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THE ILLUSTRATED

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Table of Contents.

TOBACCO.

Two things are principally required for the growth of tobacco in perfection: plenty of room and a well pulverised soil: unless these two points are attended to, no amount of manure will produce a full crop of well-flavoured leaves. I will take this opportunity of stating that I am a practical hand at the work, having grown the plant for four years, and having done all the labour with my own hands, except the hanging. My belief is that, with the present moderate tax of 4c. a pound, the harvest ought to be a profitable one. A fair yield should not be less than 1750 lbs. an acre, and when well turned out, it ought to bring 14c. a pound, or $245 an acre (1). We will first consider the cultivation of the land, starting from the last crop of the course, the grain stubble.

Ploughing in October as deep as possible for this crop is a correct practice, because the frost, the wind, and the rain, will do their winter's work on the soil, and the manure to be added in spring will correct the "crudities," as our ancestors termed them.

Now there is one thing certain: principles are principles; and the principle of deep ploughing before winter for a manured crop is correct, whether here or in the North of France. We are all going to grow sugar-beets, I believe. Do we intend to cultivate them according to our own fashion, or according to the fashion of those who have been growing them for years? Surely, after the latter mode, or else I fear we shall have but a poor return for our labour. I think this new crop will be of one very great use to us: it will show us that the farming of the country parts of the province is, yes, even in the Townships, in a very backward state, loath to believe it as we are; and in order to improve, we must, in spite of our prejudices, stoop to learn from the older countries. If any body doubts this, I can only say that the system of cultivation practised by the best farmers on the Island of Montreal, such as Messrs. Drummond, Logan, Dodds, Somerville, and others, is *exactly* the same as may be seen any day in the most advanced districts of England and Scotland; the crops are the same, and they are treated in the same way; there is positively no difference, except that they cannot feed off turnips with sheep in winter.

As to this question of deep ploughing, I would ask: don't you, in your gardens, dig 10 inches deep? If so, why not do it in your fields? always provided, as I said before, it is done before winter, and the following crop is to be manured.

As potash is a necessary manure for tobacco, and demands to be mixed with the earth some time before it is fit for plant-food, I should be inclined to sow the ashes on the ploughed land the moment the land will bear the tread in spring. Quantities I will speak of later.

SPRING WORK.—When the land is quite dry, harrow two or three times and then cross-plough. If the land is foul, it may require grubbing, but if not, after a good harrowing, it should now be ready for drilling up to receive the manure. How wide shall we make the drills? That depends upon the sort of tobacco we mean to plant. My own idea is, that the room necessary for the free access of sun and air is about twice as much as is necessary for food-hunting. The great Connecticut sort, leaves of which I have had measuring 41½ × 26 inches, requires 4 feet between the plants, but it cannot eat all the plant-food on that space, travellers as the roots are. Would it be possible to plant every alternate drill at 27 inches with turnips or cabbage.—I have done it, and it paid well—cabbage (St. Denis) and tobacco will be ready to set at the same time, i. e. about June 10th. This makes the distance between the rows of tobacco 54 inches; plenty of air and sun room, and plenty of space to top and disbud in. I can strongly recommend the plan, and it is not so troublesome a business after all.

Manure is the next point. I cannot say that I should expect much of a crop without a fair dressing of farm or stable dung. Artificials I should use as a help, not as standby: thus, say ten loads of good dung, aided by 20 bushels of fresh wood-ashes, 6 bushels of bone-dust, and 150 lbs. of Sulphate of Ammonia, or 100 lbs. of Nitrate of Soda. The potash I believe to be indispensable, for I am sure that the reason why there is so little smoke to be got out of the best Montreal tobacco is, that the potash is nearly exhausted in the American tobacco-regions.

An expensive manuring, if you like, but the crop is a high-priced one to sell. Take half the quantities of the Sulph. Am. or Ni. So. and double the bones; that will lower the cost; but the dung you must have. I would rather grow two acres with this dressing than play at manuring four. The heaviest and best crop I ever grew was with 12 loads of dung and 3 loads of tanner's refuse, per acre. Superphosphate will help to thicken the leaf, but to use it alone, or with lixiviated wood ashes, would be mere waste of time and labour. I confess I do not see how, with our very limited ideas of cattle feeding in winter, we are going to find manure enough for 7 or 8 acres of land planted with tobacco.

Whatever manure we use, the dung must be spread between the drills, the mixed artificials sown broadcast over them, and the dung and all covered up by splitting the drills; a roller passed along them prepares them for planting.

The most profitable is the "Connecticut Seedleaf." When tobacco-growers convince the manufacturers that they can

(1) I find, upon inquiry, that from 15 cts. to 20 cts a pound, may be had—*duty-paid* of course.

turn out a decent leaf, then will be the time to be particular about prime qualities; at present, the biggest is the best (1).

The seed must be sown very thinly in a hot-bed about the first week in April, and covered very shallow—in fact, only sprinkled with earth. If you really aim at a crop, the moment you can handle the plants soak the seed-bed well, and transplant them into a cold frame, three inches apart every way. This is to make the roots grow—there will be rare bunches of them when you put them out in the open air in June, and they will thrive at once, instead of drooping their languid heads like a parcel of sick turkeys.

My crop of 1870 brought people miles to see it, and was grown exactly in the fashion I am describing. It is troublesome, but it makes one planting finish the job, instead of having to keep on replacing perished plants. They will want no shading or watering, and *if the land is well pressed about the roots* the *grub* will not stand much chance of damaging them.

As to the transplanting, it may be done with a trowel or a dibble—I prefer my fore-finger; the trowel disturbs the ground too much—pulverised as much as possible it should be, but well pressed down and firm. Don't let the hole be deep enough to reach the dung. If your drills are 3 feet apart the plants may be 2 feet apart in the rows. Keep the horse-hoe going as long as you can without hurting the crop. Never earth up, the rootlets, as fine as hairs, can be traced, in July, interlacing across the rows in every direction, and though if they are broken, Nature will produce more in their place, it cannot be a wise plan to restrict their range by enclosing them in a narrow drill by means of the plough or hoe, instead of giving them free scope to wander at their own will over the whole distance between each other. If the plants are strong, the land well manured, and properly pulverised, no wind that ever blew can lay them down.

THE TIME OF PLANTING.—No rule can be established; "when the warm weather has fairly set in" is a phrase commonly used; but I should prefer, myself, to plant on the 10th of June, say from the 5th to the 15th, having always abundance of plants in case some should be frozen. The situation, however, must determine the point, and a showery time should be chosen. If the land, however, should become *wet*, leave off work—the stirring it in that state will cause it to become *steelly* round the roots.

WHEN TO TOP.—As soon as there are 14 leaves formed on a plant it is time to top it. The climate will not ripen more than, at most, 10 leaves; there should be at least three of the lowest leaves next the ground taken away, as they are generally thin, broken, and splashed with mud from the rain driving up the soil: thus, eleven will remain, one of which will most likely be torn off or broken in some way or other. If these ten leaves really ripen they ought to give half a pound of tobacco fit for sale; i. e., at 3 feet apart each way, 2420 lbs. an acre.

DISBUDDING.—When topped, the buds will resent the injury on behalf of the plant, and strive continually to poke up their heads from the *axils*—that is, at the junction of each leaf with the stem. They want, you see, to bear seed, now their leader is gone. You must not let them, for the strength of every plant goes into the seed, and both plant and land are impoverished in consequence. As for the common tobacco, it wants disbudding twice a day—that of course is an exaggeration, but you must be always at it, whilst the noble Connecticut never requires it more than four times.

(1) The small Canadian, with its queer-looking, narrow, pointed leaf, is far superior in flavour to any I have tried. It may be set at 24 inches by 15—perhaps the number of plants may make up for their small size—a dozen leaves may be left, as it ripens early.

HARVESTING.—In a favourable season, tobacco well managed, i. e., planted about the 10th of June, and kept stirred, should be topped in the first week in August, and begin to change colour about the 12th. Cutting may begin about the first of September—when fit, the leaves assume a marbled appearance, they thicken amazingly, and the *green* shows a distinct tinge of *straw-colour*. I should not wait for the whole crop to ripen, as some plants mature more rapidly than others: take them as they come.

The Connecticut having stems, frequently, two inches in diameter, an axe, or tomahawk, is the best tool for cutting it down. As, according to my plan, its three lower inches will be bare of leaves, the stem may be split some way up, which will hasten the drying. Let the plants have just sun enough to wilt them so that the leaves will not break off, and not a moment more. Then, take them to the shed, and hang them at once; not one plant should be left on another during the night, for it is the foolish plan of *sweating* at this stage that gives the nauseous smell (so easily distinguished by any one who has smelt the *unsweated* sort), to the majority of Canadian tobaccos. All tobacco should sweat after it is dried, and never in the green state.

HANGING.—If there is room enough, the plants should be hung by twisting their two top leaves over a pole; the other leaves will, then, fall outwards, be fully exposed to the air, and the buds, if any shoot, will be easily seen and removed. Open the doors of the shed during fine, still weather, but do not allow the sun to strike immediately on the tobacco: in other words, let it have plenty of ventilation, but avoid drying it too rapidly.

PACKING.—When all the ribs of the leaves are dry it is time to pack the tobacco for sale or storage. For this purpose, choose a damp day, to prevent breaking the leaves. Take half a dozen of them stripped from the stem, twisting the worst of the lot round the stems of the others to hold them fast. Place them, row upon row, in a barrel or cask, tread them down firmly, layer after layer, and send them to the factory as soon as possible. All other manipulation is the business of the manufacturer.

I append a calculation of the cost and profits: a difficult thing to do, as ideas differ so much as to expense of horse labour, &c.

Three ploughings	$ 6.00
Grubbing and harrowing	1.50
(1) Seed, hotbed, planting	4.00
10 loads of dung	2.50
8 bushels of bone-dust at $25 a ton	5.00
Horse- and hand-hoeing	3.00
Topping and disbudding	3.00
Harvesting	2.00
Hanging	4.00
Packing and casks	5.00
Marketing	2.50
Brokerage, @ 5 °/₀, on 2420 lbs	21.00
Duty @ 4 cts. a pound	80.00
	139.50

If good, the tobacco should fetch, wholesale, 18 cts. a pound duty paid—2420 lbs. = $435.60 leaving a clear profit of $294.00.

A couple of acres in hops, two in sugar beets, and two in tobacco, on each farm, where the soil is suited to the growth of these crops, would soon change the face of the country; the labourer would find more constant employment, the farmer would have some important sums of money to handle, and the country would benefit as a whole, to say nothing of

(1) I have planted out with my own hands a quarter of an acre in an evening.

the improvement of the general cultivation from the increased production of the ordinary crops brought about by the cleansing effects of the cultivation the above named plants receive. And we need not fancy they will exhaust the land, if we spend some of their proceeds in manure or cattle-food. We sell two tons of hay off an acre of land, with the seed half, and in many instances, wholly formed, and we have an idea that one ton of tobacco, which has never been allowed even to flower, must do the land more injury than the hay, though we can burn the stems and refuse, and thus restore the major part of the potash to the soil. The old Virginian tobacco-lands were exhausted, because they were never manured. We have no such fertile farms here—we *must* manure, if we would have a crop, and there will be enough left in the soil, after the removal of the tobacco, to grow any grain we may wish to sow in abundance; at least, it will certainly give more than the average crop of wheat in the province, viz. *eight and a half bushels per acre* (1).

I have answered all the questions proposed in this article except the following:

How should grass land be prepared for tobacco?

Answer.—If absolutely necessary to be so used, it should be ploughed shallow in August; broken up with grubber and harrows, to kill the turf (what is called a bastard fallow); ploughed deeply before winter, and then treated as to preparation as mentioned in the body of the article.

I know of no treatise on tobacco worth the trouble of consulting, except, perhaps, Dr. Laroque's *Manuel d'Horticulture pratique*, which contains a *resumé* of the subject, though nothing that seems to me original.

As to the quantity of Red Clover seed required.—Fourteen pounds to the acre, and, if possible, sow seed that has not been deprived of its husk: this is the plan suggested by Mr. Keene, the introducer of *Keene's forty days' maize*, and has been found to help the plant to stand the winter. At all events, observe these rules: don't sow it oftener than once in eight years; sow it shallow, and roll afterwards. Cut it when the majority of the heads are in blossom, turn it, don't shake it out, and get it into barn or stack *with all the leaves on*.

