a grazier's without, and a butcher's within.”

The engraving on the next page represents a Yorkshire Cow, and is a fair specimen of a short-horn Yorkshire Cow, without pretensions to pedigree—a sample of the kind purchased by the dairymen of London.

The quantity of milk given by these cows by far exceeds that of any others, though less perhaps than that of some others *in proportion to her size*. The writer has had instances where as much as thirty quarts per day, in summer, have been given. The distended udder has so swollen before calving—that she was obliged to be milked several days before she calved; and, after calving, had to be milked three times a-day, for fear of the consequences of an over-distended udder. She, moreover, gave a large quantity of butter as well as milk, and soon after calving she has given fifteen pounds per week. When the Yorkshire cow is purchased for the London dairies,



usually after her third calf, her milk changes its character. Rich in her native pastures in butyraceous matter, the object in London, Liverpool, and the large towns, is rather to increase the *quantity*, than to improve the *quality* of the milk, hence they are fed with brewers' grains, boiled linseed, &c., &c., and the out-door exercise is restricted, so that their powers of secretion are all converged to the production of milk alone. Mr. Laycock,



THE YORKSHIRE COW.

in his London dairy, which is supplied by Yorkshire cows, retains no cow which does not yield two gallons of milk per day, and the average of his dairy is as much as nine quarts daily.

All these things being considered, and taking into account the carcass value of the cow after she has yielded her milk, it is not too much to say that there is no breed of cows so highly gifted with milk-secreting qualities, which are also so profitable as the Yorkshire breed.

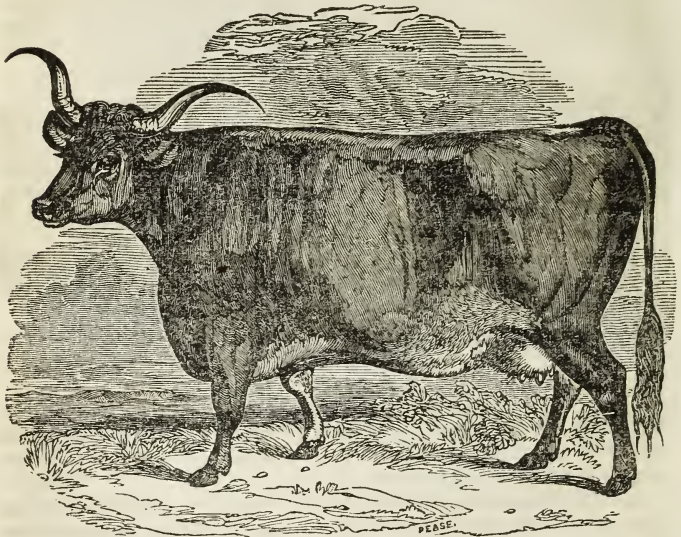
Having somewhat minutely considered the three leading breeds of dairy cattle,—the cheese-producing Ayrshire, the butter-secreting Alderney, and the milk-giving Yorkshire,—it only remains to glance at the breeds or crosses which prevail in the principal dairy districts of the country, for as types of this class of cattle, the three breeds above named may be taken as perfect.

## THE GLOUCESTERSHIRE BREED.

This is more a mixture of the several breeds of the country, long-horn and middle-horn, than any distinctive race,—the old Gloucestershire cow being nearly extinct. The various crosses to which dairy cattle have been subjected have obliterated all traces of the original race, but early crosses with the long-horned breed have somewhat prevailed. The Devons have also been used as a cross to give a more kindly disposition to fatten,—the Durham short-horns have also occasionally been tried.

## THE LEICESTERSHIRE BREED.

The old breed of this country have had a more successful struggle for existence, than the native breed of Gloucestershire. It was here that Blakewell



exerted his talents to improve the long-horned breed of cattle, and, though he succeeded in removing the coarseness from these animals, and increased their tendency to fatten, it appears he did not attain the object of either establishing or improving their dairying qualities; and hence his breed is but little prized by the Leicestershire dairymen, who prefer the coarser and

larger animals, which give large quantities of good milk, to those which have less milk-giving capabilities, but are more suitable for the grazier.\*

The yield of cheese, rather than that of milk, is the object of the dairymen of Leicestershire. A good cow will give some 400 pounds of cheese, and produce as many gallons of milk in the year, allowing for the seven weeks when she is supposed to be dry. In some districts the cows are kept for six, or seven, and even more years, especially when they are good cheese producers; for it is of more consequence to the farmer to have a cow which, for six years, gives him an annual supply of the stock in trade of his farm—his cheese—than to get a few pounds more or less when she is sold. Indeed a smaller difference really takes place than may be at first imagined. The rich Leicestershire grass enables the farmer, on a large scale at least, to sell off his cattle fat, which would have been disposed of for the dairy. Hence, as old cows of any kind are not expected to be very valuable graziers, he does not expect her to do wonders; and if he succeeds in getting her moderately fat, he is satisfied to take a smaller price per stone for her beef than is received for a primer animal.

#### THE CHESHIRE BREED,

Is, like that of Gloucestershire, or even more so, becoming rapidly extinct. The old breed of the county was, like that of most dairy districts, a long-horned variety; but the vicinity of the large town dairy system, introduced into the country by the springing up of large towns, has brought here, as elsewhere, the short-horn cow of Yorkshire into competition with the native breed; the extra *quantity* of milk they produce has been regarded somewhat more than its *quality*, and, in consequence, the character of the Cheshire cheese has somewhat deteriorated in the markets.

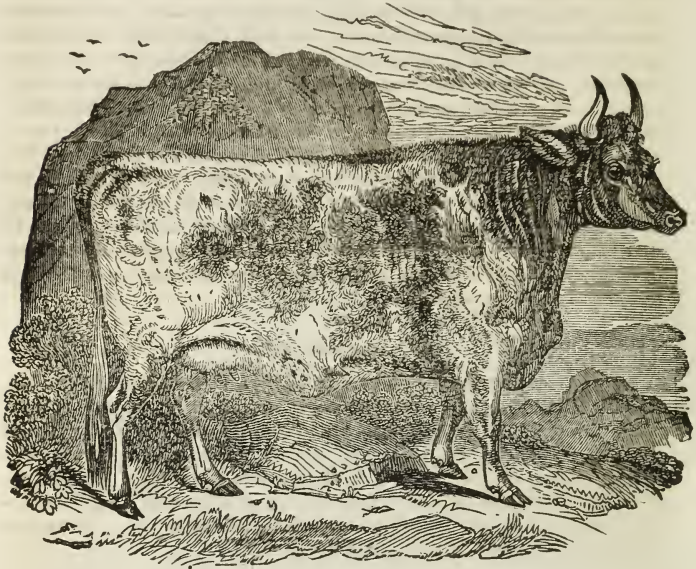
#### THE DORSETSHIRE BREED.

In this, as in most dairy districts, milk is rather an object than either form or fat, and hence a somewhat coarse ill-shapen class of cattle prevails. The cattle are of a long-horn breed, large, and coarse, principally of a red color, with flat chests and buttocks. Attempts have been made to cross this also with the Devon, Hereford, and Ayrshire breeds, but this does not appear to have succeeded; and the only advance the dairymen have been enabled to make in this country has been to introduce one Alderney to a dairy for every ten or twelve of the native breed; this is found to have a very beneficial tendency, to increase the quantity of cream, and to improve much the quality of the butter.

\* Some few herds of high bred New Leicester employed in the cheese dairy, are still found, one of which may be named, that of Mr. Warner, near Coventry; and they have a high feeding capacity as well as milking capacity.—A.M. F.

## THE KERRY BREED.

Crossing the Irish Channel there is a hardy small-sized cow celebrated as a cottier's dairy cow—the neat pet-like cow of Kerry. Her placid counte-



THE KERRY COW.

nance, patient, meek deportment, fine head and legs, her small tail, flat shoulders, breast, and quarters, and her skinny udder and large milk-vein bespeak the characteristics of the milker, and well they may, for she is a treasure to the cottage farmer!—so hardy, that she will live where other cattle will starve; she will yield milk at the expense of her own muscles, nay, will yield it abundantly when they seem all but gone; and will give it also of quality so rich, that she is a perfect machine for converting the hardest and coarsest cattle-food into rich and nutritious milk and butter.

It is not necessary to expatiate on all the crosses or breeds, more or less distinct, which prevail in the dairy districts of this country, nor does it come within the range of this treatise to examine the qualities of the foreign breeds. We will, however, close with a short description of one more animal, which may be classed, after all, as a sort of milking cow. We mean the

## SCOTCH WEST HIGHLAND BREED,—KYLOE BREED

So called from the fact of their having crossed the *Kyles*, or ferries, with which the Highlands of Scotland abound. These were, it is said by Parkinson, the models Bakewell had in his eye for the improvement of the Leicestershire breed, and had he known more of them in the early stages, they might have had their share in the crossings for improving the Dishley herd. They may be considered among the best of the middle-horned race of cattle—having their long *rumps*, *loins*, and *crops*, with but a moderate amount of offal. And as length in these parts is thoroughly consistent with thinness of chest, buttocks, and neck, it is not improbable that improvements in this direction would enable the dairyman to have a rich milk-secreting animal, with a considerable aptitude to fatten and form flesh on the most valuable parts, when she came into the hands of the grazier.

The hardihood of the Kyloe makes up for the wildness of her nature. She can resist a cold blast under which a delicate lowland dairy-cow would perish. She will consume the small and stunted grasses which appear among the heath, the mosses, and even, in winter, sometimes the sea-weed itself. In winter, when the severity of the weather prevents their obtaining their food from the morass and the moor, they are occasionally assisted by a few oatmeal balls; so that if the aggregate amount of butter and cheese raised by these miserable supplies is but small, it is not to be wondered at. Thirty-two pounds of butter per annum may be stated as the produce of a cow in the Hebrides, and from ninety to one hundred pounds of cheese, made after their celebrated fashion, being flavored with aromatic herbs, which are added to the rennet.

It will not be difficult to see that in general the qualities of dairy cattle are specific and distinct, and that most attempts to transmute them so as to exchange the *flatness* of conformation of the milker for the *rotundity* of the grazing animal, are done at the expense of her dairying qualifications. Those breeds possessing the conformations calculated for milk secretion, are precisely those which, from their endurance and hardness, are most suitable for second-rate grass land, upon which, it will be remembered, the dairying processes are principally carried on. When the soil will not feed the merely fat-producing animal, Providence has wisely provided the milker, in order that no spot of ground should be without its productions fitted for his creature man.

## CHAPTER III.

## FAT-PRODUCING BREEDS OF CATTLE

WHATEVER theoretical objections may be raised against over-fed cattle, and great as may be the attempts to disparage the mountains of fat, as highly-fed cattle are sometimes designated, there is no doubt of the practical fact, that the best butcher cannot sell anything but the best fatted beef; and of whatever age, size, or shape, a half-fatted ox may be, he is never selected by judges as fit for human food. Hence a well-fatted animal always commands a better price per pound than one imperfectly fed, and the parts selected as the primest beef are just the parts where there are the largest deposits of fat. The rump, the crop, and the sirloin, the very favorite cuts, which always command from twenty to twenty-five per cent. more than any other part of the ox, are just those parts on which the largest quantities of fat are found; so that instead of the taste and fashion of the age being against the excessive fattening of animals, it is, practically, exactly the reverse. Where there is most fat there is the best lean; where there is the greatest amount of muscle, without its share of fat, that part is accounted inferior, and used for a different purpose; in fact, so far from fat being a disease, it is a condition of muscle, necessary to its utility as food—a source of luxury to the rich, and of comfort to the poor, furnishing a nourishing and healthy diet for their families.

Fattening is a secretive power which grazing animals possess, enabling them to lay by a store of the superfluous food they take for seasons of cold or scarcity. It collects round the angular bones of the animal, and gives the appearance of rotundity; hence the tendency to deposit fat is indicated, as we have stated, by a *roundness* of form, as opposed to the *flatness* of a milk-secreting animal. But its greatest use is, that it is a store of heat-producing aliment, laid up for seasons of scarcity and want. The food of animals for the most part may be said to consist of a saccharine, an oleaginous, and an albuminous principle. To the first belong all the starchy, saccharine, and gummy parts of the plants, which undergo changes in the digestive organs similar to fermentation before they can be assimilated in the system; by them also animal heat is sustained. In indolent animals the oily parts of plants are deposited and laid up as fat; and, when vigor and strength fails, it is taken up, and also used in breathing to supply the place of the consumed saccharine matter. The albuminous, or gelatinous principle of plants, is mainly useful in forming muscle, while the ashes of plants, the unconsumable parts, are for the supply, mainly, of bone, hair, and horn, but also of muscle and of blood, and to supply the waste, which continually goes on. Now, there are several qualities which are essentially characteristic of a disposition to fatten. There have not, as yet, been any book-rules laid down, as in the

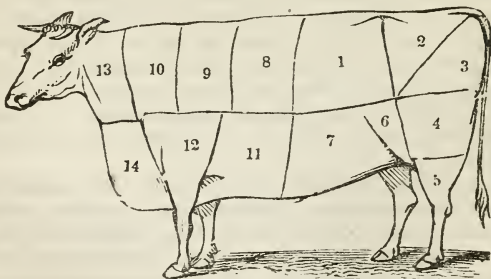
case of Mr. Guénon's indications of milking cows; but there are marks so definite and well understood, that they are comprehended and acted upon by every grazier, although they are by no means easy to describe. It is by skillful acumen that the grazier acquires his knowledge, and not by theoretical rules; observation, judgment, and experience, powerful perceptive faculties, and a keen and minute discrimination and comparison, are essential to his success.

The first indication he relies on is the *touch*. It is the absolute criterion of *quality*, which is supposed to be the keystone of perfection in all animals, whether for the pail or the butcher. The skin is so intimately connected with the internal organs, in all animals, that it is questionable whether even the schools of medicine might not make more use of it, in a diagnosis of disease. Of physiological tendencies in cattle, however, it is of the last and most vital importance. It must neither be thick, nor hard, nor adhere firmly to the muscles. If it is so, the animal is a hard grazer, a difficult and obstinate feeder—no skillful man will purchase her—she must go to a novice, and even to him, at a price so low as to tempt him to be a purchaser. On the other hand, the skin must not be thin, like paper, nor flaccid, nor loose in the hand, nor flabby. This is the opposite extreme, and is indicative of delicateness, bad, flabby flesh, and possibly of inaptitude to retain the fat. It must be *elastic* and velvety, soft and pliable, presenting to the touch a gentle resistance, but so delicate as to give pleasure to the sensitive hand,—a skin, in short, which seems at first to give an indentation from the pressure of the fingers, but which again rises to its place by a gentle elasticity. The hair is of nearly as much importance as the skin. A hard skin will have straight and stiff hair; it will not have a curl, but be thinly and lankly distributed equally over the surface. A proper grazing animal will have a *mossy* coat, not absolutely curled, but having a disposition to a graceful curl, a semifold, which presents a waving inequality, but as different from a close and straightly laid coat, as it is from one standing off the animal at right angles, a strong symptom of disease. It will also, in a thriving animal, be licked here and there with its tongue, a proof that the skin is duly performing its functions. There must be also the full and goggle eye, bright and pressed outwards by the fatty bed below, because, as this is a part where nature always provides fat, an animal capable of developing it to any considerable extent, will have its indications here, at least, when it exists in excess.

So much for feeding qualities in the animal, and their conformations indicative of this kindly disposition. Next come such formations of the animal itself as are favorable to the growth of fat, other things being equal. There must be size where large weights are expected. Christmas beef, for instance, is expected to be *large* as well as *fat*. The symbol of festivity should be capacious as well as prime in quality. But it is so much a matter of choice

and circumstance with the grazier that profit alone will be his guide. The axiom will be, however, as a general rule, that the better the grazing soil the larger the animal may be; the poorer the soil the smaller the animal. Small animals are unquestionably much more easily fed, and they are well known by experienced men to be those best adapted to second-rate feeding pastures. But beyond this there must be *breadth of carcass*. This is indicative of fattening, perhaps, beyond all other qualifications. If rumps are favorite joints, and produce the best price, it is best to have the animal which will grow the longest, the broadest, and the best rump; the same of crop, and the same of sirloin; and not only so, but *breadth* is essential to the consumption of that quantity of food which is necessary to the development of a large amount of fat in the animal. Thus a deep wide chest, favorable for the respiratory and circulating functions, enables it to consume a large amount of food, to burn up the sugary matter, and to deposit the fatty matter,—as then useless for respiration, but hereafter to be prized. A full level crop will be of the same physiological utility, while a broad and open framework at the hips will afford scope for the action of the liver and kidneys.

There are other points also of much importance: the head must be small and fine; its special use is indicative of the quick fattening of the animal so constructed, and also it is indicative of the bones being small and the legs short. For constitutional powers, the beast should have his ribs extended well towards the thigh-bones or hips, so as to leave as little unprotected space as possible. There must be no angular or abrupt points; all must be round, and broad, and parallel. Any depression in the lean animal, will give a deficient deposit of flesh and fat, at that point when sold to the butcher, and thus deteriorate its value; and hence the animal must be round and full. But either fancy, or accident, or skill—we will not pretend to say which, has associated *symmetry* with quality and conformation, as a point of great im-



portance in animals calculated for fattening; and there is no doubt that, to a



certain extent, this is so. The beast must be a system of mathematical lines. To the advocate of symmetry the setting on of a tail will be a condemning fault; indeed, the ridge of the back like a straight line, with the outline of the belly exactly parallel, viewed from the side, and a depth and squareness when viewed from behind, which remind us of a geometrical cube rather than a vital economy, may be said to be the indications of excellence in a fat ox. We give an outline of the points of excellence in one of these animals, with the method of cutting up the beast in the London markets. Now, these qualities are inherent in some breeds; there may be cases and instances in all the superior breeds, and in most there may be failures.

By far the first in the list for feeding excellence are—

#### THE SHORT-HORN, OR DURHAM BREED.

The origin of the breed is involved in great obscurity. They are supposed by some to be traced into Holderness,—and to have been imported Holstein, according to others; from continental Europe they certainly seem to have come; and, being successively improved by a variety of breeders, they have ended in that distinct race of animals, extraordinary beyond all others for their astonishing propensities to feed. Others, again, refer their origin to a native race of cattle called the Teeswater, because they have from time immemorial inhabited the valley which the Tees has formed by its washings down of the mountain limestone rocks, in which it has its origin; these it is said, being crossed by the Holderness importations, gradually became a new race.

The late Mr. Bates traces back the short horns to a breed in the possession of the Aslabies of Studley, and the Rev. H. Berry to an improvement in the East Riding of Yorkshire by the importation of a breed from Holland by Sir W. St. Quintin of Scampston. Of these early ages of the short-horns, however, it is hardly necessary to say more than this,—that a breed from time immemorial inhabited the valley of the Tees, and, trained and bred to feed, for a vast succession of generations, on its fertile deposits, acquired the habits of speedy fat-forming; for in these valleys, where *hay alone* will feed the largest ox, the production of fat would be so far an object, that breeders would always select the best and easiest feeding animals; and thus the character of the district, through a number of centuries, might easily lay the groundwork of that improvement which the Milbanks, the Greys, the Booths, the Coates, and, above all, the Collings have effected.

We will give the latest description of the qualities of the modern short-horn from the most recent authority, Mr. Dickson. After referring to the general symmetry of the frame and its delicate color, either deep-red, cream-colored, white, or delicate roan—the latter, the most fashionable and indeed prevailing color—he speaks of it as possessing “the mellowest touch, supported on small clean limbs, showing, like those of the greyhound and the

race horse, the union of strength with fineness, and ornamented with a small, lengthy, tapering head, neatly set on a broad, firm, deep neck; furnished with a small muzzle, wide nostrils, prominent mildly-beaming eyes; thin, large, veiny ears, set near the crown of the head, and protected in front with semicircularly-bent white or waxy colored short, smooth, pointed horns; all these several parts combine to form a symmetrical harmony which has never been surpassed in beauty and sweetness by any other species of the domesticated ox."

Keeping in mind what was said to be the perfection of a fat animal, the same authority, speaking of the short-horn, says,—“we have a straight level back from behind the horns to the top of the tail, full buttocks, and a projecting brisket; we have, in short, *the rectangular form*; we have also the level line across the hook-bones (hip), and the level top of the shoulder across the ox, and perpendicular lines down the hind and fore legs on both sides; these constituting *the square form* when the ox is viewed before and behind, and we have straight parallel lines from the sides of the shoulders along the utmost parts of the ribs and the sides of the hind quarters; and we have these lines connected at their ends by others of shorter and equal length across the end of the rump and the top of the shoulder; thus constituting the rectangular form of the ox when viewed from above down the back.”

It will be very wide from our purpose to show, either the immense amount of fat which has at one time or another accumulated on the backs of these wonderful animals, or the speed with which this has been done. Neither would it tend much to elucidate the principles of breeding or grazing, to detail at any length the prices which short-horns have commanded and do command.

The Durham Ox, a son of Charles Colling's Favorite, weighed 187 stone 2 lbs. The Yorkshire Ox, bred by Mr. Dunhill, of Newton, near Doncaster, weighed, when killed, 264 stone 13 lbs. These are weights of 14 lbs. to the stone, and show strange capabilities to lay on fat and flesh possessed by this extraordinary race of animals. Though there is not, perhaps, another instance on record of any bull selling for so much money as Charles Colling's Comet, which sold for 1000 guineas, and whose herd, forty-seven in number, sold for £7115; yet £500, £600, and as much as £800, are still given for a first-rate short-horn bull.

Nor is it in their rapid fattening alone that this race of cattle excels. They are beyond all question, the most remarkable for early maturity. Fat deposits are generally the result of a mature state of the animal. There are few animals who will lay it on, to any degree, at least, until they are fully formed. The short-horn is an exception. They commence the fat-forming process as calves. This seems to increase with their growth, and at a year old they have all the semblance of cows.

The feeders of short-horns, instead of keeping them to three, four, or five

years of age, fatten them and sell them off at from two to two-and-a-half years; they can thus turn off one-half more, at least, if not a greater proportion, of beef, from their farms or their stalls, than could possibly be done with any other breed. Hence they have quick returns and large amounts of beef for the food-consumer. We will not deny that the short-horn requires good keep, and shelter, and care. She needs nourishing diet; but she pays for all, for she is a cow when another is a calf, the Ox is fat when the other is growing. Hence the short-horn stands the very first on the list of



THE SHORT-HORNED COW.

the fat-producing breeds of cattle. We give a drawing of a specimen of a matured short-horn cow. \*

## THE HEREFORD BREED.

This is a middle-horn breed of cattle, upon which a good deal of pains have lately been taken. The success of short-horn breeders,—of the Booths, the

\* This cow was not only a capital cow as her portrait shows, but was a superior milker, yielding a large quantity of rich milk.

Bates, the Wileys, the Hoppers, and a score more of short-horn patrons have caused a healthy emulation, and the difference between the Hereford cattle now exhibited, and those shown some ten or twelve years ago, shows not only that these breeders have judgment and skill, but it must also be confessed, that the breed have fattening capabilities. The old Hereford was a deep brown animal, sometimes with an ochery cast, free from white, like the Devons; but an improved breed now possess the county, in which the invariable fashion is a dark red, with a white face, white belly, and not unfrequently a white back. The skin is thicker and less mellow than that of the short-horn, nor has the hair the mossy softness, or graceful curl of the latter. The eye is full and lively, the chest deep and broad, the loin also broad, and the hips well-expanded; a level broad rump, a round barrel, and full crop; full, deep flank, well-ribbed home; small bones, clean and perpendicular thighs, belly almost parallel with back, head small. Indeed,



THE HEREFORD COW. (MR. SOTHAM'S MATCHLESS.)

color and symmetry are perhaps the predominant qualifications which secure the high favor of the breeder.

