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BEEKEEPING:

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WITH NOTES ON POULTRY AND THE GARDEN.

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BEEKEEPING.

CONDUCTED BY GEORGE ROSE, LATE EDITOR OF THE "BEEKEEPER."

HOW MUCH DO BEES DEPEND UPON THEIR POWERS OF SIGHT.

C. C. Russell, Solicitor.
(Motto, "Who Knows?")

On this question apiarians and naturalists are much divided. Some contend that bees rely much on their powers of vision; others, on the contrary, depreciate these powers. Most respectable names range on each side of the question. Professor Cook maintains that bees do not depend on their eyes to any very great extent, these organs being more or less defective. Sir John Lubbock, on the other hand, seems to support their keenness of vision. His experiments of honey spread upon coloured glass go far to support the theory, although he comes to a conclusion against the bees in their powers of discovering exposed honey, and of communicating the intelligence to their friends at home. A third theory has been started on the good old principle of "splitting the difference." It suggests, in effect, that bees have the bump, known to phrenologists as "locality," developed to a remarkable degree. This power, which is called "locativeness" or "location," enables our little friends, they say, "to strike a bee-line" directly to their home from any point within a reasonable distance, and that, too, no matter how widely they may have wandered on their path outwards to that point. This theory depends on our according to the bee a power or quality unintelligible to us, by which the creature becomes, for the time being, towards its hive a sort of living compass, its head being the north pole of the magnet. Others, again, contend that bees, having two sets of eyes, use them as grandfather uses his two pair of spectacles—pair No. 1 for objects at a distance; pair No. 2 for observing objects at hand. By this theory bees would use set No. 1 as they returned from a distance, and set No. 2 for closer observation, as in the case of flitting from flower to flower, and in discovering the nectary of the flowers they feed on by following the lines and markings of the petals. All these theories have been maintained with much energy by their respective supporters, but as yet no definite conclusion has been accepted. In the following short essay we shall endeavour to advance our own opinion, based upon our own experience, rather than to advocate the opinions on the observations of others.

That the bee is observant, and, like Captain Cuttle, taking notes of its discoveries, is very evident. Any one who has removed bees from one locality to another, or transferred a hive to a new dwelling, cannot fail to have remarked this fact. Our young beekeeper gets a present of his first swarm. It has been hived properly, and he brings it home late in the evening, and has it erected where it is to remain in his garden. The friend who has given him the bees tells him to pull away the perforated zinc from the hive entrance about ten a.m. on the morrow. Precisely at ten o'clock our young friend, with fear and trembling, will remove the zinc, perhaps with the assistance of a stick, and if he do not feel a disposition to retire to a distant part of the garden he will see the bees trooping forth with a merry hum. They immediately turn their heads towards the hive, and fly in ever-widening circles round about. In a few minutes the circles get beyond our powers of observation. The circling flight, with head towards home is taken evidently for observation and to learn the way back. Now, it is reasonable to compare small things with great. We can reason by analogy. Were any of us placed in a similar position—in the Catacombs of Paris, the Mammoth cave of Kentucky, the centre of a strange city, or in the middle of a jungle, for instance—we should probably do exactly as the bees. When they have studied the position of the hive entrance in relation to the hive, it is but natural that they should continue their study and extend their observations. Is it too great a stretch of reasoning to say that they there note the relation of the hive to other objects—the gooseberry bush beside them, then the pear tree, then the garden hedge, then the great sycamore, then our neighbour's house and barn, and then the church steeple? In this way "the circle of their acquaintance" becomes sufficiently enlarged to enable them to range the country round, and to come straight home when they desire to do so.

Again, let our young friend observe a bee hovering over the blue flowers of the borage or the clustering bloom of the cherry tree on the garden-wall. Is it possible to believe that that bee is not intent upon its pursuit, and using its eyes to the utmost? Here it is in its natural element, so to speak; not so when surrounded by coloured glass and other mysteries. She sees at a glance which flower has been visited by herself or by one of her sisters, and pauses not a second over the rifled nectary. She does not even unfold her tongue to lose her precious time in fruitless quest. Surely this is sight, and that, too, of the keenest description? "It may be smell," you say. Granted, but the probabilities are against you. In the first place it is acknowledged that the smell of a flower is almost independent of its honey. It has been given to the flower as a signboard, "Honey here." In the second place, the blossoms are so close together that to tell which flower has scent and which has not would be a hard task even if the honey were the scent-producing secretion. And if our little friend is guided by smell alone, and could distinguish a rifled from a full nectary, why should it ever alight upon a rifled flower at all?

The bee is unable to tell us its own sensations. Neither are we, curious mortals, able to get inside the little creature, and look out through its eyes. But we are able to see through a bee's eye for all that. We recently had the pleasure of looking through a bee's eye, mounted on a slide, by means of a powerful microscope. In proper focus and and in good light the word "God" was printed on a card and set up opposite the slide. The word was multiplied a thousand times (we do not use the term with scientific accuracy), every facet of the eye showing the word "God" clearly and distinctly. Our impression was that if the living bee could use its eye as we were using it then, there was no room for disputing the bee's power of vision any longer. To us the argument was overpowering. The microscope only magnified the reflection on the facets, the card being removed to a considerable distance.

It has been said, "How do bees manage in the dark skep? They have no light there, and yet their most beautiful work goes on there day and night." We are unable to do anything but surmise. Their *antennæ* are supposed to be the rules, levels, and plumb-lines of these busy masons. They are to the bee what the Davey's safety lamps are in the caps of the miners, by the help of which they make their tunnels, galleries, and supports. These *antennæ*

appear to be a supplement to the sense of seeing, where seeing is impossible or unnecessary. But if we are obliged to accord to bees a new sense dwelling in their *antennæ*, through our inability to explain their secret mystery, that is no reason why we should accord to them another new sense to account for that which we can explain. Yet this is done by some persons. Although all their movements outside the hive may be rationally explained by sight, it has been sought to give them the sense of location or locativeness. By this subtle power bees are enabled to go straight homewards. But have conclusive experiments been made which prove that the bees do not depend on their vision and observation? We would venture to assert that a handful of bees taken from the swarm overnight of our young friend above referred to, if let go a quarter of a mile from their new residence, would be lost to that hive for ever if there were any other bees within a smaller radius. Again, if the "location" principle is to be carried out bees ought to be able to fly abroad by night. But what a helpless creature is a bee if excited to fly even on a clear, warm, summer night! On removing some hives to the heather last autumn we removed the perforated zinc from the entrance half an hour after we had placed the hives in position. It was the full moon in September, clear, bright, and the evening warm. Yet out the bees rushed and tumbled headlong over the alighting board. We have observed the same thing to occur on a clear night when they received some sudden accidental jar, even when the hives were on their own ground, and the bees thoroughly "up" in their location. This may at first first sight appear to be an argument against "how much bees depend upon their vision," for you would say that a bee with the clear moonlight should see the way home. Our answer is "True," but bees are not accustomed to try to see by moonlight, whereas location as you apply it is almost independent of vision. A blind man could find his way about in a fog better than you could in a town with which you are both familiar. He trusts to his "location," you to your eyesight. I can go down my own stairs in the dark, but would hesitate on yours. Here I trust to location, which I have acquired. There I trust to my powers of vision, which fail me. If the bees under the above circumstances had trusted to their location, which you uphold, they ought to be able to return; but trusting to their vision, which I uphold, they came to grief.

But it must be admitted that bees do strange things, even in broad daylight, which go far to support the theory that there is something defective about their vision. For instance, I have observed how exceedingly "put out" a bee seems to be on arriving home to find the drone trap at the entrance. Although what we have called a drone trap is the roughest of the rough, being manufactured by ourselves out of an old domino-box, the clumsiness of the contrivance is not the cause of wonder, for a similar surprise is manifested at any other change of arrangement at their hall door. The drones, on the other hand, take things easier, and appear to see and understand matters more easily. Speaking of the drones, keen sight would seem to be most essential to them. A queen sailing in the heavens is an object not easily seen, and yet in that direction the nuptial couch is spread, covered with the fleecy counterpane of a summer cloud. At other times we may observe an entering bee challenged at its entrance, and driven back as if it were a stranger. It will then just rise on its wings a few inches above the board, re-alight, and enter freely. During this autumn we were obliged to feed one hive on a board in front of the house, notwithstanding the caution against robbers. Around this feeder were constantly assembled an innumerable company of flies, from the big blue-bottle to a small black fly. It was most amusing to watch the bees rushing at these flies, we presumed with open mouth, for the fly threatened would forthwith decamp *pro tem.* Now you would think that a bee should know its own sister from a fly; yet, frequently one bee would rush at another, as if it mistook it for a fly. The bee rushed at never seemed to mind, but went on with whatever it was doing—walking, feeding, cleaning its tongue, or preening its legs or wings. As the *rusher* came up to the *rushee* it seemed suddenly to see its mistake, was puzzled and walked away. Again, we have frequently placed drops of syrup about the alighting board, and found that the bees were frequently in it before they saw it apparently. We are unable at present to propose any solution for the above, compatible with good vision, save anger or haste. Again, we are told that bees are defective in their powers of sight, because they frequently fly against your face with some force, and yet do not sting. We are not inclined to consider this an argument against clear vision, anymore than we would consider the cockchafer or night-clock short-sighted, nor the man who collides against you on the street, nor the old lady in a high wind, nor the skater who cannons against you on the ice. Indecision, accident, force of circumstances, or impetuosity may explain all that.

With a leaning to clearness of vision, we have endeavoured to state arguments on both sides, such as occur to us, which may be tendered within the limits of a short essay. Let our arguments be worth what they may, they are our own, and drawn from what we have "seen with our own eyes." We wish, however, to guard against conveying any impression that we ignore the sense of smelling as developed in bees. This sense is also wonderfully keen. When honey is scarce our little friends will penetrate anywhere. On several occasions during last summer we were pestered with bees in one particular bedroom. We knew of nothing to attract them, yet there they were, constantly buzzing on the window pane. At last we discovered in the corner of a shelf, in a press, an uncorked bottle of syrup of squills! The murder was now out. By the sense of smelling they were led into the dark cupboard in search of this strange food. By the sense of sight they were led to the window. Perhaps the queen or some of the workers themselves had caught a cold during the long wintry summer, and they contemplated filling a special cell as a medicine chest with the contents of a bottle which had proved useful to some of the children.

WHO KNOWS?

BRITISH BEEKEEPERS' ASSOCIATION.

THE monthly Committee meeting took place at the rooms of the National Chamber of Trade, Strand, on Wednesday, the 14th instant, at four p.m. Present—Messrs. Cowan, Hunter, Cheshire, Hooker, Godfrey Abbott, Jackson, Revs. E. Bartrum, Rayner, and H. R. Peel, Hon. Sec.

The minutes of the last meeting were read and confirmed.

The report of the Sub-Committee to make arrangements to facilitate the sale of honey for the members was read, as was also the report of the Sub-Committee to make arrangements for the publication of the Lecture diagrams.

The Hon. Sec. read the Committee's report of the Association's work during 1879, which, with list of

members and balance-sheet, was ordered to be printed and circulated among the members prior to the annual meeting, which was fixed to take place on Wednesday, Feb. 18.

Messrs. Hunter and Cheshire reported that the text of the "Handbook of Beekeeping, for Cottagers' Use," would be ready by the annual meeting. The Hon. Sec. communicated to the Committee that from the great amount of labour attached to his office and his other avocations he found himself unable to promise to continue in his position with the Association unless some arrangement could be made for the help of a paid Assistant Secretary. He suggested that Mr. Huckle (who had hitherto been of great assistance to him) should be appointed to that office at a salary of £25 per annum, with whose help he trusted to be able to carry on the work as heretofore.

Mr. Hunter, who spoke in reply, said he felt satisfied he was only expressing the feeling of the whole Committee when he said that the continuance of Mr. Peel in his office was of the most vital importance to the Association. He had had an opportunity of seeing the efficient manner in which Mr. Huckle had assisted Mr. Peel, and he would have much pleasure in moving a resolution at the general meeting that Mr. Huckle be appointed Assistant Secretary at a salary of £25 per year and travelling expenses.

A discussion in which representatives of the county associations joined took place as to the subjects they desire to bring forward at the quarterly meetings, and communications from new county associations were received, after which the meeting formed into a

CONVERSAZIONE,

Captain Campbell in the chair.

The Chairman having made some remarks on the usefulness of these quarterly meetings, called upon the Rev. Mr. Rayner to read a paper on the "Origin of the Ligurian Bee and the best means of introducing alien queens to stocks." The lecturer exhibited a queen which had arrived in England from Italy at the close of September last, and which he had since kept in the box sent by the breeder without any new bees being added. They were originally about two hundred in number, but had dwindled to forty or less. The queen had been kept in a warm room, the dead bees being from time to time removed and the box disinfected with a little salicylic acid, and honey given as required. The box was occasionally opened beneath a large glass shade, giving the bees the opportunity for necessary flights, in which the queen generally joined them. This is especially interesting, as the common idea is that imported queens upon their arrival must of necessity be almost immediately joined to stocks, or die. This is now shown to be totally erroneous if common-sense means only are taken to preserve them. The queen had certainly passed seventeen weeks, *winter* weeks, in the company of only a tiny knot of bees, and she is now apparently vigorous in a Rayner cage in the centre of a stock awaiting liberation. The lecturer pointed out the principal points requiring attention in the introduction of queens, in which he seems to have had almost uniform success. The salient points of the lecture were ably discussed and criticised by the members present, and many queries replied to by the author of the paper.

Mr. Lyon placed on the table samples of glass honey-pots of various descriptions which he had imported from France, and offered to supply the members at cost price. Many of them were very neat, and calculated to sell the honey when displayed in them. After a very pleasant evening spent together the members separated.

BEE STOCKS AND THE LATE FROST.

BY MR. CHESHIRE.

THE opportunity the departure of the late bitter frost and dismal succession of fogs has given for examining the condition of the "poor bees" has, no doubt, been gladly hailed and eagerly used by many brother beekeepers. With the idea of comparing notes, and so estimating by results of the value of the plans adopted, I give some account of the condition of things as I found them on Monday, December 29th, really the first day since November 18th, on which the thermometer had stood high enough to allow the bees to fly in safety. It is true that on Monday, December 22nd, some hives had partly taken advantage of a warmer hour or two in the afternoon to get a cleansing flight, but practically at the date first mentioned the bees had endured an enforced confinement of forty-one days, during which the air had not only been for the most part intensely cold, but the barometer had stood high with dense fogs—two conditions, both increasing conductivity, and so augmenting the severity of the trial to which our stocks had been subjected. Anxiously awaiting my opportunity for commencing an experiment with a twin hive, I determined on the Monday aforesaid to transfer two skeps, allowing the bees only about two hours' dance in the genial air, which, under the circumstances, was as necessary to the comfort of the manipulator as of the poor distended insects. These skeps had been carefully housed in Stewarton cases, the interspace being well filled-in with shavings and sacking laid in several thicknesses over the top.

The first skep taken in hand had its combs cut out in succession, and the bees thrown and brushed on to a board at the mouth of the twin hive, which now stood exactly where the entrance of the skep had formerly been, while three stored combs taken from as many stocks had been previously placed within to induce the bees the more readily to enter. The colony seemed both strong and healthy, and the deaths, judging by the condition of the floor board, had not been excessive, but the hive contained neither eggs nor brood. The denuded combs were now taped into six frames, two of which were added to the evicted bees so as to make their combs up to five in number, while the remaining four were placed in the other half of the twin ready for the use of the inhabitants of skep No. 2. This was soon drummed in the usual manner, when the bees responded immediately by an upward march, and the queen was secured almost at once. The forced swarm was thrown upon the board placed to receive it; but in cutting out the combs, in order that they might be trimmed and tapped into frames as before, I was surprised to find the middle comb containing about 20 square inches of advancing brood, the centre of which was sealed, proving that the queen had laid on the 19th and 20th of December, when frost held us with strong grip. Comparing the condition of this hive with others I have recently seen, the imperative necessity of keeping skep dry on the exterior is most abundantly proved. A soaked skep is a conductor of heat. When frost prevails, the air around such hives is ever stealing away the very vitality of the cheerless colonies within. For consumed (scientifically oxidised) honey in heat, the production of which, if demanded in excess, requires exhaustive labour on the part of each bee, wearing down its life and draining away its stores, until, too often, death finishes the unequal but unnecessary conflict; and even when frost goes and the sun breaks forth, the moisture by its evaporation keeps down the internal temperature, so that the bees, especially if there be any wind, are hardly better off, as any who have had a ducking and have dried their clothes while wearing them will readily believe. To-day (January 1) I find the combs all beautifully fixed, admitting of the tapes being cut without risk.

My frame hives have stood this frost most excellently. In ten examined eight had brood, one *sealed* brood in three combs of the seven it had been allowed. The aggregate of brood being about one and a half Woodbury frames, I cannot but regard this as surprising. The bees are exceedingly strong, covering the frames densely. This hive gave me wonderful results during last summer—results which would have been considered respectable in any year. It has been protected above, like all my frame hives, by from three to four inches of chaff in a tray, while it is of the pattern which bears my name, and was made in 1873. It is substantial, double-walled, with about three-quarters of an inch air space. These points are mentioned merely to show that almost every really good hive may have protected its bees as well as this. Nor is the secret in the queen, for the black mother of last year has given place to a Ligurian. Strong population, cons

traction of hive, and effective protection with ventilation, has secured here what it will give wherever tried. The bees, in addition to well-stored combs, have had a cake of sugar and pea flour like to those of which our good friend Mr. Raitt gives the method of making a few weeks since in this Journal. Another stock had a sealed patch about six inches by four inches, showing again that low temperature without, if properly provided against, will not prevent the work of the hive going forward, even amongst bees that have previously endured long confinement, and corroborating Mr. Hunter's position at the Conversazione in October last, to which some were disposed to take exception. Of my single-sided hives, one with eight combs had suffered much more than those in hives of greater solidity, but yet the deaths were not seriously numerous; but another similar one with six combs had lost very severely. In the first-mentioned the clear outside combs had contributed doubtless to the protection. The excellence of the chaff cover is attested by the dry, healthy condition of the stocks, which is in strong contrast to the results obtained by covering with carpet as recommended by one writer in particular, but against which I have before protested both on scientific and practical grounds.

Some artificial pollen without salicylic acid placed for experiment in an outside frame is badly mildewed, while that inserted centrally has in many cases just the bottom of it yet remaining unconsumed. This pea flour was put into perfectly new comb, and there reached the cell bases, a remark in a contemporary that the editor cannot get it into the cells because of the contained air notwithstanding.

The rude trial to which the weather has put all our methods leads me to this conclusion—that, however well skeps may winter bees when amply protected, they are in no way equal to double-sided frame hives (especially if the latter contain chaff between the inner and outer skin) with chaff covers above and chaff-packed dummies, and the bees confined to so small a number of combs that the interior is kept warm in every part.

The skep has hitherto been retained by not a few because of its admitted excellence as a wintering hive; but the bar-framer, as now managed in good apiaries, is upon its own ground beating it out of the field, because the skep is here as everywhere intractable, while the chaff-packed dummy gives to its rival an elasticity even much beyond that possessed by the excellent Stewarton, the virtues of which in this particular have had a talented exponent in the *Renfrewshire Beekeeper*.

In one case, in a tall experimental hive with combs seventeen inches deep, the deaths have been numerous enough to much weaken the stock, but these are the direct result of improper form added to thinness of wall, here only three-quarters of an inch as against two and a half inches, the thickness of my wood and chaff hives.

Anyone who may feel disposed to inspect the stocks to which I have referred shall be welcome.

THE CAUCASIAN BEE.

I HAVE just been favoured with an account of the above bee, from Mr. A. Neighbour, as translated from the German, a few extracts from which may be interesting to your readers:—

Information on this subject was communicated to the members of the Twenty-fourth Congress of German and Austrian Beekeepers, which met at Prague on Sept. 7 to 11, 1879, by M. Vogel, Dr. Buttlerow, and M. Gunther.