P.S.—The cost of artificial manure would be somewhat as follows: 12 bushels of bones (raw), at half a cent per pound, $2.64—If the bones are mixed with three times their weight of earth, turned over twice, at intervals of a fortnight, and kept moist, they will be pretty well mouldered down in two months' time. They should be prepared a year in advance, and kept under cover. The large bones must be smashed with a sledge-hammer. Ground bones cost $25 a ton—600 lbs., therefore, will come to $7.26.

One hundred pounds of Sulphate of Ammonia, are worth $5, and of Nitrate of Soda $7.50.

So, the manure for one acre, consisting of dung, bones, Sulphate of Ammonia, or Nitrate of Soda, would cost:

300 lbs. of bones	$ 3.60
100 lbs. Nitrate of soda	7.50
10 loads of dung	2.50
	13.60
600 lbs. of raw bones	$ 3.00
20 bushels of ashes	2.00
10 loads of dung	2.50
	7.50

(1) I have left out of the calculation the ashes, as the price varies so much. Add $2 for them, if you like, and there are still $292 left for profit.

300 lbs. bones	$ 3.60
150 Sulph. Am	7.50
10 loads of dung	2.50
	13.60

By loads, I mean tons.

The Sulph. Am and Ni. So can be had of Messrs. Lyman & Co; the bone dust, at the office of the Newell Grinder Co., Hospital street, Montreal.

Arthur R. Jenner Fust.

APICULTURE.

It has been thought right to give, in one number and in a compendious form, the different articles on bee-keeping which have appeared in the Journal. Our thanks are due to M. Lamontagne for his useful work. I have taken the liberty of adding a few quotations from the fourth Georgic of Vergil.

A. R. J. F.

PART FIRST.

The natural history of Bees.

"In tenui labor; at tenuis non gloria."

1. Population of a colony.—In its natural and flourishing state, each hive should, in summer, consist of from 20,000 to 40,000 bees.

2. Classification.—There are, in this numerous population, three individual kinds: the queen, the workers, and the drones (figure 1 *a. b. c.*)

Fig. 1. *a.* Queen. *b.* Worker. *c.* Drone.

3. The Queen, called by the Romans the King, the mother of the whole colony, is about eight lines in length, her wings are, proportionately short. Like the workers, she possesses a sting, but she never uses it except to exterminate a rival of her own diguity. Her

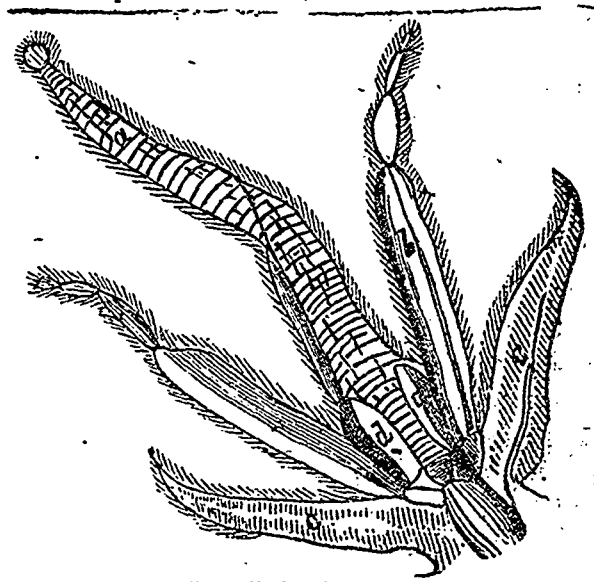


Fig. 2. Proboscis (magnified).

hind-legs have no pollen-baskets: Her sole duty is to lay eggs, of which, in the height of her season, she produces as many as 3,000 in 24 hours.

4. Her fecundation and the length of her life.—The queen never leaves the hive, except with a swarm, or 6 days after her birth for the act of copulation, when she is fecundated for her lifetime, which lasts about 3 years.

5. She exercises no authority.—Although the colony could not

get on without her, she has no power over the bees. Still, they miss her, directly she is removed or dies, and becoming disturbed, search for her everywhere, and immediately make preparations to bring up another queen in her stead. This happens often in summer, when the queen becomes old or impotent.

6. ONLY ONE QUEEN TO EACH HIVE.—There is never more than one queen in each hive, and the strongest hatred reigns between two of them, even in captivity. Thus, if you put two under a glass, they will attack each other directly; and one of them, after a few rapid movements, will seize the other by the wing and kill her (1).

7. THE WORKING BEES.—The most numerous are the workers. All the labour of the hive devolves upon them. Small as they are, only measuring from 4 lines to half an inch it is they who gather the honey and secrete the wax, who feed the young, and oppose the enemies of the colony. During the hot weather, they ventilate the hive by causing a current of air to pass through it from the frequent motion of their wings. They have a *proboscis* (fig. 2) which serves them to draw up honey and water, and a *sting* composed of a sheath and two barbs (fig. 3) (2). Their hind legs are furnished with pollen-baskets, by means of which they retain the pollen of the flowers in the shape of small pellets, and their fore-legs have little hooks by which they cling to one another (fig. 4).

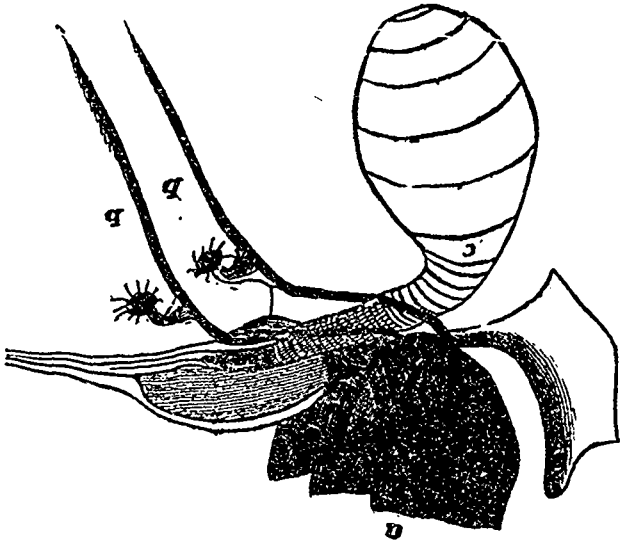


Fig. 3. Sting (mag.)

8. THEIR LENGTH OF LIFE.—Only 6 or 8 weeks do they live during the summer; but, in winter their time is prolonged to 7 or 8 months. The prodigious laying power of the queen renders this difficult to see; but if, in summer, you introduce an Italian queen into a hive, in six or eight weeks afterwards the colony will, on inspection consist only of Italian bees, easily distinguishable by their pretty gold stripes.

9. THE DRONES.—These are the male bees, and their only duty is to celebrate the rites of Hymen with the queen. They are never visible except from June to September, and their presence as well as their number depends upon the state of the colony. They are big, with a round head, and without a sting: hence, when the bees do not want them any more, they can easily get rid of them (3).

10. THEIR USEFULNESS AND THEIR LIFE.—One drone in a thousand is enough to fertilise the queen—the unfortunate one dies immediately afterwards. The bee-keeper should have as few drones as possible in each hive, as they are great consumers, and collect no honey. Their life is precarious, and much shorter than the life of the workers. They are put to death mercilessly, whenever a scarcity of honey occurs, and they are invariably killed in autumn in every well conducted family of bees.

Fig. 4. Fore-leg of worker.

(1) —nam sæpe duobus
Regibus incessit magno discordia motu.

(2) Spiculaque exacuunt rostris.

(3) —Aut agmine facto
Ignavum fucos pecus a præsepibus arcent.
Immunisque sedens aliena ad pabula fucus.

What the Bees produce.

11. HONEY, POLLEN, PROPOLIS AND WAX.—Their principal business is to collect honey, but they take a great deal of water into their honey bag, particularly in the great heat of the queen's laying.

Often they may be seen entering the hive with their hind legs loaded with a green or yellow substance: this is the *pollen* of flowers, and is used to feed the young grubs.

Instead of pollen, they are sometimes laden with a shining, sticky matter, which they have some trouble to rid themselves of: this is *propolis*, a sort of resinous gum which serves to close up any cracks in the hive, and is sometimes used to enclose in a safe prison any strange substance too heavy to be expelled from the hive (1).

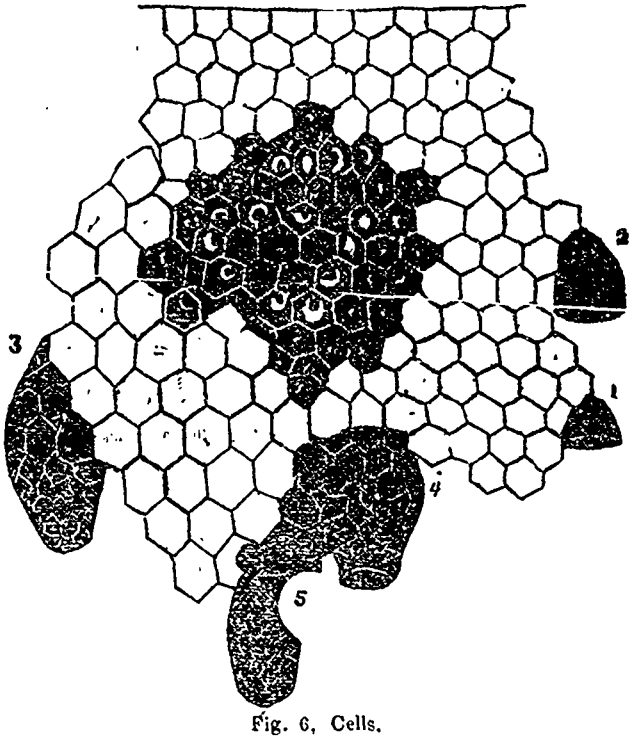


Fig. 6, Cells.

They secrete wax between the segments of the abdomen (fig. 5), in the form of polygons or thin sheets, after having absorbed a certain amount of honey. American authors agree in saying that it takes from 13 lbs to 20 lbs of honey to make 1 lb of wax.

The physiology of Bees.

12. CELLS.—Every hive is furnished with combs attached to its top and sides. These combs are parallel, and are composed of a double row of cells of three sorts (fig. 6): those of the workers, those of the drones, and the cells destined to produce the future queens. These last are in position, vertical, and, in shape, like an acorn, while the two first are horizontal. The working Bees' cells go 25 to the square inch, the drones' cells 16.

Fig. 5. Bee secreting wax.

13. HOW THE BEES ARE PRODUCED.—The queen-bee, before laying looks into the cell to see if it be clean, lowers her abdomen into it, and drops there a tiny egg just visible to the naked eye. She can lay as many as four eggs a minute. Three days after, a white *grub* issues from the egg, which is fed for six days economically by the bees with a mixture of honey and pollen. After the elapse of this time, the cell is closed by the nurse-bees, and the grub having attain-

(1) —Pars intra sæpta domorum
Narcissi lacrimam et lentum de cortice *gluten*
Prima favis ponunt fundamina, deinde tenaces
Suspendunt ceras.

ed its full growth surrounds itself with a thin coccoon to await its metamorphosis into a *nympha*, and later to emerge from its prison a perfect bee (fig. 7).

14. TIME REQUIRED FOR HATCHING THE EGGS —The worker takes 21 days to hatch, reckoning from the laying of the egg, the drone 24 days, and the queen 17 days

15. FECUNDATION OF THE EGGS —The queen and the working bees spring from fecundated eggs, whilst the eggs from which are born the drones are non-fecundated. The eggs which are to produce workers are fecundated by contact with the *seed-sac* or spermatheca, at the will of the queen alone. It is not the particular cell which determines the production of a worker or of a drone from any egg, since the queen once fecundated, and obliged to lay exclusively in drone-cells, will lay eggs that will produce workers: all the fertilised eggs, then, may produce queens. If the queen is taken away from a hive, the workers will build royal cells only around the cells containing the *larvæ* of workers. Queens are raised, when wanted, by these means.

