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West Maitland, N.S.W.: E. Tipper, April 28, 1906

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THE AUSTRALIAN Bee Bulletin.

A MONTHLY JOURNAL, DEVOTED TO BEE-KEEPING.
Edited and Published by E. TIPPER, West Maitland; Apiary, Willow Tree, N.S.W
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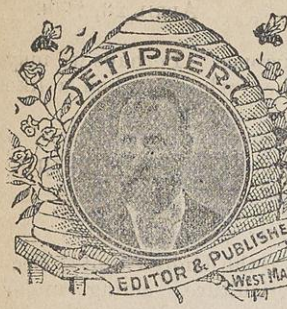

THE AUSTRALIAN BEE BULLETIN.

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Devoted to Beekeeping
Circulated throughout the Commonwealth of Australia — New Zealand & Cape of Good Hope

MAITLAND, N.S.W.—APRIL 28, 1906.

The following is the list of advertisers in our present issue, all of whom we would recommend our readers to patronise :—

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Index of last year in our next.

We acknowledge receipt of Goldsbourgh, Mort & Co's Annual Review. There is a great quantity of interesting and instructive reading to pastoralists and others.

Salt is recommended by some as a cure for bee paralysis.

J. G., South Taradale, Vic.—I get many little practical hints out of your paper.

Bookeeping pays beekeeping just as much as storekeeping. How many would try storekeeping without books.

A Californian beekeeper named Mendleson is said to have had a crop of 112,000 lbs. of honey in 1903.

Much is now written about entrances over top of hive. Some say not a crack must be left below, and the entrance above must be smaller than if below.

While making up the Index for the year just ended, it seemed to dawn upon us how very interesting those back numbsrs were when bound. Get them bound, and the pleasure of re-perusing will more than repay you.

We acknowledge receipt from "Swarthmore," of the fourth of a series of papers on Apiculture, 'Simplified Queen-Rearing for the honey-producer,' 'an economical plan for Practical Beekeeping,' 'Every Honey-producer his own Queen-Breeder,' 'Good Queens for little money.'

We also acknowledge copy of the *Fruit World*, incorporating the Commonwealth Beekeeper, of which Mr. W. L. Davey is the moving spirit. It has, no doubt, a good future before it.

Wartook Apiaries,
Victoria,
April 16, 1906.

To the Editor
"Australian Bee Bulletin."

Dear Sir,—In your Journal of March 28th (page 260) Mr. R. Helms gives an instance of a queen bred by Mr. Jervis, of Moss Vale, whose eggs would not hatch, and states he had not previously heard of a similar case. I can give two instances in which the same strange fact has occurred. One in a neighbour's apiary last February, and one in my own about 14 months ago.

Mr. George Smith, the neighbour of whom I write, hatched out and mated an Italian queen in a nucleus. He was sure of the mating, as he saw her return with the usual signs of just having parted from the drone. She commenced laying, but her eggs were eggs only a fortnight and three weeks afterwards. Thinking the fault probably lay with the workers, that were rather few and old, he introduced her into a strong stock, but the result was the same, her eggs would not hatch. So he did the best thing he could do, and killed her.

My own case was almost the same as the above, except that I kept my queen in the nucleus 6 weeks and then killed her.

To show that, in my case, the bees were not to blame, I inserted another cell at the time of killing the duffer which hatched out a nice queen, whose eggs hatched out all right.

I cannot understand why these eggs did not produce drones anyway. It seems so strange that they should be perfectly dead although to all appearances they were perfectly normal. Strange as it is, it may not be such an uncommon occurrence. Perhaps we may now hear of others who had a like experience.

Yours faithfully,
HUGH RUSSELL.

STANDARD FOR HONEY.

Some time ago the United States Secretary for Agriculture, acting under authority of Congress and upon the recommendation of the Committee on Food Standards of the Association of Official Agricultural Chemists, proclaimed the following standard for honey:

"Honey is the nectar and saccharine exudations of the plant, gathered, modified and stored in the comb by the honey bee (apis mellifera). It is levorotary, contains not more than twenty-five (25) per cent. of water, not more than twenty-five hundredths (0.25) per cent. of ash, and not more than eight (8) per cent. of sucrose."