Dr. Vogel, of Lehmanushopel, introduced the subject by explaining that it was strange the Caucasian bee should have escaped the attention of German beekeepers so long; the more so as scientific men had been acquainted with it. In the year 1773 the celebrated naturalist, Palkes, was commissioned by the then reigning Empress, Catherine II., to visit the Caucasus. While there he took notice of the Caucasian bee, a specimen of which, named by him *Apis remipes*, he sent to Berlin. This specimen is still among the objects in the entomological collection of Berlin, where I saw it for the first time in 1862.

The Russian Councillor of State and Dr. Buttlerow, of St. Petersburg, in an article in the *Bienenzeitung* for last year, says the Caucasus bee is a distinct species; adding that individual bees vary very much in the colouring of the first rings of the abdomen. The bees are said to be similar to a cross between the German and Italian bee; those met with in the neighbourhood of Wladikawkas, however, being of a fine yellow colouring, such as we admire in the Italian bee.

1. In putting the question, "Is the Caucasian bee really a distinct species?" I have no hesitation in saying that the Caucasian bee, though subject to great variation in colour, forms a distinct species. The physical characteristics which entitle it to be classed as a species are very striking indeed. In size it is inferior to the other species of the honey bee with which we are acquainted, but the difference is almost imperceptible.

2. Does the Caucasian bee possess the extraordinary docility which Professor Dr. Buttlerow ascribes to it? I am so convinced of the correctness of Dr. Buttlerow's statement, having had an opportunity of observing the gentle disposition of the Caucasian bees in my own apiary. He says they are not only exceedingly docile when the queen is among them, but also when she is absent. It is unnecessary to use smoke when manipulating, as these bees never attempt to sting, even on the greatest provocation to do so, under different temperatures. They are courageous in attacking robber bees, none of which ever approach the Caucasians with impunity. If a strange bee should pass into their hive, it never gets out alive.

3. The Caucasian queens are exceedingly prolific. From two of the queens I received in May I obtained colonies larger than I ever had in my own apiary, or had ever seen elsewhere. They are prone to build drone cells, and the disposition to swarm is great. From five colonies they increased to nineteen in one season.

4. The habit of the Caucasian bee to build a larger number of queen cells has been verified in Germany. It is by no means uncommon to find 100 royal cells in a colony of moderate size, every one of them perfect.

5. It was impossible for me during the past season to determine the capacities of the Caucasian bee for gathering honey, the season being too far advanced; but, wherever robbing was, the Caucasian bee was sure to be there. From this the inference may be drawn that they will be equally industrious when honey is to be had.

Professor Dr. Buttlerow and Gunther, of Gispersleben, confirmed Dr. Vogel's statements. Dr. Buttlerow, after describing the attempts he had made to get these bees to sting in cases of swarming, and had failed to provoke them, says—"I think, therefore, I am justified in saying the Caucasian bee is a very docile insect. As to its capacities for gathering honey, all I can say from my own experience is that the colonies now exhibiting here, which have remained on their stand for about ten days, have displayed great activity, even when the other bees were almost idle. I may mention here that I also went across the mountains to Abcharzia on the Black Sea. The bees I saw there are of a darker colour than those I met with at Wladikawkas, and somewhat less good-natured; at least, I succeeded on one occasion to make them sting me after blowing into the entrance of their hive.

These bees are not so handsome and evidently not so docile as those of Wladikawkas; and I think we had better direct our attention chiefly to the latter, which can be obtained from the beekeepers of Wladikawkas. But nobody in Russia is permitted to forward bees by post except the Imperial Agricultural Society.

The foregoing extracts will, I hope, be welcomed by your readers. The lecture in full might have been more interesting, but you might think it too lengthy for your columns.

The results obtained will, no doubt, be looked forward to with great interest both by British and Continental beekeepers, And it is to be hoped that Mr. Neighbour will be able and willing to interest them with the translated accounts as they appear. In the meantime we can only thank that gentleman for his present kindness.

The Caucasian bee will, however, not be the only one to which our attention will be directed. The Cyprians and the Carniolians will be watched with much interest, both in our own and other apiaries, during this summer.

Although the former beautiful insect was in my possession for several seasons, circumstances prevent me saying anything as to its honey-gathering capacities; but this I can say, that it is extraordinarily prolific; but in some instances it seems inclined to sting without much provocation.

The Carniolian bee, however, seems very docile and hardy, living under circumstances that other varieties died. And, judging from their present activity, I should say breeding has commenced in earnest with them, as well as with the Cyprians. Their future prosperity, or otherwise, I will duly record for the benefit of your readers.—*Farm Journal.*

LOSS OF BEES BY CHILLING.

A. PETTIGREW.

IN winter bees leave their hive and fly about for a few minutes in mild weather. Often in doing so many of them are chilled and never return to their hives. After long confinement by cold weather they come out in great numbers on the first mild day. Yesterday (December 28th) was fine here, and the bees came out in great numbers, seeming to enjoy themselves very much for two or three hours. Their dead were carried out and flung over the flight boards, but many living bees were found motionless on and around the hives. About a quart of these were gathered into a common flower pot, covered and placed over the kitchen range to be gradually warmed. In a few minutes they became very noisy, and when liberated at once flew back to their hive.

Some winters hives lose their bees fast by chills in these unseasonable flights; and as most hives this winter have not large populations all care should be taken to prevent unnecessary loss. For some years I have had about forty hives (in winter) standing within three feet of each other. After winter flights our custom has been to sweep up the chilled bees with a hair brush, place them in a straw super, and warm them into health and activity near the kitchen fire. By pursuing such a course many hives have been saved from great losses by chills. Some writers have thought that the loss of bees in winter is caused by their exhaustiug efforts to evacuate after long confinement. This question I cannot now consider. All I wish the reader to remember is that heat restores chilled bees to animation, even those that are apparently dead.—*Journal of Horticulture.*

CYPRIAN BEES.

I HAND you herewith copy of a letter just received from Cyprus:—

"Larnaca, Dec. 3, 1879.

"I am at last arrived here after a long journey by way of Jerusalem and the Holy Land. The six hives I have purchased are in good order, and the bees do not seem very different to Italians. They are apparently a trifle smaller, and have a yellow abdomen, whereas with pure Italian bees that part is black. Still I know these are pure Cyprians, and I have specially come here to fetch them. To-morrow I shall drive the bees, and have a look at the queens. All information you shall have on my return."

The bees referred to in the above are destined for Italy, where, if they arrive safely, they will be used to improve the native breed. The Cyprian queen now in the possession of the British Beekeepers' Association is equal in purity and superior in some other respects to any that can be obtained from Cyprus direct, and I have not therefore taken advantage of an offer of one of the above.—J. P. JACKSON, in *British Bee Journal.*

Of course Mr. Jackson is very mistaken if he says our friend Cory at Bruex, Austria, is the original discoverer and importer of the Cyprian bees. That honour is due only and alone to Count Kolowrat Krokorvsky at Hroby, near Teplitz, Bohemia. This noble Count has invested much money to get this species of bees. The first colony was totally ruined on the journey, and only the second and third arrived in good condition at Hroby. As the Count did not like to sell any of the queens he reared, he gave his friend Cory his surplus queens, but never one of the two imported queens. Cory alone sold Cyprian queens, and never did the Count do so, but Count Kolowrat would furnish Cory with pure Cyprian queens if the latter was not able to sell one from his own stock. Cory never said he did import Cyprian bees. Tested Cyprian queens his friend Cory sold, and the noble Count has given them away as presents to many a beekeeper all over Germany. I myself have received from the latter some very beautiful Cyprian queens; and why should not I and other German beekeepers rear pure Cyprian queens, and sell them even to English beekeepers? I cannot see any reason why not.

But I do not doubt that Cory is a worthy man, and has sent Mr. Jackson a pure Cyprian queen, and the best one he had too; though I am obliged to confess that I have seen in our country, if not finer, at least just as beautiful Cyprian bees as Mr. Jackson's at the Kensington Show. Should that not be a proof that other beekeepers may have as well pure and fine Cyprian bees as friend Cory and the Count Kolowrat, and that one may as well import such queens from other sources as from both the latter?—C. F. H. GRAVENHORST, Brunswick, Germany, in *British Bee Journal.*

DYSENTERY AND FOUL BROOD.

THERE is such an extraordinary tendency in stocks that suffer from dysentery to become afflicted with foul brood that we have come to regard it as the almost certain forerunner of that disease. Foul brood being a germ disease, and its spores of fungoid growth, we are compelled to the conclusion that the air is so charged with fungoid spores that the interior of a dysenteric hive offers the requisite conditions for their development into foul-brood germs, or *micrococci*, which then become contagious and infectious.

It has been convincingly proved that the air does contain innumerable spores which produce the fungoid and fermentive growth whose appearance on meat, vegetables, &c., is recognised as mould, must, &c., and the effect known by the term "going (or gone) bad," and that all substances liable to decay are variously affected by them if exposed to the atmosphere. Knowing, also, that hybridisation produces most wonderful changes in plants, it has occurred to us that similar effects may be produced by the mingling of fungoid or fermentive spores, the outcome being a growth that sets up disease wherever in turn it will grow. If this be anywhere near the truth, it will solve many difficulties as to the production of new diseases, and will certainly make it plain how foul brood originates in so many places that have never known it before. Dysentery is a disease of a fermentive character; it is not catching until the bees eat the fermenting honey in the hive, and it is comparatively harmless in weather when the bees can fly. But is it not likely that a mingling of fungus spores in the diseased hive may produce hybrid spores that will work destruction to animal or insect life under particular conditions? Perhaps the idea is an old one, and has been disproved, but, on the face of it, it appears feasible, and we hope to hear the opinions of others on the subject.—*British Bee Journal.*

NON-SWARMING.

ON reading that excellent paper on the non-swarming system by Mr. Raitt I feel induced to give my experience of the same thing in this warm climate. On taking one of my strongest swarms to test the same principle of obtaining the greatest amount of honey without swarming I took away the queen to make another artificial swarm, also taking care to return on the third and fourth day to take away any royal cells that were formed, and to put the hive past the time of forming them from any eggs of the dethroned queen, with a view to trying their powers of working in storing honey at the height of the season. The result was far beyond my warmest expectations. I took from that one swarm in virgin comb honey about 60 lb., and after the first week the bees seemed to work away as usual, with this exception—that they showed more of their fighting propensity when I took away their honey. I should like to hear of this being tried with others, as I think it is the key to the whole system of non-swarming management.—HOLT HOLT, Queensland.

HONEY MARKET.

PRICES of Cuban and Chilian honey remain almost unaltered. Holders are expecting a rise, and nearly all lots have been bought in. We had a sample of Canadian Bass-wood Extracted Honey sent us. It is of beautiful quality, but the flavour is peculiar, though by no means unpleasant, and very different to any English honey that we have yet tasted. We are informed that large quantities are expected over shortly from Canada. It is certainly free from glucose, we are happy to say.

THE MONTH.

IN January there is very little for the apiarist to do. All the instruction necessary can be summed up in a very few words—Leave healthy and well-fed stocks alone, and disturb your bees as little as possible. And all stocks, if proper precautions have been taken early enough, *ought* to be healthy and well fed. But, unfortunately, many bee-keepers find that their stocks are starving, and they regret now that they did not spend a few extra shillings in artificial feeding at the end of autumn. Let us trust that experience will in their cases teach wisdom. As a pure matter of business, every one must see that the money spent this winter in artificial feeding was a very good investment, for stocks and swarms cannot fail to be scarce next season ; and, being scarce, they must be valuable too.

Those who find their bees are now short of provisions had better feed with barley-sugar.

Are British beekeepers scientific? We fear that the scientific part of apiculture is sadly neglected. If this is so it is a great pity. There is much talk now-a-days about technical education for mechanics, and few can doubt that if mechanics had the means, and accepted the means of a better knowledge of the science connected with the work upon which they were engaged, England would be able to boast of much better workmen.

Lord Beaconsfield, speaking on this subject at the Working Men's Exhibition last summer, called attention to a case that showed how easily the labour and time of a clever mechanic can be wasted for want of a knowledge how to direct that labour and time to a proper channel. A blacksmith had made, with infinite pains, a metal violin. As a piece of work it was marvellous. As a musical instrument it was a failure. A little knowledge of the capabilities and nature of the metal he had used would have told him that no metal can give back anything like the tone that resounds from a wooden sounding-board, and that notwithstanding the superior workmanship displayed, the wonderful violin could never give forth such sweetly pure notes as even a second rate-wooden violin.

Is this or is it not so with beekeepers? Our own opinion is that the scientific side of the question is much neglected. Those beekeepers we have seen are, with but few exceptions, ignorant even of those minor matters that should be thoroughly understood before one can judge how to treat bees. There is much complaint made just now that farmers know nothing of scientific agriculture ; but although there may be much ground for the complaint, their want of essential knowledge is nothing compared to the ignorance shown by many beekeepers of many years' standing. We fear that these remarks will not be pleasant to many of our readers. Well, we are sorry for it, but it is our aim not to please individuals, but to spread both the knowledge and the practice of apiculture. If the present writer is wrong in believing that scientific bee-culture is all but unknown in this country, and if anyone will only show him that he is wrong, he will be glad enough to cry "Peccavi! Meâ culpâ! Meâ maximâ culpâ!"

When the prize essays sent us as (Editor of the BEE-KEEPER) were on practical matters we received many papers in competition. The only time a subject connected with the science of apiculture was given we received *one* essay only! Was it accidental, or was it a proof that science finds few students or devotees? Fortunately, this one essay is a very good one, and we think our readers will find it so interesting that many of them will turn over a new leaf—that is to say, will turn now and then from the page headed "Practice," and give a little attention to that headed "Theory." We have made arrangements with the writer to publish it with this paper.

We were talking only yesterday to a gentleman who for several years has kept a few straw hives as a hobby, and in the course of conversation we mentioned that we thought beekeepers, as a rule, were lamentably ignorant of even the first steps of the knowledge of the bee.

"I can quite believe it," was the reply. "Only a few days ago one of my children asked me how many wings a bee had, and *I could not tell her!*"

There can be little doubt that the *practice* of beekeeping is on the increase, and will become more and more widespread. The Press, someone once said, is the pulse of the country. The Press, in England at least, always can show what is a popular subject, and so many papers are now taking up bee matters that the increasing popularity of apiculture cannot be doubted. A friend said to us the other day, "Bees and Incubators seem all the rage now, but how long will they remain so?"

We print a letter from a correspondent in Lancashire. From what he says it seems that means of improvement are not easily to be obtained there. Who will volunteer to carry a mission to that benighted part? The writer speaks gratefully of the instruction he received by visiting the "Bee Tent." Is it possible to have the bee tent taken nearer to his home?

CORRESPONDENCE.

NOTICE TO CORRESPONDENTS.

We make it a rule, and one that we shall adhere to strictly, that all letters for insertion in BEEKEEPING *must, when published, bear the name of the writer. Ours is an independent journal, open to all who wish to call notice to anything new or interesting to the bee-keeping world, and we believe we shall remove a source of constant suspicion and complaint if we firmly follow this regulation. These remarks do not apply to the Notes and Queries department.*

While we shall print as much correspondence as possible we do not bind ourselves to publish every letter we receive, and shall feel at liberty to reject those that seem to us devoid of general interest and those which, in our opinion, are likely to lead to quarrelling instead of fair discussion.

We respectfully beg all our readers to have perpetually in view a laudable desire to extend the practice of bee culture in this country, and having this aim before them to send us reports of anything they meet with in their experience that seems to them to have been unnoticed before.

SOMETHING WANTING.

TO THE EDITOR OF BEEKEEPING.

SIR,—As I am thinking of starting an apiary about three miles from home, I should like to ask your opinion as to the locality. There are three spots selected, and I shall be pleased to know which, in your opinion, is the best of the three. The name of No. 1 is Ashworth Valley, and is considered picturesque. This valley is about half a mile wide, 200 feet deep, with sloping banks, and three miles in length. It is thickly covered with trees, the most plentiful being the willows (including the palm-bearing), oak, ash, hazel, birch, elm, and fir, with other wild plants and shrubs, including rose, bramble, holly, and so forth. In the middle of this valley is a flat of about one acre lying very low. Would the hives do best here, as being protected from high wind, or more elevated for sighting home? The surroundings of this valley for a few miles are nothing but open country all under cultivation, but very little arable land, and consequently there is little clover grown. Yet some fields seem to be fairly covered with clover. It is, with the exception of some pasturage, all mown. The nearest point to a town is three miles; the other points are many miles from any smoke There would not be more than sixty

fruit trees reachable. It is habited with nothing but farms, and, as aforesaid, all under cultivation with the exception of this beautiful valley. Yet no one here keeps bees!

If you should think this a suitable locality, how many stocks is there pasturage for in one apiary?

No. 2 is called Birtle, and is considered a bracing district, and is three miles from the town of Bury, west, and two miles from Heywood, south, north, and east, and is open country for many miles, with the exception of a small clough about two miles long, a quarter of a mile covered with oak, ash, hazel, and a few of the palm-bearing willows. I should say one-fourth is arable land, and there is a fair quantity of red clover grown. Like No. 1, there are no fruit trees of any note. There is a little villa gardening.

No. 3 is, with the exception of a little pasturage, all rich meadow land, and the nearest point to any town is five miles. There are not in this district any fruit or forest trees of any note, but more clover than No. 1 district. As I have said, no one here keeps bees, therefore I am compelled to trouble you. I should feel also obliged if you know any beekeeper residing near any of the following towns:—Middleton, Rochdale, Heywood, Bury, Radcliffe, Bolton, and Manchester (of course, all in Lancashire), as I believe a little experience with some modern beekeeper would be of great service. There are none of those displays one reads of. No Baldwin manipulations with bees and grand shows of the modern hives and appliances; and, above all, the enticing displays of honey. Therefore, to see such would be encouragement and a great boon to one who never saw it before, but to travel by rail one hundred or two hundred miles would not be very profitable. I shall feel very thankful for any remarks you may make to this very imperfect letter. Wishing you to point out the district of the three so imperfectly described, I beg to remain yours truly,

Bury, 3rd January, 1879. JAMES PAGE.

HONEY WANTED.

TO THE EDITOR OF BEEKEEPING.

SIR,—I hope you will excuse me for troubling you again so soon, but the fact is that, from your suppression* (in the BEEKEEPER No. 3) of the words "Expert of the British Beekeepers' Association," which I believe I appended to my signature in writing to you on the subject of honey sales, some persons have imagined that I have been setting up a honey market on my own account, an impression which I am particularly anxious to dispel

I am merely acting as the authorised officer or agent of the British Beekeepers' Association, whose committee, in accordance with a resolution passed at the general meeting held on the 19th February, 1879, have for some time past made arrangements with several old-established houses in London, whereby any member of the Central Association or of any one of the affiliated county associations can find a ready market for his honey by sending me a sample in a saleable form, stating the quantity he has for sale, together with the lowest price which he will take for it, paying carriage and the very small commission of 5 per cent. upon the amount realised by the sale.—I am, sir, your obedient servant,

S. J. BALDWIN,
Expert of the British Beekeepers' Association.

Gipsy Cottage, South Vale,
Upper Norwood, 9th Jan., 1880.

[* The suppression was inadvertent.—G. ROSE.]

"FANCIERS' CHRONICLE."

MORE scope for the airing of beekeepers' grievances! Another chance of obtaining and spreading apicultural knowledge! We are glad to learn from the proprietors of the *Fanciers' Chronicle* that that paper will on the 16th instant commence to open its columns to bee matters. We only repeat what we have already said, that every agricultural paper should do the same. At all events, it is pleasing to know that the desire for information on such an important business as apiculture is increasing, and that the means of imparting that information are increasing too. Every success to this well-known periodical in its new and praiseworthy endeavours. The *Fanciers' Chronicle* is published at 317, Strand, W.C., and at Newcastle-on-Tyne.

FERTILISATION OF QUEENS.

BY MR. RAITT.