16 BIRTH OF QUEENS AND THE ROYAL CELLS. — The larvæ destined for queens whilst in their large vertical cells (fig 6, 7, 26), receive an abundance of food of a special quality, which in 17 days causes this marvellous transformation to take place. The royal cells are built only on the eve of swarming, or when a colony has lost its queen. They are generally 10 or 15 in number

The moment the first queen is hatched, she runs to each of the other royal cells and kills her sister-queens, unless the bees have made up their mind to swarm. In this case they prevent her murderous intent, and the voice of the freed queen is heard at once: peeep... peeep... peeep and again the voice of the still imprisoned queens: kooa... kooa... kooa...; due, without doubt, to the violent hatred which exists between all queen-bees.

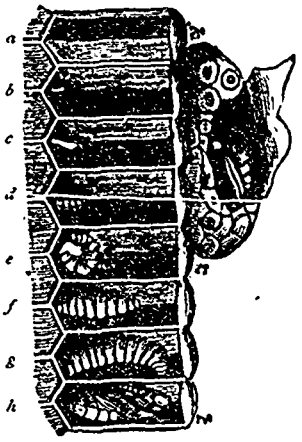


Fig. 7. Eggs, larvæ and nymphæ.

PART SECOND.
Management of Bees.

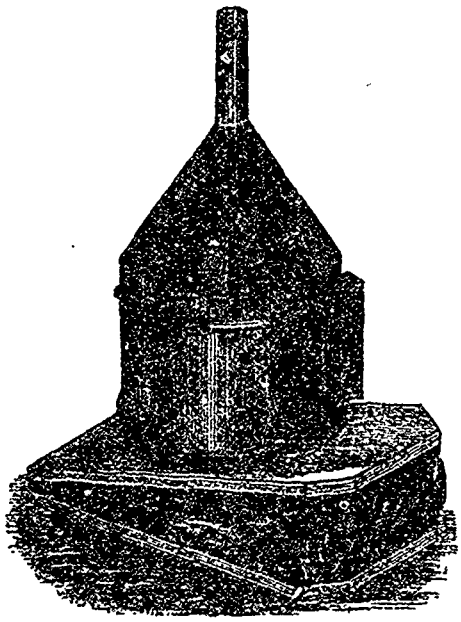


Fig. 10. Root's perfected fumigator.

17. HOW TO MANAGE BEES.—The most timid persons soon learn how to treat bees. When once they are filled with honey they won't sting. To secure this, close the aperture of the hive, and drum upon the top with a couple of sticks for a few minutes; the bees thinking they are to be immediately robbed, gorge themselves with honey, and become quite harmless.

But a good *fumigator* is the best thing (fig. 8, 9, 10). Well managed, it conquers the bees at once, and makes them perfectly docile.

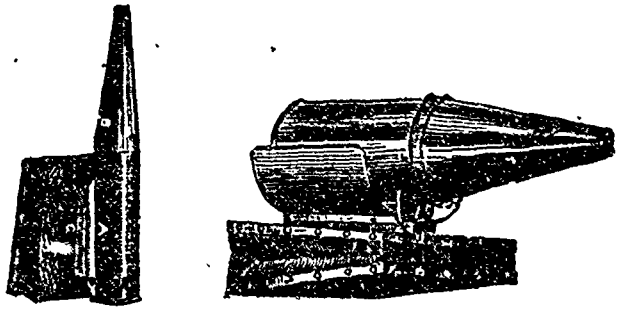


Fig. 8 et 9. Bingham's Fumigator.

Once under the influence of the smoke they begin to *buzz*, that is, they beat their wings as if to drive away the troublesome smoke, thus allowing the bee-master to work at his ease.

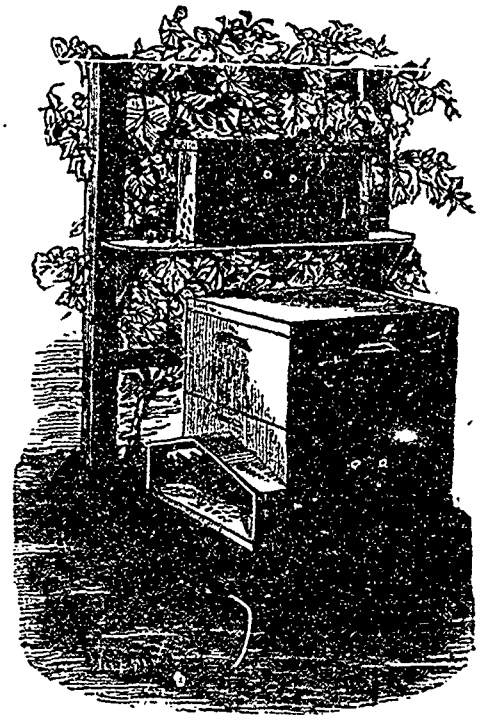


Fig. 12. Simplicity hive.

Fig. 11. The veil.

The fumigator perfected by Bingham consists of a jointed tin tube fixed on a leather bellows. At the bottom of the tube is placed a lighted coal, and it is filled up with rags or paper. When you want to use it, make it work briskly, and throw in white thick smoke.

To this add a good veil of black net (fig. 11), a pair of white cotton gloves—you won't think it worth while to use them long—and the most nervous persons will throw aside all fear. Equipped thus you may march invulnerable through a crowd of bees.

Shun all rough and sudden movements in all your operations, and most of all, take care not to let your breath affect the bees. If you get stung, draw out the sting, and the pain will almost immediately cease.

Hives.

18. Langstroth's perfected hive. — The hives which are used in the U. S., and have always given the best yield, are those with movable frames. They are of several sorts, all based on the same principle.

The one that seems best adapted to our climate, and which will be probably the national hive on account of the advantages offered by its frame, is the "Langstroth" perfected by A. I. Root and called "The Simplicity" (fig. 12).

Fig. 13. Brood frame.

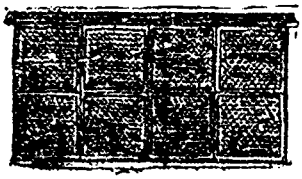


Fig. 14. Section frame.

In this hive (called "double" because the two stages are of the same size as well as the cover and the platform, making thus two hives in one) the lower part contains 10 frames for the workers (fig. 13),

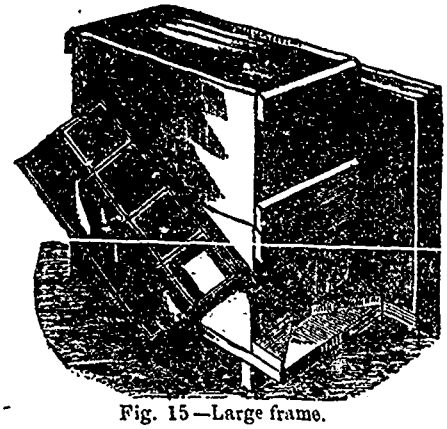


Fig. 15 — Large frame.

and the upper stage holds 7 large frames for the sections intended to hold the harvest (figs. 14, 15). These sections measure 4¼ x 4¼ x 2 inches, and hold a pound of honey (fig. 16).

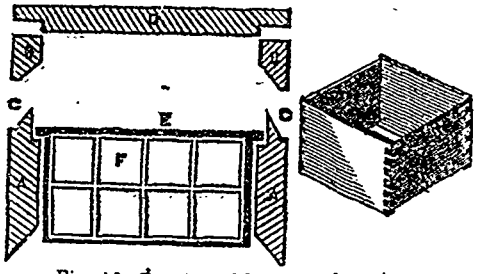


Fig. 16. Position of frames and sections.

Each large frame holds 8 of them, and is provided with two tin separators (fig. 17) which compel the bees to build the combs in a straight line, so that the sections can be put side by side in boxes made for the purpose, and carried about without injuring the honey.

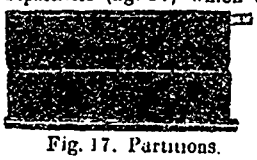


Fig. 17. Partitions.

The frame for the workers, 7 lines wide, measures in the inside 17⅜ x 9⅛ inches. The large section-frame of the same interior measurement, is two inches wide, except the bar at the bottom, which is less by a quarter of an inch to allow the bees to pass.

The frames of our hives rest on a piece of tin to prevent the bees from putting *propolis* (gummy stuff) on it; and at the top is placed an enamelled cloth to prevent them from glueing on the cover of the hive (fig. 18).

The large honey-boxes have disappeared in the new system, and their place has been taken by pretty little sections holding a pound of honey each. These have taken first prizes everywhere, especially at the exhibition at Montreal in 1880, and are generally made dovetailed. They sell for the low price of $1 a 100.

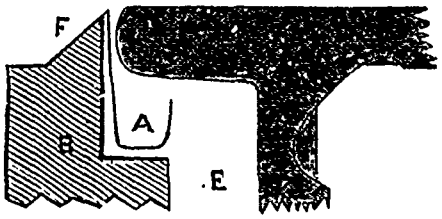


Fig. 18. Tin rest.

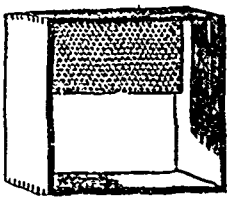


Fig. 19. Section garnie de fondation.

In order to encourage the bees to begin work soon, and to build combs in a straight line in the sections, they are baited with a piece of *comb-foundation* (f. 19). This, sometimes called *fluted comb*, is a light sheet of wax pressed into a ressemblance to the bottom of the cells. These are spread out by the bees, and save them the labour of making so much wax, enabling them to make honey instead. We have already mentioned that each pound of wax causes an expenditure of from 13 lbs to 20 lbs of honey (see arts. 41, 42, etc.)

The hive is not so important a matter as the care the bee-master affords to it. Only, remember that when once a plan has been adopted, it should be adhered to, for a change always causes great expense and loss of time. Have a plan laid down, and make all your hives of the same size, that the frames may fit them all without difficulty: nothing is more disadvantageous than to have several sorts of frames in the same apiary. Paint all your hives white: darker colours absorb too much heat from the sun's rays.

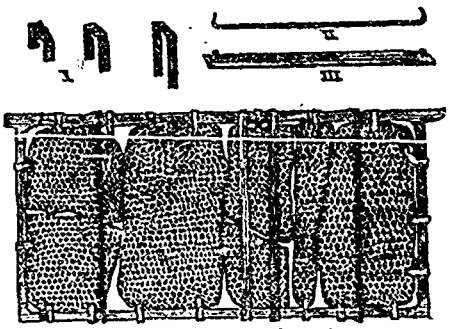


Fig 20. Transferred comb.

How to establish an Apiary.

19 The Commencement. — I should advise any one desirous of starting in this business to buy in spring a few frames-hives from a trustworthy bee-master: they will cost him from $10 to $15 a piece if they are Italians. It is better to start with one good colony than with 10 bad, and it will be found the cheapest plan in the long run.

20 The care and management of the first colony. — If the first colony has arrived by train, take it home from the station in a *spring*-waggon. If the bees are excited, and make a noise, put the hive in a shady place until they become quiet; you can, then, place them in their permanent location and open the entrance.

21 Position of the hives — Put them in a spot where the land is dry sandy, and free from grass. They should face the south, and be 3 feet apart every way (1). Flowers need not surround the apiary, for the bees know well enough where to find them; but it must be in the shade, particularly if the hives are not painted white.

22 How to transfer bees from an old to a new hive — Another way is to buy common hives in spring — they will cost you about $4 or $5 each — and to transfer the swarms into the frame-hives. Stoop them forward at an angle of 20° to 25°, that the bees may build in the direction of the foundation-furnished frames.

Another plan is to take the bees, comb and all, out of the old hive and put them into a frame-hive. Thus, having thrown a few puffs of smoke with the fumigator into the common hive, you turn it upside down, and with a chisel, detach the walls; the combs are separated with a knife, the bees are brushed into the new hive with a feather

(1) Principio sedes apibus statioque petenda.

and the combs are fastened into the frames with tape, little pieces of wood, or with small hooks, all of which must be removed 6 days afterwards (fig. 20). Do not leave more than three lines between the frames. The bees will, of their own accord, complete the fastening of this transferred combs.