This standard was adopted after careful publication of an earlier suggested standard as a basis of criticism, and after careful consultation with leading authorities in apiculture. Since the standard was issued many letters have been received from beekeepers representing many of the States of the Union, expressing a desire that the standard should be changed so as to avoid the exclusion from standard honey of all honeys that contain honey-dew. In support of this plea, it is urged that the beekeeper is unable to prevent the introduction of some honey-dew, whether taken directly from the plant or from the aphis, and that small quantities of this material are not injurious to the honey.

These requests being brought to the attention of the Committee on Food Standards at its meeting in Chicago, the committee adopted the following minute:

"The standard does not in any way exclude small quantities of honey-dew from honey. We realise that bees often gather small quantities of honey-dew that cannot be detected in the finished

product by chemical means, and does not damage its quality. It is only when relatively large amounts are gathered that the quality of the honey is impaired, and it fails to meet the requirements of the standard. It is generally agreed that such a large amount of honey-dew is injurious to the quality of the product, which cannot then be properly regarded as honey."

RACES OF BEES.

W. REID.

How many races of bees are there, and which is the best? is often asked. I can only answer this by giving my experiences, and stating it depends on the way the bee man sees, or is trying to see. Again, there are many named kinds I have never seen, and some I have never read about. Some prefer beauty, then try the best Golden Italian; for gentleness and never sting, Caucasian; for numbers, the Carnolians; for strength and honey, the Cyprians. True, I have seen some cross breeds give very grand returns (between the Blacks and Italians, commonly called Hybrids). With me these never did average satisfactory. About two toppers out of every ten; the rest from middling down to worthless. No doubt locality has a lot to do with bees as well as plants and other creatures. A fellow beekeeper once wrote me saying he had tried Italians, Cyprians, and Blacks, and preferred the last named. Some folks think that if the bees won't sting that is all that is wanted. Every second farmer could then be a beekeeper. Well, we are promised a bee of that kind in the near future. Two American beekeepers tell us that the only thing they can say in favour of the Caucasians is that they won't sting. In April, 1862, I commenced beekeeping, a lad of fourteen. Nothing but the old black or brown bee then to be had here. I thought them a wonder, but noticed that some of the bee trees contained as high as sixty pounds of honey; many of them down to worthless, forty pounds being a good average. I also noted that some would sting anything and everything possible; others were as harmless as flies. I notice the same thing with the other races, and if there is one breed stings worse than another I think it is a cross between Italian and Black, (half bred queen mated with a black drone). The workers of these are about the most ready to sting mankind, but, like the blacks, will allow other bees to rob them and the bee moth to eat them out.

About 1891 I saw some Leather Coloured Italians and tried them. A big improvement on the Blacks. I soon changed my queens, and have more honey now. No more bee-moth, and did not swarm as readily as the blacks; built up stronger. Soon came across the Goldens; pretty bees. There did not appear to be so many bees in each hive; not so ready to swarm even as the Leathrens; great bees to work; swarming became rare. I read of wonders in various places of the Three Banded Italians, but returned to the Goldens, believing them to be the best. They did not lay their eggs in top story, neither did they carry pollen into the top box. Some of my Goldens filled nearly every cell possible. I found the Goldens most orderly in building their combs. They pleased me very much. I found one fault. I often noticed that hives would slacken off. I would open that hive to find the good old queen gone, and a young queen in her place. The old lady became old. The bees slackened down, thus spoiling several weeks loss of honey. I opened my hives oftener, sometimes finding an old queen and cells well advanced. My queens were bred under the most favourable circumstances. This led to my re-queening every year, which I found a great improvement, but then some of my queens failed. I still think a lot of my Golden Italians, and use them in my out-apiary, believing them the best for this purpose. But in my opinion, after working the Goldens for ten years, I believe that both workers and queens of the Goldens are shorter

lived than the three-banded Cyprian bees. These I have been working two seasons, and find them similar to Goldens in their most orderly manner of working, but certainly an improvement in that the queens are longer lived; so are the workers. They place their stores in the top box, pollen and a little honey in outside bottom combs. Centre bottom combs are filled with brood; in some instances every cell from the bottom to top bar of the Langstroth frames. The Cyprians will swarm in spring, then settle down to work, and keep their hives full of honey if honey is to be had. As far as stinging is concerned, I often go to them between 9 a.m. and 4 p.m. without a smoker, and no bees could behave better. I have had to go to them on a few occasions at early morn, with smoker. A few puffs and they are O.K. I have noticed when a Cyprian worker goes for me she proves a good shot, and rarely misses her mark.