THIS question of an improved race of bees is no mere chimera. It does not even imply any dissatisfaction with the race we now have. It springs from the well-observed fact that in any given apiary, while all stocks are good, some are better, and one, it may be, decidedly the best. We do not refer to the mere animal strength of stocks, but to their developed instincts. Some excel others in the vastness of their populations, others in the habit of storing greater supplies. Some are gentle as flies, others fierce as hornets. Some are so attached to their brood that it is difficult to dislodge them from their combs, while others on the slightest disturbance rush in every direction as if devoid of maternal instinct altogether. And it is noticeable that such characteristics are not transitory, but from month to month and year to year, so long as the same queen is mother of them all. Change the queen and you in a short time change the character of the stock for better or for worse. Now it is evident that by breeding-up from queens whose progeny show the desired characteristics we may hope at no distant date to improve the race considerably, at any rate, to bring all our stocks up to the level of the best we at present have.

Hitherto all such attempts have proved abortive from the fact that we had no control over the queen's choice of a mate, and could not even ensure her mating at all. Left to nature the virgin queen issues from her hive as early as the fifth day of her life, and soaring aloft meets the drone; but this is rarely accomplished without several such flights, extending often over many days. The watchful beekeeper, intent on discovering whether she is yet fertile, can only in most cases await the production of eggs. Even then, indeed, he cannot be certain, but must wait to see whether these eggs develope into worker grubs. If intent on breeding Ligurians in their purity he must wait till these grubs hatch out into perfect bees before he can say to what strain they belong. He may indeed by careful watching be fortunate enough to see the queen return from a successful flight with the well-known mark of fertilisation attached, but what strain of drone she had met he cannot tell.

Now, however, all this uncertainty, and weary waiting, and disappointed hope, promises to give place before man's ingenuity and perseverance. For ten years past experiments in the line of fertilisation in confinement have been carried on chiefly by our restless neighbours on the other side of the Atlantic, and with occasional symptoms of success. Glass globes or tumblers, wire enclosures, and dark chambers, have all been tried, but the honour of achieving decided results belongs to Professor Jared Hasbrouck, of New Jersey, U.S., by the simple use of an empty sugar cask! In 1878 this gentleman carried on an elaborate series of fertilisation experiments, using various forms of wire and glass cages for capturing the queen as she came forth on her errand, and confining along with her the selected drones. In several cases he was successful, but felt that the success then attained was more than counterbalanced by the loss of time and the uncertainty of success. After a winter's cogitation he returned to his task during the past season with improved means. These not at first answering the purpose, he hit upon the idea of giving the queen and two or three drones a place to fly in that almost compelled them to keep constantly on the wing, and that within an inch or two of each other. This was simply an empty sugar barrel with a close-fitting cover having a 4-inch hole in its centre. On the inside of this cover, under the hole, he fixed a piece of glass, and having caught the queen as she issued from the hive he dropped her with the selected drones into the barrel and closed the cover. In less time than it takes to tell it she mated with one of the drones. In subsequent attempts he did not wait for the queens issuing from the hive, but picked them off the combs when he judged them to be of proper age, and was successful in each instance. On dropping them into the barrel they immediately flew to the light in the cover, and as there was no resting-place adjacent they were compelled to fly round each other in close contiguity till they mated. It will be easy to provide a more convenient chamber for fertilisation now that we have learnt the principle. Such a chamber must be so contrived that by no possibility can the queen escape either when being put in or removed, else she would in all likelihood be lost, not having flown before. It would also permit of the beekeeper having a view of the interesting operation, so that he may know exactly when to remove the queen. A sort of sentry-box with the small light in the middle of a flat roof is the form that suggests itself to me, and which I mean to adopt another season.

If, as I have no doubt, the discovery should prove equal to the occasion, it will be a great step in advance, and cause 1879 to be remembered in the annals of beekeeping. It will enable us to rear our own Ligurian queens in their purity instead of having to import them at great cost. It will deliver us from the annoyance of having palmed on us puny, half-developed queens, such as are being reared for us by the Italian breeders of late years, queens that, as a rule, do not survive in fertility over a year; and it will save much time and make us independent of the weather so far as queen-rearing goes. To me the discovery is particularly welcome after a season so extraordinary that out of a large number of virgin queens I have not been able to get a single one fertilised.—*Journal of Horticulture.*

FOREIGN NOTES.

ITALY.

ACCORDING to our Italian contemporary, the *Apicoltore*, an important exhibition was held at Monza, an aristocratic little town near Milan, from the 27th of September to the 12th of October last. The occasion was one of general interest, and, considering the almost uniform failure of the yield, the amount of honey exhibited was highly satisfactory. Among the competitors in this class, Signor Stefano Fumagalli contributed forty-five pots; Signor L. Santambrogio, twenty-four pots from the linden tree; the Rev. G. Giacomoni, four pots of a golden colour; Signor Angelo Crippa, twelve pots; Signor E. Vischi, fifteen pots of amber colour; and Prince Ferrante Gonzaga, two pots, besides a variety of other samples in the comb and otherwise.

There was also a good show of wax in cakes of elegant form, the two most admired of all being a large pyramid and a centre-piece representing the "Star of Italy."

No less admired were the live stocks exhibited by Signori Fumagalli and Mazzoli, the latter's in an observatory hive of a new design. What, however, was the greatest attraction of all, both for the jury and visitors generally, were a few Cyprian queens imported and exhibited by Cavalier Luigi Sartori; and the fact that these were the first of their kind brought to Italy had the effect of inducing the jury to grant a silver medal to their importer.

The following silver medals were also awarded: To Dr. A. Dubini for his bee implements; Signor N. Mazzoli, for the attractive manner in which his honey was offered to the public; Signor Luigi Santambrogio, for bee produce generally; Rev. G. Giacomoni, for honey; Signor Stefano Fumagalli, for the exquisite quality of his honey; Prince F. Gonzaga, for the superiority of honey and the tasteful mode of packing it up.

Another curiosity at this exhibition was a beautiful white comb, well filled with honey, which the bees had built on a sheet of tin previously immersed into liquid wax, and suspended on a movable frame, as is done with comb foundation; the bees, however, had removed all the wax from the tin before attaching their comb thereto. As regards the honey generally, the jury have recorded that, notwithstanding the great efforts made by beekeepers to improve its quality, there was yet to be found in it that unpleasant flavour which is characteristic of that particular district; and this, according to Professor Flaminio Barbieri, may be attributed to the prevalence of a flower in the fields known under the name of "Helicrisium grandiflorum."—J. CAMASCHELLA.

DO WORKERS EVER LAY DRONE EGGS?

WE refer our readers to pages 41 and 74 of the BEEKEEPER (lately edited by MR. GEORGE ROSE) for M. Arviset's former articles. The series is now concluded with the recital of his third and fourth experiences.

"THIRD EXPERIENCE.

"On the 24th July, at mid-day, I shut the queen of a hive in an observatory-box containing one comb with large cells, and one with small; these held brood of different ages, eggs, and larvæ. I put in this brood comb with the intention of inciting the workers to take care of the eggs which the queen would lay.

"On the 25th the eggs and all the brood still remained, but the bees took no care of them and did no work in wax. The queen moved about accompanied by some of the bees which seemed to excite her, or appeared anxious to seize any eggs that she might let fall. On the 26th all the brood is lost for want of care, and the combs which had contained it had been demolished. The queen was now on the large cells, but had laid no eggs; neither have the bees yet commenced to work at the wax.

"I daily examined this queen up to the 4th August, which was the eleventh day of her captivity. I had raised the box and examined the interior of the hive. There I saw four royal cells which contained young nymphs more or less advanced, and one cell recently emptied, which proved to me that a young queen had been hatched, and was now to be found amidst the bees. Some days after this the young queen laid, and the drones were sacrificed. Meanwhile the old queen remained in the box, which the bees seemed to have forsaken, with the exception of a few which remained near the queen.

"Then I removed about a third of the population from the hive, but without taking the new queen. I placed these bees in a new hive furnished with empty comb, and I put the observation-box, which still held the old queen, above the new hive, and removed hive and box to a new stand at a distance of four kilometres, that the bees might not return to their old location. I waited in expectation that the old queen would now begin to lay, but this did not happen. I thought then that she must have become sterile. To ascertain if this were really so I shut her alone in a (perforated ?) metallic box containing a little empty comb. Being thus isolated, if she laid at all the bees could not eat her eggs. I had supplied the bottom of this box with a covering, so that it would receive the eggs in case she laid without placing them in the cells. I hung up this cage and left it for four-and-twenty hours surrounded by the bees. I examined it most carefully, and found no eggs, which confirmed my opinion that the queen had become sterile. To become still further assured, I set her at liberty in the hive furnished with empty combs. Eight days afterwards I saw that she had not laid, and I knew that she was really and undoubtedly sterile. At this time there were no drones in the hive; all had been destroyed. But I had in another hive an orphan colony where there were still some drones. The idea occurred to me to unite this latter with my sterile hive and watch the result; but I first wished to become quite sure that the drone colony was really queenless, and there was no doubt on the point. Then I united the two colonies. A few days afterwards the workers destroyed the drones. Having now examined my hive I found some young brood. This queen, had she been sterile for a time only, or had she been fertilised anew? I should like to believe that it was a fresh fertilisation."

M. Hamet remarks:—"In the first fortnight of October we united a colony of Carniolians, which had been queenless since the end of June, to a small colony of Italians, the queen of which had laid no eggs for more than a month. The drones were allowed to remain for twelve days, and the queen commenced to lay immediately after the uniting, but in consequence of our having supplied food, and not because of a new fertilisation."

"FOURTH EXPERIENCE.

"This experience was something like the preceding. The queen, placed in a box, laid no eggs, and the bees had brought up some young queens, of which one was preserved and took the place of the old queen, which was still in the observation-box. When there was some new brood in the hive the workers abandoned their old queen, and I found her dead not long after in the box. Had she been killed, or had she died of hunger, cold, or grief? I cannot tell.

"REMARKS AND CONCLUSIONS.

"1. For a queen to lay in an observation-box it is necessary to operate with a first swarm, natural or artificial. There is then the certainty that the queen has been fertilised. This swarm should be placed in a hive, which should be taken to the original location, thus rendering it strong.

"2. When one experiments with the sole object of observing the bees work in wax, it is useless to shut off the queen by a grating. The bees fill up the crevices in the honey-box, and this they also do with those at the top. The windows at the side are also useless.

"3. In my two first experiences I observed queens lay male eggs, which neither confirms nor disaffirms that the workers do not also lay them under certain circumstances.

"4. The queen of the first colony experimented on was Italian, but she had been fertilised by a drone of a different species. She produced black drones, and also yellow, but of a degenerated colour. It must, therefore, be a fact that the genus of the father affects them."

(Is it really certain that black drones were laid by this queen? No, according to the previous proposition, which neither affirms nor disaffirms. As to an exotic race, it submits to the influence of climate. The yellow race used in our climate is seen to alter in its colour, while this being well understood, connection has been made between subjects of the same race born in our country.—EDITOR OF *L'Apiculteur.*)

"Two things can produce this result. Suppose one has a pure

Italian queen, and that she has been fertilised by an Italian drone, then she will produce nothing but male Italians; that is to say, yellow. But what, sometimes, happens? The workers raise young queens, adopting one of them as their ruler, and supplanting the original sovereign. It then happens that the young queen is fertilised by a black drone, and to your great surprise you see workers and drones of a degenerated type are the result of this intermixture.

"5. Can a queen permit herself to be fertilised each year at the time of swarming? I see nothing to prevent this. My third experience seems to *prove* it."

(A mistake—a great mistake, and this we say according to the eclectic axiom of Jacotot, "Tout est dans tout." And nothing can prove that the plant louse does not cause itself to be fertilised again and again at very near intervals of time, instead of being able to transfer to its descendants of even the eighteenth or nineteenth generation prolific faculties without need of refertilisation. —EDITOR of *L'Apiculteur.*)

"I remember to have read some years ago that those who have observed affirm that when a queen is held captive a long time in a cage she loses her power of laying, whether she is shut up to prevent swarming or to arrest or limit the production of brood with the object of causing the bees to give all their energies to this collection of honey. In these two cases, one operates at the time when the queen is about to finish her great laying, and, being held prisoner, she cannot be refertilised, which accounts for sterility. If this is so—but I do not affirm it, for my experiences have brought me no certainty—there would be nothing surprising to see Italian queens and cross-breeds laying eggs producing black drones.

"In all this I do not deny that the queen has the faculty to lay drone eggs without her having been fertilised, seeing that workers, too, can lay them; but I repeat that if she causes herself to be fresh fertilised every year one can no longer be surprised that a small part of the male sperm can remain preserved in the spermatheca during the whole life of the queen."—J. P. ARVISET, *L'Apiculteur.*

THE NUPTIAL FLIGHT.

M. A. PICQ writes "that he saw a queen and drone on a heap of hay, that there was no doubt of the act of fertilisation, and that he would have taken both prisoners but that he feared to make some colony, that was not his own, queenless." He adds:—"It is an easy experiment that will overthrow M. Ulivi's theory. Have, in the swarming season, an Italian colony in an apiary where there are a dozen natives. Seven times out of eight, if the Italian swarms, her young queen will become fertilised by a native drone. To deny that this does not take place away from the hive, it will be necessary to prove that the drones of the neighbouring hives introduce themselves into the Italian where they find a queen to fertilise."

M. Doucin writes on the same subject:—"I saw this spring a group of drones pursuing a queen and making large circles of flight at a distance of a dozen metres from the ground. The queen kept in front of this group at a distance that seemed to me to remain unchanged, notwithstanding the hot pursuit of the drones. The noise of their flying could be heard some way off, for the air was perfectly calm; one would have supposed that a strong swarm was abroad. The bees remained some three or four minutes in my kitchen garden, when they filed off, and flew, like a bullet, in a perfectly straight line, and were lost to my sight."—*Ibid.*

ADVANTAGES OF BEES.

IN its "Iahresbericht" for 1878 the *Bienenwirthschaftliche Hanptverein im Konigreiche Sachsen* publishes the following highly interesting statistical data referring to the indirect utility of bees: —"It has ever been one of the objects of all apicultural societies to prove the great importance of bees to agriculture generally. It appears that the society named possesses 17,000 hives, from each of which 10,000 bees fly out daily, which represents a total of 170 millions of bees. If we suppose that each bee undertakes but four journeys per day, and that this takes place only on 100 days out of the 365, then we obtain a yearly total of 68,000 millions of bee journeys. It is not too much to suppose that fifty flowers are visited on each journey, and we are certainly justified in supposing that five out of these fifty are fertilised; then we get a grand total of 340,000 millions of fertilised flowers per year. Let the value of fertilising 5,000 blossoms be but 1 pfennig (or 500,000 for 25 cents), then the work done by bees of the society represent a value of sixty-eight million pfennigs, or 170,000 dols. It results from these calculations that each hive benefits agriculture to the amount of 10 dols. annually, a value hitherto totally overlooked."

The fertilisation of plants by the bees presents a very interesting field for study. But for the oft-repeated visits of the bees, myriads of beautiful flowers would in a short time cease to bloom —aye, and cease to live also! Many plants absolutely require the visits of bees or other insects to remove their pollen masses, and thus to fertilise them. Hence Darwin wisely remarks, when speaking of clover and heart's-ease:—"No bees, no seed; no seed, no increase of the flower. The more visits from the bees, the more seeds from the flower; the more seeds from the flower, the more flowers from the seeds." Darwin mentions the following experiment:—"Twenty heads of white clover, visited by bees, produced 2,990 seeds; while twenty heads so protected that bees could not visit them produced not one seed." Thus is infinite wisdom displayed by Nature on every hand! Nothing is created in vain; each has its proper sphere, and each its appropriate work to perform.—*American Bee Journal.*

FERTILISATION IN CONFINEMENT, &c.

WE have just passed through one of the worst honey seasons in this section I have experienced since 1868. This has been general throughout the country, and almost a total failure in California. Last year was also a tolerably poor honey season in this section, and I have observed that, as a general rule, a good honey flow always follows two poor ones. It is said that good corn years are always bad honey years, and the season just past would seem to confirm this assertion, for, notwithstanding the great drought this year, I never saw a better corn crop.

I see from the report of the National Convention that Professor J. Hasbrouk has succeeded in his experiments with fertilisation of the queen in confinement. Among the various modes in which I experimented, one was very near like the one he succeeded with, the only difference being that I used a large store box instead of a barrel. If I live, I shall try his plan against next season; but I fear, if I report the plain truth for the journal, I will have to write *failed!* Should I be so fortunate as to succeed, I will send out queens that I desire to have tested as to markings, fertility, and honey-gathering qualities with any in the United States. I said in a former communication that the man who discovered a safe and practical method to fertilise queens in confinement with select drones should have one dollar given him by every queen-breeder in the country, no matter how great the number. I repeat what I then said, but am not ready to pay my proportion till I am satisfied from actual experience that it is a success. I do not mean to say that Professor Hasbrouk is mistaken, but I do mean to say, that as I took the word of over 200 (or perhaps 500) a few years ago that they had succeeded, I never will take any evidence but my eyesight.

The weather to this day has been the mildest I have seen for many years, and should it continue the bees will winter splendidly. But it may turn out, as it frequently does here, that our winter is in March and April.

I have said in former articles that an average colony of bees could winter from October till the middle of February or the 1st of March on 5lbs. of honey. I have frequently proven this true, and have wintered many a colony on from 10 to 15lbs., and thought it was a good plan not to winter on more than 18 or 20lbs., for fear of having too much honey in the way. But none of us will ever be too old to learn from experience. I now think it better to leave 30 or 35lbs. in a 10-frame Langstroth hive if you want them to come out very strong in the spring and be ready for the harvest. I believe I may safely say that not one colony in twenty wintered on say about 15lbs., will be ready until the season is about half through, unless fed regularly in the spring, and that is very troublesome. I have worked with neighbouring bees every spring, and I find that except with worn-out or unfertile queens such colonies as had an abundance of honey came out the strongest. If they have an abundance of honey early in the spring, feeding is simply useless. I used to think differently. I do not deny that some colonies can have too much in October to give the bees room to cluster out of sealed combs, and that there can be too much in the way in the spring to allow the queen room to spread her brood-nest; but these cases are very rare, and where they do occur we have only to exchange a few empty frames for full ones.

Bees wintered on little honey know by instinct their condition, and will not begin to breed until very late in the spring, while those colonies that have an abundance will begin in January, and frequently in the first week if the weather is moderate. Those

who have time and patience to feed regularly in the spring can afford to winter on from 15 to 20lbs.—*Ibid.*

THE AGE OF DRONES.

DESIRING to rear a few Italian queens about Sept. 1st from a queen I had just purchased, I examined my fifteen hives to see whether I had any drones, but finding none, I procured of a neighbour two pieces of drone brood, each about ten inches square, and, after making a colony queenless, I inserted the drone brood in it. In one piece of this brood the drones were emerging from the cells; the other was well sealed brood. A careful watch was kept over this colony; no queen-cells were allowed to hatch, and the colony became hopelessly queenless so far as the ability of the bees to raise a queen was concerned. It was well filled with honey, and the bees were continually adding to their stores. In ten days the drones had all hatched out, and the hive was apparently filled with them. Eight queen-cells were capped over and given to nuclei, and I felt sure the young queens would all become fertilised in due time.

On examining the hive on Sept. 30th I noticed that the drones were fast disappearing, and thought they may have found their way into the nuclei, but, alas, I found but two even there. By Oct. 5th the drones were so scarce that I had to give up all thoughts of queen rearing. The first of these drones were hatched out between the 4th and 9th of Sept., and now in twenty-four days they were virtually all gone. Am I not right in concluding that the age of the drones will average about twenty-four days, just the time required from the laying of the egg until the perfect bee emerges from the cell?

The eight queens came out perfectly; six were lost in their flights to meet the drones, and the other two have not commenced to lay, though one of them has made at least two flights.

A writer in *Gleanings* says that during the months of June to September the life of the worker is forty-five days, and that of the drone is about the same, but my experiment in September shows conclusively that the age of the drone is only about twenty-four days, even when reared in a strong colony, and not in a nucelus. Another writer in *Gleanings* experimented with rearing drones in June, in a nucleus, and, strange to say, his experiment and mine show the same results—the lateness of the season, therefore, had nothing to do with it.