This operation should not take more than an hour, at most, and ought to be carried on in the middle of a fine day in the honey-season

Swarming.

22. SIGNS OF SWARMING.—During June and July, if the weather is favourable, the colonies having become strong will begin to swarm. The appearance of the drones, and a loud and sonorous buzzing, are the precursors of the departure of a swarm. But the most certain sign is the construction of royal cells, a fact which cannot be ascertained except with a frame-hive.

Fig 21 Swarm.

24 HOW TO TAKE THE SWARM.—About noon, on a fine day, at a signal given, the bees, having drunk their fill of honey, come forth in close ranks on the platform of the hive. A cloud of them fills the air on every side; a murmur, pleasant to the master's ear, is heard, and after a few minutes, they attach themselves to the branch of a tree in a pear shaped group (1) (fig. 21).

As soon as they are quiet, place your hive under the bunch and shake the branch: the whole swarm will fall into the hive in one mass. When they are all in, set the new colony, quietly, in its allotted place.

25. SECOND SWARMS.—Eight or ten days after the first swarm has left, if you hear the song of the queens: peeep... peeep... koooa... (2) koooa.... you may expect the issue of another swarm on the first fine day; and the next day, certainly not later than the third day, a third swarm may leave but this is of rare occurrence. To gain any profit from second swarms, which are always weak, they must be put, two together, into the same hive.

26. HOW TO COUPLE WEAK SWARMS.—When two second swarms have left the parent hive the same day, wait till evening, and shake down one in front of the other. If one of the second swarms has left several days before the one you have just taken, take the latter as soon as the bees have all gone in, and shake it down in front of the one that has just begun to work. There will be no more swarms 17 days after the first has left.

27. THE INCONVENIENCE OF THE NATURAL WAY OF SWARMING.—The above relates to the natural way of swarming. Now, it is clear that by this fashion the parent hive is left without a fecundated queen for 20 days, which, without mentioning the risk of losing swarms, causes a great loss of time, not only to the bee-master, who is obliged to watch for swarms, which very often do not go off at all, but also for the bees; as all this time (during the honey harvest too) they do nothing.

Artificial Swarming.

28 HOW IT IS MANAGED.—This is the causing of swarms to leave the hive by the art of man; but it is conducted in strict accordance with the laws of nature.

To succeed perfectly in this, queens are necessary. You can buy them or breed them, as you please. Having them at hand, place an empty hive with the frames furnished with foundation, or with old combs, near the one whose bees you wish to divide. After having taken off the top of the latter, take the brood-frames and put them, with the bees, into the new hive, taking care to substitute an empty frame in the room of each one you remove. Every brood-frame should be changed except the one in which the queen is found When this is done, place your new swarm in the empty hive. But they have no queen; so you must take a cage in which you have confined a queen alone, and put it in the middle of the brood-frames. On the evening of the third day, take away the sponge-stopper of the cage and replace it by a small piece of fresh comb; the bees, during the night, will liberate their queen who will immediately set to work and lay. You

(1) Ergo ubi ver nactæ sudum camposque patentis,
Erumpunt portis: concurritur æthere in alto;
Fit sonitus; magnum mixtæ glomerantur in orbem,
Præcipitesque cadunt; non densior aere grando,
Nec de concussa tantum pluit ilice glandis.

(2) —Namque morantis
Martius ille aeris rauci canor increpat, et vox
Auditur fractas sonitu imitata tubarum.

should not open this hive for a week to see if there is brood; if there is, it is an indisputable proof of the presence of a queen.

29. THE MOTHER-HIVE AND THE SWARM: THEIR HISTORY.—What happens, after the artificial expulsion of a swarm, is as follows: bees always return to the same place, whether their hive has been removed to another spot, or another has been substituted for it.

The old bees which were abroad return to the same place, i. e. the mother-hive, from which all the brood-frame was removed, except that containing the queen: finding her all right, although a good half of the other bees are wanting, they take no notice of the loss and set to work as energetically as ever.

The new swarm, consisting entirely of young bees, remains idle for two or three day; but soon, these young ones, and the numerous freshly hatched brood will display a wonderful activity, and very often make more honey than the mother-hive bees.

30. WHEN ARTIFICIAL SWARMS SHOULD BE MADE.—They should be begun some days before the time when the natural swarms may be expected; on a fine day in the height of the honey-season. The whole work may be begun and finished the same day.

31. HOW TO PREVENT NATURAL SWARMING.—The plan practised by Baldwin to this end, consists in uncapping the combs filled with honey which are found among the brood-frames, thus compelling the bees to work in the sections, and keeping them back from swarming.

But the surest plan is to cut off the wings of the queen as soon as she is fecundated. It is the two large wings that must be severed, one on each side, and not two on one side, for the bees would, sooner or later, get rid of a queen left entirely wingless on one side.

When you want to catch the queen, don't take hold of by the belly, but by the shoulders or the throat; hold her between the finger and the thumb of the left hand, rest her on your knee that her feet may lean against it, and operate upon her with the scissors held in your right hand.

Italian Bees.

32 For a long time endeavours have been made to introduce a new sort of bee, hardier and more vigorous than the old race: and the consequence has been that the yellow bee of Italy (1) has been imported into this country, a trial of 20 years in the United-States having proved perfectly successful.

The Italian bees (fig. 22 *a b c*) imported into America by Mr. Par-

Fig 22 (*a*) queen. (*b*) worker. (*c*) drone.

sons, in 1860, can easily be distinguished from the common black bees by three yellow bands situated at the lower part of the belly. They are far superior to the black: 1st, the proboscis is longer; in fig 2, the proboscis of the black bee would extend no farther than *a*; 2ndly, they work both earlier and later; 3rdly, they guard their hive more easily 4thly, they are not subject to the attacks of the moth; 5thly, the queen is more prolific, and more easily discovered, when wanted; 6thly, they are less given to rear *brood* in winter; 7thly, in times of scarcity they gather food while the black bees demand artificial nourishment; 8thly, they are gentle, and less irritable, which quality alone ought to secure their adoption; 9thly, the proboscis being longer, they can extract the honey from red clover, which is more than the black bees can do; 10thly, as they are much more active, they have the advantage of at least two weeks over the black sort, which, considering our short season, is an enormous gain.

33. HOW TO ITALIANISE A HIVE.—The changing of the queen is enough to change the whole colony. Consequently, all you have to do, when you wish to Italianise a hive, is to take away the black

(1) Alter erit maculis auro squalentibus ardens;
Nam duo sunt genera, hic melior, insignis et ore,
Et rutilis clarus squamis.
Hæc potior soboles; hinc cœli tempore certo
Dulcia mella premes, nec tantum dulcia, quantum
Et liquida et durum Bacchi domitura saporem.

queen and replace her by an Italian in the way pointed out in the paragraph on artificial swarming.

These queens only cost a dollar, and are sent by the breeders, with all guarantees, in little cages which travel well by post (fig. 23). When you are going to introduce her, open the cage before a window to allow the workers to fly out, and leave the queen alone in her cage (1).

(1) The queen travels together with the bees given her as companions—*in the same compartment.*

34. HOW TO FIND THE BLACK QUEEN. — When you want to find the black queen to put an Italian in her place, raise the top of the hive without noise, and then, without smoke if possible, take out the first frame at the side of the hive: examine it, and place it on an unoccupied stage near you, or preferably, on a frame-bearer (fig. 24);

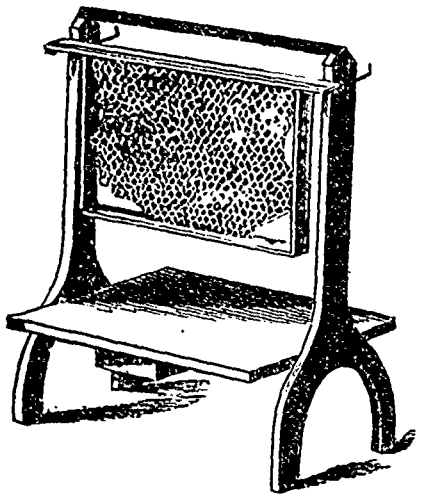


Fig. 24 Frame-bearer.

examine the other frames one by by one, moving them up to the place left by the one you removed. If you cannot find the queen at the first inspection, you must try again; but if you are again unsuccessful, you had better remit any further search to a later period.

It is easy to recognize the queen by her size and by the behaviour of the other bees towards her. It is impossible to mistake her, and an accustomed eye will not fail to discover her at the first inspection in four or five minutes at most.

The young black queens are often timid, run over the combs, and hide themselves in the corners and on the stage of the hive.

35 INTRODUCTION OF ITALIAN QUEENS. — As soon as you see the common queen, take her by the wings, or shoulders, remembering that a fecundated queen never stings, and place her in a cage prepared for her: you may want her hereafter. Now, place the cage with the Italian queen between two frames, and shut up the hive. Forty-eight hours afterwards, set her free on a central frame, and watch her reception. If the bees attack her, climb on her back, and pull her wings and legs, put her back at once into her cage, and wait thirty-six hours more, after which she will generally speaking be well received.

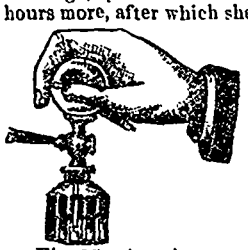


Fig. 25—Atomizer.

Sometimes, it is useful to sprinkle the queen and working bees with a thin syrup of sugar and water, mixed with some aromatic scent, and for this purpose, the *atomizer* (fig. 25) will be found handy. The object is to give the same smell to both queen and workers (*1*).

As a rule, never introduce a strange queen into a colony which is in a doubtful condition; take care that the health of the bees is good, and that everything is in a proper state. Be sure that there is neither queen nor royal cell in the colony into which you desire to introduce an Italian queen; you must know, moreover, that old bees make more fuss about accepting strange queens, than do the younger ones; and again they are easier to deal with for this purpose in honey-time than in a time of scarcity.

Breeding Queens.

36. NUCLEUS OR KERNEL.—If your Italian queen has been properly received, in five or six weeks you will have none but Italian bees in the hive; and as soon as the drones make their appearance, you may begin to rear queens to introduce into your colonies of black bees.

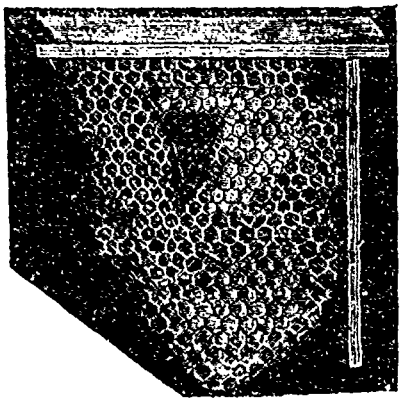


Fig. 26—Royal cells and brood.

For this purpose, take away the Italian from the hive—you can give her to an artificial swarm — the bees, deprived of their queen will begin at once to build 10 or 15 royal cells (fig. 6, 7). Nine days afterwards cut away these with a penknife, and put them to little swarms composed of two or three frames, these are called *nuclei* or *kernels* Take care that there is neither queen nor royal cells of the old sort in these frames, and only give a single Italian cell to each nucleus (fig. 26); for if you leave any, the first queen that hatches will destroy the occupants of the other royal cells

It is not necessary that their should be small hives for these nuclei; the large ones will do if the partition (fig 27) is used: this, by contracting the space occupied by the bees will keep their habitation warm enough.

Inserted cell.

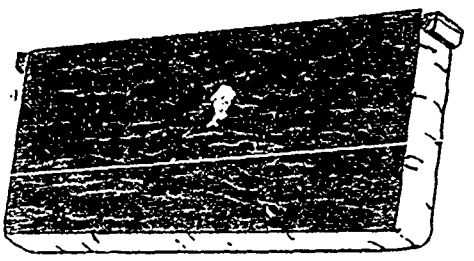


Fig. 27. Partition.

In a week your young queens will be hatched, and six days afterwards, they will go out for the purpose of copulation. If you wish them to unite with only Italian drones, you must reduce the entrance holes to of all your black bee-hives to a quarter of an inch in height, to keep their drones in doors, otherwise your Italian queen meeting with the black drones will only produce hybrids.