A fellow beekeeper, writing, says: "I thought I had tried these bees. About two years ago the bees I had were very hard to handle. Smoker had no effect on them. Will you please send me description of Cyprian bees." The worker Cyprian has a more lemon than yellow band, and three bands same as Italians. The black rings are blacker than the Golden Italians, also the Cyprian worker is somewhat smaller than the Italian. The queens are darker and somewhat larger and great layers; the drones more abundant than the Italians. The queens continue to lay as long as there is honey and pollen coming in, except in autumn when they slacken off. I believe they can fly further than any race I have tried in search of honey. It is quite possible for Goldens to do better than Cyprians some seasons. Sometimes the Golden queens do not start laying until early in October in my district, and honey comes in freely in November. They have their stores to back them up. It is common in some places for abundance of bloom in September and October. To miss November abundance the Cyprians commence to lay early. They have the credit of being the record storers, one thousand pounds in one season. To test for best bees we require to have each race side by side, and take some three or four years to try them. Once I heard a neighbour say the food is the breed. He did not believe one race was better than another. The next year he tried two Italian queens. He had 33 hives; 31 blacks died, starvation leaving him two Italian hives. Another beekeeper alongside him at the same time had 19 Blacks and 1 Italian hive. The 19 died from starvation, leaving him the one Italian hive. I knew another beekeeper who had 42 hives, 2 Italians. Bee-moths eat out the forty Blacks, leaving the two Italians. I think, Mr. Editor, I may have trespassed too much on your space.

Semi-Hibernation on the Part of Bees.

Some experiments in chilling and freezing bees to determine how long life may be sustained under such conditions.

Hibernation was exploited about 20 years ago, and it was generally decided, and rightly too, that bees did not hibernate in the ordinary sense of the term. But they do go into a quiescent state when the temperature has been lowered; and this state is somewhat analogous to the torpor experienced by some animals in a state of true hibernation. A hibernating animal enters into a sort of sleep, during which no food is taken and respiration is considerably reduced. One scientist has stated that "respiration is inversely as the degree of irritability of the muscular fibre." If the respiration is reduced without this irritability being increased, death results from asphyxia. Hibernation is usually induced by cold; and the animal under its influence attains nearly the temperature of the surrounding atmosphere. But the hibernating animal can not resist any amount of cold, although its capacity for doing so varies according to the animal. Some animals

bury themselves in holes, like snakes and frogs; others, like the bear, crawl under a pile of leaves and brush, where they are still further covered with snow. Thus buried they will go all winter without food or water; but there is a waste of tissue. Fish may be encased in ice and still live. A lively frog may be dropped into a pail of water four or five inches deep, and exposed to a freezing temperature. Indeed, there may be a thin coating of ice formed over the animal. The next morning that frog, though stiff and cold, can be warmed up into activity. One man tried the experiment of giving the frog a solid freeze-up, and it died. Whether the pressure of the ice crushed it, or whether it was the actual cold, or both, could not be said.

Flies, as is well-known, will secrete themselves in window-frames and other hiding-places, subject to cold atmosphere, for weeks at a time, and yet on exposure to warmth they will revive. As is well known, also, ants have been repeatedly dug out of logs, frozen solid—in fact, fairly enveloped in frost; yet on exposure to warmth they will come to. Some hibernators can endure a freezing temperature, while others, like the bear, woodchuck and the like, can not. Other very interesting incidents may be taken from natural history; but the purpose of this article is to consider whether bees go into a quiescent state that approaches hibernation, in which there is low respiration and a small consumption of stores. We put a number of cages of bees with some queens (laying the cages down on cakes of ice) in a refrigerator. The bees were chilled to absolute stiffness. Every day we would take out a cage, and each time the bees would revive, including the queen. This thing was continued for several days, and yet the bees would "come to" each time.