In 1868 I purchased a colony of Italian bees, and, wishing to rear some queens from it for the purpose of Italianising my apiary, I carried all my nuclei a distance of one and a-quarter miles from my apiary, taking no drones except from the Italian colony. I had to carry drones there every two or three weeks. I then thought they found their way back to the parent colony. I now think they lived out their day and died naturally. Every fall, for years, I have noticed some colonies driving out their drones, while others had none to destroy. The latter, probably, had reared none for some time, and in consequence they had died a natural death in twenty-four days after hatching.

At our Convention last spring it was stated that if drones were shut in their hives by drone traps for three days they would die. One of my neighbours says that he has tried it this summer, and that his drones did die.—*Ibid.*

SOMETHING NEW ABOUT HONEY-DEW.

PROFESSOR A. J. COOK.

WHILE at Cornell University, Ithaca, New York, I became much interested in some observations and investigations made by Mr. William Trelease, a very talented young man connected with the University, which entirely settles the matter of honey-dew. Mr. Trelease has not only tasted the nectar secreted by the plants, but he has discovered the glands which secrete the nectar. These are often so large as to be easily recognised by the unaided vision. Mr. Trelease showed me the glands on species of cassia, acassia, pasiflora—the May-pop of Alabama—prunes, and the cotton plant. On a fine acassia growing in the botanical laboratory of the University I not only saw the glands, but also the drop of nectar, which I found sweet to the taste. I had the pleasure, not only of seeing Mr. Trelease's beautiful drawings, but also of viewing the actual cross-sections under the microscope. The usual dermal cells are enlarged and lengthened at the glands. The cell walls seem more thin, while the enclosed protoplasm is much more dense. These glands are on the petioles of the leaves, on the ribs, or on the blade of the leaves. On the partridge pea, which has so often been noticed to be swarming with bees, the glands are large and numerous, and, Mr. T. says, rich in nectar. Let us observe during the coming season whether the bees get all their gleanings from these nectar glands, or whether some comes from the flowers as well, and if the latter be the case let us note their comparative value.—*Ibid.*

EXTRACTING HONEY FROM BROOD COMBS.

G. M. DOOLITTLE.

MANY suppose that something must be done in time of box honey to clear the brood combs of honey to give the queen room to lay, so as to keep up the population of the colony, reasoning thus: that when bees are working in boxes, as a necessity the brood combs must be crowded with honey, while the truth is that when the bees are at work nicely in the boxes, with a proper hive, there is scarcely a pound of honey in the brood combs. I say with a proper hive, or brood chamber of a proper size. In this there is a great secret of success. Quinby gave, in his "Bee-Keeping Explained," 2,000 cubic inches as the right size of the brood chamber, and told us that there was an advantage in feeding inferior honey in the spring, so as to have the space in the brood chamber, not occupied by the queen, filled with poor honey, thus necessitating the putting of the nice white clover honey in the boxes. This is one way of arriving at the same object that we do with a brood chamber of about two-thirds the size of the one used by Mr. Quinby. By thus feeding, he gave the bees no place to put their honey except in the boxes, and thereby losing the use of this inferior honey for half a year, besides having the boxes separated from the brood by some distance of sealed stores for the bees to pass over, which was of course a detriment; yet he got much more honey in his boxes than he would otherwise. My plan to accomplish this object is to have a hive or brood chamber of a size that an average queen will keep filled with brood to the exclusion of honey, thus keeping the boxes close to the brood, and if any feeding is to be done, do it in the fall. This is not all talk. If you will try it, you will find that the queen will keep the combs in a hive of 1,350 cubic inches filled with brood, and if any honey is to be had from the fields the bees will put it in the boxes, as there is nowhere else to store it. This is our secret of getting box honey. Now, supposing Quinby had, instead of feeding, extracted the honey from the brood combs every week or so, as some would have us believe we should do to be successful, how much honey do you think he would have obtained in his boxes? Not a pound. Bees will not build comb in surplus boxes so long as there is plenty of empty comb close to the brood to store honey in. Again, you may take a hive of 1,350 cubic inches, and fill it with frames which are full of sealed honey, and put on your boxes. Have a strong colony with a good prolific queen in it, and in two weeks' time you will have nearly all of said honey in your boxes. Once more. If you let a first swarm issue from a hive, and keep them from swarming again, by the time the young queen gets fertilised every available cell in the brood chamber will be filled with honey, and still no start be made in the boxes; but just as soon as she commences to lay the bees will commence work in the boxes; and in twenty days, if you examine, you will find scarcely a cell of honey in the brood combs, and as nice a lot of brood as you ever saw. Now, we will suppose that just as this queen was fertilised you had extracted all that honey, you would not have obtained a single box of honey unless from fall flowers. Therefore, if you want a large yield of box honey, keep prolific queens, and let the brood combs alone after the boxes are placed on the hive.—*Ibid.*

PARASITES.

EARLY in the winter, perhaps in January, in front of two of my hives many bees were to be seen each day dying. This at first was thought to be caused by dysentery, but on a closer examination it was found that the bees were distended, and when cut in two a rather brown thinnish matter was found, which contained many particles just visible to the naked eye. We called the attention of a person who was with us one day when we were examining one of these bees and told him that they seemed to be insects—a parasite that destroyed the bees, multiplying and increasing in size until the unfortunate bee, on trying to leave the hive, dropped to the ground, and, after some convulsions, expired in the course of half an hour. We have watched them for thirty or more minutes before life would be extinct. The last moments of the bee's life would show symptoms similar to those of a bee poisoned with cobalt, though in the case of poisoning the convulsions would be more violent, and life would cease quicker.

We do not consider that the climate has anything to do with

this, neither the honey, for only two or three were thus affected, while the remainder were all right.

At a recent meeting a discussion was had on "What are the causes of death of apparently healthy bees?"

Mr. Root said that "what appeared to be dust in the hive was an accumulation of deadly parasites. He had found them inside the bodies of dead bees." The last sentence gives our view as far as could be ascertained by the naked eye. A microscope would have revealed the true cause. The next time our bees are similarly affected we will make a more scientific examination.—*Beekeepers' Magazine.*

IMPROVEMENT OF BEES.

WE want the best bees the world contains! Whatever is worth doing at all is worth doing well. And as this is an age of improvement, and as the march of improvement has invaded the homes of the bees, let us carry improvement to the uttermost practical limits. America beats the world in improved hives, and we can beat the world in improved bees.

Every careful apiarist has observed the difference in different stocks of bees. They may be in the same kind of hives, in the same yard, drawn across the same fields or forests, and be in equally good condition to start with, and yet one will far outstrip the other in the production of bees and honey, and though the queens may be equally prolific, and the colonies continue equally strong, one will gather more honey than another. This is not only true of different races of bees, but of different colonies of the same race, and even of the same family. Now it is a law of heredity that there is a tendency to perpetuate accidental variations. An unprolific queen may produce a prolific daughter,* but a prolific one is more likely to do so. And a queen raised from a stock deficient in working capacity may produce good bees, but she is less likely to do so than one coming from an industrious and energetic strain.

These things being true† we see that there is an opportunity to improve our bees, and to improve them greatly, whether our bees be black or Italians.

To make improvement we must breed only from the best. That we may do this we must familiarise ourselves with bees. We must observe and study their peculiarities, and determine the comparative merits of each; and having determined what ones possess the most desirable qualities, breed from them alone.

I am an admirer of Italian bees, preferring those whose bands are a brownish red to the lighter yellow, and I would take them as the basis of improvement.

I have been among sceptics (*sic.*) in regard to fertilisation in confinement, until since I have seen what Professor Hasbrouk has written about it; but now I am sanguine of success, and with success in that direction assured, as I believe it is, the road to the indefinite improvement of our stock is open to us. When we have two or more stocks possessing specially desirable qualities we can raise queens from them, and have the queens from each one fertilised by drones from the other. In this way we may get better ones than either of the old stocks, and thus, step by step, we may develope the qualities we desire, until our bees will be the best in the world.

We will always find among our bees some that are not sufficiently productive. These should be weeded out by removing the queens and giving them better ones. In raising queens artificially we will get some as good as those that are raised naturally; but we are likely to get some inferior ones. The colonies may not be in as good condition for raising queens as when they are preparing to swarm, and the embryo queens may not be sufficiently nourished for a robust development, and then some of those started later than the rest are sure to be neglected and stunted in their growth. If we secure the best results we must raise good queens and keep no others.

I am not sure but that it may be judicious for some one to experiment by endeavouring to combine the good qualities of different races of bees, and thus to form a new variety. I think it evident that the Italian bees, as we get them, are a somewhat mixed race. Their variations prove that pretty conclusively. And it may be that by further crossing and breeding only from the best very desirable results may be obtained. I have had many colonies of mixed bees that were larger‡ than pure Italians I have ever had. I do not pretend to account for the increased size over either of the present stocks, but I know the facts to be as above stated. And these bees were not only larger in size, but they were splendid workers, and better tempered than smaller bees of mixed blood. If I can have queens fertilised in confinement, I purpose, if I live another year, to cross different strains of Italians.—*Ibid.*

* Query.

† Is not the author taking too much for granted?

‡ Query: The colonies or the individual bees were larger?

DO BEES WINTER BEST WHEN CROWDED IN A FEW COMBS IN A ROOMY HIVE?

BY THE REV. A. SALISBURY.

THE question: "Do bees winter better crowded on a few combs, or in a roomy hive?" should be answered in the affirmative. Bees winter better on a few combs than many. Where they spread out all over the hive they largely lose the effect of the animal heat upon one another; small groups in the extreme part of the hive are lost the first cold night that the mercury sinks 10 deg. below freezing. There is no settled rule as to the correct number of frames that a colony of bees should have when put into winter quarters. The number must vary in proportion to the size of the colony. In a small or medium sized nucleus, three frames of honey hung in the centre of a standard hive, one inch between the combs, allowing the bees to cluster on the centre combs, and then placed in a good warm cellar with a temperature of 45 or 50 deg., success is almost certain. No cushion is ever needed in a good cellar. Small colonies must have a warmer temperature than large ones. A few frames should never be placed in a correspondingly small hive, just large enough to hold the frames. The vapour arising from the bees, that should condense remotely on the outer walls of the hive, is confined among the bees, unless well cushioned, and cushions are necessary only to correct blunders already made.

In proportion as bees live through the winter in a damp, cold hive, dysentery and spring dwindling is a legitimate result. I have 100 fine-tested queens for early spring use—bees with queen, on from three to four frames, hung in the centre of a standard hive, and in winter quarters, and results will be no doubt, as heretofore, satisfactory.—*American Bee Journal*

REPLY TO ABOVE.

BY R. M. ARGO.

THE above question will only admit of a conditional answer. If the question had been "Will bees winter better in small than large hives?" from twenty years' experience I would say that they will winter better in small hives. An average colony of bees crowded on a few combs with sealed honey on the top and ends of each comb, with the brood-nest, or lower part of the centre of the frames, empty, and with winter passages cut through each comb, will winter far better than in a large and roomy hive; but, if the large and roomy hive should be very tight, admitting of no upward ventilation, and filled with combs at least three years old, with sealed honey, and the lower part where the bees cluster should be empty, and sufficiently so for a large cluster, they will winter about as well as in a small hive. The hive being full of sealed honey above and around, the cluster will form what is almost equal to dead-air spaces. If crowded on a few combs in a large hive with open space either at the side or above, they will hardly winter at all; but if these few combs with the above conditions are placed in the centre of a large hive, with a partition board at each side and a cloth spread over the top of the frames, and the empty space on the sides and above filled with dry straw, fine hay or chaff, they cannot be wintered better, either in cellar or on their summer stands. This is equal to wintering in a straw hive, and I have found it to excel packing the hives in straw on their winter stands. I must be understood as speaking of wintering on summer stands, as I have never tried cellar wintering.

I have successfully wintered four colonies for the past eight or nine years in a large double-floored and double-walled box two feet deep, the top being also double walled. These colonies remain there the year round, and I wish I had my whole apiary in such boxes.

"Will the natives or the Italians winter the best without protection or feeding in the fall?"

This question was answered emphatically in favour of the Italians in 1868, the worst honey year I ever experienced except the present. Now, I wish all to take an impartial survey during the coming winter, and report at the next meeting. From a close inspection of bees in my neighbourhood during the last six weeks, I predict that where no feeding was done no natives will be alive in April. As my neighbours are not feeding their bees I anticipate a splendid opportunity for rearing pure queens next season with no native drones within ten miles. I purchased four colonies of black bees last season and Italianised three, forgetting one, and that one had

not a pound of honey a month ago. I united the bees with an Italian colony. I had forty-one colonies at home, and fourteen in the country, which I have reduced to fifty-four as put up for winter. I had to feed about half of them; those that needed none were generally the purest colonies. Some years the blacks will do as well as the Italians, and by being assisted will winter better; but such years as this is the time to make a fair test.—*Ibid.*

WINTERING BEES ON THE SUMMER STAND.

By A. E. WENZEL.

WE should ever feel under obligation to do our utmost as progressive beekeepers, to advance our mutual interests, as in all other relations of life; the result of such unselfish labour to be determined by the public, whose interests are intended to be subserved. I infer that it is not anyone's intention to confine remarks to any particular subject, but to have each respective branch of the apiarian industry, as one chooses to select, brought out for its fuller development. If so, I shall choose for my subject the oft-repeated theme, "Wintering Bees upon the Summer Stand," which subject, though threadbare, is still unintelligible to many. Assuming that much has been said, too much has been interpolated that has no bearing directly upon the vital point at issue. The errors have been errors of *commission* rather than of *omission*, by generalising upon the whole system, instead of confining a subject to special treatment, and which, otherwise, might often deservedly be rebuked by saying thereof, "It's talked to death."

To winter bees successfully, it is of prime necessity that they be in proper condition in the fall, like other stock.

To winter bees at all, we must assume their condition as favourable to be operated upon; their position and location to be assumed also as the best (or should be made so), as suited to one's necessity and convenience; plenty of honey in the hives; bees numerous, which indicates a prolific queen. Their dwindling at times is, unfortunately, caused by extraneous conditions, which may be assigned to unseasonable molestation and sudden unfavourable changes in the weather.

Some people would overdo their packing or "stuffing;" stuff everything full where empty space allows, on the top, sides, and bottom—their limit to the same being restricted only by the amount of lumber at their disposal. Too much packing over the frames, without vent, absorbs and retains the moisture exhaled from the bees, while below the moisture is frequently drawn in from without by capillary attraction, which moisture in either case has a tendency to decompose the saturated packing, thereby rendering it unfit for the purposes designed, if it does not otherwise become solid by frost, in which state it becomes an element of cold.

Another fruitful error (one which is a crime of commission) is the robbing of the bees of their necessary winter stores, thereby putting them to the necessity of seeing how little they can winter upon, and consigning them to certain starvation in case of a backward spring.

Even molesting combs late in the season, for the purposes of examination or for perforating holes through the same for winter passage-ways to their stores, I esteem as a fruitful source of disease, by the brood becoming chilled by exposure, and frequently disturbing otherwise the normal condition of things by breaking joints and combs, for which the bees have no redress, it being too unseasonable for them to make repairs; besides, it sometimes induces robbing, thereby also causing decimation.

A hive properly packed over the brood chamber I esteem as the only essential to safe wintering on the summer stands.

When the side of the hive permits of a space by double walls (not particularly in feet nor inches, as any practical small-air space that will allow of circulation of air would appear beneficial) I claim from my own long experience, formerly with the common box hive, and more recently with the American frame hive, treated as I recommend, that side packing is not really essential.

The new comb-honey racks of the period are an excellent arrangement for properly packing above the bees; to wit, after removing the section boxes insert wire-cloth in their place above, and on the bottom of the rack. If such racks be not used, then by sticks elevate the wire-cloth enough to allow a passage for the bees underneath it, upon the brood frames (a temporary frame surrounding the wire-cloth); then cover with a piece of common muslin, say two feet square, upon which chaff, buckwheat hulls, wheat bran or sawdust, to the depth of two and a half or three inches (with the edges of the muslin projecting over the top to facilitate removal when desired in the spring), the whole covered by a cap having holes one and a-half to two inches in diameter cut upon opposite sides, and covered with wire-cloth to exclude the vermin. These holes allow free evaporation, without a circulation of air up through the mass of bees from below. The principle eliminated is that the moisture exhaled by the bees is absorbed and radiated by the chaff or other packing, but the heat is retained owing to the non-conducting material used. The carbonic gases and the exhalations of the bees, being heavier than air, flow out from the entrance below, and is replaced by pure atmosphere.

Thus from the foregoing we deduce the following conclusions:—

1st. We should not rob bees too close at times when they have no chance to replace it.

2nd. Do not bore holes through the combs for the bees, but let them have a passage in winter over the top-bars or frames, protected by a non-conductor of heat, but to be no less an evaporator of moisture.

3rd. Only during warm weather in winter clear the entrances, which may have become partially or wholly closed by snow, ice, or dead bees.

4th. Let the bees choose their own time for purifying flights, and, if snow covers the ground, sprinkle with a little straw, chaff, or anything of that nature, to afford the bees a better opportunity to rise again than from the snow.

5th. Otherwise, let the bees "severely alone;" but see to it that no loose, clattering boards or covers of hives can molest or annoy the bees by jarring the hives in stormy weather, when the bees are enjoying their wonted winter repose.

I will sum up by recapitulation: For wintering:—

1st. Have everything done in its proper season.

2nd. Do not do too much; but do that little well, and disease will be unknown.—*Ibid.*

HOW TO PLACE SECTIONS ON THE HIVE.

By the REV. O. CLUTE.

WITHOUT denying that, under some circumstances, other receptacles for comb honey may be serviceable and desirable, I think it is generally conceded that the prize section is best adapted for the markets of the larger cities. It is probable that before many years have passed nearly all the comb honey that goes to market will be stored in this or a very similar section. The method of putting the sections on the hives is a subject of a good deal of practical importance. There are three methods in somewhat wide use.

Those who use a honey-board over the frames often arrange and fasten the sections side by side, until they make a long box, Glass the open ends of this box, and place it on the honey-board, just in the way in which the old 5 lb. boxes are put on. For those who use a honey-board this method will answer, but for the large number who reject the honey-board it will not do.

Another method advocated by some excellent beekeepers and used somewhat extensively is to put the sections in cases or holders, and to hang the cases in a super, just as a frame is hung in a hive. The super, filled with these cases of sections, is set on the hive, bringing the cases immediately over the brood-chamber, with only a quarter of an inch space between. At first this seems to be an excellent way. It it easy to arrange the sections in the cases, to hang the cases in the super, and to set the super on the hive. All is done in a few minutes, and everything is snug and tight. But from my own experience I am led to think there are two strong objections to this method.

First, it is not possible to examine easily how work is progressing in the sections. It is important for the beekeeper to know this, and he needs to make frequent examinations. By this method of placing sections such examinations are difficult. Take off the lid of the super, and you have only the tops of the cases to look down upon. You attempt to lift out one of these cases, but find that it is not easy work. If the cases have been shoved close together—as they ought to be—it is very probable that the bees have glued themselves together, so that they must be prised apart. Not unfrequently the bees have fastened the bottom bar of the case to the tops of the frames beneath it, so that there is a still greater difficulty in removing it. Hence, by the time you have lifted out a case of sections you have pretty thoroughly roused the bees and spent a good many minutes of valuable time. This difficulty of examining the sections when hung in cases would, with me, be a sufficient reason for rejecting this method.

But, secondly, there is another objection equally strong. When you have lifted out your case of sections and find some of the sections filled and sealed, you want to remove these and replace

them with new ones. As soon, now, as you attempt to remove these filled ones, you disturb others only partly filled, and you find yourself in the midst of a difficult and perplexing job, which requires more time and patience than it is profitable to bestow. Speaking for myself, and from my own experience, I am sure that this method of placing sections in cases and hanging the cases in supers is not the best method. If I were a prophet I would hazard the prediction that in a few years it will be entirely given up, except when a small amount of comb honey is desired from the brood-chamber. In this case there seems no better method than to hang the sections by the side of the brood combs.