From the above description it will be seen that the Hereford, possessing many essentials in form, is destitute of the quality producing early maturity, and speedy disposition to fatten. He lays on his flesh, soft, and mottled, on the best parts; he has full sirloins, rumps, and crop, but he shows his beef

outside; and he requires much more *time* to develop his qualities than the short-horn. In milking qualities the cow is even behind the ox in feeding, and it must in general be three and a half to four years old before it can be fatted with any very marked success. They require a rich pasture, though a hardy animal, and the average weight when fat, does not exceed fifty-five to sixty-five stones, of fourteen pounds. Herefordshire being more a breeding than a feeding county, the cattle are reared there, and sold off at three years old to graze in the counties of Leicester, Northampton, and the rich grass districts; but with all its good qualities it must be admitted that it requires from ten to twelve months more to feed than its more favored compeer, the short-horn. We give a sketch of a first-rate specimen. Much controversy has gone on lately as to the merits of the two breeds—the short-horn and the Hereford; but it must be conceded, that while the short-horn is penetrating into the heart of Scotland, into the south of England, and into the county of Gloucester, on the one hand, and into Norfolk on the other, the Hereford is hardly keeping his ground, he is making no inroads into any one important new grazing district; and unless the gigantic efforts now made to amend the characteristics of the breed effect something more, they will dwindle still further away.

#### THE WEST HIGHLAND SCOT.

Next to the Hereford in the ranks of fattening animals, we place this breed of cattle; and they well deserve it,—for they will fatten in places and on food on which both the short-horn, and the Hereford too, would perish. This West Highland breed is somewhat wild in its nature, and will not bear the least confinement, tying, or control. It is eminently gregarious, and if kept alone will generally fret and pine. The peculiarity of the breed is, that it is a small animal, generally deep jet-black, pale red, or dun, seldom any white spots on any part of the body; its horns are long, and turned upwards and outwards. The coat is peculiar, soft, long, and absolutely curled, so as to form a sort of fleece. Another peculiarity is, that they form their beet almost entirely on the back, which is therefore straight, the body is round; and they lay on fat rapidly under circumstances in which another animal would literally starve.

He can assimilate, from a soil so barren as to be sterile for others, as much food as will enable him to feed—for to *grow* is out of the question, *that* process is performed on his native hills; if indulged, however, he will pay for it in the rapidity of his fattening, and the excellence of his beef. They will weigh, with amazingly little care, some 48 to 50 stone, and some have been said to reach as far as 70. The exceptions to this rule, however, are very important in special cases. The Duke of Northumberland having a very promising Argyshire “stot”—bullocks, as they are called more generally in England—kept him as long as he saw him improve, to see



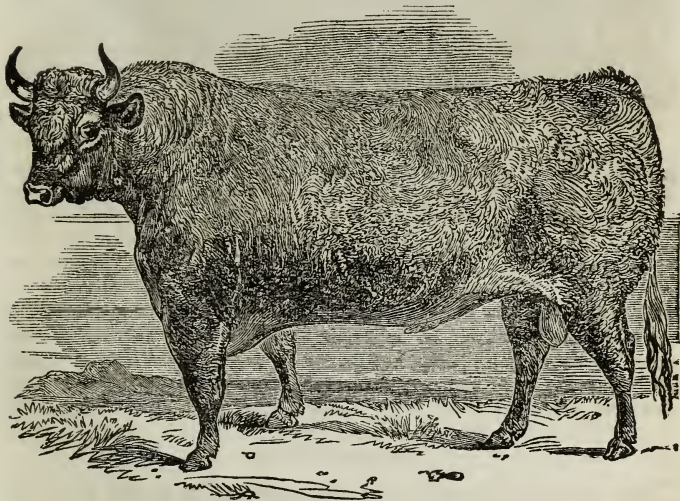
THE WEST-HIGHLAND OX.

what he would weigh. He was five and a half years old, and weighed exclusive of offal, 100 stones 4 lbs. Though, perhaps, one of the heaviest of the breed ever slaughtered, he was neither the fattest nor the most inactive, but seemed in that state to possess all the activity which he had on his native hills. To give an idea of his keeping, and of the hardihood of his race, it is only necessary to give an account of his food. In the first winter he was turned out to a poor pasture, with a little bad hay; in the summer he had again a poor land pasture; in the next winter he had again a poor pasture, but a few turnips; in the following summer he had a fair pasture, and the same pasture in winter, with a more liberal allowance of turnips; in the third summer he was tolerably well grazed; in the fourth winter, he had as many turnips as he could eat in the sheltered straw fold; and in the summer in which he was fatted, he had all the indulgence of a feeding animal, viz., cut clover, hay, mangel-wurzel, turnips, bean-meal, and a little oilcake; the latter of which he always disliked. Mr. Quarl says, his "fat was distributed in an uncommon equable manner, of a color resembling the finest grass butter, and as firm as wax; the muscle was in ample proportion, bright in color, of fine texture, and beautifully marbled by admixture of his excellent fat. Our cut is an engraving, from an original drawing, of a winner at Smithfield, of this class.

## THE DEVON BREED.

If this had been a treatise on drawing cattle, we should have placed this middle-horned description of animals first in our list, instead of almost last. They are physiologically well formed animals; they are a very old, and carefully kept, distinct breed of animals. They are docile and tractable, patient and gentle; hardy, notwithstanding their warm and humid climate; but they are not first-rate milkers, although very good feeders. They will grow to a considerable size; and they produce a class of beef, at all periods of their growth, of capital quality. The red color—all red, and nothing but red—is a *sine qua non* in a Devonshire Ox; he has a moderately straight top, a fine serene countenance, and small head; a somewhat thin skin, covered with curly hair. The rump is narrower than in the short-horns, and the chine lighter and flatter; but the brisket is large and full, the legs fine, the shoulder slanting, the neck long and thin. He is a beast of draught, and for this he is unequalled.

Mr. Parkinson, in his invaluable and practical Treatise on Live Stock, gives the weight of some specimens of six years' old cattle, which weighed some 57 stone 2 lbs.; but the cows much less. He says of them—"On the whole, they must be allowed to be good cattle for their soils, and particular-



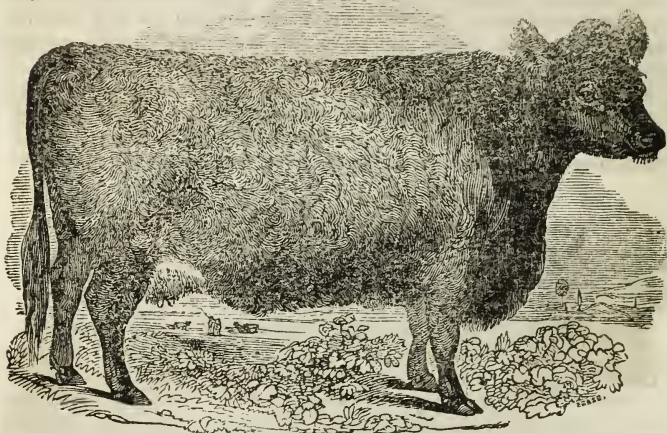
DEVON BULL.

ly where oxen are worked at the plow. When slaughtered, they are a sort of beef that suits the consumption of many customers."

Among the most successful breeders of Devonshire cattle may be mentioned Mr. Turner of Barton, near Exeter, Mr. Quartly of Moiland, (who is the most distinguished winner,) Mr. Merson of Brinsworthy, and Mr Davy of Moulton.

#### GALLOWAY BREED.

The Galloways are prominent fat-producing animals of Scotland, and are bred in great numbers in Galloway and Dumfriesshire. They are hornless, mostly black, are small in size, compact, short-legged, hardy, have thick mossy coats, and are good feeders. As milkers they are very indifferent,



GALLOWAY COW.

although, like all small milkers, the quality is rich. They are mostly driven south and fed off on the good pastures in England, and like the Highlanders, bring the highest price in the London markets. The joints are of a good size for family roasts, and the meat is of the best description; thus making it the most desirable.

#### THE ANGUS BREED.

We shall close our remarks on the fat-producing class of oxen by shortly describing a hornless, or polled race of animals—the Angus “Doddies,” as they are called. Being bad milkers, they are generally used for grazing, and very much fattened in their native country; they are also purchased for





ANGUS OX.

feeding by the graziers of Leicestershire and Norfolk. Their color is generally black, but occasionally red; the head fine; the breast deep; the back not quite straight, being a little depressed at the loin, and somewhat narrow; the eye full and clear; the touch generally good, and the hair thick and curly. The tendency of the flesh, as in all the hardy Scottish cattle, is to form on the back; but they will weigh from 70 to 80 stone, and will even reach as far as 100 when five or six years of age.

Qualities are so co-existent with conformation, that, as a general rule, it may be received as an axiom. And as dairy and butcher qualities are generally combined only to a very limited extent, and as both qualities are rarely high in the same breed, it becomes the agriculturist to make his selection according to the object he has in view.

## CHAPTER IV.

## THE PRINCIPLES OF CATTLE-BREEDING.

ONE of the most wonderful instances of man's supremacy over creation is the influence he is able to exercise in directing vital processes; here his power is perfectly talismanic. Within certain limits, he has the power of asserting his dominion so far as to make stern nature obey, and do his bidding. If he wants size or hardihood, activity or greatness, milk or fat, nay, whether he demand wool, or mutton, or beef, he can so arrange the elements with which Divine Providence has blessed him, that he can bend, and mould, and adapt them to his will, until he has produced the kind and class of animal he requires.

And this really arises more from individual skill than science! Whatever physiological principles are involved—and there are such, laid broad and deep—they are discovered by the facts known to the breeder, and teach him little in the management of his business. The perseverance and skill, the powers of observation and discrimination possessed by some breeders, have, doubtless, been the cause of their success, and led to England becoming pre-eminent for food-producing animals; for in no other part of the known world can it be said that there are anything like such native specimens to be found, either for producing flesh, milk, butter, or cheese.

To watch physiological tendencies, and avail themselves of these judiciously in practice, was practiced by breeders long anterior to scientific research. Intelligently perceiving what was required, Colling and Bakewell attempted and attained the art of producing superior cattle and sheep. Seeing also the necessity of economizing food, they set about producing those animals which came to maturity early; and so produced vastly more animal food from the same amount of vegetation. Knowing that fat was an element of favor in a northern clime, they endeavored to obtain animals with a tendency to secrete it in large quantities. In order to do this, they observed the qualities indicative of these tendencies; and, knowing that it is true in physiology, as in mathematics, that like produces like, they selected and bred from animals possessing them, until they stamped their qualities, permanently and indelibly, and invariably, on their produce. With these they managed to combine, perhaps, their invariable concomitants, symmetry and beauty; and hence the origin of our flocks of Leicester sheep, and our herds of short-horn cattle.

There are in all animals, high as well as low, those exceptional instances where an individual far outstrips his congeners in some particular quality. Now, if another possessing the same qualities should be paired with this in-

dividual, there is certainly no guarantee that the produce will exactly inherit both. A knowledge of this fact has disheartened many a breeder. He wanted milk; and he selected for his female breeding animal the best milk-cow in his dairy, and he carried her to a bull who was also the son of a dairy-cow of standing and character. He expects the produce to be a milk-er; but he is disappointed; and in disgust he retires and leaves to chance what he thinks he cannot obtain by skill and effort.

But he is in error. The principles of breeding are perfect; but he has not had the patience to wait for the fruit. One of his selections was an accidental product. She was not the successor of a favored ancestry. She so far outstripped her race, as to be possessed of qualities in which they were deficient; but her produce bred back, they resembled more the true breed of which she was an exception; and thus the breeder was disappointed in his expectations, and gave up on the first skirmish, instead of bearing the brunt of the battle. He should have gone on selecting the most famous for milk within his reach; and he would, by and by, have acquired as a tendency of his breed, the accidental qualities, which would have become the *rule* instead of the *exception*.

Hence the improvement of a breed of stock is not the work of a day or a year, but the business of a life-time; and if a breeder were to start *de novo* to engraft some peculiar tendency on a herd of cattle or a flock of sheep, it might be that his sons would reap the benefit of his skill and efforts, if they were rightly directed; for there would be no certainty of the full qualities being established in only two or three generations.

There are not only limits, therefore, to the mathematical axiom that like produces like, modified by vital powers with which the breeder has to deal, but we think there is a principle deeper still, one little noticed by writers on breeding stock, but one which all our great breeders knew and practiced, viz., that some one animal has much more power of transmitting his qualities than others. We know at this moment a couple of gentlemen, [Messrs. Booths,] who show the best short-horn cows and heifers, who may be said to have the best female animals perhaps in the kingdom, but who hardly ever get a prize for one of their bulls; and whose best animals were all got by a bull who never was qualified to merit a single distinction. He had no great symmetry himself, was coarse and ungainly; but he had so much vital force that he impressed symmetrical beauty on all his progeny, be his partners what they might; he was thus the sire of a complete herd of winners. The remarkable results of the Collings in cattle-breeding were really due either to the skill they had in seeking this transmissive power, or to the accident of obtaining by chance an animal who possessed it, in their bull, Hubback.

It is quite clear that to have any merit as a short-horn, there must be more or less of the Hubback blood. He was the sire of many of the Col-

lings's best cattle, and his grandson, Foljambe, was acknowledged to be an animal which much improved their herds; the bull Favorite was from the union of a brother and sister, whose common parent was this same Foljambe.

Thus in breeding animals the counterpart of each other, though it may not in the first generation prove all that could be wished, yet it gives the tendency in the breed to progress in that direction; and the careful and persevering selection of animals with the same tendency, through several generations, must have these results.

The difficulties now in the way of breeders are, by no means, those which met the early improvers. They had to make a groundwork from raw materials, so to speak, and had to carry them single handed through every stage of their manufacture. Now it is different; there are in the present breeds of the country quite variety enough to found any of the required qualities of animals upon, and the difficulties of selection are comparatively light. It requires, however, as much skill as ever to keep any one variety of animals foremost in the race, when there are so many excellent sorts to breed from; the original improvers therefore had less difficulty than the present race in maintaining their position.

True, they had to work without rules or experience, but they had the whole field before them and they had fewer competitors; the race they improved was such, that every step they took was palpable and definite there were fewer combinations of blood necessary, and consequently less risk of a failure. Now, the main effort is directed to overcome a defect. Suppose it is the very common one of a flat crop—a hollow behind the shoulder blade. That sire must be selected, whose peculiar physical conformation, in harmony in other respects with the head, has this point in perfection. On the calves there may be little impression; but if they are again paired with another animal having a similar conformation, there will be more impression produced, and on a greater proportion of the herd. Still they will be variable; and it will require effort after effort, and a long process of attentive selection and rejection before it becomes a uniform characteristic of the herd, and the change be sustained.

In speaking of the modes of improving a breed, the question arises,—how far is this to be done by the adoption of a male, or a change in the female animals. The universal consent, we may say, of breeders of all classes, seems to award the value to the male. The greatest care is taken in selecting a stallion; while the worst and most useless mare is sent to him. The flock master will give from twenty to fifty pounds for the use of a ram, who would grudge to give five for a ewe; but it is different in cattle. The dairyman is very careful in selecting his cows. They are watched, as heifers, for the development of their good qualities, and are preserved either for their succession to a maternal race of milkers, or because they are promis-

ing in themselves ; but the bull to which they are sent is too often a matter of convenience rather than selection. They know he is a bull and that is enough. The too usual mode is to try the heifer by her first calf. If she promises well as a milker, she is kept for a cow ; if not, she is consigned to the grazier for the butcher. Reasoning from analogy, the mother would be naturally considered as more influencing the animal than the sire. The influence of the mother is long and continuous. Her blood flows through its veins, it partakes of her habits and sympathies ; but still the vital force of the male animal is pre-eminent ; much as the mother may influence the constitution, the sire possesses a far greater sway over the conformation, the qualities, and the appearance. If, therefore, the object of the breeder is to perpetuate and impress the good qualities, and to remove the defects of his breed, he will be careful in the selection of both the sire and the dam of his breeding animals. A single failure—a single year's neglect—may stamp qualities on his race which it may take years to eradicate ; for even to keep a breeding stock in a high state of excellence, is by no means so easy a task as may be imagined by some.

This brings us to the much agitated question of breeding *in and in* ; in other words, of breeding animals solely from the same stock, all possessing more or less affinity for each other, and all originating in one or two varieties of animals. The controversy has raged from Bakewell downward. He bred entirely from his own stock. Opponents to the system say his animals became small and feeble in constitution, and they failed. But he only adopted one of the first axioms of breeding,—he selected *the best he could find*. He saw and knew none like his own, and he took them because he could not find their equals. He attained high perfection by the system. He got a breed of good animals—they were attaining good qualities ; he bred from them with each other, to give it permanency and uniformity, and indelibility to his flock and to his herd. And what if he did get them small and delicate ? His object was to produce animals less coarse, less gross, less hard than the original stock ; and he succeeded, although possibly he carried his predilections too far. Analogies are attempted to be made between the human subject and the brute. It is said that in the former the most serious physical and mental disorders arise from too near consanguinity. A family intermarries, afflicted with mania, or consumption, or scrofula ; intermarriage where these diseases exist will increase the virulence of the tendency until the family may become weak and feeble or may become extinct. They do so, not because they breed in and in, but because they disregard the first principles of increase ; they render permanent the defects of the stock, by alliances of similar tendencies. Mr. Bates's rule was, "breed in and in from a bad stock, and you commit ruin and devastation ; *but if a good stock be selected, you may breed in-and-in as much as you please*. If deficiency of mental power be a consequence of in-and-in breeding, surely it will be

an advance in *feeding animals*,—for the sensuous with them ought entirely to swallow up the intellectual.

The objectors to consanguineous breeding, and its deteriorating and enfeebling character, seem to forget, that, in the case of the wild cattle at Chillingham Park, to which allusion was made in the introduction, no cross has been made for an immemorial number of centuries; and thus unchanged and unchangeable, they remain, without deterioration, without feebleness, a standing objection to the indiscriminate condemnation of the system of breeding from the same stock.

The answer, that these animals do not show any improved points, is an argument in favor of this system of breeding, for the fact that they never had them, and possibly never will have the chance, so long as the breed is kept pure and unalloyed, is quite decisive in its favor. Like all other wild animals, a natural law prevents the feeble male from exercising any unfavorable tendency. They have a king: during the rutting season fierce and almost deadly battles take place amongst the bulls for the favor of the females. The hardiest, strongest, and most enduring male is the victor, and he becomes the parent of the future herd. This may, and is likely to continue for some years,—for, once admitted a victor, a great change must take place before the contest will be renewed. But no sooner does the male animal become feeble, than another season renews the strife—the once patriarch is vanquished, and the youthful victor, full of vigor and virility, is in turn the paramour of the herd. Now if we admit the influence of the male animal to be the greatest, we have here the most perfect adaptation for the weeding of the herd, and the best constitutioned bull is parent of the whole race for one or two years of production. It is wonderful then that they have no points, no superiority, no distinctiveness of breeding; there is no selection of adaptation, of symmetry, even of semblance, but there is strength of constitution in the male—the quality above all others for securing strength of constitution, hardness, and size in the offspring. And assuming that this tyrant strength in the leader of the herd will continue for three successive years—a thing extremely probable, there is a degree of consanguinity which few breeders will attempt. It may be said of Mr. Bates's herd, whose quality is unsurpassed, now that he is dead, that the heifers were frequently bulled by their own grandfather, or the cow by her grandson. And this was not more irregular than the wild habits of the whole herd at Chillingham, when the daughter, if not the grand-daughter, must breed with the grandsire or the sire.

Nor were Mr. Bates and Mr. Bakewell alone; Mr. Colling bred his animals in very close affinity, and Mr. Mason, of Chilton, second only to Mr. Colling, was an in-and-in breeder. No one will accuse Mr. Bates, however, after a jubilee (or period of fifty years) of in-and-in breeding of the closest kind, of having either a small sized or feeble herd.

The very opposite to consanguineous breeding is the system of *crossing*. When two distinct kinds of animals are made to breed with each other, a distinct variety is produced, called a hybrid or mule. Now there is not, externally, a greater difference between a Shetland pony and a donkey, than there is between a Durham short-horn and an Irish long-horn. But zoologically there is a more marked and distinct dissimilarity. Now, when the zoological difference is beyond a given range, nature interposes and will permit no future admixture. Mules are almost invariably unproductive. But with ill-assorted crosses of different breeds of cattle she operates another way. The union of a male and female, of different qualities, produces, sometimes, a happy combination of the qualities of the two, and considerable uniformity in the produce; but the union of these products again, amongst each other, instead of inducing a greater uniformity, ends in a crowd of mongrels, differing from each other as much as from their grand-sires, and possessing the conformations and qualities of neither.

For instance, a cross was attempted between the Herefords and the Devons—the fat-forming Hereford, and the active working Devon. The cross was a failure. The power and activity of the Devons were lost, their working qualities impaired, and still they did not fatten like the Herefords. A cross of the same with the Alderney improved indeed the dairy qualities of the breed, but lost the muscle so necessary for work and the capacity for feeding, so that this cross was also a failure. Again a cross has been attempted between the Hereford and the Kyloe. This, it might be supposed, would improve the back of the Hereford, give hardness, and keep up the aptitude to fatten; but no, the cross had the fattening qualities of neither, and the quietness of the Hereford was lost in the wild habits of the Kyloe, although the bull was a Hereford, and the cows were of the Highland breed.

Where a large and powerful-framed animal is covered with a short-horn bull, quality and aptitude to fatten is given. To go further is not judicious; to attempt a cross with a milk-producing cow is unnatural and absurd; but there is no sort of large framed animal intended for the grazier, which would not be improved by a cross with the short-horn for one generation. With the smaller West Highland cattle, even for grazing, we should have doubts. They live in a hard, bleak district to which a dash of short-horn blood, however small, could hardly ever accommodate itself; but to the larger Scottish breeds a single crossing would be invaluable. This may be strikingly instanced in the case of a cross between a short-horn bull and a large Aberdeenshire cow, to which was awarded the prize by the Highland and Agricultural Society of Scotland in 1834. The live weight of this cow was 224 stone, of 8 lbs. to the stone; and she weighed when killed 173 stone 3 pounds.

To attempt a greater proportion of short-horn blood is to run a risk of losing the hardihood of the northern tribes of cattle, without giving much more aptitude to fatten. It is certainly true that the maturity of the breeds

might be accelerated. We might see the Galloway a cow at two years old, but even this must arrest the hardihood of the breed, would impair its endurance of a northern blast, and waste in winter the advantage gained in summer.

It is questionable, however, where crossing stops. Some very grave facts have been arranged and classified to show that when a pure-breed animal has once been impregnated by one of another breed, such impregnated animal is thereby for ever afterwards a cross, and may be expected to produce cross-bred, and no more pure-bred young. But the notion is capable of being carried further still, that a female animal will always produce young resembling in character the animal by which she was first impregnated, whether of a cross-breed or of the same breed as herself.

Now, if this approaches to correctness, and if a single cross will stamp its character for ever upon the animal which is the subject of it, there arises the necessity for the utmost caution in selecting a male animal, especially in the first impregnation of the female.

The hypothesis of Dr. Harvey of Aberdeen, and Professor M'Gillivray is, that the intimate connection, at least in bovine animals, between the fœtus and its mother,—consisting of an absolute circulation of the blood of the fœtus through the veins of the mother, and *vice versa*,—so impregnates the mother with the vital functions of the sire, as to render her for ever afterwards incapable of transmitting her own unimpaired qualities to her progeny, making her indeed to partake of the character of her first young, whatever be the defects or peculiarities of the sire.\*

The case of the Earl of Morton's chestnut mare, which was put to a quagga, or wild ass, is well known. The produce gave the most unmistakable signs of the quagga in its head, its ears, its stripe on its shoulders, &c. Afterwards, in three successive seasons, the mare was put to a black Arabian horse, and in as many years did the foal strictly resemble the quagga.