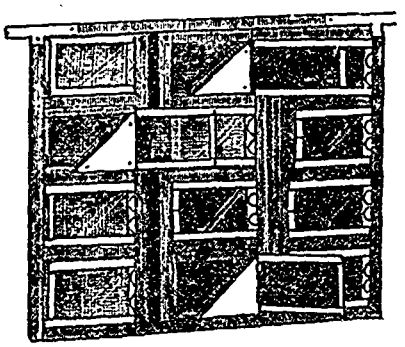


Fig. 28—Davis' queen nursery.

A colony of hybrids is that in which the bees are crossed — black and Italian — some of them with two or three yellow stripes, others with one, and the rest all black.

38 DAVIS' BROOD-HIVE.—Dr. Davis' contrivance is very useful in rearing queens (fig. 28) It is intended to cause hatching of several queens, even a dozen at a time, in the same hive Each royal cell is placed, with a little honey, in a cage. The brood-frame thus prepared is placed in the middle of a very strong colony instead of the central frame, which is removed. The young queens are soon hatched, and can be at once used for nuclei, or artificial swarms, or for colonies of black bees, whose queens have been removed.

The same colony may serve for several hatchings of young queens. After having removed the royal cells give the workers' eggs of your pet queen (see art. 39). These queens will always produce Italian

(1) Hue tu jussos adsperge sapores,
Trita melisphylla et cerinthæ ignobile gramen,
Ipsæ consident medicatis sedibus.

drones, even if fecundated by black males. If all their progeny do not show the three yellow stripes, you have only to replace them at a later period.

38. EGG-LAYING WORKER-BEES.—In rearing queens, the chief danger is the production of laying workers. To prevent this, brood-combs in the egg or larva-state—an inch square is enough— must be given to the nuclei where the queen-cells are, every fourth day.

The laying-workers are those common bees whose *ovaries* are sufficiently developed to produce eggs. They only lay drone-eggs, and as drones don't work, the colony is soon reduced to a state of pauperism.

39. HOW TO GET RID OF THEM.—These troublesome creatures only make their appearance in hives that have been long without a queen, or without eggs. It would be useless to offer a queen to colonies in this condition; they would kill her in a moment. You must either unite them to other hives having a queen already, or shake them out of the frames in a place at some distance from home. the bees will all return to their hive, but the laying-workers not knowing or having forgotten, its situation, will lose their way. It will then be safe to introduce a queen to the brood.

40. QUEENS CAN BE SENT BY POST, AND HIVES BY RAILROAD.—If you wish to send queens by post, place them with three or six young bees in little cages- provided each with a small piece of sponge dipped in clarified honey. They will bear a journey of from 5 to 10 days in summer (fig. 23). No queens are worth rearing except the Italians, and, with a small boy to help you can bring up two or three thousand a year—they fetch $1 a piece.

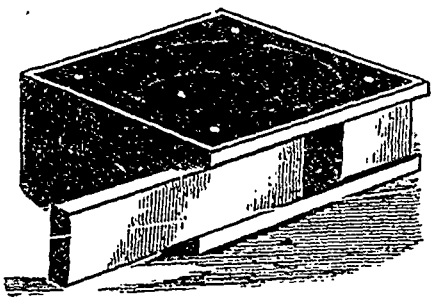


Fig 23. Cage for queen.

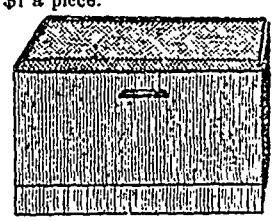
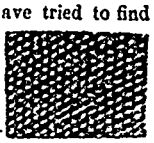


Fig. 29. Hive with net.

In sending hives of bees by railroad, they should be as well ventilated as possible, consistently with the necessity of confining the bees. This is best done by nailing a piece of wire cloth above the frames, after the top has been removed (fig 29). The frames must be fastened in securely, and the hives must travel in a shady part of the car.

Foundation.

41. ITS INVENTOR.—For several years people have tried to find out some means of replacing the combs by artificial preparations; but it was not until 1874 that F. Weiss, a German, succeeded in making a cylinder-mill to produce successfully fluted combs.



F 30 Foundation

42. FOUNDATIONS OR FLUTED COMBS (fig 30).— They are made by passing a sheet of wax between the two cylinders of the machine (fig 31). The wax leaves the machine with its surface perfectly marked with the bases of the cells.

These combs are very thin a pound of wax will press into 10 square feet of them and are called by the French *rayons gaufrés*, and by the Americans *foundation*. The people of the U. S have succeeded admirably with them.

43. HOW TO CUT AND ARRANGE THE FOUNDATION.—Carlin's foundation-cutter is use to advantage in cutting out the sheets of wax rapidly and regularly (fig. 32).

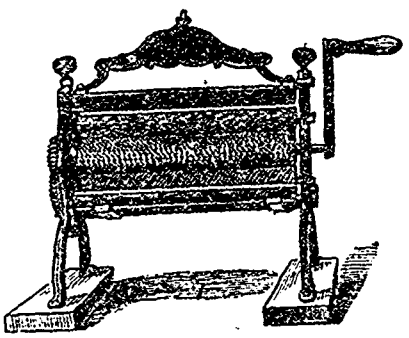


Fig. 31. Foundation-mill.

To attach the foundation to the frames and to the sections, white glue may be used, or a hot mixture of two parts of wax to one of resin.

Fig. 32. Carlin's foundation-cutter.

44. ADVANTAGES OF AND MANNER OF USING FOUNDATION. — It is used for swarms, to make them build in a straight line (fig 33); for weak colonies; but more specially to *bait* the sections, and thus induce the bees to go to work sooner. They begin at once to build up the cells, and often commence filling them with honey before they are finished; in the same fashion, the queen lays her eggs in them whilst, as yet, they are only, so to speak, sketched out.

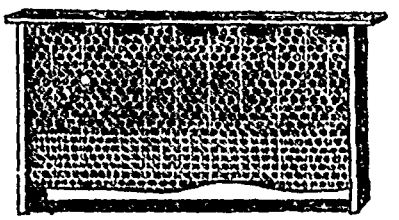


Fig. 33. Frame with foundation.

In using the foundation, the bees no longer make an unnecessary number of drone-cells—a vast advantage—and when we remember, that the manufacture of these foundations saves such an expenditure of wax, one pound of which costs 15 to 20 lbs. of honey, we cannot wonder that the invention of foundation has caused a revolution in apiculture.

Honey Extractor.

45 HOW TO EXTRACT HONEY FROM THE COMB. — The *extractor* is another most useful instrument (fig 34.

The bee-master has always wished for some means of extracting the honey from the combs, without injuring them, that they may be immediately returned to the bees, the honey drawn off pure, and the bees saved the long and arduous task of constructing fresh combs.

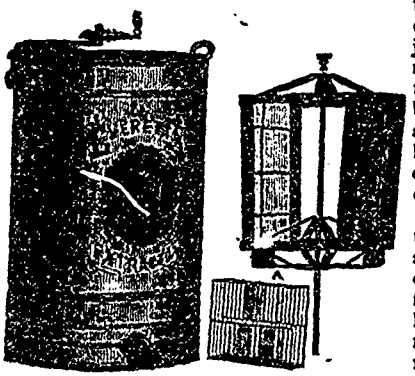


Fig. 34. Honey extractor.

The extractor satisfies this object completely; and as the frame-hive can be used exclusively for the production of liquid honey, the bee-master has only to remove the frames of the upper story, as soon as they are full and, after *uncapping* them with the knife (fig. 35), that is to say, after having taken off the tops of the cells, place them in the extractor, and turn the handle. The centrifugal force will drive out the honey against the sides of the vessel.

To do this quickly, take an empty hive, and place the frames in it, after you have shaken or brushed off the bees. The frames you remove should always be replaced by fresh emptied ones, that you may not be obliged to return again to the same hive. You may extract every fourth or fifth day, during the height of the honey-season.

Fig. 35. Uncapping knife.

46. THE USEFULNESS OF THE EXTRACTOR. — The object of this instrument is to get pure liquid honey from the combs, without giving the bees the trouble to build them; but another use of it is to make the queen lay when she is lazy, by extracting the brood-frames, and again, to extract the unwholesome honey which may be found in the uncapped cells in autumn.

A hive managed solely with a view to the production of extracted honey, gives a third more than if it were treated with a view to the production of honey-comb.

Practical work in the busy season.

47. CARE TO BE TAKEN OF THE BEES. — When once the swarms are made safe, the bees give very little trouble. Watch your colonies, and see that their population is abundant, that their protection of the hive may be sufficient, but above all, that they may amass plenty of honey during July and August. Their provision will be hastened if you supply the frames with foundation (figs. 19, 33). Inspect each hive two or three times a week, removing all the full sections, and replacing them by empty ones: take them away the moment they are finished without waiting for them to be soiled by the bees.

This operation should always take place in the middle of the day while the bees are at pasture, and the fumigator should invariably be used.

48 TREATMENT OF COLONIES WHICH REFUSE TO WORK.—If the bees collect outside the hive, and hang there like a bunch of grapes, or cluster like a swarm, it is a sign that the hive requires ventilation, which may be given by raising the top, or the back of the hive, a quarter of an inch. If that it not enough empty the brood combs which contain honey with the extractor.

If the hives are painted white and are in the shade you need not fear that bees will ever be idle.

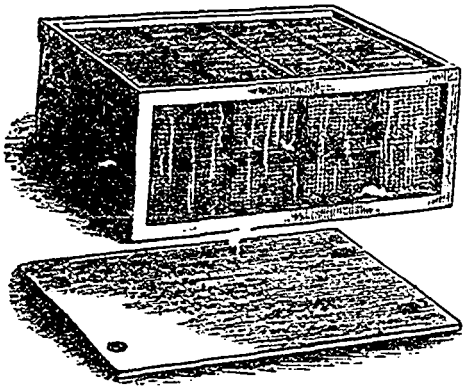


Fig. 36. Box for sections.

49. CARE OF THE HONEY AND WAX. — When the bee-master has collected a number of sections in good condition as to whiteness and cleanliness, as well as several gallons of fine liquid honey, the two sorts should be packed for sale, in suitable cases (fig. 36), and in bottles containing one or two pounds of honey each (fig. 37).

fig. 37 One pound glass jar.

The harvested honey should be kept in a dry place, warm enough to prevent the combs from imbibing moisture, which, sweating, as it were, over the wax would cause it to lose colour, and the honey to crystallise in the cells. The unfinished combs should be put into a large, well-closed box, and kept till next spring, when the bees will be thankful for them.

As to the old bits of comb and the tops of the cells, they had better be passed through the *wax-extractor* (fig. 38), which will convert them into a pure yellow wax.

50. HOW TO PREVENT ROBBERY.—When the bees can harvest no more honey, they hunt about everywhere to find it. Weak colonies had, then, better be on their guard. To prevent robbery, there must be no colonies without a queen, or weak in number: take care never to leave in the apiary any piece of comb, or any honey lying about. But if the theft has already begun, of which the wild behaviour of the bees will give you notice, never change the situation of the colony, but join it to another, and close up the entrance so as admit only one bee at a time.

The Wintering of Bees.

51. NEVER WINTER WEAK COLONIES.—He who would succeed in keeping his bees over the winter must have no weak colonies. Do not destroy them; that would be extravagant. These weak hives have not enough young bees, and as they eat more honey than the strong colonies, winter over with less ease, and are always pillaged in the spring. Two of them should be put together, and this should be done immediately after honey harvest

As to those well-peopled hives that are honeyless—which may happen in a time of scarcity—the bee-master, before storing the bees

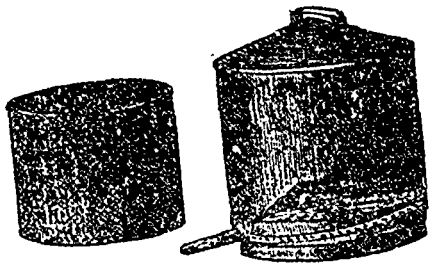


Fig. 38. Wax extractor.

in the cellar, should feed them with the *feeding-trough* (fig. 39). *Shuck's* feeding-trough is a simple affair in divisions, 12 inches long, which is fitted to the entrance of the hive, so that its bees can get in, while the trough excludes others from the outside. *Root's* trough is suited to the inside of the hive (fig. 40). You may give them inferior honey, maple-syrup, or sugar syrup, but no treacle.