The third method of placing the sections is to have a rack made for holding them, which sits closely over the tops of the frames, and holds the sections firmly in place, but by the removal of a wedge allows the sections to be easily moved, and the filled ones to be taken out and replaced by others. By this method, when the sections are once in place in the rack, and the end sections in each row glassed, the rack can be instantly set over the frames, and there are then as many tight compartments for surplus honey as there are rows of sections, and these compartments come immediately above the brood. The progress of work can easily be known by lifting off the cap or super, and each section is easily reached and removed. This method seems to me far preferable to either of the others.

The sections should always come so close to the top bars of the frames beneath them as to leave only a passage-way for the bees between, as this tends to prevent the building of bits of comb between the frames and sections, and the bees will enter the sections more readily when thus close. The fact that there is an entrance to the sections at both sides of every one of them, except the end ones in each row, has a marked influence to lead the bees to enter them and go to work.—*Rural New Yorker.*

THE HIVE IN THREE MOVEABLE COMPARTMENTS.

THE idea of moveable compartments is by no means new. Even in 1763 Lapoutre made a hive in three pieces, which, said he, ought to have the dimensions so well-proportioned that they represent, as closely as possible the form of a simple hive. Since then many inventors have set to work to divide or multiply these pieces, and to place them in every conceivable position—above, below, on the sides, before, behind. All these systems seem equally good, but all are open to two objections—

1. The bees can only enter with difficulty these superadded spaces.
2. The work done there at the outset is only done with disappointing slowness.

To attract the bees from the commencement, and to force them to immediately set to work to build, is a double problem that has caused much deeper attention to be given to these insects.

Place a frame, either empty or furnished with artificial comb, into the middle of the brood chamber of a strong colony, the building will become finished at the end of a few days, for the bees instinctively will tolerate no empty space.

I do not wish to find out the inventor of the first hive made on these conditions, but it is incontestable that the new methods of improvement were not made known to the public till the publication of the *Bienenrentmeister* by Bentz, and the explanations made by the same author at the Congress of Swiss Apiculturists held at Fribourg in 1877.

Bentz is a fixist. His hive is made in two compartments of unequal size; that is to say, the hive proper and an upper hive. This latter, of smaller dimensions, rests on a plank pierced with a hole in the centre, and the plank itself rests on the body of the hive. When these two hives are furnished and the queen lays eggs in the lower one, Bentz raises the upper and inserts a wooden compartment. It is marvellous, say the experimenters, to see this space so quickly filled. The operation can be renewed several times in good years with great increase of profit.

Bentz's pamphlet gives much hope theoretically for a harvest seven times as great as one can ordinarily expect. Practice has reduced this exaggeration to three, and that is not bad.

Can this method be made applicable to bar-frame hives?

M. Ritter, of Berne, adapted the Burcki hive to this method, and that was fifteen years before the publication of Bentz. But his hive had the fault of being in one piece, but in three stories, and in the use of frames of different sizes. I have just read in the *Pfalzer Bienenzucht* that M. Braun has just constructed a hive in moveable compartments. I also have a hive in moveable compartments. But as this journal enters into no details, it would be curious to see whether by simple chance our two children do not resemble each other in all points.

It is natural that I should imagine my invention to possess all sorts of good qualities. I will give a few of the advantages:—

1. In operating like Bentz I obtain, as he does, a triple harvest.
2. Like him, I can suppress swarming.
3. I employ frames exactly like those already in use, which enables me to utilise material already to hand, and makes an exchange with other hives possible.

(The writer mentions several other advantages.)

Now for objections:—

A. Why do you divide your hive? Because—

1. Wishing to raise the super in one piece, I have no need to take each frame out separately, and the operation thus is done quickly and without smoke.
2. I have no necessity to have any intermediary piece for each hive. In ten colonies five should furnish swarms and five gather honey. In the next year the first five will gather and the others swarm.

B. You leave an empty space between the frames of the upper and lower hive? Yes, two to three millimetres. This space is sufficient to prevent the bees from propolising. Even were they to propolise, it would be very easy to detach the frames, especially in summer, when the heat of the hives makes the propolis almost liquid.

C. Your upper hive will become full of brood! No. These few millimetres of which we have spoken are sufficient by themselves to prevent the entrance of the queen for several days; besides, we have the distance of an empty frame that she must first pass over. Now the work commences above, and we are in the middle of the honey harvest. So soon as the comb is finished it will be filled with honey. By the time it touches the lower stage, and offers a bridge to the queen, it will be too late; all the cells will be already occupied. This objection can have no force unless I filled my hive with ready-made combs, which would be absurd.—*Alsace-Lorraine Bienenzuchter.*

LE JARDIN D'ACCLIMATATION AT PARIS.

ONE of the most interesting sights of Paris is, without doubt, the Zoological Gardens, in the Bois de Boulogne. It was founded, in 1858, by the Acclimatisation Society to introduce into France different species of animals and plants, useful or ornamental, tame or wild, natives of foreign lands.

The visitor sees in the grounds greenhouses, winter-houses, open-air gardens where the choicest of the more hardy exotics are grown, an aquarium, poultry yards, menageries, cow-houses, aviaries where the most beautiful feathered birds, from all parts of the world, are exhibited, besides kiosques, a concert-hall, a restaurant, a lecture-room, &c. In a word, this is the most complete establishment of the kind in the world, and reflects well-merited credit on its founders, but principally on its energetic manager, M. A. Geoffrey Saint-Hilaire. The Jardin d'Acclimatation, occupying a space of twenty hectares, is one of the favourite walks of the fashionable Parisian. But it is frequently not only as a place of amusement, but is sought by many students, who find there much instruction and intelligent recreation, and as a "school" it deserves and obtains the highest credit from French as well as foreign visitors.

Thanks to the energy of its director, the establishment boasts, since the summer of 1878, of an apiary and an apistical school. In an enclosure every way suitable are a dozen hives on stands. Six of these are constructed on the moveable comb principle. In the centre is an observatory hive. This enclosure, with its hives, serves as a field of lecture to Mdme. Jarrié, a lady well known as an accomplished authority on bee matters, and who conducts a class twice a week. In one part of the enclosure is a covered room, serving as a sheltered spot for the students in time of wet weather. Giving from this room are too smaller chambers, the one being used as an office, the other as a show-room for apistical implements and tools. In the office is a library containing all the better-known books and periodicals—French and foreign—connected with bee matters. Different systems of hives are there shown, besides honey extractors, wax presses and melters, honey knives, honey packages of all sizes, fancies, and shapes; in a word, everything is complete.

I had the good fortune to be allowed to assist at one of Mdme. Jarrié's lectures. In the course of it Mdme. Jarrié took one of the hives and fearlessly showed comb after comb, exhibiting the queen to her audience, and pointing out the brood, honey, bees, &c.

Those unacquainted with the subject were more than astonished to see a lady, without veil, gloves, or other protection handle so confidently, and without any danger, frames covered with bees.

"Our beekeepers, Madame," said a countryman, "are much more timid. They cover themselves from head to foot before they dare commence operations on their bees."

"Always move gently and without hurry," replied Madame Jarrié, "and your bees will not become frightened, and will consequently do no harm."

During the whole of the lecture not one of those present was stung by a bee.

I can only congratulate the Acclimatisation Society on the "happy thought" which induced them to introduce a school of apiculture into their establishment, aiding by this means the great extension of a practice so interesting and so profitable in the beautiful country of France, rich alike in flowers and honey.—M. DENNLER.—*Ibid.*

NINETY POUNDS FROM ONE HIVE.

You have already made known in your journal that I took 150 livres of honey in 1878, ninety livres of this coming from one hive.

"What a *whopper!*" say some of your readers. Nevertheless, it is true. A friend of mine, from Strasbourg, was present when I cleared this hive, a hive extraordinarily strong in numbers—six frames of honey of five livres in May, and twelve of five livres in June. Examining it in autumn, I found the hive still held thirty livres of food. During the six years that I have been occupied in bee culture I have often taken fifty livres of honey from one colony. My hives contain twenty-four frames a little larger than those of the Alsatian hive.

Since I have had bees I have not taken two kilogrammes (2 2-5 lbs.) of wax; that is to say, I always preserve my combs. Each spring I have nearly two hundred empty combs that I give to my colonies when honey is abundant in the fields. While other apiarists are trying to get their bees to build comb, mine are filling them fast with honey. I make a point of never having any but well-populated hives. With this view I unite all weak stocks, I keep my hives supplied with young queens (half-bred Italians, which I think are best suited to our climate, and are more productive than pure Italians or Carniolians), and I prevent undue swarming by giving my bees twenty-four frames, and by clipping the wing of each queen as she begins to lay. This clipping does no harm whatever, but has the advantage of enabling the apiarist to tell more quickly and easily when a new queen has deposed the old, and it prevents the latter from swarming out so long as she is not, so to speak, thrown out of the hive.

Notwithstanding this large harvest from one of my hives, and some sixty livres of honey that I took from two others, I consider 1878 as having been a bad year, for in previous years I have often taken 300 livres from my apiary.

I always renew, as it were, my old combs without quite destroying them. I cut off the honey cells from each side, leaving merely the cell foundation in the middle. When I give them to the bees they lose no time in re-constructing the cells. I possess an extractor. CH. KIEFFER, of Strasbourg.—*Ibid.*

DIFFERENT SORTS OF HONEY.

NECTAR.

AMONG the various substances from which bees naturally gather honey and sweets to transform into honey, the first first place must be given to the nectar of flowers. This is a sweet juice, clear, of a little greater density than water, which the nectaries of the flowers secrete during the time of fine, somewhat humid weather. A continuance of rain and of dry north winds stop for the time, and frequently altogether, this secretion. A hundred parts of nectar contain twenty-three of sugary matter and sixteen of water. When it is transformed into honey, it contains but eight per cent. of honey. Part of this water is thrown out by the bees before they return to the hive. As a proof of this, it is only necessary to walk to some little distance in the line of the bee flight on a day when honey is abundant, and a fine rain can be perceived. This is caused by the legions of bees throwing out the superabundance of water as they return from the fields.

The chemical transformation of honey into wax takes place in the digestive organs of the insect. It is by the action of acids on the sugars that this transformation happens. The remainder of the excess of water evaporates spontaneously in the cells through the access of air, as well as by the heat which the bees produce in the hive. As soon as the honey is sufficiently condensed in the cells the bees seal it over with wax to keep it from the influence of the air and to prevent fermentation.

The honey of nectar has the aroma of perfumed flowers; it loses this and takes the taste of wax, pollen, and propolis when it is extracted, as some people are foolish enough to extract it by melting honey and comb together.

Exposed to too strong heat it becomes of bad quality, and the greater the compression of the combs the more impurities of wax and pollen will the honey contain. The only way to get really fine virgin honey of aromatic flavour and without impurity is by means of the extractor. The honey that remains in a largely-populated colony in the winter loses its quality.

HONEY OF MANNA.

Certain vegetables exude also sweet liquids of which the bees are extremely fond. Of these we may mention the leaves of the lime, the willow, the oak, the larch, the fir, &c.; the stalks of certain herbaceous plants, such as the vetch and others. The honey which the bees gather from these different sources is not so valuable as that obtained from the nectar of flowers, although it is preferable to heath honey.

PLANT-LOUSE HONEY.

In summer there are some plants which are literally covered with lice, the sweet excrement of which is greedily seized by the bees. The honey obtained in this way is of the worst quality. The bees who derive nourishment from it in winter are very liable to dysentery; it is better to sell this honey and feed them with sugar.

SUGAR HONEY.

This is a sort of honey given to the bees as artificial food, or the bees may obtain it when they are placed near refineries or confectioneries. It has no perfume, but this difficulty is generally overcome by mixing it with mountain honey, which is often of too strong a flavour.—C. ZWILLING.—*Ibid.*

COMB FOUNDATION.

In the last number of your journal Dr. Reisser has given a series of articles, in which he shows the great and incontestable advantages of the employment of artificial comb. Having myself made use of these sheets for fifteen years, I can confirm all that has been said by the learned author.

Concerning his process of fixing the sheets in the frames to prevent their becoming crooked, I can only say that I have not tried it, but believe his plan to be good. At the same time I do not know if it can be considered more practical than that of M. Gallois, who exhibited a large number of specimens of comb obtained by his method at Haguenau, which seemed to me to leave nothing to be desired. Be this as it may, and admitting both processes to be equally good, I am sure you will permit me to say that without any hesitation I give my preference to the method adopted by M. Blatt, of Rheinfelden, Switzerland, a method that I have not only myself followed for many years with much success, but that I have introduced into our country because it is so simple, so easy to follow, and is sure of success, even in the hands of a novice.

I have shown this process at Colmar, at the Conference held in the garden of the Normal School, and M. Duck was most anxious to repeat it at Hagenau in the presence of the apiculturists who met there in general assembly last September. Dr. Reisser has also mentioned this process while speaking with much appreciation of the divers modes used for fixing the sheets and frames. He made one mistake, however. We have no need of any consolidation, for if once the wax is pressed against the two sides and spread the whole length, and is the same thickness as the groove in the frame, the sheet cannot slip, notwithstanding the greatest possible weight of bees. The bees themselves at once set to work to make everything right.

As to the objection made by Dr. Reisser, who supposes that one would be obliged to replace a very old comb by a new sheet, this is no objection at all. It is only necessary to melt a little of the wax of the sheet to enable us very easily to place it in the groove of the frame. The replacement of a sheet would be very seldom necessary, for when the cells constructed on it have been used for many years for brood, and have become black, it will suffice to erase the cells and leave the foundation as it was.

Two other makers have furnished me with comb foundation. The sheets of the former are a little more expensive, but, on the other hand, the wax is whiter and the shape of the cells stands out in better relief.

The manufacture of the second has given me results no less satisfactory. The size of the cells in the one is much larger than

that in the other; but can one accept without examination the assertion of a beekeeper that the queen is sure to lay drone eggs in the larger?

I doubt it myself unless in the case of an orphan colony. At all events, I have employed a great number of these larger sheets myself without finding this to happen.

(The comb foundation mentioned by this writer is in square sheets, but from each side and from half the length a small piece is cut away.)—EDWARD THIERRY-MIEG.—*Ibid.*

BEE CULTURE v. FARMING.

BY W. O. CARPENTER.

"Is bee-culture subject to more failures than farming or stock raising?"

This is a very abstruse question, and by no means to be answered in a summary manner; each avocation has its special requirements, and the question is not so much whether the one is subject to more natural failures than the other, but whether both come within the average capabilities of the ordinary run of individuals. "Non cuivis homini contingil adire Corinthum"—only those who strive to acquire great things can reach Corinth—and this is especially applicable to the successful management of bees. The chances are the same individual would not be equally successful, whether he undertook the occupation of farming or bee-culture. To succeed in beekeeping, irrespective of having a fair knowledge of business, you must possess a certain aptitude, have more or less a mechanical turn with an inventive brain, quick sight, and good powers of observation, and settle in a favourable location. It is by no means a game of chances.

To succeed in farming you require another kind of knowledge, altogether apart from that acumen of perception so necessary for bee-culture. You must be a good judge of stock (a specialty of itself), and you must have a considerable experience in raising and cultivating crops, with a knowledge of the nature of different soils, manures, &c., and their relative application to each individual grain or herb. This information is usually obtained in early life, and you commence on your own account at a suitable age with a full store of farming knowledge. Not so in beekeeping; it is a science usually commenced at mature age, probably a fancy instilled into the mind by a certain intuitive faculty you feel you possess, but of course it requires some experience and observation before you can safely launch into it, and before you are really on a par with the young trained farmer just about to commence business. This being accomplished, suppose each enters upon his relative occupation, both well up in their profession; I will suppose each to be first-rate in their respective callings. Query: Which will make the largest return for the capital invested? But to work this out fairly, a given number of colonies must be supposed to be an equivalent for a given number of acres; and I am hardly prepared to give that piece of statistics correctly, but say, for example, 500 colonies of bees against 320 acres of land; I would then say if you gave the 500 colonies to Mr. Doolittle, and the acres to the best farmer in the State, the latter would stand no chance with him. The Vice-President of the Kentucky Convention stated his average for six years was 12 dol. 35c. per colony; can the experienced farmer produce such an average per acre? But it must be borne in mind by all those about to enter upon the business of beekeeping that all bee-masters are not Doolittles. The want of science will materially reduce the proceeds, and with regard to the relative failures of each from various accidents of bad weather, &c., if the farmer loses his oats, he perhaps saves his corn or his hay, or some other produce; but the beekeeper saves nothing! Of course if you place a bungling beekeeper in competition with a skilful farmer, the farmer will beat him; but setting two men together of average intellect in their respective professions with the average failures from bad seasons, the bee man will have the best of it, unless prices fall to an unprecedented extent.—*American Bee Journal.*

HINTS TO BEGINNERS.

IN writing a few remarks upon bee-culture I wish to state at the outset that I shall not, perhaps, present anything new to many of the members, but I will offer a few hints to beginners. The old opinion which ought by this time to be entirely exploded, that bees will take care of themselves, and bring us large returns for little or no investment of capital or labour, is still a stumbling-block to prosperous beekeeping. Added to this are the misrepresentations of unscrupulous dealers, whose advertisements are sure to mislead the uninformed.

None of us like to tell of our failures or of bad years before the public, and consequently the reports in the papers usually show only the bright side and large yields. Ignorance of the business, then, is the fault of a large proportion of ill-success. What, then, is essential is a thorough knowledge of the business—plenty of application and hard work. Much useful information may be obtained by reading the best works and papers on the subject, but actual practice in the apiary is indispensable. Many persons are naturally unfit for the business from carelessness and inaccuracy about their work. I know of no out-door work where so much depends on the right thing being done at the right time, and in the right way.

Avoid the common blunder of rushing into beekeeping just after there has been one or two good seasons. The fact is that an extra good yield is usually followed by a very moderate or poor one. Beginners should purchase but a small number of colonies at first, and the bees will increase as fast as their knowledge will increase. Buy always the best that can be found, even if they cost more; for it will often pay you the first season. Spring is the best time to buy, for then they are through the winter, and you have not much risk, and they will then soon be a profit to you. Use some good moveable-frame hive, for with the box-hive the best results cannot be obtained.

A very great hindrance to handling the bees is the fear of stings. Every beginner should supply himself or herself with a good bee-veil, which will protect the face, and a good bellows smoker is as necessary for the beekeeper as a plough is for a farmer. The extractor for removing the honey from the combs without injuring them is a very important implement, for then you can use the combs again, and it will increase your yield of honey.

Use comb foundation for the brood-chamber, for it will insure all worker comb, which is of great importance. A piece of drone-comb 2 inches square, in the centre of the brood-chamber, is a small thing, yet it is a space in which every twenty-one days 200 worker bees might be raised, and in which they will raise a lot of drones, which are not producers, but consumers of honey.

I have but mentioned some of the necessary fixtures of a first-class apiary, without which success cannot be obtained. But do not make the mistake of thinking that if you get these fixtures you are sure of success. They are only aids, and it will take work and knowledge yet to get the full benefit of your work.

The merits of the Italian bee are thoroughly established among enlightened beekeepers. I cannot now mention all their points of superiority, but I would advise all beginners to buy the Italians.—*American Bee Journal.*

INSTRUCTIONS FOR BEGINNERS.

By E. D. BLACKWOOD.—No. 3.