We shall give one instance more, tending to show that the effect is in some cases produced through the imagination of the mother. Mr. Boswell relates what he considered a well authenticated instance of a hornless cow coming in season when one of his neighbor's horned black and white oxen broke over the fence, and accompanied the cow home to the bull; both the sire and the dam were black and hornless, nor had the farmer any horned or spotted beast on his farm. The produce of the cow was black and white, and in due time its horns grew resembling those of the ox. If the same neighbor had not also a black and white horned bull, the fact is very important!

Little as these facts prove in themselves, they raise a doubt as to whether the imagination of the mother may not in some indescribable way or other,

\* The facts to contradict this hypothesis are so numerous, that its refutation is useless.—AM. ED.



operate upon the offspring ; however, it is evidently far safer to run no risks with very superior animals, and to cross only with those when subsequent progeny was of less consequence.

It is sometimes desirable that the farmer should possess the power of *controlling the ratio of the sexes in the animals he breeds*. The wonderful ratio in which they are produced in nature, is one proof of the all-wise provisions of the Almighty in making them subject to certain laws. Many investigations have been made to show how far this is within the control of man. A dairy man is particularly interested in the production of heifer calves, wherewith to increase his dairy stock ; a grazier may be equally desirous of producing bullocks for large weights and summer grazing ; while a breeder for sale may be anxious to see a goodly proportion of bulls. How far can he control this production ? is a question of interest and importance. Hofkener, a German, made some calculations as regards the human species, which tended to show that where the father was younger than the mother, the proportion of male births to females was 90.6 per cent. ; when of equal age, 90 per cent. ; but when the age of the father was greater than the mother, nine to eighteen years, it was 143 per cent.

Similar in principle was the experience of M. C. C. de Buzareurnes, who professed to have the power of controlling the sexes in sheep ; his principle being the same as the above, viz., that vigor was favorable to female, and the converse to male births. For females, he proposed to select young rams, and place them in a good pasture ; for males, three to five shear animals, and to place them in an inferior pasture. His experiment was successful. In his female trial there were seventy-six female lambs produced against thirty-five males ; and, in his male trial, there were produced eighty males against fifty-five females. Another trial was made by M. Courneujouls. One section was put to young male lambs, and on a good pasture ; the other on a poorer pasture, and with old rams. The result was, that in the first experiment there were fifteen males and twenty-five females, and, in the second, there were twenty-six males and fourteen females.

Buzareurnes also showed that in several lots the approximations to male or female births, were also in the ratio of the ages of the animals on both sides. Thus, of the young ewes put to the young rams, the two-year old ewes produced fourteen males and twenty-six females, the three-year old gave sixteen males and twenty-nine females ; whereas the four-year old ewes, to the aged rams, and on the poor pasture, produced thirty-three males and fourteen females.

More than this is not known ; but there is quite sufficient to indicate that the breeder possesses at least considerable power in controlling the proportion of the sexes, and that the more vigor he has of frame and food, the greater will be the proportion of females ; and that the converse will hold equally good. There is enough in the principle to deserve a trial.

## CHAPTER V.

## DAIRY MANAGEMENT.

Of all kinds of food milk is one of the most important; perhaps it is the only one which contains within itself all the elements of food, and in such a form as may be most easily assimilated, and rendered fit for the building up a feeble and delicate structure. This nourishing substance, referring especially to the milk of the cow, contains a variety of proximate and ultimate principles; and every part of it is more or less useful in providing food for mankind. In one or other of its forms it is in great request, either as a necessary of life, or an article of luxury. The young of our large and populous cities make it a considerable portion of their food; in the shape of cream, the almost universal consumption of tea and coffee has placed it on the tables of the rich and the lowly. In the shape of butter it is again present at our tables as a condiment to our bread, and an ingredient in our pastry; while as cheese it again appears either as part of the diet of the poor, or a conclusion to the feast of the rich; not to mention other productions which the cuisine art has taught mankind the use of, to pamper the appetite and increase the means of luxurious gratification.

Milk consists chemically of three parts;—a watery portion, in which its sugar and salts are dissolved; an oily, and a solid and albuminous principle it thus affords in turn a supply of the materials for replacing the waste of the old, or constructing the new animal which partakes of it. The saline and saccharine part forms at once the solids of the system, and the means of sustaining animal heat; the oleaginous furnishes the reservoir of fat, to be available in times of adolescence or scarcity; while the albuminous part gives the means of forming sinew and muscle.

A little before parturition, the new sympathies of the system cause the mammiferous glands to swell and enlarge; adolescent before, they now become ready for energetic action; and no sooner is the young brought forth, than the aliment of nature is ready for the sustenance of the being which, so short a time before, derived its subsistence from an internal, as it is now preparing to do from an external source.

If the milk taken from the cow be allowed to stand in a shallow dish, a change takes place in its appearance as soon as the cooling process begins. A whitish-yellow substance, thicker than the milk, separates from it, and swims on the top, forming an adhesive coat, covering the whole—this is the cream, the richest part of the milk—leaving the mass below thinner, and often of a bluish tinge, well known as skimmed, or blue milk. If the upper layer is examined by the microscope, it will be found to consist of a

large accumulation of minute globules; these globules are the oily or butyraceous parts of the milk, coated with a thin covering of a more solid substance; and this may be separated from the mass almost entire. Here you have the greatest part of the butter, with some mixture of other matters. The greatest part we say, for some of the globules of oil or fatty matter, are still suspended in the milky mass.

If the milk so skimmed is allowed to remain, a change takes place, more or less rapid, according to the temperature. In hot weather this is very rapid indeed. The albuminous or solid portion of the milk, is one which contains an ammoniacal principle, and is liable to run very rapidly to decay. It begins to ferment, and an acid is formed, which immediately joins the solid parts of the milk by uniting with an alkali, which keeps the solid part of the milk in a state of solution; under these circumstances are formed two substances, technically known as curds and whey. The solid portions are distinctly developed, and fall down—these are the curds; the watery particles in which they were before dissolved, are also determined, and become the whey.

If these be now separated, the solid parts—acted upon by the changing agency of the nitrogenous matter, having moisture, heat and air added—soon show signs of putrefaction; mouldiness and decay induce the deposit of the eggs of innumerable insects, and the whole mass very soon becomes a heap of putrefaction. If the whey, or watery part, is then suffered to ferment, and this is exposed to sufficient heat and plenty of air, another kind of fermentation will take place, and a slightly alcoholic drink will be produced, which is used for exhilarating or intoxicating purposes by some of the inhabitants of the north-east of Asia.

As the separation of the cream from the milk does not take away all the oily or butyraceous matter from the milk, neither does it remove the whole of the solid (caseous) matter from the cream. The envelope of the oleaginous globules is of this same albuminous and changing substance, and in this, by absorbing oxygen from the air, a change also takes place—curds and whey are formed in the cream itself, but intermixed with a considerable quantity of butter. This butter may be separated in various ways; heat will send it to the surface by breaking the enveloping globules of casein; but being merely animal oil it has an insipid taste, and is very different from our table butter. Agitation, with warmth, especially after incipient fermentation has gone on, is the most effectual mode of breaking down the globules, by fracturing their enveloping skin, and this is the well known process of *churning* of which we shall speak more fully in viewing the several dairy systems.

Let it be remembered first of all, in considering the constituents of milk, that in every 100 parts it contains 87 parts of water, something more than  $4\frac{1}{2}$  parts of sugar, a little more than 3 parts of butter, something beyond one-half part of saline matter, and  $4\frac{1}{2}$  parts of cheesy matter (curd or casein)

Its weight, from containing so many matters in suspension and solution, is some three per cent. greater than that of water. The milk of different animals, however, contains different properties, and is different again according to the breed, food, and treatment of the animals. The following exhibits a few of these differences:

	Cow.	Woman.	Ass.	Ewe.	Mare.
Casein (curd)	4.5	1.5	1.8	4.5	1.6
Butter	3.1	3.6	0.1	4.2	trace.
Sugar	4.8	6.5	6.1	5.0	8.7
Salts	0.6	0.5	0.3	0.7	} 89.6
Water	87.0	87.9	91.7	85.6	
	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

Now all dairy operations are aids for developing, or arresting, these natural changes of milk; and if we give a faint outline here of the principles of these processes, it will very much assist in determining the relative value of the different dairy systems when we come to details.

The object of the dairyman is sometimes to assist, and sometimes to retard these natural stages of decomposition into which the milk will run when left to itself; sometimes it is necessary to defer, sometimes to hasten these stages, and he possesses great power for controlling them. Thus heat, it will be seen, is necessary to all these stages of action. Hence in winter he can easily arrest, and by artificial application as easily advance, the manipulations of his craft. But in summer it is not so easy to control. He has often to be in his dairy watching his milk under the influence of the sun's rays; and he contrives his dairy so as to keep out the hot rays of the sun as far as possible; or he endeavors, by evaporation or profound shade, to counteract their influence.

To begin with the new milk, it is by no means necessary that the cream should be separated from the milk. If butter be the object, it can be attained without any separation of the cream. There are two modes of breaking the globules of casein, one by the application of a gradually increasing gentle heat to the new milk, until the buttery matter floats at the top, which is then taken almost in a boiling state and churned to butter in a very few minutes. The other is, by at once applying the beaters of the churn to the whole mass of the milk; but, as the bulk of liquid is so much greater in the latter case than in the former, and skim-milk is of greater value than butter-milk, it is much less frequently resorted to.

Generally the cream is allowed time to ferment. This process aids in breaking down the structure of the enveloping skin, in precipitating the casein of the mass, and thus assisting the maturation and development of the butter. In churning, the heat of the mass rises from five to ten degrees,

and in very cold weather it is sometimes necessary to pour in boiling water in order to obtain the necessary heat. This heat is also indispensable in separating the cream. At a temperature nearly freezing it will rise with difficulty; perhaps the most regular and healthy temperature is  $55^{\circ}$ , but so rapidly does it rise at  $76^{\circ}$  or  $77^{\circ}$  as to require great skill and watching to prevent the whole of the mass becoming sour. At the first-named temperature it will be perfectly raised in twenty-four hours, and may be kept two meals; but in the latter state of the temperature it will be complete in ten or twelve hours. As the globules have to rise by specific gravity chiefly, it is desirable that the milk should be disposed in shallow dishes. Glass is clean and beautiful, and porcelain is fashionable, but lead is the old-fashioned and useful medium, retaining the heat of the hot water from the scalding process in winter, and slowly conducting the heat after the cooling from evaporation after the same scalding in summer. The desirable temperature in churning cream is  $54^{\circ}$  to  $55^{\circ}$ , a degree of heat preservable only in summer by early churning, and in winter by raising the temperature by scalding the churn before that process, with boiling water, heating the cream at the fire before placing it in the churn, or by adding boiling water to the mass in the churn.

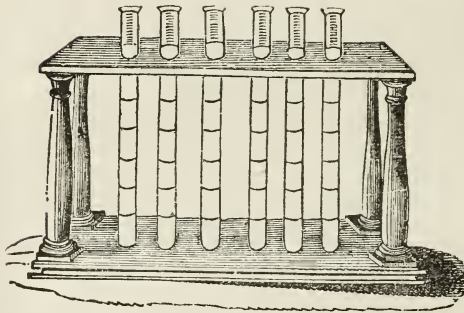
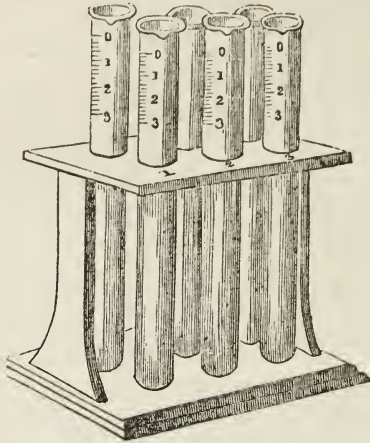
Besides the matter we have alluded to as being present in milk, and consequently in its products, we must not omit the aroma of the food consumed by the cow. In the case of turnips this is very distinct, and sometimes very disagreeable,—causing even pastry to partake of the undesirable flavor. In the spring of the year milk will even have a bitter taste, from the vigor and freshness of the herbs consumed by the cows at that season; but the change from the insipidity of milk and butter produced by hay-fed animals in winter is so great that even that is agreeable.

Immediately after calving the milk is thick and yellow; in this state it is called “beestings” or “beaslings;” this is more abundant in casein or curd, and on this account often forms part of the elements of the curd sold for the purpose of making cheesecakes. Chevalier and Henri gave the composition of these as follows:—Mucus, 2.0; butter, 2.6; casein, 15.0; water, 80.3. The afterings or strippings, in other words the last milk taken from the udder of the cow, are by far the most abundant both in cheese and butter, and hence some dairymen make it a practice always to strip their cows themselves, even when the milking has been left to their servants.

We give two forms of a lactometer. This instrument is designed to test the cream qualities of milk. Pour the milk into the tubes, and the cream, when risen, will show how rich the milk is. The depth of cream will be shown by the figures on the tubes. By the lactometer the difference in the quality of the milk of different cows may be readily ascertained.

The qualities of cream vary much in the different breeds, depending on the modes of management, as well as the food. Thus, in some experiments

made, it required twelve quarts from a short-horn cow to produce one pound of butter—something like a day's supply of milk; while nine and a



LACTOMETERS.

half quarts of an Ayrshire cow's would give the same quantity; but it is often very variable in the same animal at different periods, and different animals of the same breed will produce very different results both in cream and butter.

The churning operation is usually most successful when somewhat speedily performed. Though  $55^{\circ}$  may be the most desirable heat, it some-

times require more. If the cows of the dairy have all been long calved and the weather be cold and stormy, the operation becomes long and protracted; and when ten and twelve, and even fourteen hours, have been consumed in churning, not a few charms have been invented to hasten it. Usually, however, if briskly turned, it will be effectual in twenty minutes. The first sign of butter is when the caseous matter is separating from the butyraceous. The brisk motion requisite to produce this state of things must now be softened, when the small particles of butter begin to adhere to each other; then the butter-milk must be partially let off, and the gathering process, which will continue for ten minutes more, will be complete.

The butter, however, is still in a state far from being fit for use. It contains much of the cheesy matter, and repeated washings in cold water are necessary to secure its removal. If this should not be carefully done, the butter will soon become rancid. The tendency in the caseous matter to decay will induce its speedy decomposition, and the formation of a variety of substances, especially butyric acid, which has a most disagreeable smell. For the same reason, it is essentially necessary to observe the utmost cleanliness in the dairy. Fresh beef placed in a basket or in a room where beef has been in a state of decay before, will soon putrefy; and a very little putrefied milk spilled upon the ground, or left in the churn, the pail, or the bowl, will soon so communicate itself to the whole of the milk and cream in the dairy as to spoil churning after churning of the butter it contains.

Professor Trail made several experiments with the different modes of churning. He tried the churning of fresh cream, of fresh milk, of soured milk and cream together, and of the scalded cream; the results of these experiments were not very different from what had been previously taught. His results were, first, that the addition of cold water to thick cream in hot weather assisted the churning by facilitating the separation of the butter; then, that cream alone, in whatever state, churned with more facility than when mixed with milk; that butter from fresh cream is the finest, and keeps the best, but the butter-milk from this is somewhat poorer; that the scalding of the cream, after the Devonshire method before alluded to, yields the largest quantity of butter, but requires immediate use, as it soon becomes rancid; his last remark is, that the most economical mode is to allow the cream to be soured, or fermented, as it is sometimes called—though it is a change which is not strictly fermentative—because, by this process, it yields the largest quantity of butter, and the butter-milk is also the best.

Circumstances, as well as peculiarity in the management, will have great influence on the flavor of the butter. Thus, where calves are fatted for veal, there is often the best butter. The calves are allowed to suck the cows before the milk is taken for the dairy. In this case, the calves get the solid and saccharine part of the milk, and the dairyman gets all the afterings; and hence he gets a large quantity and a rich quality of butter. The

Bretagne butter, so celebrated in France, owes its peculiar qualities to the mode of its manufacture. It is in such demand that it becomes a manufacturing process; and hence it is made in large quantities—a circumstance always favorable to the quality of butter. The process followed with this butter is as follows: after churning and washing, the butter is steeped or sprinkled plentifully with new milk, and kneaded into cylindrical cakes, and placed, for a few minutes, in a sort of covered frying pan, with heated coke both below and above. It is then taken out, and is fit for immediate use. The flavor is peculiar, and the butter particularly rich in flavor.

The real secret of butter-making it appears to us is, so to arrange the *temperature of the dairy*, and the churn, as just to maintain the requisite degree for thoroughly separating the cream; but not so great as to render the whole over sour. If too cold, the butter will separate badly, the churning will be long and tedious, the butter full of breaks, pale in colour, and brittle in texture; and if, on the contrary, it is too hot, it will be light and oily. It is also essential that the cows should not have calved too long. This will retard the churning process, and have a tendency to make the butter both bitter and unpleasant. Perhaps the best butter will be made from one half soured cream and the remainder fresh. Enough of the lactic acid will be formed in this portion to facilitate the churning, and enough caseous matter will be left in the other to prevent its being tasteless.

If butter has to be kept, means must be adopted for its preservation. The souring change soon proceeds; the butyraceous matter changes also into several disagreeably smelling acids. The first mode of preservation is by salting. If it is to be removed far, it may be necessary also to pack it away, and exclude the air. Hence, when it is made on a large scale, it is put in firkins, or casks, holding from 40 to 70 pounds, which are carefully fastened up by the cooper so as to exclude the air. Salt is well known to have the power of preventing animal matter from falling into the putrefactive state, by means of its peculiar antiseptic power, preventing the caseous matter of the butter from becoming putrid, and running on in its course of decay. But such is the affinity of salt for the moisture of the atmosphere, that the outer portions of the butter soon become subject to the changes which contact with the atmosphere produces; in order, therefore, to keep it for any length of time, it must either be covered with a saturated solution of salt, or with a syrup of sugar, which has the same effect; otherwise it must be placed in air-tight, or nearly air-tight casks, having the top and bottom dredged with salt. In fact, the more moisture is attracted from the atmosphere, the more closely will the wood of the cask adhere, and *vice versa*; a very important means of preservation is thus afforded to the dairyman, and to the inhabitants of our large towns, for without this, even with all our facilities for railway transit, it is difficult to conceive how a constant supply could be maintained. The firkins made in summer are opened in winter

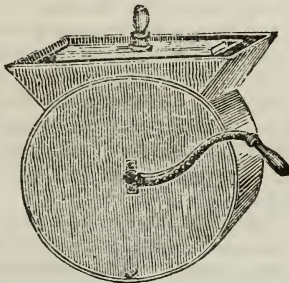


and, though not so rich in their contents as the fresh products from the dairy, they form a second-rate class of butter, by no means disagreeable.

When these are opened for use, a very free washing should be given them, to wash out the soluble lactic acid; and the butter should afterwards be well washed, and kneaded in new milk. This gives it much freshness and flavor, which improves and renders it, if well made and packed, much more pleasant than some of the turnip-flavored fresh butter made in winter.

When once the rancid taste has been acquired, it is never again fit for the table; but it may be so purified as to be by no means useless for pastry purposes. The disagreeable acids are all, to a certain extent, soluble in water. Butter should, therefore, be placed, in clear fresh spring water, over a slow fire, and kept there until the water boils. This will evaporate, wash out, and volatilize the acids. It may then be skimmed off, and again put in fresh cold water, again to undergo the boiling process. If after this it be washed thoroughly, it will be found free from any bad effects upon pastry, but very insipid, and unfit for the table.

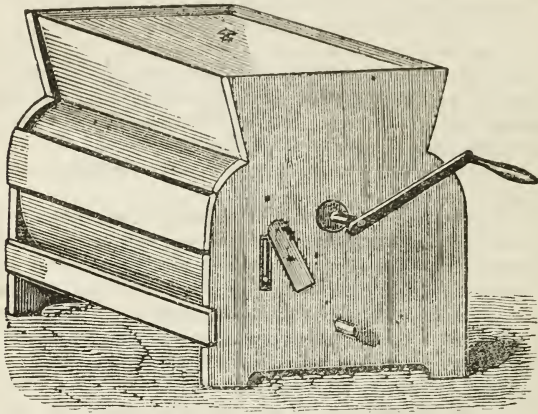
As to the form of churn there may be a variety of opinions. The ultimate object is to secure that form, which will facilitate a rapid, steady, and shaking pressure of the contents; and this is effected either by a flapper, driven through the cream, at a considerable rate, by means of a piston with a perforated base; by a perpendicular motion, raised up and down in a cylindrical or similarly formed vessel; or, what is more common, and by no means the worst form of churn, a cylinder studded with perforated beaters, fastened to its inner surface, and revolving round its two axes, admitting of one handle or two, according to the quantity of the cream. By this means the specific gravity of the cream, as well as the force and impetus of the machine, are both brought into play to excite the heat, the pressure, and the agitation necessary to the proper and speedy development of the butter. To



BARREL CHURN.

this horse or steam power may be easily attached, and though there have

been many forms of churn in use, we are not certain that any very great improvement on the above form has so far been discovered. Plans have been adopted to diminish the labor, but this has often ended in defective operation. The American and the table churns, available for the extemporaneous manufacture of butter every morning for the tables of the rich, are so far a step in advance, and a luxury; but for the large operation of the dairy-farmer, a better application than the churn of his forefathers has not



BARREL CHURN WITH THERMOMETER ATTACHED.

yet been discovered. We give a sketch of useful kinds of modern churns. These are essentially the same. Into the wood of the larger one is let a thermometer, and it is in contact with the cream, and indicates temperature.

The principles of *cheese-making* are, in many respects, those applied to the manufacture of butter; but the object being to a certain extent different, they apply in a different manner. The production of the different kinds of cheese will more appropriately come out in the details of dairy management in the different localities, to which we shall have occasion to refer; but they all center in the artificial development of the cheesy water (casein) of the milk, whether the milk be new or that from which the cream has been taken, termed skim milk.

It has been stated that, if left to itself, lactic acid, into which the sugar of milk is changed, soon begins to form, in circumstances of air and temperature favorable to its development. If to this mixture heat is applied, so as to contract the caseous matter, we should have genuine curd, fit for the manufacture of cheese; but the cheese would be unpalatable, brittle, and hard, and the process too slow for the purposes of commerce. Hence some sub

stance is required to facilitate the change. Lactic acid, natural or artificially added, will combine with the soda, which holds the casein in solution, and form lactate of soda. Here the acid will, with the addition of a little heat, be developed. For this purpose various means may be adopted. The most common is the addition, in some form or other, of the very substance nature has herself provided, for the abstraction of the casein, *i.e.* the stomach of the calf, or some mammalian, generally a ruminating animal. The stomach of the calf curdles the milk in its natural state; and often this curdled milk, the contents of the calf's stomach—the animal having had first a full meal of milk given to it—is withdrawn and used to produce the change in the milk intended for cheese. The idea seems neither pleasant nor cleanly, nor is it necessary. The stomach itself, if well washed, chopped to pieces, and steeped in water for several months,—as many as twelve being in many cases advised—and reduced either to a liquid, or powder, or even the skin itself, is equally potent in effecting the coagulation of the milk. The notion that it is the gastric juice of the stomach which curdles the milk, though it will doubtless have that effect, is exploded by Professor Johnston, who satisfactorily shows that the change must result from some acid in the structure of the rennet itself, and not merely from the gastric juice, especially in the cases where it is considered necessary that it should remain for twelve months steeped in water before being fit for use. The rennet, however, is not the only material used for striking the curd, or hastening the coagulation of the casein. In some cases muriatic acid is used. This acid transfers the alkali of the milk into common salt (muriate of soda); being diluted with water, it has the same effect as the rennet. Vinegar, tartaric acid, alum, and even occasionally milk, are all used with success; each having in it acid enough to effect the purpose, under favorable circumstances. A considerable part of the fatty matter of the milk will, of course, unite with the curd; but some will remain with the liquid, or whey, as it must now be called. In the case of whole or new milk cheese, the whole of the milk immediately it is taken from the cow and passed through a fine sieve, is subjected to the action of the rennet. In cases when a full meal of milk will not produce a cheese, the milk of the evening is reserved till the morning, both added together, and the rennet poured upon the mass. As something like 95° is the heat at which coagulation, and contraction of the curd, is performed with the greatest rapidity, the milk should be raised to about that degree. If more heat than this is given, the cheese will be tough and waxy; if less, there is some difficulty, owing to its softness, in separating the cheesy from the watery matter. In cold weather a small quantity of hot water has to be added to the new milk with the rennet; but if much water is added, or the temperature interfered with more than is necessary, it injures the quality of the cheese.