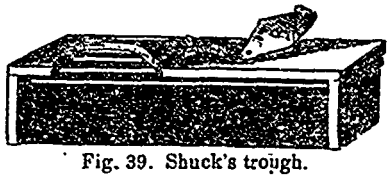


Fig. 39. Shuck's trough.

52. THE QUANTITY OF HONEY TO BE EXPECTED; THE TEMPERATURE, AND THE DEGREE OF LIGHT, IN WHICH IT SHOULD BE KEPT.—Every hive should retain from 25 to 30 pounds of honey, apart from the weight of comb. They ought to be placed, in November, or, if the season be fine, in the beginning of Dec., in a dry, dark cellar, where the temperature can be kept at 45° F. to 50° F. The ordinary farm cellars are very suitable, if they are dry and dark. Full ventilation must be given at the top of the hives by openings or stoppers of chaff, that the air may pass through the hives without any draughts which might prove the destruction of the bees.

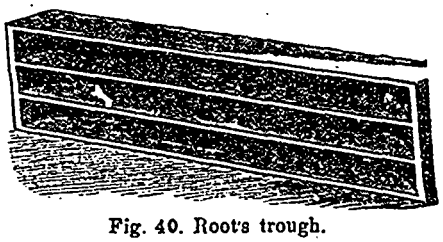


Fig. 40. Root's trough.

It is better to put the bees in winter quarters too early than too late; the weather would be dry rather than wet, and the evening when the bees are in repose should be the chosen time.

Diseases of Bees.

53. DYSENTERY. — The chief diseases and disasters of bees are attributable to *dysentery, foul brood*, and the *bee-moth* (*miller*).

A long spell of cold seems to produce dysentery, and so do too much wet, and bad food.

Fig 41 Damage from moths.

The greatest cleanliness as to the hive is observed by bees in their normal state, even in winter; but the moment they are affected by dysentery, their excrements, formerly dry, become liquid, and fall over the combs, staining them, and giving them a horrible taste of the brood-comb The sorely-tried colony is soon reduced to nothing.

Give the diseased hive some frames filled with honey from which the cell-tops have been removed Clean and change the bottom-boards (1).

54. FOUL BROOD. — This complaint is contagious, and affects the brood by causing it to emit an abominable smell It ruins a colony in no time, and exposes it to robbery, which in its turn transmits the disease by the dishonest bees' feet. It appears to be seated in the honey.

(1) "Nam sæpe favos ignotus adedit
Stellio et lucifugis congesta cubilia blattis
Immunisque sedens aliena ad pabula fucus,
Aut dirum tineæ genus."

Fig. 42. Larva of moth.

The only remedy is a solution of 128 grains of salycilic acid with 128 grains of borax, in 16 oz. of water: with this, the combs, the bees, and the brood, should be sprinkled by means of the atomizer (fig. 24).

55. BEE-MOTH (Miller).—This insect only attacks the combs (fig. 41). It is in the larva, or caterpillar state, when it attacks the hives. It penetrates at night into the interior of the hive, and lays its eggs which stick to the bees' feet, and are thus carried into the middle of the combs. Only weak colonies suffer from its attacks. Italians drive them away with ease.

Fig. 43. Moths.

Negligence is the chief cause of these disasters. If the bee-master will follow our instructions with care, he will never see his colonies perish, and he will issue triumphantly out of all his troubles.

Honey-bearing Plants.

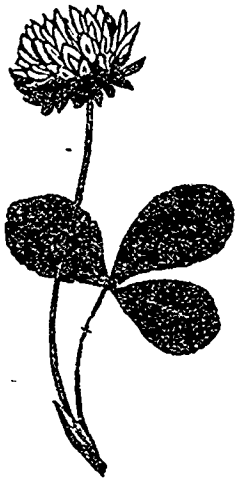


Fig. 44. Alsike clover.

56. ALSIKE CLOVER, MIGNONNETTE, LIME-TREE (Bass-wood). — The bee-master who will take trouble to plant in his grounds young maples, will be well repaid by their beauty, and by the profit derived from their flowers. Let him grow plenty of Alsike clover (fig. 44). Sheep and bees are equally fond of it. A bed of mignonnette is always frequented by the bees, and it lasts till the autumn frost (29th of November, 1880, —A. R. J. F.) The lime-tree, which blossoms in July, affords a profusion of honey equal to that derived from white clover (1).

Many other plants deserve attention, but these are the chief, and they are always to be depended on.

Conclusion.

The great means of success is to keep your colonies strong in number and in health: bear this always in mind—never lose sight of it, and you will never fail of success.

KEEP YOUR COLONIES STRONG.

VETERINARY DEPARTMENT.

Under the direction of D. McEachran, F. R. C. V. S., Principal of the Montreal Veterinary College, and Inspector of Stock for the Canadian Government.

The Foot of the Horse and its management.

How the foot should be treated.

Having, in our last, seen what the common practice of the farrier is, in preparing and shoeing the foot, we will now see how it should be managed. From the time that the colt is a month old, his feet should receive the constant attention of his owner; the development of the bones, joints and muscles of the limbs is materially influenced by the care bestowed on the feet, in a state of domestication. Thus, we find that if the feet are neglected and allowed to grow long, they act as levers on the muscles and ligaments, altering the general relation of one part of the limb to another. Similar distortions take place when the foot is allowed to grow laterally, either turning inward or outward. In the hands of a skilful person, the foot and limbs are almost as capable of being trained and guided into shape as is a sapling. The importance of this attention in horses intended for speed, especially in trotting colts, cannot be over-estimated.

(1) "Pascuntur et arbuta passim
Et glaucas salices casiamque crocumque rubentem
Et pinguem tiliam (bass-wood) et ferrugineos hyacinthos.

Speed is especially dependant on mechanics, and it is just as essential to assist nature in the development of the requisite mechanical structure, as in the growth, form, and habits of the animal. We must, by proper attention to selection of sire and dam, ensure the transmission of the necessary temperament and inherited action, but we cannot obtain the maximum of perfection without attending to the proper developing of those parts which are essential, and none are more so than the feet and limbs.

Care must be taken that the foot does not grow too long, that it meets the ground with a level surface, and that any tendency to uneven growth may be checked; so that, when the time comes for the foot to be protected by an iron cover, the shoe, the farrier shall find a foot of proper form, and bearing a proper relation to the limb of which it is the digital extremity.

To insure good feet in a young horse, he should not be pastured in low, soft land: hill sides and dry land, where the foot not only meets with resistance, but is subject to friction and wear, will develop a foot of better form and harder substance than we find in low wet pastures, where the foot is always moist, and is not exposed to the friction necessary to keep it down: the foot, thus becomes large, wide spread, and of a soft quality. The difference is seen in the mediums-ized hard hoofs of the mountain-bred horse, compared with the large, flat, soft feet of the prairie-bred one.

While the former has feet so hard as to enable him to perform long journeys on hard, rocky roads without shoes, the latter cannot go any distance on a macadamised road without wearing the soft, spongy hoof down to the sensitive parts, rendering the animal lame and useless.

It is a mistake, therefore, to keep the feet too soft. The only preparation the foot of the colt requires at the hands of the farrier, is to rasp the wall level, and, if necessary, to shorten the toe to the proper length. The sole or frog must on no consideration be pared; the shoe should rest evenly on the crust all round, and it must present a perfectly level surface to the ground. The only object we have in applying the shoe is to protect the foot from being worn down by friction on the road, and the nearer we can keep it to the natural condition, the better.

The shoe being fitted exactly to the foot, it should be carefully nailed on five nails, or at most seven, should hold any shoe on a sound foot of good shape and quality of horn. The nails must not be driven high up, and in clenching, they must not be hammered too severely. The rasp is only to be used on the wall, to remove any superfluous horn which may overlap the edge of the shoe; and to smooth the clenches, but on no consideration to polish the wall.

Farriers will thus see that they give themselves a great deal of unnecessary trouble in paring the sole and frog, and in rasping away the unctuous covering of the wall: not only so, but by doing thus they ensure endless suffering to their victims, and very great expense and vexation to their customers.

It is remarkable how persistently horse shoers, the world over, will adhere to the destructive custom of paring the feet, and with what an expression of wounded pride they receive an order not to use the knife on the feet.

I do not hesitate to assert that it would save hundreds of thousands of dollars annually, in Canada alone, if the drawing knife and buttress were forbidden to be used in forges by any except the fitter of the shoes. It is strange, that the very men who ruthlessly remove nature's efficient protection for the sole are the first to suggest the necessity for substituting a leather sole in its place.

SHOEING THE ADULT HORSE.—The first step is the removal of the old shoe, which operation should be commenced

by the cutting of the clenches, which should be done carefully and with a sharp clench cutter, cutting or raising each one thoroughly: then, with the pincers taking the nails by the heads and withdrawing them, or, if worn close, by gently raising the shoe by the leverage of the pincers and removing it. The condition of the foot will suggest the necessary preparation—a sound healthy foot should be treated as we have recommended for the colts foot, while a foot altered in size and form by mismanagement or disease must be dealt with according to circumstances. Thus, some feet grow rapidly and require shortening, and even the removal of loose flakes of horn from the sole which are retained by the shoe. Others, again, will not bear the least interference, grow so little, and are so brittle, that it is, with difficulty the shoe can be attached in sound horn.

No specific rule can be laid down for shoeing; an intelligent farrier must use his judgement in dealing with each case, and that judgement should be guided by a sound knowledge of the anatomy and relation of the different parts of the foot; not, as is almost universally the case, subjecting every foot to the like paring, applying the same style of shoe to each, blundering on in ignorance, and treating the delicate structure of the horse's foot as if it were an inert substance of wood or iron.

In our next issue, we will consider the different kinds of shoes.

On the Etiology of the Carbuncular disease.

By L. PASTEUR.
Assisted by Messrs. CHAMBERLAND and ROUX.

ONE of the diseases which cause the greatest destruction of cattle is the *carbuncular disease*, or *anthrax*. Almost all portions of this country suffer from it; some in a slight degree and others very heavily. (1) The pecuniary loss from this disease is very serious in some localities, as, for instance, in the Department of Eure et Loire. Among the many herds raised there, there is hardly one which is not afflicted by it every year. Any farmer there considers himself fortunate, and even pays no attention to the disease, if his loss is not greater than from 2 to 3 per cent of the number of animals in his flock. This disease is known in all countries. In Russia it is particularly disastrous, and it is there called the *Siberian plague*.

For a long time the belief has prevailed that the carbuncular disease is due to various incidental causes, such as the nature of the ground, of the water, of the fodder; the methods of breeding and of feeding. Every cause has been invoked to explain its spontaneous existence. Lately, however, the researches of Messrs. Davaine and Delafond, in France, of Pollender and Brauell, in Germany, have called attention to the existence of a microscopical parasite in the blood of animals who have died of this disease. Moreover, rigorous researches have disputed the doctrine of the spontaneous generation of microscopical beings, and the effects of fermentations have been attributed to specific microscopical germs. From these causes, the idea has arisen that possibly animals suffering from carbuncular disease may have acquired its germs, which are the germs of the parasite, from the exterior world, and that there is not, properly speaking, any spontaneous origin to this disease. This opinion became still more definite when, in 1876, Dr. Koch, of Breslau, published that the bacteridia, in its vibrionary or cacillary shape, may be resolved into germ corpuscules or spores.

Two years ago, I had the honour of submitting to the Minister of Agriculture and to the President of the Council General of Eure et Loire, a project of research on the etiology of the carbuncular disease, which was accepted with alacrity. I also had the good fortune to find in M. Manoury, Mayor of the Village of St. Germain, near Chartres, an enlightened agriculturist, who had the kindness to allow me to establish on his farm a small flock of sheep, under the same general conditions that are usual in the Beauce for sheep penned in the open air. Moreover, the Superintendent of Agriculture very obligingly placed at my disposal two shepherd pupils of the School of Rambouillet, to watch and feed the sheep.

(1) France.