NUCLEUS hives are of various kinds. Professor Cook says:—"The nucleus hive, if we use frames not more than a foot square, need be nothing more than an ordinary hive, with chamber confined by a division board to the capacity of three frames. If our frames are large, then it may be thought best to construct special nucleus hives. These are small hives, need not be more than six inches each way—that is, in length, breadth, and thickness—and made to contain four to six frames of corresponding size. These frames are filled with comb. I have for the last two or three years used the first-named style of nucleus hive, and have found it advantageous to have a few long hives made, each to contain five chambers, while each chamber is entirely separate from the one next to it, is five inches wide, and is covered by a separate, close-fitting board, and the whole by a common cover. The entrance for the two end chambers is at the ends near the same side of the hive. The middle chamber has its entrance at the middle of the side near which are the end entrances, while the other two chambers open on the opposite side as far apart as is possible. The outside might be painted different colours to correspond with the

divisions, if thought necessary, especially on the side with two openings. Yet I have never taken this precaution, nor have I been troubled much by losing queens. They have almost invariably entered their own apartments when returning from their wedding tour. These hives I use to keep queens during this summer. Except the apiarist engages in queen rearing extensively as a business, I doubt the propriety of building such special nucleus hives. The usual hives are good property to have in an apiary, will soon be needed, and may be economically used for all nuclei. In spring I make use of my hives, which are prepared for prospective summer use, for my nuclei. Now, go to different hives of the apiary and take out three frames for each nucleus, at least one of which has brood and so on, till there are as many nuclei prepared as you have queen cells to dispose of. The bees should be left adhering to the frames of the comb, only *we must be certain that the queen is not among them*, as this would take the queen from where she is most needed, and would lead to the sure destruction of one queen cell. To be sure of this, never take such frames till *you have seen the queen* " (see Foreign Notes in present number for Professor Hasbrouk's plan for marking a queen), " that you may be *sure* she is left behind. I usually shake off into the nucleus the bees from one or two more frames, so that, even after the old bees have returned, there will still be a sufficient number of young bees left in the nuclei to keep the temperature at a proper height. If any desire the nuclei with smaller frames, these frames must, of course, be filled with comb, and then we can shake bees immediately into the nuclei till they have sufficient to preserve a proper temperature. In this case the queen cell should be inserted just before the bees are added; in the other case, either before or after. Such special articles about the apiary are costly and inconvenient. I believe that I should use hives even with the largest frames for nuclei." I find, on inquiry at several of our larger English apiaries, that these large frames *are* used, and used with great advantage, much use being made of the division board. Indeed, I may safely say that in only two cases have I heard of special nucleus hives being in use. To resume Professor Cook's description: — " In this case we should need to give more bees (*i.e.*, for the sake of greater warmth). To insert the queen cell—for we are now to give one to each nucleus, so that we can never form more nuclei than we have capped queen cells—we must first cut them out, commencing to cut on either side of the base of the cell, at least one half inch distant, *we must not in the least compress the cell*, then cutting up and out for two inches, then across opposite the cell." In other words, cut out a triangle piece of comb, the lowest angle and point being the queen cell. Cut, also, from the comb where the new queen cell is to be inserted a triangle somewhat larger, and place the comb with the royal cell in its new abode. To avoid compression cut away from the lowest angle of the comb enough space to allow the new piece with the queen cell to hang in such a way that the cell itself is not touched by any of the surrounding comb. The bees will right anything that may be wanted. " After all the nuclei have received their cells and bees, they have only to be set in a shady place and watched to see that sufficient bees remain." For the skilful apiarist will know that bees have a great knack of returning to their original stock, a dispensation of Providence that has more advantages than disadvantages, like all other dispensations of Providence. " Should too many bees leave, give them more by removing the cover and shaking a frame loaded with them over the nucleus; keep the opening nearly closed, and cover the bees with a quilt. The main caution in all this is *to be sure not to get any old queen in a nucleus*. In two or three days the queens will hatch, and in a week longer will have become fertilised, and that, too, in case of the first queens, by selected drones, for as yet there are no other in the apiary, and the apiarist will possess from ten to thirty-five queens, which will prove his best stock in trade."

Our Editor tells me that he could not possibly find time this month to overlook my MS., and that I must, therefore, be most careful in my remarks. I think that this formation of nucleus hives is one of the most important affairs that should command the care and attention of the beekeeper; but I know, from careful observation, that it is a matter that does not obtain a quarter of the attention in England that it deserves. The Americans are most careful in this thing, and every, or almost every, apiarist there has several of these nucleus hives. I myself think the matter so important that I give the whole of this paper to the subject, and I make no apology for taking nearly all I have said from Mr. Cook's Manual, for I find that our own authorities on bee-culture almost ignore the nucleus hive and its many uses. To any man of sense the importance of a nucleus hive must be apparent, and it would be merely waste of time for me to enumerate the many occasions, unforeseen and otherwise, when it is found advantageous to have a queen or two in reserve, besides the profit that may be made by the apiarist by the sale of queen bees alone.

Once more to revert to Professor Cook, who seems to think as much of the importance of this question as I do myself: " I cannot over-estimate the advantage of *ever* having extra queens. To secure pure mating later, we must cut all drone-comb from inferior colonies, so that they shall rear no drones. If drone larvæ are in uncapped cells they may be killed by sprinkling the comb with cold water. By giving the jet of water some force, they may be washed out, or we may throw them out with the extractor, then use the comb for starters in our sections. By keeping empty frames and empty cells in the nuclei the bees may be kept active. Yet with so few bees one cannot expect very much from the nuclei. After cutting all the queen cells from our old hive we can again insert eggs, as above suggested, and obtain another lot of cells; or, if we have a sufficient number, we can leave a single queen cell, and this colony will soon be the happy possessor of a queen, and just as flourishing as if the even tenour of its ways had not been disturbed."

The Americans are a go-a-head race, and any reader of their bee literature will know what importance they are now giving to queen rearing, and how fierce is the contest about American-bred Italians.

(*To be continued in our next.*)

FRANCOIS HUBER.

THE following memoir is taken from Volume 38 of the " Naturalist's Library :"—

The naturalist whose researches have been specially directed to the instinct and operations of the domestic honey-bee will be strongly disposed to regard the subject of this memoir as at the very head of apiarian science, and his writings as forming the safest and most useful text-book. Multitudes have written on this interesting department of Natural History, and have added more or less to our knowledge of what has been a subject of investigation for ages. But none, either in ancient or modern times, have displayed so much sagacity of research as François Huber, nor so much patient perseverance and accuracy of experiment, even admitting some errors of minor importance detected by succeeding observers. His success in discovery, notwithstanding the singular difficulty he had to struggle with, was proportioned to his intelligence and acuteness; and this difficulty arose, not from what some of his advocates have, in their zeal in his defence against the sneers of the sceptical, termed " imperfect vision," but from *total blindness*. For, from the period when he first applied himself in good earnest to investigate the nature of his winged favourites, external nature presented to his eyes one universal blank—

So thick a drop serene had quenched their orbs,

It is not, therefore, without reason that his friend and eulogist, De Candolle,* asserts that "nothing of any importance has been added to the history of bees since his time; and naturalists of unimpaired vision have nothing of consequence to subjoin to the observations of a brother who was deprived of sight."

François Huber was born at Geneva on the 2nd July, 1750. His father possessed a decided taste for subjects of natural science; the son inherited the taste of his father; and, even in his boyish days, pursued his favourite studies with such intense ardour as materially to injure his health, and bring on that weakness in his visual organs which eventually ended in total blindness. His attention had been led to what became his favourite, indeed his sole and engrossing study, the habits and economy of the honey bee, by his admiration of the writings of Réaumur, and, above all, by his acquaintance with Bonnet, the illustrious author of "Contemplation de la Nature," who quickly discerned the intelligence and penetration of his young friend, and who kindly and strongly encouraged him in his peculiar researches. It is singular enough that these two distinguished naturalists and friends should both have laboured under a similar personal defect, occasioned, too, by the same causes; for the same intenseness and minuteness of observation which deprived Huber of sight altogether had brought on in Bonnet a weakness of vision which for a time threatened total blindness, and from which he never fully recovered.

It will readily occur to everyone that the loss of sight in Huber must not only have presented a very serious obstacle to the successful study of his favourite science, but must have had the effect, also, of throwing considerable doubt on the accuracy of his experiments and the reality of his discoveries. His most devoted admirers and most unhesitating followers in everything connected with the economy of the bee are bound in candour to acknowledge that his observations, reported as they were at second hand, and depending for their accuracy on the intelligence and fidelity of a half-educated assistant, were, of themselves, not entitled to be received without caution and distrust. Francis Burnens, his assistant, had, no doubt, entered with enthusiasm into the pursuit, and appears to have conducted the experiments not only with the most patient assiduity, but with great address and no small share of steadiness and courage, qualities indispensable in those who take liberties with the *irratabile genus apum*. Still, Burnens was but an uncultivated peasant when he became Huber's hired servant, and possessed none of those acquired accomplishments which serve to sharpen the intellectual faculties, and fit the mind for observing and discriminating with correctness. It cannot reasonably excite our wonder, therefore, that on the first appearance of Huber's observations, the literary, or rather the scientific world, was somewhat startled, not only at the novelty of his discoveries, but also at the instrumentality by which they had been effected. Huber, however, had taken great pains in cultivating the naturally acute mind of the young man in directing his researches and accustoming him to rigorous accuracy in his observations. And the fact that a glimmering of many of the discoveries reported by the assistant to his master had presented themselves to the minds of Linnæus, Réaumur, and other preceding observers, should so far satisfy us that they were not brought forward merely to support a preconceived theory (of which it is probable Burnens had no idea), nor owed their origin to a vivid and exuberant imagination. At a future period Huber was deprived of the aid of this valuable coadjutor; but the loss was more than compensated, and accuracy in experiment and observation, if possible, still more unquestionably secured by the assistance and co-operation of his son, P. Huber, who has given so much delight to the lovers of natural history by his "Researches Concerning the Habits of Ants."

But, whatever hesitation may arise in our minds from the fact of Huber's discoveries not being the result of his personal observation, no doubt can reasonably remain as to such of them as have been repeatedly confirmed and verified by subsequent observers. And this has actually taken place, and holds strictly true in regard to the most important of them. His discoveries respecting the impregnation of the queen bee, the consequences of retarded impregnation, the power of converting a worker larva into a queen (a fact, though not originally discovered by Huber, yet, until his decisive experiments and illustrations, never entirely known or credited), the origin of wax and the manner of its elaboration, the nature of propolis, the mode of constructing the comb and the cells, and of ventilating or renovating the vitiated atmosphere of the hives; these, and a variety of other particulars of inferior moment, have almost all been repeatedly verified by succeeding observers, and many of them by the writer of this brief memoir.

It is readily admitted that some of his experiments, when repeated, have not been attended by the results which he led us to expect; and some instances in the proceedings of the bees stated as having been observed by him or his assistant have *not yet* been witnessed by succeeding observers. But in some of these the error may have been in the repetition; in others the result, even under circumstances apparently the same, may not always be uniform, for the instinct of bees is liable to modification; and in some he doubtless *may be*, and probably *is*, mistaken. In passing judgment, however, on his reported discoveries we ought to keep in view that the author of them has thrown more light on this portion of natural history, and pursued it with a more assiduous and minute accuracy, than all the other naturalists taken together who have turned their attention to the same pursuits; and that, therefore, nothing short of the direct evidence of our senses, the most rigid scrutiny, and the most minute correctness of detail in experiment, can justify our denouncing his accuracy or drawing different conclusions. His experiments were admirably fitted to elicit the truth, and his inferences so

* See "Memoir of Huber," by M. de Candolle, in the *Edinburgh Philosophical Journal* for April, 1833.

strictly logical as to afford all reasonable security against any very important error.

Huber's "Nouvelles Observations sur les Abeilles," addressed in the form of letters to his friend Bonnet, appeared in 1792 in one volume. In 1814 a second edition was published in two volumes, comprehending the result of additional researches on the same subject, edited in part by his son. An English version appeared in 1806, and was very favourably noticed in the *Edinburgh Review*. A third edition of this translation was published in Edinburgh in 1821, embracing not only the original work of 1792, but also several additions contained in that of 1814, and which had originally made their appearance in the "Bibliothéque Britannique." These additional observations were—On the Origin of Wax, On the Use of Farina or Pollen, On the Architecture of Bees, and On the Precautions Adopted by these insects against the ravages of the *Sphinx Atropos*.

(To be continued.)

DEADLY BEE STING.

J. S. WOOD.

DR. LASSEN, practising in Farum, has given the following particulars in *Ugeskrift för Læger* (weekly newspaper for doctors) of a man that has lost his life owing to a bee sting, as follows:—"A strong, well-built man (a wheelwright), thirty-seven years old, *perfectly healthy*, just after eating breakfast went out to look to his bees. As he knew from past experience that a sting from a bee could have a serious effect on him, he took an assistant to help him, so that he himself could stand at a distance. As he drew near to the hives a bee stung him on the left cheek, an inch from and in a line with the mouth; he killed the bee immediately, his assistant took the sting out, but hardly was this done before he felt unwell, trembled over the whole body, got dizzy, and hardly got into bed before he was seized by syncope, hardly five minutes after having been stung. The doctor who resided in the same town was immediately called and found him lying relaxed, senseless, unable to speak, swallow, or make a movement, the beat of the heart weak, snoring, slow breathing which, about a quarter of an hour after he had been stung, quite ceased. All re-animating resources were ineffectual. Twenty-four hours after the body was much swollen, blue-black in colour, and then went through a change of colour from green to dark brown on the sixth day, when the burial took place. About two years ago the man was stung on the left temple, and there then occurred about the same symptoms, but in a milder degree, and after an hour's exertion the doctor succeeded in bringing the breathing in order again, and he was, after twenty-four hours, completely restored. A month before he died he was stung on the first finger, but only felt a little dizziness, went to bed, and after two hours was well again. The thickness of the skin here possibly weakened the effect of the sting."

The words "perfectly healthy" are of my own underlining, as I think it hardly possible but that the man must have had a disordered circulatory system or other ailment. But could any medical reader of BEEKEEPING throw a little light on the subject, as it is of such a serious nature, and no doubt will frighten many from keeping bees? The occurrence took place on the 30th of August, 1879. If there are many such peculiarly-constituted people it would be advisable to be a little cautious in curing rheumatism by means of bee-stinging.

REMOVING BEE GLUE FROM THE HANDS.

BY DR. A. B. MASON.

I was a good deal disappointed at not being able to attend the annual meeting of the Michigan State Beekeepers' Association, which was appointed to meet at Jackson, Mich.

In the *American Bee Journal* for June, 1876, I asked, "Is there anything known that will remove bee glue from the hands?" and was answered "alcohol or spirits of turpentine." I soon after accidentally discovered another way. I had been examining all my hives, and my hands were pretty badly smeared with the glue. My next job was some repairs in and whitewashing my hen house. When washing my hands to remove the lime I noticed they became quite yellow, as did the water I was washing in, and I did not understand what made it, but I soon discovered that the bee glue was nearly all gone from my hands. Since then I keep some slacked lime ready for use during the season when handling bees. I moisten the places that I wish to cleanse and rub with the wet lime till the propolis is removed. If I use much lime, I then moisten my hands with vinegar. This is much cheaper than alcohol, and as I am sometimes called from work among the bees to work at someone's mouth, I am not annoying my patients with the fumes of turpentine.

BEES v. KALMIA LATIFOLIA.

THE following are some observations on the effects of the flowers of kalmia on bees:—July 12th.—During a brief paroxysm of sunshine, the kalmia was visited by (1) a bluebottle fly; (2) a butterfly, who retreated after a short flirtation; (3) a bee, who remained some time at work, and then crawling about languidly fell down to the ground. July 15th.—(1) A bee, who set to work steadily, but soon appeared to be stupefied and powerless. I removed her (him) to a pink, where she (or he) remained quietly a little while and then departed; (2) a bee; (3) a humble bee, who after flirting with two or three flowers departed without alighting; (4) a bee who settled to work for some time, and became almost helpless, was removed to another flower and no more seen. July 18th.—Several bees and a humble visited the kalmia, but without alighting. I put a bee into a flower, and after working there some time found her making feeble attempts to get away. In gathering the bloom, for the purpose of closer inspection, I lost the bee, and so missed the opportunity. Query. Is there some intoxicating substance in the kalmia?—*Hardwicke's Science Gossip*.

[From "A General System of Botany," by Le Maout and Decaisne, we learn that the genera (of Ericaceœ or Ericineæ), Rhododendron, Ledum, Kalmia, and Azalea are narcotic; the honey extracted from their flowers is extremely poisonous. Lindley ("Vegetable Kingdom") tells us the same thing, adding that the whole species of the Ericaceæ (or Heathwort) tribe is narcotic, and that the leaves are deleterious to the goats, cattle, and sheep which feed upon them. Some writers affirm, however, that the different genera of the Ericaceæ are merely astringent, not poisonous. Loudon ("Encyclopædia of Trees and Shrubs") says that the leaves of Kalmia latifolia are poisonous to cattle and sheep, but not to deer. The "Nouveau Dictionnaire Classique d'Histoire Naturelle" (1845) observes that the leaves are poisonous to horses, kine and birds, but not to goats or deer. It has been said that the common evergreen shrub Rhododendron ponticum, another species of Ericaceæ and closely allied to the Kalmia, was the plant from whose flowers the bees of Pontus collected the honey that produced the extraordinary symptoms of poisoning described as having attacked the Greek soldiers in the famous retreat of the 10,000. Xenophon says that after eating it the men fell stupefied in all directions, so that the camp looked like a battle-field covered with corpses. But the Russian traveller Pallas is of opinion that Azalea pontica (again a species of Ericaceæ) was the real cause of the mischief. Kalmia latifolia, or Mountain Laurel, is a native of North America, and was introduced into England in 1734.—EDITOR BEEKEEPING.]

Since the above reply was in print we have seen the following in the January number of *Science Gossip*:—

"Kalmia Latifolia is certainly a poisonous plant. In Ree's 'Cyclopædia' (1819) it is stated that the value of the first sort (latifolia) is much lessened by its noxious properties." Don's "Dictionary of Dichlamydeous Plants," (1834) has—"This genus is considered poisonous, and is often fatal to cattle." Lindley, in his "Vegetable Kingdom" (1853) p. 454, quotes from Burnett:—"The flowers exude a sweet honey-like juice, which is said when swallowed to bring on intoxication of a phrenitic kind, which is not only formidable in its symptoms, but very lengthened in its duration." In Vol. ii. of Supplement to the "Penny Cyclopædia" (1851) is information to the same effect. On p. 517 of Mrs. Hooker's translation of Le Maout and Decaisne's "General System of Botany" (1873) I read, "The genera rhododendron, sedum, kalmia, and azalea are narcotic; the honey extracted from their flower is extremely poisonous." In Miss Edgeworth's "To-morrow" (tales and novels, 1832, vol. v., p. 341), a story for those who are fond of "sweet procrastination," the hero says:—"I observed in the crop of one of the pheasants some bright green leaves and some buds, which I suspected to be the leaves and buds of the kalmia latifolia, a poisonous shrub," &c., &c.—BERNARD HOBSON.—Tapton Elms, Sheffield.

THE WORKER BEE.

BY WM. RAITT.

IN the head of the worker bee are the wonderful antennæ by which the bee guages all its work, discovers friend from foe, and holds intercourse with its fellows. In the sides of the head are set a pair of compound eyes, composed of about 3,500 different lenses built together like the cells of a honeycomb. In the centre of the forehead are three simple eyes, called stemmata, in the form of a triangle. As the larvæ, hatched and reared in their narrow abodes and having no occasion for distant sight, possess these simple eyes only, it may safely be inferred that these are intended for viewing objects close at hand, while the compound eyes are intended for viewing objects more remote. Dissection under the microscope corroborates this idea, as the different ocelli forming the compound eyes are each shown to be an elongated tube like a telescope, with a lens of very slight convexity, and presumably of long range. The stemmata, on the other hand, are small bead-like lenses of great convexity, presumably with a very short radius. Every beekeeper has observed a bee alight on its floor-board a few inches to the right or left of the entrance, and after all be fairly puzzled to find it. After running hither and thither in vain search it generally takes wing, retiring a foot or two, and then darting straight into the hole. Does not this seem to indicate that there is a certain range at which clear vision by either set of eyes is wanting? As a rule the momentum of the bee in its flight towards a flower or other object will carry it across this line of indistinct vision, but occasionally it does seem to land itself upon it. May not this also account for the well-known fact that during an operation a person standing at the distance of a few feet frequently receives many stings, while the actual operator, whose face is within a few inches of the bees, escapes scot-free? I have so frequently observed this, that in operating on an unruly hive I invariably try to get my face as near the bees as possible; in fact, I take shelter within the range of indistinct vision.