The next process is the cutting of this curd, to separate it from the whey,

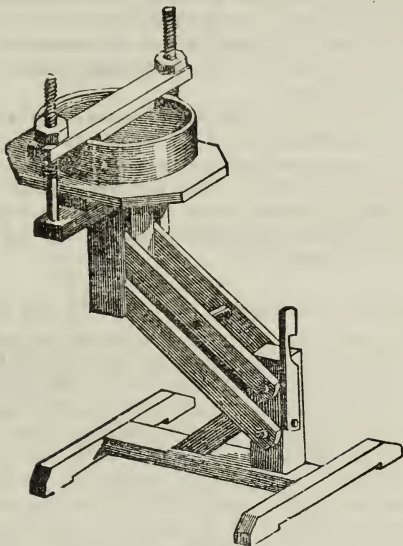
and this is a manipulation which requires care on the part of the operator. If done rudely or rapidly, it will burst the mass and press out the butyraceous particles; but it must not be delayed after the curd is formed, or the whey will obtain more than its legitimate share of the butter. The process of draining away the whey held in loose attraction by the curd, is to cut it in pieces and lay it on a strainer; then by the application of slight and equable pressure to take away the remaining whey. As little force should be used as possible at first; but as the first portion of whey has drained off the curd will acquire more power to retain the fatty matter. Forty or fifty pounds weight will be as much as it can bear at the commencement of the process.

Nearly the whole secret of cheese-making depends upon thoroughly draining off the whey. This carries off the sugary matter of the milk, the lactic acid, and perhaps the rennet as well; and these substances are so liable to undergo changes, that cheese-making altogether depends upon this process being properly attended to. In some places even the curd is washed; for, beyond the danger of washing out a little butyraceous matter, little injury would be sustained compared to the loss incurred, if the cheese were suffered to retain any considerable portion of the whey besides; as butter is sometimes churned from this whey, the loss is made up to the dairy-man, if not to the consumer, in another way.

So powerful is the tendency of the albuminous matter of the casein, to putrefy, that even cheese itself will not keep unless the salting process in one shape or another is adopted. This is performed in the manner most favorable to the production of the peculiar kind of cheese for which a district may be famous, and is either added to the curd, or *rubbed in* after the cheese is made and strained; for such is the affinity of salt for moisture, that it will soon permeate the whole mass of the cheese, and preserve the casein from putrefaction by its peculiar antiseptic qualities. The next process is that of *drying or turning*; but as these are matters of detail which will come under view shortly, they need not be described here. The only remaining subjects requiring notice, are the general care and attention necessary to be exercised in order to keep up the character of the cheeses of a district, whatever the peculiarities of manufacture may be.

If scrupulous, nay fastidious cleanliness, be necessary in the process of butter-making, it is equally necessary for the making of cheese. The flavor of a cheese may be much more easily destroyed even than that of butter. Decaying matter in the dairy will send out its sporules, undefinable even by the microscope, and infect the whole place with its miasmatic influence. And so long as the dairy is not a separate room in the house, kept aloof from the food of the family, from the decay and putrefaction of animal and vegetable matter, kept apart from the performance of household work, and in the most absolute state of cleanliness, there will be injury and loss to the dairyman.

If the bowls, and dishes, and pails, and coolers, are not assiduously cleaned and scalded, so as to destroy all remains of fermentation and putrefaction, the whole dairy operations of the year, at least such part of the year as succeeds these violations, may be rendered unprofitable.



SELF-ACTING CHEESE PRESS.

Allusion has been made to the taste of turnips inseparable from the milk and butter of cows fed on that root. As the bulk of the cheese is made in summer, the remark does not so far apply to cheese; but it is not unapt to obtain a flavor from any herbs upon which the cow may have especially fed. This aroma of the milk may be often removed by the addition of a little saltpetre; and a few drops of chloride of lime are recommended to remove entirely the taste of turnips. A little prudence, however, will generally obviate the injury arising from any special kind of food, with which the cows may at any time be fed.

The *inoculation of cheese* is one of the refinements of modern taste and luxury. A blue mould is by some considered the *sine qua non* of a tasty cheese; while others prefer the decay to be gray, and the cheese to be in a state of putrefaction so absolute as to be soft and wet,—a nest for mites and jumpers or skippers.

If it be desired to give to a cheese, the flavor peculiar to one of its kind, it

may easily be accomplished. A dozen holes may be made in the specimen to be operated upon, with the common cheese trier, and the pieces taken away. The same trier may cut as many pieces out of the favorite cheese, and insert them in the places from which the others were removed. This, covered up in a close place for a month will, if free from mould before, turn out absolutely ripe, and of the same flavor as the cheese from which it was inoculated; always premising that the mouldering process had not first set in in the inoculated subject.

The cheese press, of which the accompanying is a cut, is called the self-acting press. It is so constructed that by means of two pair of double acting levers, the cheese presses itself by its own weight, and in a ten fold proportion to the weight of the cheese. Thus, if a cheese weigh twenty pounds, it will exert a constant pressure on itself of two hundred, and whenever a greater pressure is required, weights are added, and for every pound added, a power of ten pounds is gained.

#### THE LONDON DAIRY SYSTEM, AND THAT OF GREAT TOWNS.

The Dairy systems of this country resolve themselves into three: providing supplies of milk for the population of our large towns, which are becoming every year more important and extensive; the making of cheese to suit the various tastes of our population, who may be said to use it almost to a man, in a greater or less degree; and the production of butter, almost as extensively used by the bulk of our population. Of all the large towns in the kingdom, the supply for the population of London is the most important matter: and so great were the secrets of a London establishment deemed, that it was the greatest difficulty Mr. Youatt, when writing his Treatise on British Cattle, could gain the information he required; for access to the dairies in London was absolutely refused, though in the country he had but to ask to obtain assistance, and even hospitality. Those who take a strong view of the adulterations of milk will attribute this to a dread of exposure; but it may very readily be believed that the joint-stock dairies, which at one time threatened to swamp the trade of the private dealers, might have some reason for a wish to keep their secrets to themselves. Whatever may have been the cause, it must be admitted we know hardly anything about the London dairies but what is furnished by Youatt's authority—we mean that of Mr. Laycock's and Mr. Rhodes's establishments. The number of cows he gives in 1834 at 12,000; but although London has increased since the period when Mr. Youatt wrote, at least one-fourth, we should be surprised if the increase of dairy-cows had been very great—if they have even increased at all! The railway system has introduced a completely new mode of supplying our large towns with milk. The very notion of a milk establishment in a large town at all, has in itself become an anomaly. To carry large herds of cows amongst over-crowded streets! To get to them

their food, and to convey away their manure, to obtain litter, and air, and water was no ordinary difficulty. But it was a difficulty short of the transport of milk from a distance. The railway system has brought fresh milk from the country in less time, and with less injury, for a distance of twenty miles round London, than used to be incurred in conveying it from the milkman to the consumer. But the railways have also cheapened the food. The environs of great towns have not now the monopoly of the sale. Clover and turnips are brought thirty and even forty miles, with much more rapidity, and are much fresher, than formerly when the distance was only seven; and, though they are sold by the pound, they are much cheapened compared with what they were, even ten years ago. The monopoly has been spread over a much greater surface. The somewhat large sum of £82 per cow was given as an estimate of her produce per annum, as obtained by the retail dealer; and the gross sum expended in milk and cream in London, at nearly one million sterling. Not a large sum per head for the population, nor a large sum for the wholesale dealers and retailers, when the art, the labor, the time, and, above all, the expenses of food and rent, are taken into consideration.

The milk is sold by the dairymen to the middlemen retailers. These take off the cream, and mix it with water for sale, boil the skim-milk, and sell it warm from the fire. There is no such thing as new milk in London; it is all boiled skim-milk. Mr. Rhodes's establishment, one of the largest in London, stands on an area of some two and a half acres of ground, which has a gentle slope towards the east. The cow-houses are in a line with this slope, and are furnished with drains behind, and a long trough before; in the one their food and water are allowed to run, and down the other their droppings and drainings discharge themselves. The stalls are arranged on each side of the gutter. These stalls are double; two cows being placed in each, and having each cow a manger and a covered water-trough let into the wall. The cow-houses are twenty-four feet wide and eight feet high, lighted with glass, and well ventilated. Of these cow-houses there are four long rows, and at the bottom is a quadrangular yard, surrounded by somewhat similar sheds, partly used for feeding the dry cows and partly for keeping pigs, which feed on the refuse food of the animals. Four or five hundred cows, which are usually kept in the establishment, supply milk, varying with circumstances, and sometimes, of course, beyond the demand; where this is the case the milk is skimmed, and given to the pigs—being placed in a large souring cistern; and this, as well as the grains which may be left after the cows have been fed, are almost their exclusive sustenance. Near this quadrangle is the dunghill, after the American fashion; a plan of all others the most desirable in a large town, being so much excluded from the air, and affording the best opportunities for its innocuous removal. The cows are never loosed, so long as they are milkers. They usually come in from York-

shire or Durham, and are all newly calved. They are fed mostly on grains and hay. Sometimes, as we said before, clover and grass, tares and mangel are brought from a distance; but the system of feeding on fermented and preserved brewer's grains, is more or less general, because they are known to have the most wonderful effect in promoting the secretion of milk. Those of the ale brewers are preferred to the porter brewers, and they are preserved in a pit sunk in the establishment, lined with brick and cement, trodden down and kept air-tight. An incipient vinous fermentation takes place, which runs into acetous, and the whole mass is soured, the same as the milk was for the pigs, but with this difference, that in the one case the air is freely admitted, but in the latter case it is carefully excluded. Here keeping is said to improve the grains; and months, and even years, are permitted to elapse before they are consumed. Of these the cows get about a bushel per day. Hay in winter, and tares and cut-grass in summer, eke out their soured grains, with a daily allowance of salt, keeping them in high condition; and they will give, on an average, nine quarts of milk per day; if they do not give this quantity, or within one quart, they are at once condemned. Mangel wurzel, turnips in small quantities, and even potatoes, are given in winter. The change from the open air to the cow-houses of London is very great. It might be supposed that it would have a ruinous effect on their health and condition. But this is not the case. They are usually confined only for eight or ten months; and this is not long enough to produce much damage. The change in their food, also, is rather favorable than otherwise; and the currying of the skins, which is universally adopted, has a very beneficial tendency in overcoming the want of exercise. The cows, when they cease to be milkers, are generally sold to the distillers, though some dairymen keep and breed from the best specimens. The general system, however, is to sell them off; and for this reason the Yorkshire cow is so generally the favorite in the London dairies, because she is of more value for fattening than almost any other, and gives a larger proportion of milk, although it be of a less nourishing and poorer quality.

In the establishment to which we have alluded, and at the end opposite to the pig-houses, is the suite of rooms used for the *dairy*. Here are three rooms—a measuring room, where the milk is measured to the retailers, an inner or scalding room, where the vessels are kept and washed, and which is furnished with a boiler and tables, and the inner room, or dairy, for the unsold milk. The retailers usually milk the cows themselves, at four o'clock in the morning, and three in the afternoon. They take the produce of one, two, three, or more cows, according to the demands of their customers; but have their supply either added to, by the dairyman, from the produce of other milch cows, or they pass over the quantity they do not require, if they have procured more milk than they have demand for. The dairyman makes butter of the surplus milk, and gives the skim milk either



to feeding, or, more generally, to breeding and store pigs, sours as has been described.

## THE LIVERPOOL DAIRY SYSTEM

Is different from that of London, because it is more connected with the farming operations around that town, and we cannot select for remark anything so complete in that neighborhood—if indeed anything in the country is half so perfect—as the system of Mr. Littledale, of Lisceard. His dairy, though much smaller than the London one we have named, is carried on with a spirit that rather reminds us of Mr. Harley, at Glasgow, who remodeled the whole dairy system of towns, than anything else with which it can be compared. Mr. Littledale's farm, of 350 acres, is made subservient to this purpose, and his farm buildings were specially erected for the purpose of carrying out the system; they cover about four statute acres. His cattle occupy three cow houses, or, as he calls them provincially, "shipons," and are arranged in parallel lines, with yards between, one holding sixteen, another twenty-eight, and another thirty-two cows. From these, drains proceed into liquid manure tanks, and the cattle are tied by the head, in a stall after the London fashion. His farm grows mangel wurzel, turnips, potatoes, and green food for his cows, and he also feeds a large number of pigs, as an auxiliary to his dairy. The stalls in the cow-house are partitioned with blue Welsh flags, connected with iron rods, and each animal is furnished with an iron manger.

A passage before the head of each row of cows, which is single in each cow-house, enables the feeder to supply them with their food without disturbing the animals; and they are never taken from their stalls either for food or exercise. The whole of the cow-houses are laid also with Welsh tiles, and an open drain runs behind the cows, furnished with stench traps, to convey the liquid to the tanks we spoke of, by the covered drains from the cow-houses. There is no provision for the conveyance of water, for being fed so largely on roots, they require but a small quantity, and what they require is carried in pails. In addition to this green food, Mr. Littledale uses a large quantity of grains from the brewery, and gives boiled linseed, as an auxiliary to his roots and green food. His cattle are curried and brushed regularly, and as regularly fed, and though they are, as we said, never loosed from their stalls, they are remarkably sleek and healthy, and free from many of the epidemics which so commonly prevail throughout the dairy county in which he lives—the county of Chester. The ventilation is attended to by means of open-paled weather-boarded ventilators at the top of the cow-houses, by which he is able to regulate the temperature.

The dairy is a very completely arranged building, the floor is laid in cement, and there are two large sycamore tables, one on each side, and one of

marble at the end, with three large, but shallow, octagon leaden milk-bowls in the center. The walls are lined with glazed Staffordshire-ware tiles, and the roof has in it a large ventilator. The walls, which are exposed to the north, are built hollow, having a three-inch aperture, which communicates with the space between a double ceiling, which covers the building, and this gives an ample command of low temperature in summer,—a higher one in winter being easily obtained. The milk, when cool, is placed in glass milk-pans, and is brought from the cow-house in sycamore pails. The churn is of the old-fashioned cylindrical form, it is made so as to be worked by his steam engine, and will churn eighty gallons of cream at one charge. To make this into butter, under favorable circumstances, it requires but some eight or nine minutes.

Though, as may be supposed, profit is not the entire object of the spirited proprietor, there is no doubt but his proximity to Liverpool renders his produce both in milk and butter worth a large sum; and as he grows so large a quantity of green crops, and uses these to produce the paying article—dairy produce—he is enabled to grow large quantities of corn as a consequence.

Somewhat similar to this was Mr. Harley's dairy, near Glasgow; he kept 260 cows, closely tied by the head; kept them by soiling, and showed the milkmen of Glasgow that he could obtain as much milk by *one* acre soiled, to house-kept cows, as five would produce if the cows were allowed to roam at large. If we take into account the quantity soiled with their excrements, and rendered unfit for food, the unequal manner in which they eat the pasture, which allows much to run to straw, while some is eaten so close to the ground as almost to injure the roots, the quantity trodden down and destroyed by the cattle lying upon it during the night, and contrast this with the cleanliness, the sweetness, the freshness, of such as have food brought to them, we need not wonder at the statement. The preservation of the whole of the liquid manure, enables a dressing of that fertilizing material to be applied to the grass after every cutting, so as to make the most of the productiveness of the soil. A great quantity of this is doubtless saved, which would otherwise volatilize and evaporate.

Perhaps a stronger contrast to the good management of these spirited men cannot be offered than the *adulteration of milk*, unhappily practiced in others of our large towns, and so extensively carried on, that it is doubtful whether some of our population ever taste such an article as the pure milk of the cow. Allusion was made before to the mixing with water so generally practiced, and to the partial or total abstraction of the cream before the milk is sold to the consumers. This of course makes it blue and thin; and the least objectionable and most simple resource to disguise the fraud, is to boil it, to thicken the consistency, and improve the flavor. But far more equivocal modes are adopted. Sometimes sheep's and calves' brains are mixed

with it, which render it thick and rich in appearance, and make an apparent rising of cream to the surface ; nor is this adulteration easy of detection.

Very old adulterants are chalk and flour, so common a few years ago as to obtain for town milk the significant name of "whiting;" this mixture preserved the milk sweet for a longer period, thus enabling the adulterator to take off more of the cream. It became thin, however, by standing, and deposited a sediment, and thus was liable to detection. An improvement in this trick is to adulterate with boiled paste and sugar—a permanent thickness and sweetness is thus given, and it is less easy of detection than raw flour, but is recognizable by the test of iodine. Starch has the same effect, but is liable to the same process of detection ; the white of eggs is also sometimes made use of to thicken the mass.

A refinement on all these modes is to mix the milk with an emulsion of almonds, and even of hemp-seed ; indeed, it is questionable if milk itself is not absolutely manufactured of this and some other ingredients. Some fifteen quarts of water may be made to resemble milk for less than a shilling ; and if a little milk is added, the deception will be complete. Hemp-seed emulsion has very much the same effect, but is more easily detected by its acrid taste ; but this may be removed by a sugar, or sugar-candy mixture. Raspail detected both these as thickening matter for skimmed milk in Paris ; and the reseaches of Mr. Berruel showed that the deceptive effect, especially of the almond mixture, was nearly complete. It would be tedious to repeat all the tests for these adulterations ; when they are suspected it will be far the best to carry them to an experienced chemist, and the exposure of the parties in a few instances in the public prints would be far more effectual in arresting the villainous process than any personal manipulation, which could not carry the same weight with the public. As a public duty this ought to be done, as the mischief as well as the disgusting nature of the practice should at once be arrested.

#### PRESERVATION OF MILK

This is by no means an easy measure. It is of materials so protean in their character, that to attempt to preserve, must so discompose or transmute their qualities, that the mixture ceases to be milk. There are, however, many inducements to preserve this invaluable luxury, if it be possible, even for the purpose of transmission from the interior of the country to the large towns ; but this can only be effected by preventing the formation of the lactic acid, or the vinous fermentation of the mass ; and by preventing the decomposition of the sensitive casein. We must therefore either lock up both these principles—the saccharine and caseous materials—by some strong affinity, or we must exclude air and warmth, to effect our purpose. In Holland the milk is mixed with carbonate of magnesia, which thickens it, and

prevents it from souring; this, or some other alkaline mixture, will doubtless preserve it for a short period, especially in winter, by forming a salt with the lactic acid, as it is developed, and by keeping the casein in a state of solution. Fifteen grains of the carbonate in a quart of milk will not give it any very unpleasant taste, and will certainly prevent its acidulation and curdling. Carbonate of soda will have a similar effect, and it is thought by some to improve the tendency of the cream to separate from the milk. Possibly the reason is, that with the soda it can be kept so much longer, and thus give it a better chance of rising.

Another plan is to place the new milk in bottles, and insert them in a pan on the fire, immersed in cold water, until the water boils. The air in the bottles thus becomes rarefied, and, if corked up hot, will be kept for a considerable time in a state of comparative freshness, to be used immediately the bottles are opened. The addition of a few grains of carbonate of soda, will of course much improve its keeping qualities. It should also after this be kept as cool as possible.

M. Adepert's method is a step beyond this. He recommends the milk to be subjected to a heat so gentle that the great bulk of the purely watery parts are evaporated; then to be closely corked up. This, of course, has a much stronger tendency to resist decomposition than if the whole of the watery particles remained, and if it were boiled in the bottles in which it was to be finally corked up, and this done during the hot state, as in the instance above, and a small addition of soda made, it might keep in a palatable state for a considerable period,—not indeed to compete with newly-produced milk, but to be a luxury on board a ship far out at sea, without any fresh supply of that nutritious article. Duchoff, a Russian chemist, went even beyond Adepert, and his scheme professes to be perfect, furnishing a supply of milk for any length of time, and to use at pleasure. It is by forming essentially a milk powder. He proposes to evaporate by a slow fire the whole of the watery matter from the milk, and thus have a solid and pulverulent mass, which may be kept in a small compass in a bottle, and when required be dissolved in a proper quantity of water. Now, as milk contains water in the ratio of nearly nine-tenths of its substance, it may, doubtless, be much reduced in compass, and made capable of being produced extemporaneously at pleasure; this would supply a great desideratum. It is extremely doubtful, however, if it would retain much of the taste of milk how much soever it might retain its nourishing qualities.

#### THE OPERATION OF MILKING

Is ONE which has more to do with the success of dairy management than is generally supposed. It must be performed carefully, thoroughly, and kindly. The cow must be educated to give her milk freely, and this can only be accomplished by a system of kind treatment when she is a heifer,

and has produced her first calf. Many a cow physiologically capable of being a good milker, is spoiled at the very outset by unskillful treatment. The new sympathies and sensations of the mother are very decided and very painful. The vessels of the udder are strained and sore, and a rough and brutal treatment of her at this time, will stamp her as a vicious cow for ever. She will hold back her milk, become a hard milker, and will thus, by keeping the contents in her udder, meal after meal, soon run off her milk, and become prematurely dry. Nothing can be more utterly injudicious than the mode adopted by too many dairymen, of taking away the calf the moment it is dropped, to prevent the mother from seeing it till she cannot distinguish it as her own. A greater violence done to common sense cannot be imagined. The udder is distended and painful; and nothing is so calculated to soothe and relieve it, as the mucous covering of the mouth of the offspring; nor will anything be so grateful to the mother, or cause her so readily to give up her milk with ease and facility in milking. At first the teats are gummed up by a glutinous sort of cork; this should be removed with the hand carefully, or by the application of warm water. A little of the beestings should be milked into the hand and rubbed on the teats and udder; and then the calf should be assisted to milk. If the udder be very full and distended, a little milk may be carefully extracted by an experienced milker. If the calf be feeble it may have a few spoonful given by the spoon; only, however, that it may more vigorously attack its mother. When the calf is satisfied, the udder should be stripped clean. On the second day it should be placed in a stall near the cow, to attract her attention, and be let out only just before milking hours, which, in newly calved cows, should always recur three times a-day at least. This should be practiced for a fortnight, as all calves should have new milk for at least that period, and then the hand milking may be altogether substituted. She has got a habit of docility from instinct, and gives her milk with cheerfulness and pleasure; but, if with a sore udder, without her calf, and its mental influence as well as its physical, upon her, she is left to brood on her unsatisfied instincts, she gets peevish and sulky. The period of milking, which ought to be one of relief, becomes one of pain and annoyance, and often cruelty; she becomes a confirmed vicious cow, and therefore a hard milker! Young heifers should never be tied at first. So long as the calf suckles she will not require it, but when tied by the feet she should also have a noose passed over her hams, to prevent her kicking. Three persons should always be sent to milk a young cow, one to her head, one to her hams, and one to milk. If she shows vice, or wildness, or kicks at first, the noose over her hams will be a very efficient remedy. Milking should always be performed the very first thing in the morning; five in summer, and six in winter, are the latest periods it should ever be performed. In the evening it may be done at five, and regularity here has more to do with success than is generally imagined. The cows

should not be driven home, but the milk should be carried from the field, if distant; for a great waste of milk will take place if they are driven about. If under cover, it is by no means a bad plan to give them their feed at the time they are milked. It adds to their quietness, and makes them part with their milk more freely; and as most milk cows, in winter and spring at least, have mash, it is desirable to give them this during the milking the first thing in the morning.