The experiments began in the first days of August, 1878. These consisted in feeding certain lots of sheep with lucerne, watered with artificial cultivations of the bacteridia of carbuncular disease, containing the parasite and its germs. Without entering into details in this place, I will give the following results of our experiments:

Notwithstanding the immense number of spores of bacteridia swallowed by all the sheep of one lot, many of them escape death, often after being visibly ill; others, in smaller numbers, die with all the symptoms of spontaneous carbuncular disease, after an incubation, which may extend to eight or even ten days, although towards the last the disease assumes those suddenly violent characters which have led some observers to think that the period of its incubation is very short.

The mortality may be increased in a marked degree by mixing with the food soiled by the germs of the parasite, bodies with sharp points, such as the pointed ends of thistle leaves, and the barbs of oats cut up into fragments about a centimetre in length (2)

It was important to ascertain if the *post mortem* examination of animals dying in these conditions would shows lesions similar to those which are observed in animals who die spontaneously in sheep folds or in open air pens. It was found that the lesions in all cases were identical, and the nature of these lesions authorise the belief that the disease begins in the mouth and in the back pat of the throat. The first observations of this kind were made in *post mortem* examination, conducted under our own eyes, by M. Boutet and by M Viguot, a young veterinary surgeon, and a gradute of the School of Alfort. Both of them have helped us with graet zeal during all our experiments in St. Germain.

The idea that sheep which die spontaneously from the carbuncular disease in the Departement of Eure et Loire are infected by the spores of the bacteridia of this disease mixed with their food, acquired more consistency in our mind from these examinations. But whence come the germs of these bacteridia? If we reject every theory of the spontaneous generation of this parasite, we must direct our attention to the animals buried under ground.

We must here explain what is done when an animal dies spontaneously from carbuncular disease. If there is an establishment in the neighbourhood for skinning animals, the body is taken there. If no such establishment is in the neighbourhood, or if the hide is of little value, as is the case with sheep, a grave is dug from 0.50 (3) to 1 metre deep and the body is thrown in and covered over with earth. This grave is dug wherever the animal has died, or in some neighbouring field, if he dies in a stable. We may ask: What happens in this grave, and is there in it any cause for disseminating the disease? Many persons will answer in the negative, for Dr. Davaine has ascertained by accurate experiments that an animal who died of anthrax cannot, after putrefaction, communicate the disease. Very recently numerous experiments have been made by one of the eminent professors of Alfort, a great partisan of the spontaneousness of all diseases. He has reached this conclusion: "That waters charged with the blood of animals who have died of carbuncular disease; that composts made by stratifying earth, sand, and stable manure with remains of bodies of dead sheep brought from Chartres, have never (by inoculation) causee the least symptom of carbuncular disease." (Colin, *Bulletin de l'Académie de Médecine*, 1879) But here we must take into account the difficulties of this research, difficulties of which M. Colin was entirely unaware. To take specimens of earth from the fields of the Beauce, and show in them corpuscules from one to two thousandths of a millimeter in diameter, capable of infecting animals with the carbuncular disease, this is in itself a difficult problem. However, by proper washings, and by making use of the susceptibility of Guinea pigs and rabbits to contract the carbuncular disease, something could be done if the parasites of this disease were the only ones in the earth. But the earth must contain an infinite multitude of microscopical germs of various species, and in the cultivation of these on a living animal, or artificially in vessels they interfere with one another. During the last twenty years I have often called the attention of this Academy to the struggle for existence between microscopical beings. I may add that to isolate the carbuncular bacteridia from a portion of earth in which it may exist as germs, recourse must be had to special methods, whose application requires the most delicate attention. The action of air, of vacuum, changes in the nature of the media of cultivation, influence of variations of temperature;

(2) About 4½ lines.
(3) From 17 to 38 inches.

these are the means which must be used to prevent one germ from hiding the action of another. Any method of research which is not characterised by the most careful attention is powerless, and negative results only prove that, with the conditions in which the observations were made, the bacteridia did not show itself. The main argument presented by the eminent professor of Alfort is that the bacteridia disappears from the body of an animal as soon as it putrifies. This is an accurate statement, and the fact was known by those who flay and cut up the bodies of dead animals long before it was confirmed by Dr. Davaine. I have often heard these men, when handling the dead bodies of horses who had died of anthrax, when I put them on their guard against the danger they were running, say that there is no danger when the body is in an *advanced* state; the danger only exists when it is still warm. Although this fact is not strictly accurate, it agrees very well with what is true. In a previous investigation, published by M. Jaubert and myself, may be found the true explanation of the phenomenon. As soon as the bacteridia in its filiform state is deprived of air, if it is placed, for instance, in vacuo, or in carbonic acid, it resolves itself into granulations of great tenuity which are dead and innocuous. Putrefaction places the bacteridia precisely in these conditions of disaggregation. The germ corpuscules or spores do not go through the same process, as was ascertained by Dr. Koch. At any rate, as the animals at the time of their death only contain the filiform parasite, putrefaction must destroy it entirely. If this opinion was accepted as explaning the facts that take place in nature, we should only have an imperfect idea of the truth.

When a horse, a cow, or a sheep, which has died of the carbuncular disease, is buried in the ground, we may imagine that in most cases some blood finds its way out of the body, even if the animal has not been wounded. A habitual characteristic of this disease is that at the time of death, blood runs out through the nostrils, through the mouth, and even in the urine, which becomes red with blood. Besides, several days must elapse before the bacteridia is resolved into innocuous granulations by the gases free from oxygen which are produced by putrefaction. Meanwhile the excessive swelling of the dead body causes the liquids to run out through the natural openings, and through such ruptures as may exist of the skin and other tissues. The blood and other matters thus mixed with the surrounding portions of aërated earth are no longer in the same conditions as those of putrefaction, but rather in the conditions of artificial cultivation, suitable for the formation of the germs of the bacteridia. Does experiment confirm these preconceived ideas?

We have mixed blood from animals who had died of this disease with earth watered with yeast extract or with urine at the ordinary temperature of summer, and at such temperatures as are maintained by the putrefaction of dead bodies. In less than twenty-four hours, multiplication and production of germ corpuscles of bacteridia have taken place from the bacteridia in the blood. These germ corpuscles may afterwards be found in a condition of latent life, ready to develop, ready to propagate the disease not only after weeks of stay in the earth, but even after years.

But these are only laboratory experiments. We must ascertain what happens in fields exposed to the open air, and to all the alternations of dryness and moisture. In the month of August of 1878, we buried in a garden of the farm of M. Ma..oury, a sheep of his flock which had died of the carbuncular disease, as verified by a *post mortem* examination Ten months after this, and also fourteen months afterwards, we took up earth from the grave, and we easily ascertained in this earth the presence of the germ corpuscules of the bacteridia, and, by inoculation on Guinea pigs, we caused their death by the carbuncular disease. Moreover, and this is a circumstance worthy of note, the same investigation was carried on with earth from the surface of the grave, and the germ corpuscles were found to exist, although the earth of the grave had not been disturbed in the interval. Finally, similar experiments were made with earth from graves in the Jura of the depth of two metres, (1) in which had been buried the bodies of cows that had died of this disease in the month of July, 1878. Two years afterwards, which was quite recently, we have collected earth from the surface, and we have obtained deposits from it, which gave rise to the carbuncular disease. Three different times in this interval of two years we have obtained carbuncular disease from this same surface earth. We have finally ascertained that the germs on the surface of graves, in which animals are buried who have died of this disease, may be found after the operations of cultivation and after the gathering of crops. These last experiments were made in several places on the farm of M. Manoury. When these experiments were repeated on earth situated at a considerable distance from the graves, no carbuncular germs have been obtained.

(1) 6 ft. 4 inch.

I should not be surprised if, while I am speaking, doubts should rise in your minds concerning the accuracy of these observations. For how can the earth, which acts as a filter so thoroughly, allow microscopical germs to rise to the surface? Such doubts could easily find a justification in the experiments which M. Jobert and I have published. We have announced the fact that water of springs which rise from the earth, even from a moderate depth, are so entirely free from germs that they cannot produce a change in those liquids which are the most easily affected. The waters of springs, nevertheless, rise below portions of the ground through which rain-waters are constanly passing, even during centuries, and their tendency is to carry downwards the finest particles of the earth situated above these springs. There is certainly a great difference between such results and those to which I have called your attention, in which microscopical germs rise from below, even from great depths, in a contrary direction to the flow of rain-water. Here is certainly an enigma. The members of this Academy will certainly be surprised to hear the explanation of it. You may even be astonished that the theory of germs, but lately born from experimental research, has in store such unexpected revelations. Earth worms are the carriers of germs, and it is to them that we owe it that the terrible parasite of carbuncular disease is brought to the surface from the depths of the earth, for it is in the little cylindricál agglomerations, and in the finer pellets voided by these worms, and deposited on the surface after heavy dews and after rains that we find the germs of the carbuncular disease, together with many other germs. We may, by direct experiment, ascertain that it is to this agency that is due the transfer of the germs to the surface. If, in a volume of earth, in which spores of the bacteridia have been mixed throughout the mass, we leave a number of earth-worms for several days, we shall, on opening their bodies, so as to carefully extract the earthy cylinders which fill their intestinal canal, find in these a great number of spores of the bacteridia.

If the loose earth at the surface of graves of animals who have died of the carbuncular disease contains the germs of the bacteridia, often in great quantities, they must originate from the disintegration, by rain-water, of the cylindrical excrements of earth-worms. The dust from this disaggregated earth is thrown on plants growing at the level of the ground, and, in this way, animals in the open air find in some pastures the germs of the germs of the carbuncular disease, and become infected exactly in the same way as those in our experiments who fed on lucerne, soiled by artificial cultivation of the bacteria These results lead us to meditate on the possible influence of the soil on the etiology of other disease, on the danger of cemeteries, and the usefulness of cremation!

Do not earth-worms carry to the surface of the ground other germs which may, to the worms themselves, be as harmless as those of the carbuncular disease, but which may be the cause of disease to man and to domestic animals? They are, indeed, constantly filled with germs of all kinds, and in all cases the germs of the carbuncular disease are found associated with those of putrefaction and septicemia.

As to the prevention of the carbuncular disease, it seems easy of accomplishment. Animals must never be buried in fields in which fodder is raised or in which cattle are penned. Whenever such soils can be found, preference should be given, for burying dead animals, to sandy or calcareous soils, in dry situations, as such soils are not favourable to the life of earth-worms. The eminent Chief of Agriculture, M. Tisserand, lately told me that the carbuncular disease is unknown in the region of Savarts, in Champagne. The absence of this disease may be attributed to the fact that in the poor soils of this kind, as in the case of the Camp at Châlons, the thickness of arable land is not greater than 0.15 to 0.20 of a metre, and the subsoil is a bed of chalk in which earth-worms cannot exist. In a soil of this kind, the burying of a carbunculous animal may give rise to many germs, which from the absence of earth-worms will remain at a depth in the ground where they are harmless.

It would be very desirable to have careful statistics stating, in given localities, whether the carbuncular disease is prevalent or not, and also stating the nature of the soil, whether favorable or not to the presence of earth-worms. M. Magne, Member of the Academy of Medicine, has informed me that in the Aveyron, in

localities in which the carbuncular disease is found, the soil is argillo-calcareous, while in those in which the disease is unknown the soil is schistose and granitic. I have always understood that in these latter soils earth-worms do not abound.

I will take upon myself to close this communication with the assurance that, *if agriculturists desire it, the carbuncular disease will soon be a thing of the past*, because this disease is never spontaneous, and can only be found where it has been deposited, and where its germs have been disseminated by the innocent complicity of earth-worms; and, finally, that, in any locality, it will soon disappear unless the causes of its propagation are maintained (1).

POULTRY DEPARTMENT.

Under the direction of Dr. Andres, Beaver Hall, Montreal

Duck-Breeding.