The jaws or mandibles are the tools with which the bee does all its building. They can be used as pincers, scissors, trowel, &c., according to necessity. From between them issues the tongue or trunk, by which the bee laps up its honey or collects pollen from the flowers. In the thorax we find several segments, three of which have each a pair of legs and two each a pair of wings. The legs are furnished at their extremities with suckers for use while moving on a smooth surface, and with claws for use on a rough one. By means of these claws the bees hold on to each other in clustering, and they also serve as hands to convey the wax scales from their abdomen to their mouth, or for carrying dead bees of *débris* out of the hive. The wings are furnished with hooks so contrived that when in flight those on one side are joined as one, but when at rest the one is folded over the other.

The abdomen consists of six segments or rings containing within it the digestive organs, the ovaries, the sting, and the wax pockets with their membranes, which secrete the wax much as milk is secreted in the higher animal. Throughout the body runs a series of air-vessels minutely ramified. The bee does not breathe by its mouth, but through rows of holes called spiracles in its sides. These air-vessels are in close connection with the one blood-vessel which runs through the whole length of the body. In animals possessed of lungs the blood is carried by the action of a heart to the air, in the bee the air is carried to the blood. The wisdom of such a system of respiration is seen when we consider that the mouth of the bee is, as it were, fully occupied by the almost constant action of the mandibles and the tongue, and is frequently filled with wax in process of mastication. When a bee is at work in a cell, or when resting there as it does during winter, its body so completely fills the cavity that if breathed through the mouth it would in a short time perish from suffocation; as it is its head may be entirely cut off from communication with the air and yet breathe freely. The blood-vessel referred to lies close to a well-developed spinal column, having a well-developed brain, and ramifications by nerves to the extremities of the various organs. Almost each of these organs might form the subject of a long paper, they are all so admirably adapted to the end for which they were intended. We shall, however, only notice two more particularly, the ovaries and the sting.

The ovaries in a normal worker bee have been already stated to exist in a mere rudimentary form. In what is called a fertile worker they are slightly developed, and produce a limited number of eggs. These eggs batch into drones only. To beekeepers the existence of these fertile workers is a great nuisance. They receive all the homage due to legitimate queens, while they fail to fulfil their functions; they are, therefore, difficult to get rid of. The bees will not accept a new queen where these are present, and they cannot be destroyed, as they are indistinguishable from the other workers. I have twice kept on queenless stocks that had developed fertile workers until they dwindled to a dozen or two of bees, and though I have scrutinised every bee that remained I could not positively fix on one as the layer of the eggs that were always found in the cells.

Virgin queens frequently, from defective wings, unseasonable weather, or the want of drones, will commence egg-laying. In their case as in that of the fertile workers these eggs hatch into drones only; their ovaries are, however, in a much better state of development, and they are capable of producing a larger number of eggs. In their case it is found on dissection that the spermatheca, a little sac communicating with the oviduct, is destitute of the living filaments which mark the presence of the fluid from the male. In the case of fertile queens the spermatheca is filled with this fluid, which fertilises the eggs as they pass its mouth, and by so doing changes their sex from male to female. This contact appears to take place at the will of the queen. The ovaries of a good fertile queen become enormously developed, and are capable of producing at least from two thousand to three thousand eggs a day during the breeding season. The queen once fertilised continues so for life, or until the contents of the spermatheca are exhausted, which is sometimes the case in a year or less, but generally from three to four years. There is no fact in the natural history of the bee of more practical importance than this in regard to the fertilisation of queens.

The sting is popularly the most important thing to be considered in dealing with bees; all know how formidable a weapon it is. Sharper than the finest needle, barbed like an arrow head, both hollowed and grooved to allow the poison to flow along into the wound, and possessing vitality enough within itself to enable it to work its way deeper even after separated from the bee, it is really a formidable weapon. To

the sting, as found in the wound, there is usually attached the poison sac, and frequently a portion of the intestines of the bee. To beekeepers it is important to know that there is no remedy for a sting like prompt action in removing it; it takes some seconds to work its way deep enough to reach the flesh and insert its poison. Before this takes place, or to any great extent, it is quite possible to have the sting extracted. Care should be taken in doing so not to press the poison bag, and thus aid the injection of the fluid. The sting should be scraped off with a knife or finger-nail, and if this be done promptly little effect will be felt.

Hitherto we have been mainly devoting our attention to the typical worker bee. Of course the drone has also all organs of locomotion, digestion, respiration, and sensation. He is the male bee, and we leave him to point out a few special features of the organisation of the queen. Although she may have been raised from an egg, or even a grub, that was originally destined for a worker, yet by being reared in a cell of different shape and position, and fed on a different food, she issues a perfect insect five days before any of the eggs laid at the same time develope into worker bees. Then how different she is from these sisters. She is quiet and dignified in action, a third longer in body, has a differently shaped tongue and mandibles, is destitute of wax pockets or pollen baskets, has a curved sting, has neither the building nor gathering instinct, and is content to remain at home while her sisters roam the fields. No Arabian tales can surpass the real marvel here to be seen. By natural means, hidden from us, a change is produced on a living organism that is more like the fabled results of the enchanter's wand. How becoming it seems that this marvellous creature should henceforth be an object of devoted attention on the part of the other bees. Though she is utterly helpless to provide herself with home, or shelter, or food, yet her every want is devotedly supplied. Her attendants caress her with affection, brush down her body, clear for her a pathway, supply her with food digested in their own stomachs to save hers the toil, take charge of the eggs she laps, defend her against hostile attack by forming a shield of their own bodies, and mourn her decease with a bitter mourning. She lives for them, they for her. See here the stamp of Divine order, each the unselfish attendant on the common want.—*Journal of Horticulture.*

WHENCE PLANTS OBTAIN THEIR FOOD.

PLANTS get part of their food from the air, through their leaves, and other green parts; the rest from the soil, through their roots. This was proved by a vast amount of laborious and accurate experimenting, carried on for the most part in the European experiment stations, for the purpose of discovering the laws of plant nutrition and growth.

Plants have the power of absorbing water through their leaves; but the bulk of their supply comes, and must come, from the atmosphere to the soil, and thence to the plant through the roots.

Carbon, oxygen, and hydrogen.—The carbon of plants is taken from the atmosphere. The leaves absorb carbonic acid, and with the aid of light wrest its carbon and oxygen asunder, setting oxygen free, and thus puifying the air, while they retain the carbon. Carbon unites with hydrogen, oxygen, and nitrogen to make up the various tissues of the plant—the root, stem, leaf, and seed, the wood and bark, the gluten, starch, sugar, and so on. The atmosphere supplies carbon far in excess of the demands of plants. The best experiments indicate that the carbon is all, or nearly all, obtained from the air. The source of the oxygen and hydrogen is not definitely settled. It is very probable that the water absorbed through the roots is the main, if not the entire source of supply.

Our cultivated plants get the bulk of their nitrogen from the soil, through their roots. Many years of labour of the best investigators and many thousands of pounds have been devoted to the study of the nitrogen of plant food. The theory that plants avail themselves of the free nitrogen of the air, of which there are thousands of tons over every farm, must be regarded as wrong.

So also the theory that plants in general, and the "large-leaved" plants in particular, as clover, turnips, corn, &c., obtain a good deal of combined nitrogen (ammonia and nitrates) from the air by their leaves is hardly tenable. The gain of nitrogen from this source seems to be very small indeed. The most of the nitrogen of our crops is got from the soil, through the roots.

The soil gathers some nitrogen compounds from the air, however; and it is extremely probable that it assimilates free nitrogen, and thus in two ways stores up atmospheric nitrogen for plant-food. The nitrates in the soil, formed mostly from the decay of vegetable and animal matter, are the chief natural sources of the nitrogen of plant-food. Ammonia, which, like nitric acid, comes from vegetable *débris* and from manures, as well as from the air, is also used by plants. Other compounds of nitrogen, no one yet knows what or how many, can also be assimilated by plants.

The mineral ingredients of plants are derived exclusively from the soil. Of these potash, lime, magnesia, iron, phosphoric acid, and sulphuric acid must be furnished to all agricultural plants, through their roots and by the soil, in order to stimulate their growth. If the available soil supply of any one of these is deficient, the whole crop must suffer. As regards soda, silica, and chlorine, the experimental evidence is not so decisive. A small quantity of chlorine has been proved necessary for the perfection of some plants. Soda is needed in very minute quantities, if at all, by crops. A little silica is probably necessary to the perfect blossoming and ripening of grain.

To sum up in a few words:—"Air and water together yield the materials out of which fully ninety to ninety-eight per cent. of crops are built up. The soil has to give for their nourishment only the two to eight per cent. of mineral matters, which remain as ashes when they are burned, and the one-half to two per cent. of nitrogen which they also contain."—*Farmer.*

MISTAKES MADE BY INSTINCT.—I communicated the case of an egg of *Anthocharis Cardamines* being laid on the caducous sepal, instead of the pedicel, of the flower of the food plant by the insect in captivity. I subsequently met with several instances of the same thing occurring under natural conditions. Errors in instinct through the laying, or mis-laying, of their eggs by insects at wrong times or in wrong places were well known to the older entomologists, as the following interesting passage from Degeer abundantly proves. I quote from the German translation of Götze (Abhandlungen zur Geschichte, &c., vol. ii., part 2, page 241, plate 35, figs. 12 and 13). He has been describing a saw-fly which spins a double cocoon. Inside one of these double cocoons, with its head sticking out of its own coarctate pupa-case, he found a dead dipterous parasite of the saw-fly; and he ascribes its death to a mistake of the parent fly in laying her egg on the false caterpillar of the saw-fly when the latter was too far advanced in its growth. "Its fate," he says, "was a consequence of the mother's oversight, which seems to have laid her egg too late on the false caterpillar, so that the larva proceeding from it could not attain to its full size before the saw-fly caterpillar must prepare for its transformation, and, consequently, unwittingly let itself be shut up in an everlasting prison. It had indeed gone on to devour the caterpillar. It had changed to a nymph within the red cocoon; but when it became a fly it could not make its way through the double cocoon of the saw-fly, and must consequently perish. Thus the mother fly had erred in laying her egg, a thing that is not usual among insects, which on every occasion, and especially in the propagation of their species, display always so much diligence and foresight." To this, however, the translator adds in a note—"Nevertheless, examples and instances occur in more than one species that insects, whether in respect of time or place, are frequently wont to err in ovi-position. I could wish that people would collect and compare more examples of the like kind. Perhaps we might thereby discover many a secret in the economy of insects that still remains hidden from us."—F. A. OSBORNE, M.D., Milford, Letterkenny.

MEAD.—Take a quantity of spring water fully below blood-heat temperature and dissolve with honey until the compound will bear an egg up to a shilling breadth. Boil for an hour; add the requisite quantity of mace, cloves, nutmeg, cinnamon, and a root of ginger; mix the whole together with a lemon, a sprig of sweet briar and one of rosemary (the latter two being tied together); after a short boil, let the liquor stand on the spices till next day, then strain carefully through a fine sieve into a clean earthenware vessel; let it remain six weeks and then bottle, when it is fit to drink.

NOTES AND QUERIES.

NOTICE TO CORRESPONDENTS.

We do not undertake to reply at once to every query we receive, although we shall always endeavour to do so. Those beyond our power of answering we shall invite our readers to discuss.

Those queries that we think too simple to appear in BEEKEEPING *we shall answer by post.*

Subscribers wishing for replies by post may have them if they will enclose in their letters stamped directed envelope. We cannot undertake in every case to answer by return, but shall do so when possible. Queries that we are doubtful of solving accurately we shall submit to some of our experienced subscribers who have already kindly promised to help us, and inquirers must in these cases grant us the requisite time to obtain the best information. If, instead of receiving answers by return, our correspondents are kept waiting four or five days, they will know that we are consulting some of the best experienced apiarians.

Name and address must accompany all inquiries, but not necessarily for publication.

WE have so many queries that are answered by post that we think it waste of time to print the names and numbers here. We now keep two registers: first, those answered by post; and second, those answered in the columns of BEEKEEPING. In the latter we include all those, trivial or not, reaching us between the 12th and the 15th of the month.

No. 1, J. Vincent, jun.—Thanks for your remarks on the article "Wax" in the BEEKEEPER. We believe you are right, and the wax vestas are made almost, if not entirely, of the Japanese vegetable wax. We are told that the imports for 1878 were nearly £100,000, but can hardly credit it.

No. 2, M. Stevens.—The "dollar queen" is an American-bred Italian, and it is very doubtful (at least, it has given rise to much discussion) if it is a success. The Americans seem inclined to call the cross "The American Bee!"

No. 3, W. R. Atkinson.—Barley-sugar alone is the food most generally recommended just now. It is best to leave your bees in repose, but, of course, if they are really on the point of starvation you must choose the lesser of two evils.

No. 4, E. M'Rae.—We should imagine they were tempted by the varnish. If it was, as you observe, a mild day, a little exercise would do them more good than harm. It is a pity you gave them no chance on the day you mention.

No. 5, Mr. Bell.—He uses them eighteen inches long twelve inches wide, twelve deep, but it depends on, locality, quality of bees, and kind of forage.

GOLD IN BEESWAX.

I CAN assure you and your readers that the precious metal (gold) abounds in wax, for I made it my business to purchase the same in many different quarters, and always met with the same good result. I may add that I have found gold in the ashes of many flowers, and that, in some instances, the *tiny* grains may be discerned on the leaves with the naked eye.

To procure gold from wax.—Heat a pipkin very hot to inflame a piece of it, then remove from the fire, and keep adding small pieces only at a time, until you have burnt a pound. Scrape the pipkin well when cold, and burn the ash in a small melting-pot, with carbonate potassa five parts, carbonate soda four parts, as a flux.

2. The metal may be parted by electricity.

3. Melt, add brimstone, and calcine.

4. Envelope the wax in tinfoil, bury it in salt in a crucible, and heat strongly.—JAMES BRUCE, in *British Bee Journal.*

LITERARY GLEANINGS.

THE MODERN ART OF BREEDNG BEES.

By JOSHUA DINSDALE, A.M., 1740.

Immortal Bard! that on Italian plains
First sung the loves and labour of the swains,
Whom the distinguish'd favour of the nine
Inspired with all the power of song divine,
Pardon, if I an arduous subject chuse,
The fav'rite theme of thy celestial muse;
Not emulous of equalling thy fame,
But proud to join with thine my humble name;
'Twas thine to sing with next to Heav'nly art,
'Tis mine some new discov'ries to impart.

After their origin the industrious bees
Dwelt in the clefted rocks, or hollow trees,
And in the Grot's recess or leafy shade,
The wonders of their fragrant art displayed.

With the sweet odours of fair blooming flow'rs,
We call them from the woods to ready bow'rs,
And made them love the hive; for offer'd gain
Will cheat the careful bee, the simple swain.
Thus hives were first with golden honey fraught,
And their republics sharpened human thought.
Inspired with love of public good, mankind,
'Till fraud and luxury debauch'd the mind.

But, difficult's the task, with curious eye
Into the myst'ries of their state to pry;
For cautious they avoid an open light,
And hide their labours from the robber's sight.
Should any spy disturb their balmy seat,
They strive with stings his treach'ry to defeat,
And boldly fly in the invader's face
To make him unobservant shun the place.

Yet still the sweet, industrious, kind invite
The raptur'd Muse to bring their praise to light
(Tho' Honey all their wise ambition raise)
And consecrate them in her grateful lays.

The sage with art and searching thought endued,
Who subtle Nature's inmost secrets viewed,
By quick invention a nice hive composed,
And in transparent glass the bee enclosed,
With all the wonders of the state displayed,
And open both their art and manners laid.
Hence will the bard his observations bring,
Nor in false strains, though sweetly, dare to sing.

When Evening paints the heavens with rosy strains,
And flow'rs smell sweet upon the dewy plains,
The bee returning prudent wings its way,
Nor sleeps fortuitous, like birds of prey,
But in its cell is lost in sleep profound,
Tho' the rain beat and the storm murmur round.

Not man with all his boasted art and care
Lives safer from the inclemency of air,
Though he a Louvre with vast cost provide,
A monument of vain, unbounded pride.
Ev'n what too often wastes our wretched race,
They never feel pale poverty's disgrace,
But in the blooming seasons hoard their store—
In common live, nor proudly wish for more.
Equality with concord warm each breast,
By love of public good supremely blest.

Their just ambition seeks no higher claim
Than from their fragrant art one common fame
With Providence to found a prosp'rous state,
And fill up by a glorious race their fate.

Their useful labours have a steady plan,
Unequall'd yet by all the thought of man,
Whose sweet successive cares their time employ,
And crown their lives with harmony and joy.

The youth their labour in the morn renew,
And sip the flow'rs empearl'd with brilliant dew;
The senate in the hive expecting dwell,
And lodge th' imported treasure in its cell.

In day's warm blaze the busy nation fly,
And plunder blooming flow'rs of various dye;
But at the cool approach of night
Take to the fragrant hive their timely flight;
Cautious avoid the cloudy dark'ning sky,
And quick presaging to their city fly.

When first the morning darts its beaming rays,
And the wak'd lark tunes sweet his warbling lays;
The elders, with soft sleep no longer blest,
Break off the lazy youth's protracted rest;
Who shake their wings, and with a buzzing sound,
In quest of honey search the meadows round;
Now on the cowslips, now the hawthorn prey,
And sweat and toil in the bright blaze of day,
Nor miss one balmy flow'r in all their way.

Small clangours in the hive new courage yield,
And urge them with fresh vigour to the field.

'Tis pleasant to observe in the pure air,
How quick they fly with thoughtful busy care;
In crossing lines seem mutually to play,
But lose no moment of the shining day.

See! how they light upon each flow'r in view,
And from the calix suck the balmy dew,
With diligence each op'ning gem explore,
And in their bag the golden treasure store.
Nor when with honey satiate, homeward fly,
But still industrious load with wax their thigh;
Which rises from the flow'rs like yellow down,
Or on the turn-sole with a glossy brown.

But if a bee more fortunate should light
On a sweet field with vernal honours bright,
He to his sociates straight makes known the prey,
And to the fragrant booty leads the way;
Thick they descend o'er all the shining dale,
And from ten thousand flow'rs the sweets inhale;
The rich perfumes expand themselves around,
And o'er the meadow's head a buzzing sound.
But when the sky unsettled does appear,
And the bees judge a drizzling show'r is near,
In haste they load with wax their dented thigh,
And to the friendly neighbouring covert fly;
There better the collected mass prepare,
And trusting to the clearer shining air,
You'll see them in bright flow'ry powders roll'd
Entering the hive all ting'd with dusty gold.

In the sweet rosy spring the bees delight,
And to the blooming meadows take their flight,
There with mutual emulation strive
To gather honey for the common hive,
While in the beamy wide-perfuming morn,
Sweet balmy dews hang on the fragrant thorn,
And odours from the painted meadows rise,
That charm the smell, and fill the ambient skies,

You'll view them, e'er the pearly dews exhale,
Spread o'er the lawn, and buzz o'er all the vale.
But when no nectar the scorch'd flow'rs supply,
Or waxen burdens for the gilded thigh,
They dawby gums collect and slimy juice,
Against the wintry cold of sov'reign use;
With subtle thought exclude the beating rain,
Or driving snow that whitens all the plain:
Industrious fill each little chink with care,
Against the insect or the chilling air.

Hence 'tis they firmness to the whole contrive,
And fix their artful combs within the hive.

What with more wonder may the mind suspend,
From each side of their head two hands extend,
With which they pull the waxy down, and free
The clinging gum from the rough-rinded tree:
By these that structure to their combs impart
Which far excels Palladio's * boasted art.
The bees, who loaded at the dome arrive,
First store the golden honey in the hive,

Then from their separate cells suspended cling,
And buzz and flutter with a trembling wing.
Immediately you'll see the others come,
With signs of gladness to the lab'rer's hum,
Then pick the waxen treasure from the thigh,
And back the lab'rer cuts the smiling sky,
Triumphant o'er the flow'ry kingdom reigns,
And tributary makes the blooming plains.