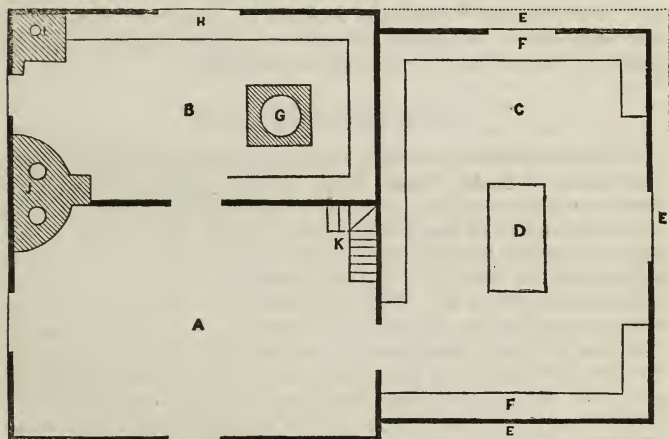
The most important part of the operation of milking is perhaps to *milk clean*,—to take out the whole of the milk from the udder. Not only is the last portion the richest in cream and in butter, but there is not a more certain way of drying a cow than allowing a part of her meal to remain in the udder. It is a good, but too generally neglected plan, to wash the udder with warm water before milking. Nor is it of less consequence to have a good tempered and expert milker; a savage ill-tempered milker will often spoil a cow, and, if she once holds up her milk, it is a proof that the milker is defective or disagreeable to the animal, either from her disposition and temper, or in the manipulation of the udder. Pleasant milking is that which sensibly relieves the cow's udder. A free, decided, but gentle grasp of the teats, and a full and vigorous stream of milk, are the marks of a successful milker. It is desirable to rub and stroke the udder when the stream ceases, to encourage the delivery of the slightest remains; nor is it a bad plan for the milker, or in large dairies, for the foreman, or even master, to take a small measure and follow the milker to "strip" all the cows. There are some masters who make a point of always attending to this at milking, and they thus see the character and capabilities of the milker; women are by far the most capable of milking, their hands are more gentle and delicate, and the cows seem generally to prefer them.

There have been several attempts to accomplish the milking with other than hand manipulation. Some syphons were invented, which were alleged to have the peculiarity of clearing out the udder without the use of the hand. But this has not been found so successful as to obtain any wide-spread use; nor indeed to be much known, even amongst experienced agriculturists. It is obvious that there are only two modes of overcoming the tension of the udder, likely to effect the purpose. The one is compression, the other is suction. The syphon went on the erroneous principle of distending the mouth of the inner duct of the milk in the teats. This is a disagreeable process, and would subject the cow to a flaccid state of teat, likely to induce her to commit the fault of milking herself. An American plan recently mentioned in this country as practiced in the United States, is much more feasible. It proceeds on the two principles we have named, and consists of four India rubber bags, which are drawn over the teats, and set so as to be air tight. At the lower end of these, metallic tubes, with taps, are inserted: when the adjustment is perfect the taps are turned, and the whole of the

milk in the udder is said to be thoroughly exhausted, and in half the time required for hand-milking. It is said that a man can milk ten cows thoroughly in fifteen minutes. It requires, perhaps, more experience than has yet been obtained before it could be recommended, but the idea is novel and not altogether void of feasibility.

## THE DAIRY HOUSE

Is, perhaps, of all other appliances, the one on which success most depends. It should be apart from all household operations, from open grates, and from dung-heaps, and should have as much as possible the means of an equable temperature. As, however, it is much easier to keep a cold building warm, than to cool a hot one, it is desirable that it should be as



A Churning room.  
 B Cheese and scalding room.  
 C Milk room.  
 D Table.  
 E Verandah.

F Table for milk bowls.  
 G Curd pan.  
 H Tables round.  
 I Pump.  
 J Boilers for scalding.

much as possible shielded from the sun's rays. It should have its side to the north, its end to the east, and should, if possible, be let into the earth a few feet, but not so deep as to interfere with the drainage. If covered by a large tree it would be all the better. Around it should be either a hollow wall, or peat earth should be walled round its exterior; or, as another alternative, and possibly the best but most expensive, it should be surrounded by a verandah. It should also have a double roof, and abundant top and side

ventilation,—either of which should admit of being closed. It is necessary to have in it a pump, the floor sloping, and on the highest part a perforated pipe should be connected with the pump, to allow of the cleansing of the floor with cold spring water when necessary. The bowls should either be earthen ware or glass dishes, placed upon wooden tables—fir, maple, or sycamore are the best,—or leaden bowls may be used, placed on frames, and surrounding the dairy. Stones are the best for the floors, and a lining for the walls of white pottery is not only elegant but useful; a pipe connected with the boiler attached to the kitchen fire is a great advantage, with a stop-cock, so as to regulate the heat of the room in winter. The scalding and churning rooms should be distinct from the milkhouse, and the latter should be kept as free as possible from all kinds of foreign matter. An outer verandah is useful for drying the dishes and pails, and therefore desirable, when the dairy is sufficiently extensive to render the expense of its erection judicious. We give in the sketch on the preceding page the plan of a dairy which combines the whole of these advantages.

#### THE AYRSHIRE DAIRY SYSTEM.

A district celebrated in Scotland, and in the north—and justly so,—for the manufacture of *Dunlop Cheese*. These cheeses are from twenty-eight to fifty-six pounds in weight, and hence, to make one large cheese at a meal requires a dairy of at least fourteen cows. In this case a cheese is made night and morning, but, if a smaller dairy is kept, the night's milk is reserved till morning, the cream skimmed off, and both are warmed, so as to make the whole mass  $90^{\circ}$  to  $95^{\circ}$ . Following the course of the large dairies, however,—those where the cheese is made in the greatest perfection, namely, from new milk as it comes from the cow,—a large cheese-tub is placed in the dairy, and upon this is placed a framework of wood, denominated a ladder. Over the whole is placed a thin linen strainer, and the milk, if sufficiently warm, viz., at least  $85^{\circ}$ , is strained through this cloth into the tub. If, however, it should not be of that heat, it is placed in a deep tin or copper vessel, and inserted in a furnace of hot water, until it attains the requisite degree of heat,—for all the success of the cheese-making from the rich milk of the Ayrshire cows depends upon this precaution. If the cheese is made from milk of a less heat than this, the curd does not contract properly, and some is wasted in the whey—nor is the cheese so compact; whereas if it is much hotter than  $90^{\circ}$ , except in winter, when it cools down considerably in the very operation of making, the cheese will ferment and the casein run through its various stages of decay.

The next process is that of adding the rennet. This consists of the stomach of calves, kept until at least one year old, when they are steeped in salt and water, in the ratio of three to the gallon, and, in the best-managed



dairies at least, a lemon is added to take off the bad flavor. This stands for some two months, before being used. A tablespoonful of this solution is added to each hundred quarts of milk, and the whole is covered by a woolen cloth to prevent the escape of the heat.

When the curd is sufficiently firm for breaking, usually about a quarter of an hour after the rennet has been added, it is cut in all directions—a knife with three blades being preferred, as expediting the process—so as to have the curd in cubic pieces. It then begins to sink, and as much of the liquor (whey) is taken out as can conveniently be removed in a wooden dish. The cutting of these cubical pieces again commences, slowly and cautiously at first to break the curd as little as possible, but more rapidly afterwards, until the whole of the pieces are thoroughly divided, and made quite fine. It is then allowed to settle for some fifteen minutes, and the whey again taken from it with the dish, and strained through a fine hair-sieve, to arrest any of the small particles of curd which may be taken up with the whey. The curd is then cut out, and laid in a heap in the tub, to allow the whey still to drain away, but only by the pressure of its own weight; and when all the whey that will leave it has been so expressed, it is placed in the cheese-vats, which were before covered with a cloth, remaining there for half an hour, under a pressure of about fourteen pounds, to press out the remaining whey, but leave the fatty or butyraceous particles in the curd. It is then taken out and cut into slices, and again subjected to a greater pressure, and either broken fine by the hand or torn in pieces by a curd-mill, until it becomes almost reduced to crumbs. It then undergoes the salting process, which generally takes place at the rate of  $7\frac{1}{2}$  ounces of salt to fourteen pounds of cheese. A fine linen cheese-cloth is now washed in warm water, wrung, and placed in the chessel, chessford, or vat, and half a hundred-weight laid upon it for an hour; this is doubled for another hour, when the cheese is taken out, placed in another cloth, and again put under an increased weight for about three hours. This continues for about four days; every time changing the cloth, and generally turning the cheese upside down; and the weight is increased until the cheese arrives at a degree of consistency to bear the pressure of a ton.

When taken out of the press, the cheeses are placed in a very dry and somewhat warm atmosphere, often within the range of the influence of the kitchen-fire, turned several times a-day, and rubbed with a dry cloth. This continues for a week or ten days, when they are removed to the cheese-room, where they are exposed to a cool dry atmosphere; a gradual mode of ripening being, at this stage, necessary to their proper condition. The Dunlop cheese is seldom colored, though some herein imitate the Gloucester and Cheshire fashion. The peculiarity of management is that of making the cheese from the milk from the cow before it cools.

## THE CHESHIRE DAIRY SYSTEM.

The Cheshire cheese is as celebrated in England as the Dunlop is in Scotland, and it has long received the greatest attention from the Cheshire dairymen. The evening's milk is set until the morning, when the cheese is generally made, and the cream taken off. The skim-milk is scalded to about 100°, and one half of it, mixed with the new milk from the cows of the same morning, is strained through a fine hair or gauze sieve, while the remaining half is mixed with the cream, which is also added, so that the whole mass is about 83° to 85°; the annatto being added to the mixture in the proportion necessary to give the color aimed at in that particular dairy. Two pounds of annatto are generally considered adequate to color a ton of cheese. The rennet is prepared exactly in the mode described in speaking of the Dunlop cheese, and added in about the same proportion. The tub is then covered with a wooden cover, and a cloth placed over it to keep in the heat, and remains about an hour in this condition. The curd is then gently but thoroughly cut with a cheese-knife until it is divided into small pieces, and is again left covered for an hour to settle. The whey is then taken out by a pan or dish; the dish being pressed gently on the curd, to gather up the whey. The curd is laid on a heap in the tub, and gently pressed. As more and more of the whey separates, the curd may sustain the greater amount of pressure without fear of forcing out the fatty matter. A perforated board is placed over the curd in the tub, and a weight, of from twenty to twenty-five pounds, placed upon it, and again the whey is bailed out; it is then turned, and the same board, with a greater weight, placed upon it. It is then cut into square pieces, and pressed once or twice, when it is fit for the vat or chessford, which has in it a coarse cloth. Before being put in, the curd is broken into smaller pieces and salted, then piled up in the chessford, and covered with the cloth by having its edges turned over it; and as soon as the curd adheres, a cover is placed on the vat, and the whole is pressed by a thirty pound weight. The curd is then punctured on all sides with skewers to admit of the free escape of the whey. It is taken out, cut in slices, and again subjected to more pressure, and more punctures by the skewers. The pressure is again increased, and the cheese frequently turned and the edges pared; the parings being placed on the top of the cheese, and pressed into the center. A pressure of sixteen hundred weight is now given, the cloth changed, and the cheese turned several times in forty-eight hours; then taken out, and immersed in or covered with salt. It is sometimes salted by washing it with salt brine, and is, when taken out of the vat, placed in a cylinder or hoop of proper dimensions, when it is washed in warm water, dried with a cloth, and placed on a shelf to dry, where it is allowed to remain a week. It is afterwards washed and dried again, and anointed with fresh butter. It is placed in a somewhat warm situation, and rubbed

every day, for one week more, with butter, which much improves its character, and, above all, its appearance.

#### WHEY BUTTER

Is a product of new milk dairies, and in Cheshire is a branch of dairy manufacture. It was stated, that though much of the fatty matter of the milk remained in the curd, yet some necessarily escaped into the whey. It is already developed, but in a state of feeble union with the whey, and requires a churning process before it can be collected. One hundred gallons of milk, made into cheese, will give ninety gallons of whey. This will yield twelve gallons of fatty, creamy matter, which when churned, will give some four pounds of butter. The mode of treating the whey is to heat it to about 180°; afterwards it must be well stirred to prevent it "setting on." At this stage some sour butter-milk is added, and occasionally some white whey, in the proportion of about 1 to 1.70 of the former, and one tenth of the latter. This causes the butyraceous matter to rise to the surface of the pan, when it is skimmed off and placed in an earthenware jar, to take exactly the course of fresh cream—to form lactic acid, and separate the casein from the mass. The remainder of the whey is then allowed to run off from the oily matter, which swims on the surface, and this is churned the same way as the ordinary cream. The whey butter is an inferior kind, worth about 20 per cent. less than milk butter, and is mainly used for pastry purposes.

#### THE LEICESTERSHIRE DAIRY SYSTEM.

This fertile county, partly grazing, and partly dairy, is a mixture of arable and grass land, and the pastures being, on the whole, rich, and the land productive, a large portion is grazed by cattle. On some farms, however, the dairy is the principal object, and the land enables them to produce a cheese perhaps unequalled in richness. We have hitherto only had our attention directed to new, or whole-milk cheese; but a step beyond this may be gained. If some of the skim-milk be rejected, and the cream added to the new milk, we have a still richer cheese—the product for which the north-eastern parts of Leicestershire are famous; we mean the far-famed *Stilton Cheese*. This cheese differs from the Dunlop as regards shape, and the Cheshire both as to shape and bulk. The latter may be from half a hundred-weight to two hundred-weight, though perhaps the former is nearer the mark; but the Stilton seldom weighs more than from twelve to fourteen pounds, and is the shape of a round hat without the brim, or about eight inches in diameter and nine or ten high. They are generally made by adding to the new milk of the morning the cream of the milk given on

the previous evening. If a richer cheese is required, more cream is added, and even butter is sometimes said to be added to enhance the peculiar richness of the Stilton cheese. The temperature should be about the same as for the Cheshire, 85°, and this is attained, when necessary, by inserting jugs of hot water in the mixture. The rennet is added without any coloring matter, and in an hour the curd is fully formed. Great care is necessary in removing the curd. If handled roughly, or squeezed at all, the cheese is seriously injured. It is usually gathered carefully off the whey by a wooden dish, and placed upon a linen strainer, which is tied together at the corners, after the manner of making cheese-cake curd; and the whey gently strains off by the pressure of its own weight alone, into a vessel beneath, which receives it. A little squeezing with the hand, or with laths, is then given, and the whole is allowed to drain six or eight hours in moderately warm weather. It is then placed in a cylinder of copper, zinc, or tin, which has numerous perforations at the sides, being first secured in an open or coarse strainer; gently cut in slices from the first strainer with a sharp knife. In this hoop it remains for four or five days, being turned every day once or twice, and punctured with skewers through the holes of the cylinder after the manner of the Cheshire. Warmth is requisite to the ripening of this description of cheese.

When the curd has become solid, the cheese is removed from the cylinder, and bound up in canvas bandages, or rollers, which encircle it several times. These are clean and dry, all cracks are gradually filled up, and fresh binders supplied every morning for a week or two, until the much prized skin is formed; after which they are removed to the drying place or chamber. It is two years, however, before a Stilton cheese is at full maturity, except when its ripening is hastened by the method of inoculation, described at the commencement of this chapter.

#### THE GLOUCESTERSHIRE DAIRY SYSTEM.

In this district, celebrated for its *double Gloucester* cheese, the practice is not so entirely dissimilar to the Dunlop and Cheshire modes, as to require a very minute detail. They weigh usually about twenty-two pounds each, and are a rich and useful cheese. The single Gloucester, or one-half new milk, and one-half blue, or skimmed, are disappearing from public approbation. The milk fresh from the cows is taken and mixed at once with the rennet and annatto, and left for an hour covered up to prevent the escape of the heat, which is maintained, so far as it can be, at the same degree as in Cheshire, and the curd is broken by a knife with three blades, or a sieve made of wire. The whey is taken out with a wooden dish, and is placed in the vat, over which a linen cloth is spread. Into this cloth the curd is put, and pressed with the hands until it will bear the cover of the vat, which is

then placed upon it, and loaded with a weight, or it is placed in the cheese press. The curd is then torn in pieces by a curd mill, and again placed with a clean cloth in the vat, and pressed. In four or five days the curd is thoroughly deprived of the whey, and is taken out to undergo the process of drying. No salt is mixed with the curd, but it is rubbed upon the exterior of the cheese, some twelve to twenty hours after it has been put in the press. It is rubbed in with the hand, so long as the curd appears to absorb it; and the cheese is again transferred to the press. This takes place three times each day, and the quantity of salt, allowing for waste, which a cheese of twenty-two pounds will absorb, will be about ten ounces. When taken from the cloth, they are wiped and laid to dry, in the ordinary manner, being frequently turned. When intended for sale in London, they are scraped and painted. A coat of red coloring matter, dissolved in ale, is used, which is rubbed on the cheese with flannel. Of course this has no beneficial tendency.

## THE DEVONSHIRE DAIRY SYSTEM.

This is peculiar, especially as regards the manufacture of *butter*. It is said that the process adopted there, is one productive of more butter, and that of a better quality, and more agreeable flavor, than any other. The cream, before churning, undergoes the process of *clotting*, or *clouting*, and the *clouted cream* is thus procured. As soon as the milking and skimming processes are over, the warm new milk is placed in a brass pan, sufficiently capacious to hold the meal. A small quantity of cold water is placed in the pan, and here it stands in the day time for six hours, or at night till the following morning. It is then carefully placed near a slow charcoal or coke fire, so as to be heated to a certain point, but not permitted to boil. It is a delicate matter to have a fire just brisk enough to prevent the milk from curdling in summer, and still not so hot as to cause it to heave or boil. A firm consistency on the surface, and a tough consolidated appearance are the criterions usually depended upon for the proper amount of heat.

When sufficiently scalded, the pan and its contents are removed to a cool place in summer, and covered over, until cool, with a woollen cloth in winter, when the cream is taken off. The churning may then either be performed at once, or delayed a day or two; but no souring is necessary in this clouted cream—a reason why the butter may be considered more palatable to some tastes. The process of churning is very simple: the cream is placed in wooden bowls, which are alternately scalded with hot, and washed with cold water—a process which by evaporation is said to cool them beyond anything else in which the cream can be placed—it is then briskly stirred by the hand, or by a “whisk” of peeled willows, until the buttermilk separates from the butter, which is usually effected in some ten minutes. The butter-

milk being poured off, the butter is washed with fresh water, a little salt added, and the butter repeatedly beaten either by the hand, or with a wooden trencher or spatula. It is then formed into small cakes, and impressed with either the peculiar device of the dairy, or some fanciful emblem, and is ready for the market.

#### THE YORKSHIRE DAIRY SYSTEM.

The dairy husbandry of Yorkshire is a combination of the ordinary operations of some four distinct classes of dairy-farming. The one is the making of butter in rolls, stones, or firkins, for the manufacturing districts of the West of England, and is often combined with the making of *skim milk cheese*, as it is provincially called. The other is the making of new milk cheese, practised in *Wensleydale*, and to a small extent in *Cleveland*; these two latter modes we shall not describe, as they are not materially different from that of other districts; and lastly the making of *cream cheese*, mainly confined to the valleys of the west, and known as *York cream cheese*.

*The Yorkshire Butter* is usually made from dairies of from six to fifteen cows. In summer the milk, after straining, is placed in a large brass "kettle," or cooler, and often stirred, to dissipate the foam, and prevent the setting of the cream. In winter this process is unnecessary, and it is at once strained into leaden bowls, in which it is usually kept, a little hot water being added to the milk in winter, to evaporate the aroma of any roots the animals may have eaten, and in summer a little cold water is added, which is said to facilitate the separation of the cream. In winter it remains twenty-four hours in the bowls; in summer twelve, and even less, for the dairy-woman watches the milk with the assiduity of a hay-maker in a showery hay-time, and on the least advance of heat, or tendency to thunder, she separates the milk from the cream. The bowl contains a plug in the bottom. This is taken out, and the milk runs off, and is taken away; the plug being returned to arrest the flow of the cream. The cream is then also let off into an earthen vessel, or pancheon, and the leaden bowl being nicely scraped with a thin piece of horn, is carefully washed and scalded, and is ready, when cool, for the next meal of milk. The cream is kept in these earthen jars or vessels, and stirred frequently; and in winter placed before the fire all night, to acquire the fermentation necessary to an easy and rapid churning. If the cattle have had turnips, a little saltpetre is added to the cream; and if there is no recently calved cow amongst the dairy herd, a little rolled annatto, or, what is better, an infusion of grated carrots is added, to give the butter the color requisite for the taste of the markets. The cream is then strained again into a clean, and well-scalded churn, which is turned gently at first, and frequently vented, to allow the escape of the air accumulated by the churning. When this escape ceases, it is turned briskly round, and if all is

right will be churned in twenty minutes. If the process is slow in winter, a little hot water is added, the sign of the formation of butter being the watery sound in the churn, and a semi-curdled appearance on the vent cork. As soon as the butter is forming, the churn is turned much more carefully round, and the butter begins to collect. As this goes on, a little of the buttermilk is let off, and the butter, when finally collected and freed from all the remaining buttermilk, is placed with cold water into the butter trough, washed and kneaded several times in fresh supplies of cold spring water. It is then salted, and either worked into rolls, which usually consist of some twenty-four ounces, or rolled up into lumps of fourteen pounds, called "store butter." In other cases it is put away in wooden casks, called firkins, usually a mode in which it is preserved till the winter, and made up into pounds then by being washed in milk and resalted; in this state it is sold to their customers by the huxters, who think a little rancidity is not too great a penalty to pay for escaping the taste of turnips, so common in winter-made butter.

#### BLUE MILK CHEESE.

This cheese is made in the great butter dairies, and is a sort of accompaniment to the combined dairy system of Yorkshire. The milk, while sweet—one reason why the dairywoman must be stirring in summer by three or four o'clock in the morning, or even earlier—is placed in a kettle, the rennet is added, with the coloring, which consists of annatto, and the whole mass heated to something like blood-heat; the hand being the general test of its extent, and perhaps 90° being the nearest approximation to it that we can arrive at. When the curd is formed, it is laved out with a dish into the butter-trough, and the whey allowed to drip from it through a hole in the bottom. When all the whey has escaped, it is either broken very small by the hand, or placed in a curd-mill; for, having little of the butyraceous matter present in whole or new milk cheeses, there is less fear of manipulating the skim-milk curd than there is in the cases of Dunlop and Stilton. A cloth is then spread over a vat, and it is put in a press, turned every night and morning till the whole of the whey is expressed; the cloth being changed every turning. It is then put away to dry and ripen, and was once a favorite substance for a morning or evening meal, for the farm-servants, with bread and milk. They now, however, dislike and despise it, and have oftener animal food three times per day than anything else. It is used with bread and ale, for their "drinkings" in harvest.