There are many breeders and farmers who are finding out that it pays to breed ducks: that they are profitable stock. Ducks sell well in the market, and the demand for them is largely on the increase. They command good prices, for the flesh is rich and juicy when well and quickly fattened, and it costs less, in proportion, to raise them than others kinds of poultry. While it is desirable to have a pond or stream of water, it is not absolutely necessary to success, for large flocks have been raised where there was no such thing, but an artificial one was supplied from the pump or cistern daily. This may make a little work, but nothing worth having is obtained, or made profitable, without care in some shape. A great objection has been raised to ducks because of their being such great eaters, and we admit that a good healthy duck is a voracious feeder. But it is not necessary to give them all they can eat unless when they are being fattened for market, nor is it prudent to go to the other extreme and starve them.

We do not advise every one to raise ducks, but let those who have the right place for them try it.

Treatment of Canker.

In the April issue of the Journal I promised to give a treatment for canker. In ordinary cases, it will prove a sure and speedy cure. In cocks, canker will form in their mouths after fighting, or beaking, with others, although both may be healthy before. When the mouth and tongue only are affected, a cure is almost certain, but when you observe a difficulty in their crowing, a loss of appetite, and see the bird extending his neck with each breath, while a wheezing sound is noticeable, the canker has attacked the head of the windpipe, and by forcing it up well into the mouth you will find the parts much enlarged, and so filled with canker that effort in breathing must be labored.

You will also notice a sickly odor peculiar to this disease.

Now, wherever you find canker spots, scrape them off with a stick or pinch them off with a cloth: the more freely they bleed the better. If the affected part be the head of the windpipe, force it up, and scrape it clean; then wash out the bird's mouth, holding the head down, so as not to let him swallow any of the particles of poisonous matter. Then take a slender stick, with a small piece of sponge tied to one end, and wash well the mouth, throat, and entrance of wind pipe with zinc of myrrh, and as soon as the live flesh darkens dip your sponge into dry, powdered, burned alum, and apply to affected parts. Now let the fowl run for an hour, then give one teasponful, equal parts, brandy and lemon juice with red pepper mixed with it; after this a stimulating powder of some kind given dry twice a day, is beneficial. To sharpen the appetite, give the bird a raw egg; coop warm, or put in a sunny place, and feed on sweet milk and bread.

A. P. Journal.

(1) Kindly contributed by Dr. Girdwood.

The Leghorn Fowl.

We present this month a well written letter from Mr. O. E. Cresswell, to the *Journal of Horticulture* concerning this fowl.

"The nomenclature of our breeds of poultry and pigeons has not always been fortunate, and when once a race has become popularly known by some incorrect name it is next to impossible to get it changed. Cochins will always be so called in spite of the now undisputed fact that their home is China where they have for ages been known, in what fanciers would call an "unimproved" form. Hamburgs and Polish will still keep their names, in spite of the fact that no possible connection can be found between them and their reputed countries.

With some races it is otherwise: Spanish and the various sub-varieties of the breed which we know as Minorcas, Andalusians, &c., belong, certainly, to a breed which has been long spread over the Pennisula. As we find the French breeds, here and there, where attention has been given to poultry, kept in purity and with regard to certain points, but for the most past greatly confused, so the Spanish breeds retaining some general and defined characteristics of form in all minor points, are found of the most charming variety.

The object of this present letter is not so much to speak of the fowls of the Mediterranean in general, as of the Leghorn or Italian breeds in particular. If my memory does not deceive me, the Brown and White varieties of Leghorns which have become so soon popular in England came to us first from America, bringing their name with them. For once in a way there seems to have been really some reason for their bearing it. Doubtless birds of a certain degree of purity had gone straight from the port of Leghorn to some fancier in America, who appreciated the merits of the race and attempted to improve it.

When Leghorns were far less known than now, I was struck by the size and excellence of the eggs at an obscure village in the Alps at the extreme edge of the Italian frontier. I asked to see the fowls that laid them, and was not a little surprised to find them fair specimens of the two breeds of Leghorns; all of course, mixed together, and one or two hens among them of the same characteristics, but varying in color.

Since then at various times I have been able to observe the poultry in almost every part of Italy, and have found them more or less kindred to this breed, from the Alps to Cape Spartivento. At Leghorn, however, and in the neghbouring part of Tuscany they are decidedly finer than elsewhere, and far more uniform in characteristics.

I have specially observed some pretty Cuckoo specimens, and fancy that the admirers of the breed would not find it difficult to procure birds from which to raise a permanent Cuckoo variety.

For the most part, through all the Italian peninsula, the peculiar single comb, the Leghorn carriage, and yellow legs, are every where seen in the poultry. As to size, the fowls are simply miserable. I do not remember where, or by whom, Spanish, and Spanish sub-varieties were first classed with Leghorns as "the fowls of the Mediterranean;" certainly the classification was a very apt one, for there is a most distinct relationship between these Spanish and Italian races, in spite of their differences, especially of color. In both, the single comb is almost invariable; in both, the general form and carriage is alike; both are good layers of — for their size — large eggs, and both are poor mothers. Here, in Sicily, I still find some birds of the Leghorn type; but these have also evidently been many importations from the East and Spain.

Feather-legged and Spanish-like birds both abound in the ports, and the result is that common street fowls are at least twice the size of those in Italy. These constant importations seem to have invigorated the gallinaceous race, as much as

the various waves of immigration have improved the human population.

Those of your readers who show so much spirit and perseverance in the improvement of Leghorns may be glad to know, that in the land of their origin, their favorites evidently have a pedigree.

Mistaken Ideas.

We give to our readers an article taken from the "American Poultry Journal, which we think will bear upon the subjects we have heretofore tried to urge upon them, and will stand reproduction in our columns.

"One would hardly suppose, nowadays, that any sane man of any practical experience in domestic live stock would be unwilling to admit the superiority of thoroughbred animals over the common or mongrel stock of the country. But, after all, some fossil comes to the surface; once in a while, clinging to the old fogey idea of his ancestors, that the breed is in the feed all through. Among a class of men who ought to know better, similar ideas prevail in regard to Poultry. We know there is no kind of livestock raised on a farm, or at the suburban home, or on the cottager's limited plot, that is forced to take care of itself as poultry are. It is no trouble to convince the farmer that the gigantic Norman is better than the Mustang, or that the Poland-China, or Berkshire, pig is better than the "prairie rooter.' The stock raiser will easily yield to the force of truth when one points out the superiority of the short-horn to the Texan steer. After all, it seems to be an idea, with those who pay little attention to the cultivation of poultry, that there is little or no difference between the common dunghills and the improved breeds, as regards utility; and that, do as we will, hens will lay about so many eggs and produce as many chicks, let the care they may receive be what it may. Such a mistaken idea is founded on a grievous error, apparent in the raising of any kind of stock, simply because determined neglect and gross ignorance have prevailed, all along, with a certain class of our people, regarding the value of poultry stock as a productive and profitable industry. Those who consider poultry a worthless stock, must have kept the worthless kind, or else they know nothing about choice of foowls. What does the keeper of a flock of impoverished dunghills know about the real value of good fowl stock? Doubtless they are the very men who keep their fowls in the most wretched condition, by grudging every particle of sound food they may pick up, or steal from the adjoining pig-sty. Half the time, they are without any food at all, only what they may obtain from the stable floor, or the straw rack. They roost on winter nights under dilapidated sheds, on plough handles, or on old wagon trucks, and, are forced by sheer neglect to drink from the vile gutter, or of what is voided by animals. Is this way of keeping poultry in consonance with common sense? How can fowls be in a condition for the market under such slipshod treatment? How could they supply the table with the nice fresh eggs, while the owner wilfully refuses to give them the food required to make them.

Unfortunately, there are many such men keeping poultry in our midst, who never feed, care for, or house their fowls, from one year to another, and who still complain they do not get eggs. The man who expects a nice plump fowl for the table, and the luxury of a nice fresh egg for breakfeast, from such neglected stock, is meaner than the sneak thief we read about, who stole acorns from his neighbour's blind pig.

The Coming Sheep.

As I have for some time been praising the Hampshire Downs and expressing, pretty pertinaciously, my opinion that they are of all sheep the best suited to this climate and soil, I could not resist the temptation of laying before the readers of the Journal the high esteem in which they are held by Mr. Morton, editor of the *Agricultural Gazette*, England. Mr. Morton farms extensively, and can have no object except that of doing good to his brother farmers in stating what he thinks of this valuable breed. The following extract forms his leading article in the issue of the 13th of December last. I may mention that the best pen of Hampshire-Down lambs at the Smithfield-Club Show, last month, weighed 33 lbs. the quarter, at 9 months old: just 3¼ lbs. a week from the day of their birth! A. R. J. F.

The philosophy of evolution and development appears to be supported by the history of our live stock. Those who have traced out the rise and progress have also had to record the decadence and the fall of races of cattle and sheep. The old Longhorn, brought to perfection under the skilful management of Bakewell, waned and vanished under the superior qualities of the Shorthorn. It would indeed be touching upon delicate ground to hint that this pet of the great ones of the earth could be displaced from her temple. All things, however, come to an end, and exorbitant sums of money given for individuals for no special excellence except what exists, or is supposed to exist, potentially in the mysterious virtues of pedigree, savours of that luxury which precedes decay and dissolution.

The history of our chief breeds of sheep affords more than one instance of improvement and abandonment. Take, for example, the Leicester. Fifty years ago this breed might appropriately have been said to "rule the roast." Now, except in a very few counties and among a small minority of farmers, the Leicester has been superseded. The Cotswold sheep is said to be going out, even upon his own hills, and does not seem to be spreading rapidly in any other locality. The Southdown was to the Shortwoolled races as the Leicester was to the Longwools. Scarcely a breed was not improved by his touch, and for this reason alone, the Southdown will always hold a high position in the history of British flocks. Still, it must be confessed that the Southdown has ceased to be a rival for popularity with larger and more profitable, if less shapely, breeds of sheep.

One of the greatest advances in sheep breeding was made by Mr. Druce, of Eynsham, when he successfully crossed the Hampshire Down and Cotswold, and thereby produced the Oxford Down. The rise of this remarkable breed has been rapid, and it seems likely to extend further in its geographical distribution. It is undoubtedly a farmer's and a rent-paying sheep, possessed of great vigour of constitution, and it is in good hands. It has been hard run by the Shropshires, a race of mixed origin but of great excellence, which has also had its day. No doubt a future is in store for both these breeds, neither of which were known some forty years ago. An unfortunate predisposition to foot lameness is one of the weakest points in the favourite breed of the midlands, and a slowness in coming to maturity may possibly be also recorded as a frequent mark against him.

The last breed we have to mention is one which deserves very special attention. He has not as yet attracted a large share of public notice. Columns of show reports have been lavished upon Leicesters and Southdowns, but scant notes has been usually thought enough for the Hampshires. They have not been pushed, or taken up by the great. Thy have, however, been long carefully bred by a large number of first-class tenant-farmers around Salisbury, and tended by a good and faithful race of shepherds. We venture to assert that the Hampshire sheep is not sufficiently known and appreciated. There is no race in England, or in the world, which can vie with it in the production of large-sized lambs of from six to eight months old. Shropshire lambs are simply "nowhere" to them. Let any unprejudiced person attend the ram sales in

July, held by Messrs. Waters, Sons, & Rawlins, near Salisbury, and if he has never before seen a Hampshire lamb he will be astonished. There he will see lambs which present you with a pound weight per quarter from the day they were born No one thinks of using shearling rams, as they would be too heavy and unwieldy if not used as lambs. As yet, the Hampshire breed has been insufficiently represented in our showyards, but we expect soon to see a change in this particular. Such a breed cannot be comparatively hid from public notice, but must come out. His hardihood, size, and quality of mutton, are all unsurpassed. He thrives between hurdles and never asks for greater liberty. He is extraordinarily docile and intelligent, and can be brought into such perfect training that a word from the shepherd suffices to guide and control his movements. In the district in which this splendid race of things are found in greatest perfection, it is not uncommon to realise as much as 60s. or even 65s. per head for lambs of from seven to eight months old. It is in those parts customary to sell off the wether stock. If instead of selling the lambs at the autumn fairs, they were kept on through the winter and sold out, as is the case with most other breeds of sheep at ten to thirteen months old they would make prices which we are confident in maintaining that no other race of sheep could touch. These are strong points in favour of the Hampshire sheep insuring him a brilliant future, and in a certain sense the title we have placed at the head of these remarks.