But while the youth pour o'er the shining field,
And the sweet-smelling cowslips forage yield,
The seniors in the public care have part,
And form the angled cells with curious art;
Or for the young prepare the downy bed,
And soft the od'rous flow'ry powder spread.
For if they early in the summer's days
Begin the structure of their comb to raise,
Before descends the golden globe of light,
And o'er the shaded landscape steals the night,
Four thousand cells their diligence declare,
A monument of nice instinctive care!
Each has his task; this makes the city's walls
On this the shapeless wax to labour calls;
Another, for mechanic judgment known,
Reviews the buildings of the waxen town;
That none with useless weight o'erbear the rest,
But all alike be in proportion prest.

Others obsequious the artist's steps pursue,
And give by order the proportion due;
Here add, and there with caution take away,
And skill perfective, beyond man's, display.

While some are busy in a nicer part,
And glaze and polish the sweet cells with art.

No city with proud Heaven-ascending spires,
The human mind with juster cause admires,
Than that nice art by which the bees contrive
The curious comb within the strawy hive,
And that variety of useful ways
Which through the citadel the swarm conveys.

(To be concluded in our next.)

* André Palladio was a celebrated Italian architect, who was born at Vincenza in 1518.

THE GARDEN.

By WM. EARLEY.

MUCH as we advocate the giving of all plants all the fresh air possible during the winter season, there are times, nevertheless, when even at this time more is absolutely needed than at others. It will be found, by way of illustration, that if the structure be kept very close during cold or frosty weather, little, if any, apparent injury will accrue to any of the inmates, and this fact may be accounted for on two distinct issues:—1 Being that whilst the frost continues the heated apparatus so dries up the atmospheric moisture as to deter any obvious rotting or decay of the foliage which may have been originally injured, &c.; and, 2. The frost itself attracts the moisture to the glass, beneath which it attaches, and, rapidly freezing, forms ice in many fantastic shapes and forms. Though, however, no apparent injury befall the plants, if they are maintained too close, and with an insufficiency of air at such times as it is possible to give them, they are excited by this unnatural artificial warmth and close atmosphere, and become, therefore, correspondingly enervated as a consequence. Now mark the results. If a warmer, moist, or foggy period follow, and it is the rule rather than the exception following all severe frosts, and whether from choice or forgetfulness greenhouses are kept shut up, or closed for a night and day, more or less, it will be too readily observed that upon entering it an endless number of leaves are thoroughly decayed, if not, indeed, therewith also branches, and that much more injury is also done the plants as a whole.

It is only by close observance of this practice of air giving on all possible occasions, which we are always so anxious to enforce, that this evil can possibly be met. By giving an opening always when possible, little or much, so as to give egress to the vitiated air from within, and ingress for such as is without, alone can we assure to the various plants as healthy a tone as it is possible to assure at such a season and under such peculiar circumstances of culture, &c.

There are no glass structures which would not at this time be benefitted by having every plant gone over, picking all litter, &c.,

from off it, and in being replaced, perhaps, in a somewhat different position to what it occupied previously. This simple operation goes far to freshen a house up generally, and individual plants benefit by it very greatly.

After such a cleansing, so to speak, every plant that requires watering may receive just such an amount as it is seen to require; because having "handled" and "weighted" each pot, and the soil within it, far better knowledge will have been obtained of the state of dryness or otherwise each plant may be in, and each can, therefore, receive a thorough watering, or otherwise, according to its need. Nor should the fact be overlooked that where a plant is really dry, water may now be given to it more freely by comparison than it was possible to have done a few weeks since, and when the days shrank as 'twere, daylight became less and less, and all adverse surroundings increased. Now it is not so day by day; more light and a somewhat increasingly stronger sun-warmth will favour all such aids, given in proper time, and with due judgment.

Another simple fact may not be omitted in connection with such plants when passing them in view. Where any example proves wet and soddened at the root, search should be made for the cause, and this will be found, as a rule, to comprise either worms or soil impediment to the drainage—a fact only to be ascertained by turning the ball out of the pot neatly for that purpose. These remarks apply especially to auriculas, the decayed leaves of which should be carefully removed by aid of a sharp-edged knife.

Be particular to give to both camellias and azaleas, whether dormant, or as regards the former swelling their flowers, as much water as they may really require without the risk of making the soil too wet.

Fuchsias for early flowering should be potted, and such as are intended for cuttings place into a warm atmophere without potting. The latter may require a nice moist heat to cause young shoots to form, but the former must not be pushed on unduly at first.

Cyclamens should now be forming their flowers, and these will be greatly enhanced if it is possible to place the plants for a few weeks into a slight increase of heat, or an average of 56 deg. to 58 deg. They bloom moderately well, but, of course, somewhat later in a colder house.

Persist now in placing bulbs in pots at the warmest end of the structure, and near to the heating apparatus, to induce a more ready and free growth.

FLOWER GARDEN.

The weather without has been so very uninviting that little progress has been made either as regards cleaning up the flower garden or lawn in front of or contiguous to the dwelling. It will not only be possible, but also necessary, to do so now as quickly as possible, because every brighter day than ordinary will otherwise show things to greater disadvantage. All grass plats and verges might be neatly trimmed or edged over, the lawn neatly swept and rolled, after having all shrubbery borders forked over tidily. Much may also be done now in connection with shrubs, whether evergreen or deciduous and flowering. Coarser growing kinds should be so cut back and thinned out as to give more light and room for all the lesser, and what happen generally to be more valued ones. There are occasional exceptions to this rule, which, however, the judgment of individuals will be able to well guard against. For instance, occasionally a plant of the showy ribes or flowering currant may have overgrown and so "overlap" some far more permanent evergreen. In such instance it will not be wise to cut the currant at this time. Rather permit it to flower first, and immediately this has taken place then remove all overgrown portions.

Oftentimes much good may be done in view of artistic effect of single shrubs by means of a little judicious pruning at the stage when they are somewhat young. Conifers, hollies, Portugal laurels, and such like may be neatly cut in, so as not only to enhance their neat appearance, but so also to cause each to grow more densely, and to fill out all their parts far better than what the same plants would do if left to themselves.

Anemones may still be planted during mild weather, and when the soil is not very wet. To ensure their starting freely into growth, and to obviate decay, which old or somewhat long dried bulbs are given to, a thin layer of some light sandy material could be advantageously placed over them before placing soil upon them. At the same time, if thought desirable, a few ranunculuses may also be planted under similar conditions for an early display. Many bulbs planted in the open borders will begin to push through the ground should this mild weather continue following so severe a period. It will be desirable so soon as possible after all are through, and their exact position can be ascertained, to neatly hoe between them. This will relieve them somewhat from the hard beaten and flattened soil, and really tend to protect the tender young points somewhat from such cold winds and frosts as may follow. Growers to any extent, and especially in regard to growers of valuable bulbs, generally hoop the beds over, and mat them over during very inclement weather when at such a stage.

It will be well for all who contemplate planting roses to obtain their stock, and plant them with all possible dispatch should mild weather continue. The soil cannot be too deeply or well dug and manured.

KITCHEN GARDEN.

Those who are anxious to get early peas and broad beans would do well to make sowings as quickly as possible after this date. Sangster's peas and long-pod beans are proper sorts. Once the month of February has fairly arrived the season will advance with such rapid strides as to cause much work to be behind, if this and many similar operations be at all neglected.

It is unfortunately a result of the past inclement season that all garden work is sadly in arrears. So much rain, snow, &c., has been experienced that it became an impossibility to dig or work heavy grounds in any form, hence do we expect to see many busy hands fully occupied during the next month or two. It should not be forgotten, however, that every pole of ground dug at this time—the weather and soil favourable for the operation—is so much work gained presently and when so much of other kinds will be demanding attention.

Spring cauliflowers will, we have little doubt, be somewhat scarce, so severe and penetrating has been the past frost. Every attention should, therefore, be given to such plants as have been saved. Give air freely by removing handlights or other kinds of protection, and cut away with a sharp-edged knife all symptoms of decay, moving the soil freely between all such seedlings. Continue to take off the heads of a few Brussels sprouts in all instances where they do not sprout as readily as they should do. This is the more necessary this year, owing to the fact that such things have made such very poor growth, and are, therefore, incapable of forming many good sprouts naturally. Besides, such "heads" as they possess will prove acceptable accordingly. Amateurs and others who contemplate forming a hot-bed with fermenting materials will do well to commence the collection of such. Leaves are an admirable aid to the formation of a sweet heat and the retention of heat in process of fermentation, oak leaves more especially, though any kind is useful excepting such as are in a green state. The materials consisting of these and stable manure require turning over several times and sweetening, by causing them to so ferment as to cause much of the rank or primary powerful heat to pass off. So soon as the material heats well, after having been thrown up into a heap well mixed and lightly, turn the whole heap over, bringing that which is within on to the outer side, and placing what was previously outside in the centre. By doing this so that the heap heats three times in succession, the materials will have become so sweet as to maintain all kinds of vegetation within its steam without any injury.

ROSE GROWING FOR BEGINNERS.

Most books on rose growing that I have read give too many and too copious directions, and make too little distinction between those which are important and those which are of slight importance only. Rose growing is really a very easy matter indeed. I advise every beginner not to turn his attention only to those sorts which are usually reckoned among the best. Let him plant in some part of his garden—and he need not select by any means the best—at least one plant of the common dog rose (Rosa canina), one of the Rosa Manetti, and one of the Rose de la Grifferaie, &c. These are exceedingly hardy, rampant growing sorts, with the utmost vigour of constitution; they require no skill in pruning, and in fact the less they are pruned the greater the quantity of blooms they produce, and whether in bloom or in berry they are beautiful.

A beginner who purchases a lot of the newest and most expensive roses to start with is apt to be disheartened if these do not at once succeed and yield him a good return for his rather extravagant outlay, and will in some cases throw up rose growing in disgust. If, however, such a beginner had planted a few of the commonest, hardiest, and cheapest sorts, he would, when he saw how these would thrive, and produce thousands of beautiful flowers, with little or no care and attention, be induced, even if all his most

superb and doubly dear favourites died, to proceed further. He would probably say, "Well, if my garden produces so well, and in such profusion, rose blooms of this kind, with little or no care on my part after I have once planted them, surely I may be able to succeed with varieties of greater rareness and sorts that are held in greater estimation, with a little perseverance;" at any rate, I think he would be induced to try. No one need to "turn up his nose" at a common dog rose. No prettier sight can be imagined than a large plant of this in full bloom as an object of garden decoration.

A few of the old summer-blooming climbing roses should also be planted, as well as a few plants of the fine old summer-blooming kinds of the hybrid Bourbon and Gallica classes; these being perfectly hardy and able to grow well in almost all soils and situations, will, by their adaptability to circumstances, the ease with which they grow, and the profusion in which their flowers and exquisite beauty reward their proprietor, be sure to stimulate him to further exertions. The acquaintance with roses which a beginner will gain from these old easily-grown kinds will aid him in cultivating the more fashionable varieties of the queen of flowers, much more than any amount of directions to be found in books. Directions to a beginner should be few, short, and concise. Much of the advice given in books on the subject seems to be given with a view to show what a clever fellow the Author is, and how much he knows about roses rather than with a view to give real help to a beginner.

One thing which it is most important a beginner should learn is the difference between a shoot from the stock on which a rose may be worked and a shoot from the rose itself. One of the greatest causes of disappointment in growing the best sorts of roses arises from ignorance on this head; and it goes on a stage further, if the rose grower, in consequence, obtains plants of the most superior varieties on their own roots, for thereby it is probable he jumps from the frying-pan into the fire. Only a few of the best exhibition roses do any good on their own roots, unless both the position and soil of the garden be exceptionally favourable, and even then they cannot always be induced to succeed, unless the cultivator be thoroughly acquainted with and experienced in their management. After the experience of a very few seasons an amateur, if he begin at the beginning and become acquainted with the commonest and hardiest before he attempts to depend entirely on the rarest and most exquisite kinds, will surely master the art of rose growing, and will find he can grow the best with as great ease and as little chance of disappointment as he can produce cabbages.

In order that disappointment to beginners in growing roses should be reduced to a minimum, I would have them try first those varieties which are the most easy of cultivation; then as they become more and more acquainted with the subject from their own observation, so will the directions given in books become more intelligible to them; they may then try the best kinds with something like certainty of success, or at least with greatly lessened chances of failure. If the course I recommend be followed many will become rose growers who otherwise, after one or two trials, resulting in inevitable failure, would have given up in disgust.—J. E. EWING, Norwich, in *Gardeners' Chronicle.*

POULTRY.

RESULTS OF POULTRY-KEEPING.

I SEND you the result of one year's keeping of fowls for the benefit of my fellow readers of your estimable journal, showing that there is, at any rate, no need to fear loss by keeping fowls, but £200 per cent. profit would be very difficult to realise. This year has not been favourable for the rearing of chickens, and eggs generally in this district have been unsatisfactory for hatching. The Hamburghs I believe to be the most profitable fowls for eggs, three of the Hamburgh eggs being equal to two Brahmas. They would stand roughly as Brahmas twenty-seven, Hamburghs twenty-eight; but my Hamburghs being pullets and the Brahmas in their second year, and all my Brahmas lived through the year; but three of the Hamburghs died in June. The Hamburghs are really more in advance of the Brahmas weight for weight in eggs as layers than appears by the figures. I have had the largest eggs from the mongrels. The Hamburghs have been kept distinct, Brahmas and Dorkings together, and mongrels, as the eggs are easily distinguishable. Soil damp; gravel on clay not very warm. The fowls have a run of two acres of grass, except when it is shut up for hay, and they are well housed. In the following statement of receipts and expenditure of fowls and produce for 1879, one year, no account is taken of buildings, coops, or attendance:—

RECEIPTS.	£.	s.	d.
4 Brahmas laid 55 eggs each—220			
3 Dorkings laid 49 eggs each—147.....			
5 Spangled Hamburghs laid 83 eggs each—415			
8 Mongrels laid 21 eggs each—168.....			
Total of eggs at 1½d. each	5	18	9
19 Chickens killed	2	10	8
29 in stock to carry forward to 1880, at 2s. 6d. each	3	12	6
Total	£12	1	11

EXPENDITURE.	£	s.	d.
21 fowls in stock, at 2s. 6d. each.....	2	12	6
To loss, 5 fowls found dead	0	12	6
Paid for eggs for sitting	0	3	10
Barley, £1 12s. 6d.; barleymeal, 9s. ...£2 1s. 6d. Rice, 3s. 9d.; maize, £2 17s. 9d.; buck-wheat, 16s. 3d. .....£3 17s. 9d. Wheat, 7s.; Spratt's food, 8s.....£0 15s. 0d. Middling .....£1 8s. 3d.	8	2	6
Gain	0	10	7
Total.....	£12	1	11

	£	s.	d.
Increase of stock.....	1	0	0
Balance as above.....	0	10	7
Real balance in stock and money...	£1	10	7

144 eggs, less 30 chickens hatched, 27 chickens reared, five fertile eggs (chickens dead), 103 eggs rotten, and six broken by hens. Allowance to fowls—three meals in bad weather, two meals in summer and mild days; 3½ ozs. per day to each bird of corn or meal.—JAMES BRUCE, Cheshunt.

MILK FOR CHICKS.

Milk contains everything essential to promote the growth of muscles, bones, feathers, and every part of the animal; and the earliest matured and the best chicks every way that we have ever seen were milk-fed. It is not essential that the milk should be fresh. Taking off the cream removes carbon mainly, a cheap element which is abundantly supplied by Indian meal. Skim milk, and even lobbered milk, will make chicks grow wonderfully fast. Boiled potatoes are also excellent for them, and if chopped into a hash with some refuse meat, nothing delights them more, unless it is a fat angle worm. Like all other animals, chickens like a variety of food, and their taste should be gratified. Among other things, they like fresh grass. Few farmers seem to be aware what a graminivorous animal a hen is. One of the best foods for hens in winter is rowen hay cut fine in a cutting machine.—*Kentucky Live Stock Journal.*

IS POLLEN NECESSARY TO BREEDING?

MR. ABBOTT writes in the *B.B.J.*:—"The assertion by Mr. Cheshire that pollen is necessary in breeding has received contradiction through the BEEKEEPER, lately edited by Mr. George Rose (page 36), by Mr. Desborough, who, as the result of his experience and observation, has asserted that "honey, and honey alone," is the food of the bee in the grub state. We have all along believed that pollen, meal, and other nitrogenous matter is necessary in breeding, and also to keep in repair the tissue and fibre of adult bees; that they may have built small pieces of comb, or raised a few hundred young bees when none could be perceived in the hive, is not, to our mind, satisfactory proof to the contrary. The milk yielded by animals for the support of their young is not composed of the liquids only which they may have taken, and if they do not take sufficient solid matter for its concoction, their own bodies yield it as long as they are able to do so—and with bees, we believe, the same rule will hold good. Experiment with the aid of the microscope will, however, dispel any existing doubt on the subject, though it may not be possible to produce absolute proof."

A PRACTICAL cultivator suggests to those about to make fresh plantations of raspberries the necessity of thoroughly trenching the ground and heavily manuring it before planting. After planting cut the canes down to within a foot of the ground. Better canes will be produced for next year's fruiting than if left their entire length.

SPECIAL NOTICE

TO

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ANTS AND HONEY.

THAT ants are fond of honey has long been known; they will come a great distance to feed on a shower of honeydew; but, amid the ant world, there is, probably, nothing more strange or wonderful than that ants should store up the honey on which they intend to feed in the very bodies of some of their own comrades, and yet such is the case. The Rev. Mr. M'Cook has lately investigated the habits of the American honey ant (*Myrmecocystus Mexicanus.*) They were found by him in the so-called Garden of the Gods, Colorado. The nests are found on the tops or southern slopes of ridges. In external aspect they are small gravel-covered moundlets, truncated cones, pierced in the centre by a perpendicular opening which is from three to six inches deep. The interior of one of these consists of a series of underground galleries and chambers cut through the gravel and sand-stone often to a distance of nearly 18 feet in length, two feet to four feet beneath the surface, and from ten to twelve inches in width at the widest part. The ants were of the three worker casts—major, minor, and dwarf—the honey-bearers and the fertile queen. The honey-bearers were found hanging in groups to the roofs of the honey chambers by their feet. There were about thirty of these honey-bearers in each chamber, and some eight or ten of these to each nest. When filled with honey, the large, globular abdomens of the honey-bearers looked like small Delaware grapes. When these chambers were broken into, the workers at once rushed to the care of the honey ants and dragged them off to some undisturbed parts. These ants proved to be nocturnal in their habits, remaining within doors until after sunset, which was at the time of Mr. M'Cook's visit about 7.30 p.m. Then the workers would issue forth in columns, and soon disperse themselves among the clumps of scrub oak. Here they sought for the galls made by a species of cynips which are to be found in abundance on the bushes, and they licked therefrom a sweetish exudation which issued out in small transparent drops from the surface. From 11.30 p.m. to about 3 30 a.m., when the first early streaks of dawn began to appear, the workers returned home laden with the honey. This appears to be given to the honey ants, which are sedentary. The workers disgorging it after the manner of a bee, it there remains in the globular abdomens of these honey-carriers until it is required for future use. The economy of this habit, indeed, in most respects resembles that of the hive bee. The bees' honey is, however, when collected, disgorged into the substance of a wax cell; that of the ants into the enlarged stomach of their fellow ants, which are thus made to act as living amphoræ. Full details of this most interesting ant are promised in a report to be laid before the Academy of Natural Science, Philadelphia.—*Farm Journal.*

MISTAKEN INSTINCT.—The following may, perhaps, prove interesting to some readers. In July last, one fine afternoon, as we were watching my bees carrying in pollen, one of them separating from the others alighted on some pretty blue artificial flowers in the bonnet of a lady who was looking at them; tried each flower carefully for honey, and, of course, finding none, flew away, no doubt much disgusted. The bee must have been attracted by form and colour; the flowers were not at all natural, but gaudy red anthers and blue stamens.—FRED. W. E. SHRIVELL.

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