#### THE YORK CREAM CHEESES

Are not, as the name would purport them to be, made at York; but are mainly made in the poorer valleys at the western extremity of the county. The village of Gruelthorpe has the envied notoriety of making the best

cream cheese,—a great trade with London, and all parts of the kingdom being carried on by the inhabitants of this locality. The process is simple, and depends, like almost all other dairy practices, on the most scrupulous regard to cleanliness, and freedom from the taint of all kinds of putrefaction. There are two kinds of cream cheeses—one which is made by simply placing the cream in an oblong tin case, perforated with holes, from which the milk and watery portions of the cream leave the thick cream, and to which a little hand-pressure is applied. But the genuine cream cheese is made of the cream coagulated by the steep of the rennet in the following manner:—Five quarts of the strippings (the last milk given by the cow) are put in a pan, with two spoonfuls of rennet. The curd, when formed by gentle heat, is broken down two or three times with a dish. It is then allowed to stand on a sieve, covered with a clean napkin, for some two hours, when a little pressure is applied by the hand, or by a fluted piece of wood,—and it is ready for use in three weeks.

#### THE WILTSHIRE DAIRY SYSTEM.

This will close our description of the English modes of dairy management; and would not have been introduced, for even this cursory notice, had it not been the district which supplies the celebrated *Cheddar cheese*; for, although the Cheddar valley is really in an adjoining county, yet the greatest part of the cheese known by that name, sold in London, is made in Wiltshire. These conical-shaped cheeses very slightly differ from the Dunlop in their actual make. The smallness of their size enables the dairyman to make a cheese for every meal; and also prevents the necessity for so much pressure as is used in some other kinds, by which a great quantity of the butter is crushed out. The only severe manipulation is the breaking of the curd, which is performed in a very minute degree; this enables the dairyman to allow a great portion of the whey to drain off, with no other compression than is given by its own weight, the curd being disposed in a conical form in which position it remains some twenty-four hours. It is then suspended in an open coarse cloth, or even net, to admit air freely, and is so small in dimensions, and especially in diameter, that the whey is dried up by evaporation, before it becomes rancid or spoils the cheese. The freshness of the milk has also a favorable tendency in this particular. The salt is added to the curd.

#### FOREIGN DAIRY MANAGEMENT.

Climate, as well as breeds of cattle and kinds of pasturage, have influence on the production of cheese, as well as butter; and though few countries can vie with our own in the excellency of its general dairy productions, still in some particulars, foreigners are our superiors. Take, as an instance



## THE DAIRY SYSTEM OF ITALY,

Especially in the manufacture of *Parmesan cheese*;—which, though partly skim-milk cheese, is almost equal to some of our very best home productions from milk; it is also in great demand by the epicures of our large cities. From the great size of the cheese, containing sometimes as much as two hundred weight, they often require eighty or ninety cows in a dairy to make them to perfection. One-half of the milk is kept twelve hours, and then skimmed; the other half, six hours, and also skimmed; they are then put together in a pan, and heated to a greater heat than English skim-milk cheese, sometimes as high as 120° Fahrenheit. After it has a little cooled, the rennet is added, and the curd being formed, the mass is again heated to a still greater heat (140°), taking care to stir the mass rapidly during the heating. This breaks the curd into small pieces, and saves the curd-mill, to which it is said so much of the toughness of the English skim-milk cheese is due. The whey is run off, and the curd colored slightly with saffron. The mass has then cold water added to cause it to coagulate and set, it is then collected from the whey with a cloth, and placed in a fixed press. The next day the cheese, for so it must now be called, is taken out and rubbed on one side with salt, and again subjected to pressure. This rubbing with salt is repeated on the other side, when it is again turned, continuing the process of turning and salting, with the pressure, for forty days. For preservation, the surface of the cheese is rubbed with linseed oil, and a red ochery coat is given to one side; when the cheese is fit for sale, this favorite production fetches a large price.

*Mascarponi cheese* is also an Italian production, and somewhat resembles our cream cheeses, but made rather after the Devonshire mode than the Yorkshire. The cream is heated nearly up to the boiling point; and, when the butyraceous matter begins to separate, a little sour whey is added to the mass, which forms a sort of curd; this is taken out and placed in moulds,—having perforated bottoms, through which the whey escapes,—to take such shapes as fancy or custom may dictate; and when come to a proper consistence, they are deposited in napkins, covered with straw or leaves, and pressed gently with the hand. Sometimes tartaric acid is used instead of the fermented whey, as the latter, occasionally containing particles of putrid casein, is apt to give a rancid taste to the cheese, and diminish its keeping qualities. The kind of acid is not material.

## THE DAIRY SYSTEM OF SWITZERLAND.

The Swiss butter has the remarkable peculiarity of keeping for ten or eleven months perfectly sweet, without any admixture of salt. Some attribute this to extra diligence and care on the part of the dairy people, in expressing the buttermilk, and to the peculiar mode of preservation adopted.

but in all probability it is due to the cool and highly rarified air of the mountain districts, which are the most favorable for its preservation. The butter is made every day, so that no decomposing putrescence takes place in the cream; when made, it is washed with the greatest care, and a great deal of kneading and compression in the pure spring water of the district takes place. It is then deposited in the following extraordinary manner. A narrow board is fixed across the dairy, like a kind of shelf, but in the part where it is most exposed to a free current of air; to the surface of this are attached a row of wooden spikes, some two or three feet long. As the butter is made, it is plastered to the top of one of these spikes; and so the deposit of butter continues to accumulate every day till the whole is covered, and each deposit of butter is dried and preserved as it is placed on the pin, but more upwards than downwards, until it forms a sort of inverted cone; the top overhanging the base to permit the more facile dripping of the moisture. In a short time a hard air-tight covering envelops the mass, and renders it so impervious to air that it will be found perfectly fresh for several months.

The *boiled butter* is another mode of preserving the produce of the Swiss mountain sides, and is thus manufactured:—A quantity of thirty or forty pounds of butter is placed in a large copper, over a very slow fire, until the whole is gently melted. This slow fire is continued until the whole comes to a boiling point, generally in about two hours, careful stirring at intervals taking place during the whole period. The boiling must be gradually and gently kept up for the same period as it took to arrive at the boiling point, and still continuing the stirring. After this it is allowed to cool slowly down, which may occupy about two hours more. The deposited mass of caseous matter, coagulated by the heat, then takes place; and the butter, while just so warm as to pour, is carefully taken off the cheesy mass, and corked up in air-tight jars, when it may be kept sweet, though of course without the flavor of fresh butter, for any number of years.

#### THE HOLSTEIN DAIRY SYSTEM,

Is one which turns out very celebrated butter, and this is only due to the simple fact that, being itself so important a production as to be worthy of attention as a manufacture, all its details are managed with attention and skill, and consequently well done; this can never be the case when it is combined with the perplexities of arable farming. The dairies in Holstein vary from 100 to 1000 cows, and the establishment consists of a distinct suite of dairy apartments. In some of the best dairies the milk-dishes are placed in a raised brick ledge, forming a sort of open drain, and in hot weather cold spring water is pumped into them, so as to give artificial coolness to the milk in the pans. Sometimes even a large piece of ice is introduced into the dairy, and even into the churn, to lower the temperature when the heat is

excessive. Milking is performed earlier in the morning than common. Three o'clock, and even two, are hours at which they are occasionally stirring; and the milking takes place at four, and in general five in the afternoon. The milk is placed in vessels of wood, zinc, lead, glass, and sometimes of various materials lined with china or delf. Of course, when the ledges we before spoke of are in use, the glass or zinc vessels are used, as wood is too slow a conductor of heat to admit of the carrying out of the water-cooling process. The churning and attendance are the same as in every well-managed dairy; but the making of the butter is peculiar. It is never washed at all, which is said in Holstein to injure the butter. It is salted with some one and one-eighth pound of salt to fourteen pounds of butter, and subjected to a good deal of pressure, kneading, and beating, by being lifted up and thrown down again into the trough: it is then allowed to soak or drip for several hours, when it is again subjected to the same treatment. When a sufficient quantity of butter is made to fill one of the casks or firkins,—of which there are three sizes made, one containing about a hundredweight, another some one hundred and forty pounds, and the third two hundredweight,—it is re-kneaded and packed in a salt-seasoned cask; care being taken to make the cask perfectly air-tight. Skim-milk cheese is also made exactly in the mode in which it is made in England, only on a scale considerably greater.

This brief sketch comprises all that we need say on the leading dairy systems, and in the course of it the peculiar principles which ought to guide the dairyman in improving his system, have been pretty clearly developed. The large establishment of the dairy husbandman and the small product of the cottier require to be directed by the same great essential principles of dairy management; watchful attention to the health and comfort of the animals, and careful milking, perfect cleanliness in the dairy itself, and careful watching of the proper time and weather for the various operations.

## COTTAGE AND SUBURBAN DAIRIES.

Although an attempt has been made in the progress of this treatise, to describe, step by step, the details of dairy management and cattle keeping, and to elucidate the best principles of management, yet it may be considered desirable to afford to the cottager and the amateur, who may have a limited area of land, the means of making the most of their resources. The latter has usually two or three acres of grass, the former somewhat less of arable land, and there are modes of management which will enable them both, with proper care and labor spent upon it, to produce double the quantity as compared to ordinarily farmed land.

The *capabilities of arable land* for growing green crops are almost unlimited; and it is scarcely possible to over-rate the productiveness of a small area of land, when carefully and liberally farmed.

The *quantity* of arable land necessary to the keep of a cow all the year

round, will necessarily depend upon its *quality*; but if useful land, and once in heart, it may be taken at one and a half acres. If not in condition, it will require deep trenching; if light land, claying and well manuring; but once in good fertile condition it may be readily kept so, only requiring a very small amount of extraneous food to be given to the cattle. The cropping that should be adopted to attain the largest amount of food is, first to sow the land with rye, clover, winter tares, and Italian ryegrass. In favorable localities the rye will be fit to cut in February. It is supposed that all the crops are to be soiled, that is, consumed in the stall; as soon as the rye is off, the land must be dugged and planted with potatoes, cabbages being inserted between the rows, and beans planted between the potatoes. The Italian ryegrass is next soiled, and after each cutting the land must be well saturated with liquid manure brought from the cow-house. When this is once cut down the winter tares may be eaten off, and the land dug for turnips, Swedes for the spring, and white Norfolk for the winter, or if near the sea, mangel wurzel will be the most advisable crop. The clover and Italian ryegrass will then alternate with each other, taking care that the latter is always dressed with liquid manure, for it has not the same effect on the clover. The bean straw may be chopped and the beans crushed, and thus a great amount of green food, both large in quantity and valuable in quality, will be afforded all the year round.\*

Where the amateur has *grass land* only, it will be necessary to set apart a portion for meadow, and the rest for soiling. The latter should have a dressing prepared of wood scrapings, clay, and decayed vegetable matter, applied in February, with a pretty liberal hand, the whole of this compost being well saturated, under cover, with liquid manure. In addition, there should be applied two hundred-weight of guano per acre, and either along with it, or soon after, there should be brushed in, half a peck per acre of Italian ryegrass seed. When ready for cutting, this should be mixed with hay, a mixture of boiled ground linseed, and bean or barley meal poured upon it, in the proportion of one pound of the former and two pounds of the latter to the gallon; the grass, after every cutting to be dressed with the liquid manure. Three, and in favorable years four, cuttings may be easily made. When the hay has been mown and made in the lap-cock fashion, the land should have a dressing of liquid manure, and the fog soiled the same as the grass. When the season is unfavorable or the grass deficient, the linseed compound may be resorted to. In winter, cut hay, given with linseed compound, varied by occasional meals of brewers' grains, will be found invaluable substitutes. Green food may then be given from March till November, and hay for the rest of the period mixed with linseed compound, in which case roots so difficult to obtain by the suburban amateur may be dispensed with altogether.

\* Of course in America a different system must be pursued. The green crop should be Indian corn. Clover for summer and roots with hay for winter.—AM. ED.

The *cow-house* should be as airy as possible, and if with weather boarding facing the south and west, so much the better. The floor may be boarded or flagged, with a slope from the head of the animal to the tail, a channel behind, and a drain into a tank, of the capacity of one hundred gallons per cow, well coated inside with Roman cement. The whole should be kept white-washed and perfectly clean, and free from all disagreeable smells. Where the floor is boarded, the litter, so often difficult to obtain, may be dispensed with; but if the floor is flagged with stone, or indeed, in any case, it is desirable to litter her with an ample supply of *saw-dust*. The fragrant freshness of the wood, the soft bed it makes, the absorbant character of the material, and above all, the facility it affords as a vehicle for conveying away the solid manure, render it exceedingly valuable as a litter for cows. Moreover, it is as easily obtained as it is almost invariably overlooked. The cows should be regularly fed and well curried, and, if possible, turned out daily in fine weather, for two hours per day, for open-air exercise. The cottager, at the expense of very little labor and ingenuity, may construct for himself a very excellent cow house at little cost.

The *dairy* should be quite apart from the house, and, how small soever its dimensions, should be strictly kept for dairy purposes. No cooking, nor decayed meat, nor any offensive processes should be allowed within its precincts, but only such as are connected with the management of the milk. It should face the north, and admit of free ventilation. It ought to be a little sunk in the ground, with a sloping floor, and have a pipe carried into it in connection with the pump, and also a drain running out. In hot weather the water from the pump should be allowed to trickle on the floor; at any rate, daily washing should be scrupulously attended to. *Glass milk-pans* are neat and elegant vehicles for holding the milk, are easily removed, and any want of cleanliness in them is readily detected. The amateur should also have a pipe from the boiler of the kitchen fire, into which, at pleasure, he can allow the hot water to flow. This pipe should be carried under the table on which the milk-pans are placed, and in very severe frosts of winter it will be useful in keeping up the requisite temperature.

The *dairy operations* of the small cow-keeper, whether for livelihood or pleasure, are necessarily on a small scale, and do not admit of many appliances. Attention to cleanliness is, above all things, requisite. The main points are the thorough *scalding* of the milk-pans, the pails, and the whole of the dairy utensils. The proper cooling and stirring of the milk in summer, when first brought into the dairy, until the whole of the foam generated in milking is subsided; the careful straining of the milk through a gauze or wire seive, and the creaming of the milk before it is allowed to turn sour in the slightest degree. The cream, when collected, must be frequently stirred, especially in summer, and in winter, warmed before the fire all night previous to the operation of *churning*. This, for small cow-keepers, may be

performed either with the ordinary stand-churn, or with the American *churn*, now common in most parts of the country, and which is very suitable for churning small quantities of butter.

It is needless to recapitulate the directions as to the *management of cream and butter*, because there is no difference between the mode of regulation required for a dairy with one cow or with twenty. Care, attention, early rising, good ventilation, and cleanliness, even to fastidiousness, are the cardinal virtues of dairy management.

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## CHAPTER VI.

### FEEDING OF DAIRY COWS AND REARING OF CALVES.

THE main points in the controversy as to whether dairy cows should be house-fed on cut grass in summer, or pasture-fed, has been partly anticipated by the previous remarks. It is an unsettled point, because the advocates of each system are unwilling to give in to the other, and the truth is that each system has its peculiar advantages in peculiar situations. The element of cost of land and labor, of nearness to and distance from a large town, of the nature of the grass or herbage, of the conveniences of the occupier, and fifty other considerations, will make the scale of profit preponderate one way or the other. In large towns, for instance, where land is dear and at a distance from the dairy, it is found to be more economical to cart the materials of food to the cattle. For small cottiers also, for instance, when they have but a small quantity of land, and this perhaps dear, and their labor of little value, soiling or summer feeding in the house will be abundantly preferable. But in the majority of strictly dairy farms, where there is a large range of poor pasture, the grass of which would hardly repay the cost of cutting and carting, there can be no question whatever that there must be a complete revolution in the nature of the occupation, and of the character of the soil itself, before any change can ever be expected to take place.

It is a very important question, however, whether the *two systems* may not be *combined* with profit. We mean, that, instead of allotting an acre or an acre and a half of land to a milking cow, that two-thirds of that quantity should be provided, and here she should roam at liberty, with plenty of running water if possible, and either large shady trees or an ample shed for shelter, while, at each milking time, she is to be supplied with a bundle of tares or clover, of saintfoin or lucerne; under this treatment she will be found amply to repay the trouble. The principal danger of house-feeding solely would be obviated. This danger is that either too much food is given to the cow, and so nausea and waste are occasioned, or the cow does not get it in

that clean sweet condition which might be wished, while she is also deficient in air and exercise; but, with the treatment we have recommended—with a foddering of green food, fresh mown, with her roam in the pasture, she has all the advantages of hand-feeding without any of its objections. She can eke out her meal in her pasture; she has it clean, and has also plenty of air and exercise; while she can consult her own will as to the amount of rest or shelter she takes, in hot or rainy weather.

So much for summer management; in winter it is quite another matter. Some are pinched and starved, have the cold straw-fold in winter, and are exposed to every blast of heaven; some have more or less hay or turnips, while others are watched and tended with the most assiduous care. The first is the most costly system. It is the dearest way of all to starve the cows, and a moderate degree of attention and care is necessary to the most economical produce of the milk cow, whether it be in milk or butter. When the pastures begin to fail, it is usual to turn the cow upon the fog or aftermath, say in the month of October,—for nearly all cowkeepers have of necessity a quantity of grass-land producing hay, and the after eatage of this land affords the best possible food for the milk cow, whether butter or cheese be the object sought by the dairyman. When this somewhat fails, a little hand-feeding—a few turnip tops, or rape, or even a little bran mash, will be well bestowed; for if the milk goes down at this period it is never regained in winter by any care which can be exercised. If town milk is the object, a few brewers' grains would be the most valuable addition to the eatage which could be made. If the weather should still be open and favorable, the pasture, freed in October, will have grown up a little, and will afford a very useful turn out for the cow, for she must usually be housed at night, when the fog is finished. In the house she should either have hay and mangel wurzel or turnips; or if she has straw, should have cooked linseed, or oat, or bean meal mash. The mode of cooking linseed we shall refer to amply in the chapter on cattle feeding, but for small farmers without apparatus, a very cheap and extempore mode may be pursued without difficulty. The chaff of the barn, after winnowing, may be collected, as free from dust as possible, or, if mixed with it, may be sifted and laid by. A bushel of linseed may be added to two bushels of barley or oats, or even wheat, or any other grain, grown in the ordinary way. This may be boiled in an ordinary boiler, taking care to keep it well stirred to prevent its "setting on" at the bottom of the boiler. After boiling a quarter of an hour, if this be poured upon the chaff in the proportion of one and a-half to two pounds of the meal, and one gallon of water to one bushel of chaff, one of the most useful, and certainly the cheapest adjunct to milk cow and store stock feeding, will be adopted which can be conceived. A great objection to turnips, in large quantities at least, is the flavor they give to the milk and the butter; and this is a difficulty which only can be partially got over. It

is surprising, however, how few turnips or roots will be required if the compound system be adopted, and this quantity being so small, it is easy to vary them, giving potatoes, carrots, mangel wurzel, &c., in an ever changing round.

It is a question whether hay need ever be given, if the compound system be adopted. If it be not, the cows must have a liberal allowance of hay. In Norfolk, oats, barley, or bean-meal, is mixed with chopped hay. It is questionable, however, whether the cow has not more gratification, and hence more advantage, from selecting and masticating the hay alone, than can be derived from the cutting and mixture which, at least, is a costly and laborious process. A small quantity and a great variety of food, will, on the whole, produce the most favorable effect on milk cows.

*Cleanliness* is one of the greatest of all the requisites in a successful dairy cow-house. They must be kept free from smells of all kinds, and if they are not turned out, the house should be frequently washed, whitewashed, and the animals diligently rubbed, and even curried. A thriving cow out of doors is known by her having the marks of her tongue upon her skin. If she is not at liberty to lick her own skin she should at least have it done for her. Her litter should be taken away the first thing in the morning, and fresh clean straw given in its place. But, above all, she cannot have too much air, if the cold blast be just shielded off. Bad as exposure is, the crowding of cows in close places is ten times worse. There should be free currents of air. Ventilators at the top of the cow-house in the louver style, open fronts to the south, capable of shutting up in case of snow or southern rain, and capacious ventilators at the bottom by grates or ventilating bricks, are indispensable to the health of the cows. If these be neglected there can be no hope of health in the cows or success in the dairy.

The *influence of food* on the quantity and character of the milk, is a question on which there has been a great deal of speculation. A very scientific agriculturist, Mr. H. Briggs of Overton, furnished the writer with an experiment showing that the increase of milk, within certain limits, was almost in the power of the farmer, by an addition of bean meal to the ordinary root food and hay. And though, as a general rule, milk may be produced by these costly and stimulative kinds of food at too great an expense, yet it is a vast acquisition in a particular season, or under special circumstances, to know the means of increasing the supply of milk beyond the ordinary quantity.

The researches of the Professors Thompson are well known. They selected two Ayrshire cows, and fed them with malt in various combinations. They found that 100 lbs. of barley, hay, and grass, produced 8.17 lbs of milk, and that the same quantity of malt and hay produced 7.95 of milk; the former yielding 1.95 lbs. of butter, and the latter 1.92. Now, though this was not at all satisfactory as to the value or otherwise of malt for milk



cows, a proposition never perhaps before seriously entertained, still it shows how food may influence the quantity and quality of the milk, for both the experiments calculate the milk and food as such, *i. e.* destitute of the water they naturally contain.

Messrs. Dumas and Boussingault tried a number of very careful and interesting experiments on the quantity of milk and its products which would be given by cows fed on different kinds of food. They tried nearly all the combinations usually given, except perhaps bean meal, and the result was that the greatest quantity of milk was given when the cow had green clover in every case, *i. e.*, that in each instance this yielded the greatest quantity of butter, and, with one exception, the greatest produce also of cheese; and that exception was when the cow had been but one day calved, which would account for the abundance of cheesy matter in the milk. The table is so instructive, that we will quote one or two of the items:—

Food.	Days after calving.	Milk.	Butter.	Cheese.
Potatoes and hay, . . .	176 ..	9.3 ..	4.8 ..	3.3
Hay and green clover, . . .	182 ..	8.9 ..	4.5 ..	4.0
Green clover, . . .	193 ..	9.8 ..	2.2 ..	4.0
Clover in flower, . . .	204 ..	7.8 ..	3.5 ..	3.7
Potatoes, . . .	229 ..	5.0 ..	4.0 ..	3.4
Turnips, . . .	207 ..	6.0 ..	4.2 ..	3.0
Red beet, . . .	215 ..	5.6 ..	4.0 ..	3.4

Into their philosophical investigations and reasonings we shall not enter Mangel wurzel, bean meal, and grains, much increase the milk. Good hay and oat mash much increase the butter, and turnips, though they give a disagreeable flavor, greatly increase both.

To keep the cow as *long as possible in milk* is sometimes an object. Some cows dry early,—some may be milked through, though always with disadvantage to both the cow and her calf; both being feeble and impaired, if it is persisted in. In summer weather, however, when cows are very deep milkers, and in high condition, it is not only sometimes advisable but absolutely necessary. A cow not put to the bull will hold to her milk much longer than one which is regularly breeding.

The *spaying* of milk cows is adopted by the veterinary schools of France, and a great deal is said in its favor by the Academy of Rheims and other authorities. A report on the subject was furnished to that authority by M. P. Charlier, which spoke almost exclusively in its favor. The practice is an old one in Germany and England, supposed for the purpose of increasing the feeding propensities of the animals, but by no means for the purpose to which we refer, and which mainly occupies the attention of the French veterinary school, *viz.*, the prolonging of the period of lactation. The report, which is very voluminous, states a variety of experiments made on cows, old and young—some as far advanced as eighteen years in age; but, in order

to realize all the promised advantages, the cow is said to be best from four to eight years of age. The operation is performed on the right side, and does not altogether occupy more than four to ten minutes. It is seldom fatal, unless the cow is in calf, and in some instances the cows are said to go and feed as usual, even after the operation. The conclusions from the report, endorsed by the reward of the society's medal, were—that it increases the supply of milk from the animal after a few days—that there is a steady return of milk of the best quality—less liability to fall off milk, and no troublesome tendency to desire the bull—that in eighteen months the milk does not diminish—that the feeding tendencies of the cow are much increased, and the quality of the beef is improved, nay, it is further said, in one dairy (the number of cows is not given) a difference between spayed and unspayed cows in milk was 850 pints per annum; no great quantity if it were a considerable dairy, and where possibly the best cows were spayed. There is, we must confess, a barbarity about this practice, needless, as we believe, which makes our kinder feelings revolt at the operation, performed for so small advantage after all, over the gentle, patient, harmless milk cow.

#### REARING OF CALVES.

This is a process more or less belonging to every dairy-farm. Though every cow does not annually produce a calf, still heifers are usually put to the bull at two years old, and the period of gestation varies from 275 to 290 days, so that the old fashioned mode of reckoning three months back in the almanac, is by no means a difficult way of ascertaining the date at which a cow put to the bull may be expected to calve. She is nearly three years old before she produces her first calf. Too often no pains nor skill is used in selecting a male animal. A neighbor has a bull, and that is enough. A farmer may have no opinion of the neighbor's skill or judgment. He asks nothing about the breed or the blood. He may see him, or he may not. It is no wonder that such brutes of animals are produced. Encouragement is given to a careless indolent selection of male animals, and bad breeds of cattle are extended and perpetuated.

Five or six weeks after calving, the cow will again be disposed to take the bull; but it does not happen that she always holds, and, if the month of June passes before she is bulled, she calves at a period of far less value to the breeder. In some cases a tithe only of the dairyman's cows are in calf. He loses both produce and milk; for, whether in calf or excitement every twenty-one days, it produces a most unfavorable influence on the milk of the cow and that of her companions. There are a variety of remedies suggested for this sad defect. Bleeding, confinement, and abstinence, at the period of bulling, and omitting to carry the animal to the bull for one return of the affection, are amongst the most likely resources of the breeder. Some adopt

the plan of throwing a pailful of cold water over the loins after the cow has been served, which it is alleged, gives contractability and tone to the system. It can do no harm; sometimes a change of bull is advantageous; it is also desirable to send them in the morning before milking.

But sometimes the reverse is the case. The cow *refuses to come in season*. For this a variety of panaceas are proposed, the most reasonable of which is the giving the animal a quart of the milk of a cow in season. At the three weeks' end after this it is alleged she will take the bull, and a second return will be a fruitful conception. We state it as an axiom of old dairymen,—it deserves record as an opinion, for we never saw it in print, and so we leave it.

To bring up a calf for the butcher is the easiest thing possible. They have only to suck the mother for the requisite number of weeks, till they are of size and fatness required by the taste of the consumer, or the judgment of the buyer. But to rear calves for store purposes is a different matter. Breeding farmers have to bring up perhaps eight or ten calves, with only four cows. They buy them in the market, they must necessarily grow them on artificial food, and it is their business to produce them in a favorable state for growth and maturity, on such substitutes for milk as shall be the least expensive and most efficient. Their own calves are easier brought up.

The materials usually employed are new milk, skimmed milk, meal-porridge, linseed-tea, and, for solid food, hay, grass, turnips, meal, potatoes, mangel wurzel, &c. &c. Some breeders, whose object is the calf, and the calf alone, sacrifice every other consideration to it. The breeders of short-horns, whose early maturity require a corresponding early supply of nutritious food, generally apply nature's own provision, and allow the calves to suck either their mother or some other dam, or in some cases more than one, in order that they may develop their precocious and distinctive qualities; and they often continue this for several months—as many as six to twelve. Haidlen gives the ash of milk in 1000 lbs.—phosphates, 4.55; chloride of potassium, 1.83; chloride of sodium, 0.34; and free soda, 0.45. We have no analysis of the nitrogen in milk; but Schlossbuger determined the nitrogen in cheese to be as much as upwards of 7 per cent. in some specimens; and hence we may infer it is an important element in the milk.

This is, however, an expensive mode of feeding for those who rear only ordinary cattle for the market; and some are so “stingy,” that as soon as the cow ceases to give “beastings,” they begin to give the calves skimmed milk. A process of this kind does irreparable injury to the young animal.

The best mode, in ordinary calves, is to give new milk for at least fourteen days after the calving. There are two modes of doing this: either allowing them to suck the dam, or removing them as soon as calved, and training them to drink in the first instance. For ourselves, we think the taking away the calf both cruel and unnatural. The healthiness of the mo-

ther, we consider, depends upon it. After calving, it is only necessary to see the anxiety and care for her offspring, which makes her forget all her pain, and diverts her attention from her sufferings; whereas, if you subject her to the gloomy excitement of losing it, it is no wonder that milk fever and inflammation so often supervene. We invariably allow the presence of the calf for at least a fortnight. We allow the mother to lick over the whole of her offspring; and we think that a privation of this medicine of nature is a cause of many a valuable animal being lost. After the first fourteen days, we mix one half new and one half skimmed milk for fourteen days more; this skimmed milk is scalded nearly to the boiling point, set aside to cool, and given to the animal. One great secret in the successful rearing of calves is to give them frequently small quantities of food at a time. For the first fortnight, it ought to be fed, at the very least, four times per day; and about a quart at a time will be necessary, to be increased afterwards as the animal's wants may require it. Soon after this the skim-milk time commences, when the animal, if properly trained, will begin to eat the solid food.

*Teaching them to eat* is a less difficult matter than that of training them to drink. Nature presents to them, first a sucking and then a drinking process; and, in general, in training them to drink it is necessary to use the finger, and introduce this into the mouth, plunging the whole into the milk, the calf sucks the finger, and thus imbibes the milk. By and by the finger is withdrawn, and the calf drinks alone and unassisted. The eating process is somewhat differently taught. A piece of fine hay is tied together with a string, and suspended in the calf-crib; the calf begins to suck this bunch of hay, and part of it coming out from the string, the calf is gradually taught to eat.

Some parties tie up the calves by the neck in stalls and other places; others keep them loose in houses. We prefer the latter course. The exercise the animals take is beneficial to their health; and, on the whole, we much prefer this partial freedom.

The supply of milk, however, is on most farms limited. If the farm is not confined to dairying purposes, the milk cannot be spared; and, if new milk cheese is made, it is equally in request. Hence *substitutes for milk* have necessarily to be adopted. Hay-tea is one of the substitutes sometimes used for milk. We think it is generally a poor one. If it has been made from hay grown on very rich alluvial soils, so much the better; but there is every probability that the bitter extract may, with the color, deceive, and lead to the belief that it is more nutritious than it really is. Taking good meadow hay, and deducting 44 per cent. for woody fiber, the saline matter, which varies from 5 to 10 per cent., most of it being held by the organization of the plant, leaves about 50 per cent. of starch, sugar, gum, gluten, albumen, legumin, and fatty matter remaining in the tea. Many persons make a point of boiling the hay; but we are not certain that there are any

great advantages in the practice. Mr. Parkinson's plan is about the best we are acquainted with. His tea is made by placing in a tub a quantity of good hay,—such as has a sweat in the stack, is of a brownish color, and feels clammy like tobacco,—pouring boiling water upon it, and covering it up to keep in the steam. This decoction ought to be prepared twelve hours before using it; when the milk, being boiled, should be added till the mixture is reduced to a proper heat.

We believe that food for calves may be prepared of a much more nutritious nature, and much more likely to be of advantage to the producers; some of these, on which we have successfully reared calves for several years, we shall place before the reader:—

1. *Wheatmeal Porridge*.—This is made in the following manner: Boil two gallons of water, and mix a pint of fine flower with cold water, sufficient to make it into the consistency of a thick cream. This should be thoroughly mixed, and put into a bowl capable of holding half a gallon; a small quantity of the hot water is added to the mixture, and stirred so as gradually to raise the temperature of the flower and water in the bowl, and prevent it from running into lumps. This is plunged into boiling water, and stirred until the whole boils again. This coagulates the mass, and forms a thick nutritious porridge. It is a great improvement to the mixture if one-sixth part of old skimmed milk is mixed with it; which not only gets scalded itself, but very materially improves it. Two gallons of the mixture per day will be found sufficient.

2. *Linseed Jelly*, combined with the milk, is a very valuable auxiliary. We ourselves have scarcely tried the seed by itself sufficiently to be able to give a very decided opinion upon it; and we much prefer the pressed seed, in the shape of cake, crushed to a powder; and, for this reason, if we wanted to lay on the fat, we should give them the crushed seed, because its fatty matter would, when cooked, be easily assimilated into animal fat; but when bone and muscle are to be formed, every pound of fattening matter in the food displaces other substances calculated to build up the animal structure; for this reason we most approve of the jelly produced by the crushed cake. The proportions of the crushed cake to the water should be as follows:—to two gallons of water take two pounds of oil-cake bruised or crushed nearly to a powder, sprinkle it in the water, stir, and allow it to boil ten minutes. Cool with skim-milk, if convenient. A rich jelly-like mass, of the most nourishing kind, is produced, which should be given in a lukewarm state.

3. *Broth Porridge*.—This is a somewhat unnatural mixture; but it is often used very successfully, combined with other mixtures, for feeding calves. The water in which bacon has been boiled is carefully preserved, and diluted with perhaps one-half of its quantity in water. It may be expected that a substance like bacon, from which nitrogenized and phosphoric matter may be expected to be dissolved by the action of boiling, will be of use; but, to

make it alimentary, it is necessary to mix it with a considerable proportion of milk. However unnatural this mixture may appear; how contrary soever to all theories of natural history it may be to give carnivorous matter to herbivorous animals, we may find in it an analogy by no means unimportant, in the disposition evinced by mature animals of this description to select and chew, for hours together, a piece of bone, which they will search for with instinctive pertinacity, and relinquish with reluctance. Is it not because she finds in it the nitrogen or the phosphates denied her in the food upon which she is confined? And if this be so—if she is guided by her instinct to select and choose animal matter, why may not a decoction of animal substance be useful to the calves, in their younger stages, as an auxiliary, and, to a certain extent, a substitute for the beverage which nature has given them, but which man denies them.

*Solid food* for calves will soon, however, displace much of the liquid. At five or six weeks old they ought to be trained to eat sliced roots. To do this it is only necessary to supply them in convenient forms in a trough within their reach. Their moments of leisure will be employed in playing with and sucking these pieces, until they begin to masticate them. The roots should, for this purpose, be cut into oblong pieces, one inch broad, half an inch deep, and two inches long—these shapes are better than either slices or squares, being more adapted to their conformation, and better calculated to make them learn to eat of their own accord. Calves should be reared from the months of September to March. We do not approve of late-bred calves; if they are reared late, they become tender and require nursing the following winter. In the months we have named, however, turnips are always plentiful; or, if mangel-wurzel is cultivated, it will be found a very successful substitute; although we prefer Swedes. These appear not only to agree with the palate of the animal and to make it thrive, but they exercise a very beneficial influence on its subsequent development. Is it because they contain a large share of the phosphates? Sprengel makes the relative proportions of the phosphates in the Swede to be nearly six times as great as in the common turnips, and sulphate ten times.

	Phos. acid.	Sulph. acid.	
Common turnips	. 73	.. 41	} per 1000 lbs.
Swedes	. 408	.. 890	

Other auxiliaries are sometimes adopted, such as bean-meal, pea-meal, oat-meal, cattle sago, and Indian meal; all these being very material aids in rearing calves. It not unfrequently happens, however, that some peculiar root or grain may be purchased at a much cheaper rate than any product of the farm can be grown.

The *degree of confinement* to which a young and growing animal ought to be subjected, is an important question. For a Highland Kyloe, to be much confined, would be to give him disease. But a short-horn will bear confine-

ment, and thrive better with it than with excessive liberty. We do not approve of tying an animal constantly by the head when very young. It opposes natural, healthy exercise, and renders the animal unfit for the purposes of life. The writer, who has fattened animals at eighteen months and two years old, which are necessarily very much confined, has had young animals whose supple bone was not able to carry the heavy body, so that their legs have literally broken in getting them away to the slaughter-house. But perfect confinement in the case of calves is much worse. It prevents their growth and healthy development, and is the parent of many diseases.

Nor should *cleanliness* be neglected in the food, in the litter, and, above all, in the calf itself. If too hot food is given, the calf will be surfeited, and lose its health and hair; if too cold, it will be starved, and liable to disease; if sour, it will scour; and if strongly fermenting dung be allowed to accumulate where it is kept, it will, ten to one, become disordered in its bowels, a disease which, when once begun, will go through the whole pen of calves, unless the one attacked is at once removed. In this case whitewashing of the house and stall will be necessary daily, and plenty of fresh air should be afforded.

To avoid all the dangers, loose confinement in stalls, with the front fastened up, which enables them to walk about, without escaping, and allows them company, without actual contact, is by far the best. The open causeway before the stalls will afford them plenty of air and light, while their constant trampling will keep the manure beneath them from fermenting. They will then only require to be well littered; for it will too much expose them to be too frequently cleaned out in winter. They will have at all times a warm bed below, with plenty of air above, and the litter will be so consolidated, that it will never putrify so as to be either objectionable or inconvenient.

In feeding stock the worst of all policies is to stint the calf of food in its early stages. That calf may be said to be always fat, which never loses its first layer of fat; and as the difference is often a question in after-fattening, of some six months' keep, there can be no question that it is of the greatest importance to keep it well at first.

To give the calf food easy of digestion, and suited to its feeble stomach in early life—to allow it especially its mother's milk—the beestings—and the soothing influence of its mother's tongue—to wean it from new milk slowly and gradually and cautiously, and with a plentiful allowance of good sweet hay, are the real elements of success in calf breeding; and this, with proper attention to air, warmth, exercise, and cleanliness, are all that is required in the proper management of young calves.

## CHAPTER VII.

## CATTLE-FEEDING.

It might be supposed that in a pastoral country like this, when *fat* has ceased to be a luxury at the tables of the great, and has become a necessary of life to the mass of the population, that all the modes of fattening cattle would be so well known, that a tyro might be able to describe them. But they are only beginning to be investigated in their main element. Everybody knows that rich alluvial pasturage, that linseed cake and Swede turnips, that combinations of hay and bean-meal, and ground corn, with a dozen kinds of roots, will feed cattle sooner or later. But the question now is simply one of *economy*—*How can the largest number of pounds of beef be produced at the least possible cost?* This is the real question still unsettled, and on this we will proceed to show the present extent of our knowledge.

First, the grazier must select such animals as will lay on fat rapidly; and, by a physiological law, as we have seen, there are those which will soonest attain maturity so as to be fit for feeding. We stop not now to examine whether or not the two principles of taking on fat early as well as rapidly are necessarily connected—though it is very probable they are—and that a tendency to lay on fat will show itself at a very early period of the animal's history; though it may possibly be a mere result of the breeder's skill to obtain the two qualities combined.

Now, every good grazier knows an animal which will *thrive*, that being a simple matter of judgment. A skillful man will select out of a drove, five, or ten, or twenty animals, and nineteen of the twenty will be the best graziers for his particular farm. The eye guides him partially—the signs we have described in our chapter on the breeds of cattle also—but more than all, he is directed by the *touch*.

Having selected the animal, the mode of feeding him is to turn him out into a grass field skirting a river—if such be within the grazier's power—where alluvium of ages has been washed into the soil so deep that the roots of the herbage cannot find its bottom, and so firmly comminuted as to admit of the minutest filaments of the radicles of the plants to penetrate it with facility, so porous as to admit the air to enter, and the water to filter gently through, and containing its elements in a state of solution so delicate that they are ready for food to the plants which consume them; but last, though of greater importance than all, having the elements of vegetation in plentiful abundance. Now all men know that on such a soil, in five, six, or even in four months, a lean animal will become fat. He has all he requires, a little attention to see that he is *well* is all that is needed, from the time of his being placed in the pasture to being taken out to the butcher. There is nei-



ther labor, nor pains, nor expense incurred. He is worth five pounds more when he is taken out than when he was put in, and that is all the grazier knows or cares for. Now, we shall find out the requisites here for feeding, strictly laid down. There is plenty of fresh and highly nutritive food; there is scarcely any labor in searching for and obtaining it; with water, and shelter, and warmth; and also, plenty of air, and freedom from constraint.

Now, this is what the feeder must aim at in his winter-fed cattle. They cannot feed in the open air; the cold and wet would deprive him of the flesh as fast as the food laid it on. Here he must provide *shelter*. Now, one of the controversies of cattle feeding in winter is, which is the best mode of providing this. The Scotch farmer loudly contends for full and perfect liberty to the animal. If he is too warm he will sweat, and if too closely confined he will fret and murmur; and he declares that practice has decided that they should be fattened in open places; a sheltered shed they may have, but nothing beyond it. The midland counties man says this exposure is dreadful. It wastes their beef, and renders them subject to disease, and involves long feeding. Another class again insist on the tying up of the animals as injurious to their health; that a little exercise, but absolute confinement, are equally necessary; and that they should have shelter with freedom: these two classes are controverting the merits of box and stall feeding.

And both of them are right. Take a Highland Scot, consider his wild habits, his long stray of mountain and glen, his wide-spread pasture of peat and heather, from which he could in his native fastness smell afar off his friend or his enemy man! Tie him by the head and he becomes fretful or furious; he will pine, and fret, and worry himself; while in his gregarious state, with a herd of his fellows in open yards, or sheds, he will thrive. Nay, he has a nature which will lay on fat despite the cold and wet, as the rye among plants can assimilate food from the barrenest soil; so he has a natural shelter in his hair and constitution, for which the owner of more delicate and tender animals will not give him credit, forgetting that the Scotchman has a different animal to deal with in his shed-feeding from the short-horn.

The short-horn feeder, on the contrary, possesses a tame, quiet, gentle, lethargic animal, which shows that universal mark of good breeding in men and animals, he is always *quiet*. He will neither pine at never beholding the light, nor feel the want of exercise if he never leaves his stall, provided he has food and comfort in plenty. Nay, he will hardly take the exercise necessary to keep his limbs in healthy action. But keep him from the cold and wet, prevent the blast from passing over him; he likes protection, and thrives best in boxes.

Take a Devon, or, if you like, a Sussex ox. He is large and cumbrous; but he is active. Give him liberty, and he will roam and harass himself;

but he is tame enough to keep to his stall without pain or fretting. He requires a stall.

The *temperature* at which it is desirable to keep feeding animals, is a matter of more importance than might be inferred from the apparently small amount of investigation bestowed upon it. The question is, are we to run the risk of a wasting expenditure of food by perspiration under excessive heat,—or are we to induce them to waste it, to keep up animal heat, by exposure to too much cold? Nay, will not different classes of feeding animals be subject to different consequences, from the same degree of heat?—In the same cow-house there may be some too hot and others too cold, from their different constitutions. Oxen generally sweat at a temperature in which heifers thrive admirably; this happens at any rate till Christmas, after which they seem to be able to bear the same degree of heat as female animals.

H. S. Thompson, Esq., to whose indefatigable and well directed efforts we have before alluded, tied up two sets of feeding bullocks,—eight into a warmer shed than the rest. They had the same quantity and kind of food; but those in the warmer shed made more beef than those in the colder, showing that warm air, as well as warm food, were highly favorable to fattening short-horns; which breed, we believe, he invariably fattens. The temperature he aims at is about 55° to 60° of Fahrenheit; an increase of this, caused them to get off their food, and lose their tone and appetite.

*Stillness*, with the limitations given in our remarks on shelter, is necessary to successful feeding. This is well known to geese feeders, who even nail them to the boards; and it was shown very strikingly by Mr. Childers, M.P., in his experiments on shed-feeding, and by Lord Bathurst, on stall-feeding sheep. An animal in the very effort of searching and securing his food, expends the principle necessary to make fat; hence it is necessary that his turnips be brought to him instead of driving him to the turnips. They are cut and placed before him, that he may have as little effort as possible in the operation of chewing, and he has ample allowance of room, so that when he has fed, he may lie down and sleep.

It is a question whether animals feed fastest in the *dark* or not. There can be no doubt whatever that any thing which distracts their attention, which excites action, or which produces nervous irritation, is opposed to fattening; and, as darkness will induce sleep, inaction, and promote quietness, it is so far favorable; but it is not so easy to have darkness and sufficiency of fresh air at the same time, and therefore the best possible state, perhaps, is to have the feeding-houses rather in a state of shady gloom than in absolute darkness. A certain amount of nervous energy is necessary to give tone to the vital powers, and, beyond this, repose and quietness are easily attained by a simple gloom, while shelter from flies and heat in sum-

mer, and from blasts, wet, and extreme cold in winter, sheuld be carefully provided.

*Abundance of good food. and regularity of feeding,* are essentials in all kinds of fattening. Though it is not desirable to allow the animals to have food standing before them when they are filled, they should never, on the other hand, experience a single feeling of want. The usual hours of feeding should be strictly adhered to, for the two-fold purpose of inducing regular periods of sleep and for supplying the system with food at the first call of appetite.

*Variety of food* is a most essential element of rapid fattening; and it is not far from the truth to say that all kinds of food are *equally* fattening, if they are given in sufficient variety. If roots, grain and hay be changed every few days, the appetite is never cloyed; and the whole are devoured with a relish which develops fat in the most rapid manner.

The *formation of fat* is the work of the grazier. His animals are generally full grown, or nearly so, and, though there may be a small increase of muscle, still the bulk of the material of increased weight is *fat* and not *flesh*. In this country, food to be palatable—to be consumable—must be fat: unless it has this recommendation it is absolutely unsaleable. The appetites of the higher and the necessities of the lower class, urge on the demand for fatted beef, mutton and pork; and any brought to market in a state other than fat, is looked upon as carrion. Hence the grazier must supply the whole of his animals in a fat state to the consumer; and therefore it is not the number of animals, nor their weight he has to consider, but he has to provide for them the means of fattening before they can be brought to the consumer.

The saccharine matter of vegetables, and their starch, will supply the means of fuel-food; the fatty matter will produce ready-formed fat to deposit; and the albuminous matter will afford the flesh which waste is continually throwing into the excretory system, and for the small additions which may be necessary to the muscles, to carry the requisite amount of fat.

It is not our intention to enter into the dispute between two great schools of physiologists, as to whether the fat was formed by transmutation of the sugar and starch of the food, or whether it consisted of the ready formed fat of the food on which the animals fed. Without for one moment pretending to settle this point, it is at any rate desirable so far to supply both saccharine and fatty matters, as shall give the system the choice of selection.

*Preparation of food* for the animal's stomach, or a system of cooking, is a very important question. Steaming hay, potatoes and turnips, has been tried very carefully in Scotland, and failed. For *cattle*, at least, it is useless; how valuable soever it may be for pigs. It is pretty certain, however, that, with certain combinations, all that a feeder can desire is attained by the *cooking of flax-seed*.

The fat of animals is strictly analogous to vegetable oil; its elements

are much of the same character as sugar, starch and gum, and no doubt is entertained, by physiologists and chemists, that the fatty matter (vegetable oil) in plants, is assimilated into animal fat, with but little change. The elements of those compounds severally are:—

	Sugar.	Starch.	Gum.	Mucilage.	Animal fat (stearine.)
Carbon .....	12	12	12	24	71
Hydrogen .....	11	10	10	19	69
Oxygen .....	11	10	10	19	7

The oil contained in many seeds is given by Professor Johnston —

	Oil per cent.		Oil per cent.
Flax-seed.....	11 to 22 say 17	White mustard .....	36 to 38 say 37
Hemp-seed .....	14 “ 25 “ 19	Sweet almond .....	40 “ 54 “ 47
Rape-seed .....	40 “ 70 “ 55	Bitter do. ....	28 “ 46 “ 37

This would naturally indicate that any of these seeds would, so far as they were palatable, be useful; and when linseed contains as much as seven per cent. of mucilage, ten per cent. of sugar, and fifteen of soluble albumen, it is clearly indicated as being a seed most valuable for feeding and nourishing purposes.

Various attempts have been made to adapt it to the feeding of cattle. There was some difficulty in grinding it by ordinary mills, as it clogged up the teeth; and when given to animals either alone, or combined with considerable quantities of corn, meal, or other feeding matter, the effect on the animals was purgative, and but few breeders persevered in the use of the seed alone. The demand for the oil, however, induced the crushing of the seeds to obtain it, and the refuse left was found to be very valuable as feeding material; while the portability of oil cake, its cleanliness, and capability of being long kept, made it a general and desirable food, both for growing and feeding stock. The oil abstracted, the cake contains, according to the same authority:—

Water . . . . .	10.05
Mucilage . . . . .	39.10
Albumen and gluten . . . . .	22.14
Oil . . . . .	11.93
Husks . . . . .	9.53
Saline matter and sand . . . . .	7.25

We do not see exactly how the cake can contain so large a proportion of oil relatively with the seed; but it is probable that the seed had originally contained a large proportion of oil, and that it had been but indifferently crushed. Good English-made cake, however, has been thoroughly established as one of the best of fattening products; and the extensive farmers

of Lincolnshire and other places expend upon a single farm, in one year, as much as £400 to £500, for this article of food ; and so well understood is its fertilizing character, that many landowners are willing to make themselves and their incoming tenants, chargeable with proportions of the money so expended, at the rate of one-half to one-third. It is the opinion of some of the best farmers, that when cake can be purchased at the same price per ton, in pounds, that beef and mutton can be sold at per stone in shillings, it will be paid for in the cattle and animals fed, without reference to the manure.\* The price of cake, however, depends on no such element of calculation ; the demand for it has increased far beyond that of the oil, and in some seasons it has been so great, that the former became an object of commerce rather than the latter.

Attempts have been occasionally made to render the uncrushed seed available by a cooking process, but it has been generally found more adapted for calves than for store stock or for fattening ; where used at all for the latter purpose, it has only been to supply a deficiency in turnips.

The most decisive step, however, in the use of cooked linseed, was taken by Mr. Warnes, of Trimmingham, near North Walsham, in Norfolk, in 1841, when a discussion was appointed by the Farmers' Club there, on feeding cattle with linseed cake. Mr. Warnes commenced by inquiring into the nature of cake. He immediately commenced a series of experiments with flaxseed in various forms—both crushed, steeped, boiled, and cooked in various ways. He also tried the boiling of barley and other food on various animals. He ultimately adopted a mode of feeding, on what was called by him flaxseed compound. He carried out, in connection with his experiments, growing, dressing and preparing the flax, the feeding of cattle with the prepared seed in boxes as antagonist to tying up, and the summer grazing of cattle by soiling.

His cooking apparatus is so simple, that it is managed by a blind man, whose happy countenance bespeaks neither over-weening anxiety, nor unremunerated toil. The apparatus consists of two cast metal boilers, fixed in brick, and having a fire-place beneath them ; the water is made to boil before the flaxseed is put in. The seed is crushed by a very powerful implement, consisting of two cylinders, one of them being of large diameter ; they are made to press upon each other in their revolutions by two lunar springs, and two men will thoroughly grind two bushels in ten minutes ; at this rate the men are able to work the whole day. The mill is, however, capable of being reduced to the capacity of one man. The crushed flaxseed is sprinkled upon the boiling water at the rate of one gallon of seed to eight gallons of water ; great stress is laid on sprinkling the seed very gradually, otherwise it is apt to adhere in lumps, and cleave to the sides or bottom of the boiler. With this precaution, however, Mr. Warnes assures

\* The pound sterling is \$4.85; the shilling 24 cents; the stone weight 14 lbs.

us he has had no instance, for several years, of this occurrence. This mixture is boiled six minutes, and for that period is slightly stirred ; at the end of that time it is found to be a thick gelatinous mass. In one minute after this the mass became more mucilaginous, and was improved. Nine bushels of cut pea straw were then placed very gradually, and by one bushel at a time, in a tub twenty-eight inches high ; the liquid jelly was now taken out in a scoop, poured upon it, and as each addition was made the whole was rammed down by a kind of beater, more for the purpose of mixing the mass, and confining the heat, than for any other object. The present cost of the animals in flaxseed is 3s. per head per week. In addition to this they have also about one bushel of cut Swedes per day.

Mr. Warnes occasionally mixes his compound with meal. This, when used, is also sprinkled over the boiling mucilage. So soon as the first boiling was nearly emptied from the boiler, it was again filled with water, and was ready for another boil, when required.

As a test of its value, Mr. Warnes furnished the following remarks and experiments illustrative of the effects of his system :

“Flaxseed,” he says, “has five essential properties, viz., mucilage, oil, albumen, gluten and sugar. The shell, or external crust, is the hardest of all seeds, and the most difficult to break in pieces ; but not too hard for the miller, who has every particle ground almost to powder, in order that all the oil may be expressed, which it could not be if coarsely crushed. This is demonstrated by the cake, in which the presence of seed is scarcely apparent. To a similar state seed for the cattle compounds ought to be reduced ; otherwise some, at least, of the properties above described will pass off without benefit to the fattening animals. This the scientific grazier will discover by the excrements, in which he will find sufficient cause for grinding, not only flaxseed, but all grain or pulse, if possible, into flour. From researches like these the profitable returns for grazing upon my premises, may be dated.”

The expenses of this copper, with the whole working apparatus for 80 or 100 head of stock, will not be more than four pounds.

A part of Mr. Warnes' system is the feeding in boxes, the growth of flaxseed, the manufacture of the fibre into flax, and the soiling of cattle with green food and compound in summer. It would swell this article much beyond its legitimate limits, if the box system were more fully described. It may suffice to say, that the boxes at Mr. Warnes have been put up very cheaply—they form two sides of what has formerly been a fold-yard. The sides have had a roof put along the wall, supported by pillars of wood, and divided by rails of any ordinary wood ; the front next the yard being inclosed by two gates. The box is 8 feet 6 inches square ; and adjoining the wall is a passage from which the food is given in troughs, which are made to slide up or down as the manure accumulates. The manure is never carted out until it is taken to the fields ; and, as the boxes are walled for one foot

from the bottom, there is not the slightest escape of the liquid manure or of the ammonia, and therefore it is peculiarly rich, from this circumstance and from the stimulating food supplied to the fattening animals.

Much has been said as to the dirt and filth, and unnatural state of the animals; but their condition is precisely the reverse, in every respect; they are quiet, have exercise sufficient for healthy secretion, can feed at leisure, and, whenever we observed them, they were clean and free from smell, and everything objectionable. The fact of the treading, and thorough consolidation by the animals' feet, prevents fermentation, and the consequent evolution of gases which would take place if mere stall-feeding were practiced. On the whole, we think there are many more valid reasons in favor of than against box-feeding.

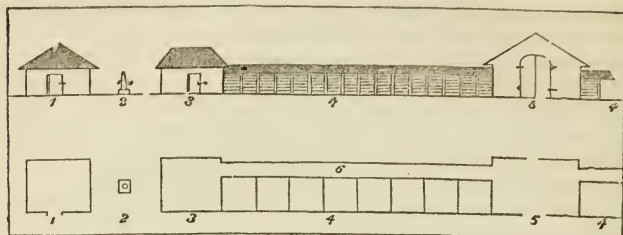
The direction given to men's minds by the experiments of Mr. Warnes, induced trials with all kinds of modifications of flaxseed-cooking; but the one which has obtained the greatest amount of favor is that adopted by Mr. Marshall, near Thirsk. The great difference between Mr. Marshall's plan and that of Mr. Warnes, is, that the material cooked has not the heat applied to it directly, but to the outside of the boiler in which it is to be cooked, so that no direct application of the fire shall take place to burn the mucilaginous matter. Mr. Marshall insists that, to cook the material properly, it must be boiled at least two hours.

His mode is this:—one pound of flaxseed is boiled for two or three hours in about one and a half gallons of water. Five pounds of straw are chopped, say one inch long, and mixed with two and a half pounds of ground oat or barley meal very intimately, which is then placed on a floor of flags or bricks, and the boiled seed poured upon the mass, and turned, and then allowed to cool one or two hours, when it is given to the cattle.

The cost of the apparatus or fitting will be about £50 (or \$250). On the whole, we think it very desirable to adopt one or the other process in all situations where an increased quantity, and better quality of manure is a desideratum, not to mention the more profitable return, as exhibited in both the systems described.

Mr. Warnes, altogether unprejudiced in favor of his own peculiar system, has been experimenting on the mode recommended by some graziers, of steeping the linseed-meal in cold water for some twelve or fourteen hours,—when a slight mucilaginous deposit was the result. The experiment will no doubt be carefully and accurately made under his directions; but, we confess, our prepossessions are in favor of the cooked materials.

The following is a plan of Mr. Warnes' shed-boxes for cattle-feeding :—



- |                                       |   |
|---------------------------------------|---|
| 1. Cooking-house, 20 feet by 16 feet. | 4, 4. Boxes, averaging 90 square feet each. |
| 2. Pump.                              | 5. Fodder-house, with tax under the floor.  |
| 3. Storehouse for roots, &c.          | 6. Passage, 4 feet.                         |

Mr. Thompson, of Moat Hall, Yorkshire, one of the most skillful and accurate investigators we know, made some very important experiments on the relative value of *hot and cold preparation* of flaxseed. He took two animals, and fed the one on hot and the other on cold food. He had both weighed before he started, and both again weighed at the expiration of six weeks. The animal fed on cold food weighed, when put up, 107 stone 11 lbs. (1509 lbs.); that fed on hot, 108 stone 7 lbs. (1533 lbs.) At the end of six weeks the first had gained 40 lbs.; while the last, the one fed on hot food, had gained 71 lbs. To guard against the one having any special aptitude to fatten which the other did not possess, he reversed the order; and then it turned out that the animal now fed on cold food, and before on hot, gained 53 lbs., while the other, now fed on hot food, gained 71 lbs.

But not only on the animals did the results of cooked food show itself in this striking manner; for, while one fed on hot food had only 80 lbs. of Swedish turnips per day, the one fed on cold food was not satisfied till his feed was increased 87 lbs. of turnips in the same time, showing a greater consumption of other food to make up for the want of heat!

## CHAPTER VIII.

### DISEASES OF CATTLE AND THEIR REMEDIES.

THIS is perhaps the most unsatisfactory division on which a writer on cattle can pretend to write. There are more cattle destroyed than cured by the strange quackery and drenching pursued by their over-officious owners; and to write anything to encourage a system so ruinous is to perpetuate the evil. The first thing a dairyman or grazier does is to get a



long list of "receipts" inserted in a book, classified or not, but all under the names of certain diseases. A sow falls ill. She has the yellows, or the staggers, or the worms, not because there are any clear and decided symptoms, but because the owner fancies it is so, and his specific is administered. He watches intently, and no good effect is produced; he runs for another medicine prescribed by another hand; the one opposing, and perhaps counteracting the other. One neighbor looks in, and perhaps another; each advises a medicine, as empirical as that of the owner, and all must be given, until the symptoms increase and get so bad that the village quack is sent for, who is more clever than the rest, because he has a larger range of "receipts," and he adds his quota of drugs, until the beast dies, poisoned by medicine!

Now, so long as unprofessional men will continue to prescribe and treat obstinate and complicated complaints; and so long as the public press will pander to the receipt-mania, there is no hope of any amendment. Certainly we shall lend no aid to the system.

But there are some simple and manifest ailments where the farmer may himself administer simple medicines; and there are some cases of emergency, too, when it may be necessary to do something, till scientific aid can be obtained. To these cases we will allude. We will take the complaints in the order of their frequency.

#### FELON.

This is a complaint common to all kinds of cattle. It proceeds from cold and exposure, and is accompanied by low fever. The beast is more or less off his food. His coat is staring, his eye dull, his nose dry, his *back sore*, he will flinch from the touch, and his teeth feel loose. It is an attack of felon. He requires rousing by cordials. Let him be housed and given a drink: 1 oz. of turmeric, 1 oz. fenugreek, 1 oz. liquorice, 1 oz. aniseed powder, in a quart of ale; and he will generally recover; if not, repeat the dose. A very common and a very safe process is also to divide the nerve of the under side of the tail. This relieves the back, and is thus performed: Feel for a soft place in the under side of the tail. The knobs are the joints, the soft place is the bone. Cut the skin across at the soft part, and it will bleed for eight or ten minutes. Tie up the tail with a piece of linen cloth, and great relief will be afforded. This is not mentioned in any work we ever met with, but we have seen its efficacy in hundreds of instances.

#### HOVEN, BLOWN, OR "OVER-FULL."

Sometimes a change of food, or a feed of wet clover, or potatoes, greedily eaten, will induce fermentation in the stomach instead of digestion. The sides will be blown up, until the stomach presses on the skin, with a force which renders it hard to the fingers. For this the probang is by far the best

remedy. Introduce this into the stomach by the throat, and the foul air will immediately escape. This instrument is not always at hand, and the beast will lie down, and the disease may continue until the walls of the stomach are ruptured. In these cases an ounce of ammonia will often give relief. A pint of vinegar we have known to effect it; but the safest remedy is a *pint of linseed oil*. It lubricates the mouth of the stomach, and assists the air to escape by both the orifices, otherwise closed up. Gentle exercise will be useful; but all violence, and, above all, such horrid drenches, as tar and salt, with the idea of making them eject their saliva, can only do harm. It is sometimes necessary to cut into the stomach, an operation a veterinary surgeon alone can perform.

#### CHOKING.

A beast will often get a turnip or potato fast in its throat, which will resist all efforts to get it either up or down; and, what is worse, when once this has taken place, the beast will always after be liable to the same accident. The mouth should first be carefully examined, to see that the turnip cannot be extracted with the hand; if it can be, this is the best mode by far for effecting its extraction. If not, the probang, invented by Dr. Munro, is absolutely necessary. Let a little sweet oil be first given to the animal, and then let the probang be carefully and cautiously put down, the cup end downward; if the turnip offers much resistance it must again be withdrawn, and by this its position may be changed. Generally it will go down with a very slight effort, and sometimes it may be got up by running the thumbs up each side of the neck, and gently pressing with the hand.

#### CALVING.

This, though not a disease, is rightly classed amongst them, because it is strictly a subject of medical and surgical treatment; and, though a natural operation, is always accompanied by more or less danger. In old cows, or cows after their first and second calves, if the right presentation takes place, the animal will generally calve without mechanical help. It often happens, that cows which calve unobserved, do the best, and we know a very careful and successful grazier who makes a point of never interfering in ordinary cases. There is certainly more danger from premature assistance than from delay. Usually the waters are the first symptoms of decided labor. A thin filmy bag first breaks, and after this the cow will sometimes eat, and seem comfortable for an hour. The second is larger and thicker, and envelopes the feet of the calf. When the feet are there, or one begins to protrude, the other may be sought for, and when both are brought forward, mechanical assistance may safely be rendered, if the head is found between and above them. A cow-tie may be strung round each foot, and certainty of the head

being between them is a signal for a slow and gentle pull, avoiding anything like force, and the pulling being downward towards the udder. But above all things, *give time*. The muscles relax and give way for the calf, if proper time is allowed. When calving is over, follow the directions formerly given in regard to the management of the mother and produce,—the latter should suck, and the mother lick the calf.

*False presentations* will sometimes take place;—a single foot, or the head, or the hind legs. In either of these cases, the operator must wait for one of the throes being over, and then gently put back the calf, and introduce his hand, which has been previously oiled, and bring forward the legs which are wanting. If this cannot easily be done, a veterinary surgeon will be necessary. When the hind legs alone are presented, it is only necessary to proceed in the usual way. In cases of difficulty, of malformation in the mother, of water in the head, or monstrosity in the calf, it is always best to call in a veterinary surgeon.

Some parties have a practice of giving every cow a calving drink. We uniformly prefer, as we said, nature's medicine, the licking of the calf, to any and all others which can be given. If it has been a long and protracted labor, a drink of warm gruel will be useful. If the cow refuses to lick the calf, which heifers of their first calves will sometimes do, it is seldom necessary to do more than run the hand over the newly-dropped calf, and then pass it across the mouth and lips of the mother.

*Abortion* is a habit with some individual cows, and is often the result of the presence of blood, or bad smells, arising from putrid matter decaying near the cow-houses or yards; and once introduced into a cow-house, it often so affects the imaginations of the rest, as to become epidemic. Let the cow and the remains of the calf be instantly removed from the rest, and kept alone and quiet. Chloride of lime should be plentifully sprinkled near the stall where she was, and the whole of the herd should have their noses besmeared with tar.

*Retention of the placenta*, or failing to cleanse, after calving, sometimes occurs; and it requires great care to prevent its retention, when the expulsion does not take place in a few hours after calving. It indicates weakness, and want of tone in the uterus. A mild stimulant may be given—nothing better than an infusion of chamomile flowers, say two handfuls in a quart of water, added to a quart of good boiled ale, and if necessary, an injection of soap-suds, to keep open the bowels and prevent inflammatory action. If it resists all efforts, and begins to putrefy, it will be necessary to consult a veterinary surgeon.

#### RED WATER.

This is a complaint which frequently attacks cows in summer; and, on some pastures, is a regular occurrence. If taken in an early stage a dose of

eight ounces of Epsom salts, dissolved in a pint of water, will almost invariably set the beast right. If not at hand, a pound of common salt may be given, and the dose repeated, in case of need.

#### QUARTER FELON.

Inflammatory fever, or quarter-ill, is one of the most obstinate diseases with which cattle can be afflicted; and, though odd instances of cure have been reported, they are extremely few, unless the disease has been attacked in a very early stage. It is also highly contagious, and will sometimes go through an entire herd of calves before they are a year old, for it seldom occurs after that period. The calf gets off its food, and becomes lame or stiff in one foot. The foot may be examined, and no cause of lameness discovered, but soon the disease has become general; air bubbles are formed between the skin and muscles, and there is a cracking sensation to the hand on passing it over the skin, especially in the legs. Inflammatory fever is disorganizing the body.

Preventives, as the seton in the dewlap, bleeding in autumn, doses of dyer's madder, &c., are favorite remedies. The seton can do no harm,—it may be tried; but no specific, either remedy or prevention, has yet been discovered.

#### FOUL IN THE FOOT.

This is a tiresome, worrying disease, to which large heavy milk cows are specially subject; and is to the cow what foot-rot is to the sheep. There is inflammatory action between the claws; it begins to discharge fetid matter, and is a source of pain and irritation, which often dries up the milk, and is often a painful and annoying complaint to cure. Let the foot first be well cleaned and fomented with warm water, and all loose flesh be cut or clipped off. The foot may then be poulticed for one night with flaxseed-meal poultice, and then again fomented and anointed with tar; and, if it should smell very offensively, a little charcoal, or a few drops of chloride of lime, may be added to the water. Next day the inflammation will be relieved, and brought out externally by the tar, and the foot may be then dressed with the butyr of antimony (chloride of antimony) night and morning, and the tar applied afterwards. The foot should be confined in a boot or stocking, and kept free from dirt. A little salts or linseed oil should be given, to keep the bowels in a state of gentle activity.

#### MILK FEVER.

This is a common complaint in cows which are deep milkers, at least in summer. Prevention is all the farmer has to do with, for the cure, if any,

must be left in the hands of the veterinary surgeon. He must, if he see the udder distended, milk the cow before calving regularly three times a day ; she must be kept as cool and quiet as possible, and have mashes of bran only, for a few days after calving. This is cooling and somewhat laxative, and, if the udder should be hard, which it should not be after this treatment, let it be rubbed with marsh mallow ointment. A gentle dose of purgative medicine may be given if the cow is in very high condition, and she should be driven a few miles every day before calving. With these precautions there is little danger, at least of its being fatal.

#### THE YELLOWS OR JAUNDICE.

This is easy distinguishable. White cattle are peculiarly subject to it, and it makes its first appearance by a yellowness of the eyes and under the anus ; the bowels become costive, the teeth loose, the appetite gone, and rapid weakness sets in. Give—4 oz. common salt,  $\frac{1}{2}$  oz. Barbadoes aloes, 1 dr. ginger, 1 quart home-brewed ale, made into gruel.

#### LOSS OF CUD.

All ruminating animals are sometimes subject to this. The stomach, with a sort of convulsive action, throws the half-masticated food back into the mouth to be re-chewed, and sometimes this healthy contractile tone of the stomach is lost. Give—6 dr. Barbadoes aloes, 6 oz. common salt, 3 dr. ginger, 1 oz. alspice, in a quart of gruel.

#### INFLAMMATION.

This is a disease known by coldness of the horns and extremities, generally accompanied by much acute and constant pain. All home attempts to cure this disorder will be impotent,—a veterinary surgeon should be at once consulted : the same may be said of *staggers*, *strangury*, and a variety of acute disorders.

#### PLEURO-PNEUMONIA

Is only mentioned to say that nothing like a specific has, so far, been discovered. The fearful medicine of a gill of spirits of turpentine and a gill of spirits of sweet nitre seems to be the most successful but desperate remedy. If the animal is fat, there is scarcely a chance of recovery. If the animal is lean, remedial measures may be tried, but they are more likely to fail than to be successful.

## THE EPIDEMIC, OR SORE MOUTH AND FEET ;

For so a disease which affects the mouth with blisters and the feet with pain and inflammation, is best known, has lost much of the virulence it possessed from 1839 to 1844, but still is sometimes troublesome. A dose of Glauber or Epsom salts, in the first stage, with shelter and bran mashes, will generally prevent evil consequences. Should the foot break out, the same treatment will be useful that we advised in the foul of the foot.

## DISEASES OF CALVES.

If well managed, calves are subject to few diseases ; and if starved, neglected, or ill managed, they will be scarcely kept alive by medicine. The most fatal disease is the *scour* or *diarrhœa*. As it usually proceeds from some foreign, often acrid matter, in the bowels, a tablespoonful of sulphur in the milk will generally remove it in due time. If it should continue after this, give a teaspoonful of laudanum and a tablespoonful of tincture of rhubarb. We once had a calf nearly dead of diarrhœa ; medicine seemed to have no impression upon the obstinate attack. It was dying. We gave it a bottle of port wine, expecting it to be dead in the morning. In the morning, however, it was well and crying for its breakfast. A pint of good old port will often work wonders when all other remedies have failed, both in man and beast.

## COSTIVENESS

Is sometimes a disease in calves, as well as the opposite extreme. Here it is undesirable to give medicine, unless it be very severe. A handful of onions, boiled with an ounce of fat bacon, is by far the best remedy, and it never does injury, but is nutritious to the animal even if well.

## GRIPES

Is a complaint to which young calves are subject, which have had sour milk given to them ; and there is often acute pain exhibited, kicking of the belly with the hind legs, pawing, &c. A cure is generally effected, in a remarkably short time, by a cupful of peppermint water and a teaspoonful of laudanum.

The great secret of keeping all animals is, to tend them carefully and keep them well. Let the land said to be subject to disease be well drained and better farmed ; let the bad herbage and cold beds of the cattle be cured and they will be healthier and thrive better. It is better always to pay the cake-crusber or the miller, than to pay the veterinary surgeon, however skillful he may be.

In conclusion, treat the cow well and she will be grateful. Let all your proceedings be dictated by humanity and kindness, and a more patient and grateful servant you cannot have.

**THE END.**



















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