The strange part of it was that the queens went on laying normally when put back in the hives, instead of laying drone eggs as we expected. Just what the temperature to which these bees were subjected was I cannot say—probably something below 40 and something above 35, for the doors of the refrigerator were frequently opened, and the ice was constantly melting.

During the past winter, when a cold snap came on, the temperature going down to zero, we put out some cages of bees, exposing them to the cold wind, which was then blowing a pretty good gale, when the temperature was 5 above zero I had expected that the bees might possibly be able to survive the shock for a number of hours, and yet revive; but 20 minutes of zero freezing was sufficient to kill them outright. I believe if we had taken the bees and gradually acclimatised them to the cold, first subjecting them to 40, then to 35, and gradually down to the zero point, they would have withstood the shock better.

When the weather warmed up a little we took several cages of bees and buried them in the snow, leaving with them a thermometer so that we might know the absolute temperature. We went out and got a cage of bees about every two or three hours, and we found that we could revive them without difficulty; but at the end of 24 hours the bees, when they "came to," seemed somewhat the worse for the experience. The temperature in the snow played around the 32 mark. But the experiments conducted during the summer would seem to show that bees might stand a temperature of 38 for a number of days.

We know it to be an absolute fact that the bees on the outside of a ball or cluster, in the case of an outdoor-wintered colony, will often be chilled stiff while those inside will have almost a blood temperature. It has occured to me that, during very severe weather, the inside bees may be gradually replaced by those without the cluster; for we know there is a constant movement of the cluster. Experiments show that a bee that has been starved will not stand as much cold as one that is well filled. Beekeepers

who have had any experience in wintering out-doors know how repeatedly they have taken clusters of bees that seemed to be frozen stiff; yet when warmed up before a good fire would revive and appear as lively as ever.

In view of the experiments we have thus far conducted, it would appear that bees might be able to stand a temperature of 40, or slightly below that, for a number of days; that if a warm spell does not come within a week, or perhaps less, those bees in their chilled condition will starve to death. But if it warms up the cluster will unfold and the bees will take food, when they will be ready for another "freeze." I have repeatedly seen clusters of bees, after a prolonged zero spell lasting a couple of weeks, that were stone dead; but the honey had been eaten from all around them within a radius of an inch or more. If a zero spell of weather continues more than a week or ten days, we always find some of the weaker colonies frozen to death in the spring.

I have given a few facts for our readers to consider. Understand, I do not claim that bees hibernate, nor yet do I stand sponsor for the idea that they may assume a state of semi-hibernation. In the language of Dr. Miller, "I don't know." But there are a few interesting phenomena in connection with chilled bees, their quiescent sleep, their low respiration, their light consumption of stores, that stimulates a condition of semi-hibernation. The bee in a chilled condition can go only a few days without food, while a bear, a true hibernator, may go all winter. When the temperature of a bee-cellar goes up to 50 or 60 the bees are active. Their respiration is normal. They must have ventilation or die in large numbers. If we can maintain a temperature down to 45, with slight variation, there is a state of sleep where the respiration is very low, food consumption slight, and consequently fresh air is not needed, or no more than what will percolate through the walls of the repository. We know that, in true hibernation, respiration is low, and no food is taken. Now then, I ask the question: Is it possible that bees assume a state of torpor that is about mid-way between that of true hibernation and the sleep of ordinary warm-blooded animals that are aroused at intervals of a few hours to be fed?

There is a practical side to this matter, for if we can induce semi-hibernation or torpor we cut down the consumption of stores. Doolittle's cellar comes pretty near giving us a condition where no ventilation is needed, and the stores consumed are slight.—E. R. Root, *Gleanings*.

WHY DEQUEENED COLONIES DON'T SWARM.

BY L. STACHELHAUSEN.

Why will a colony, dequeened so long that it is without unsealed brood during 4 or more days, not swarm?

In an article in the late Western Bee Journal, Mr. Adrian Getaz says that by caging the queen, or dequeening, a colony can be prevented from swarming if this colony is without unsealed brood at least 4 days.

In an experiment to test this during these 4 days or more without unsealed brood and honey, the bees were in a starving condition when the experiments were ceased to save the bees. Baron Berlepsch concludes from this that the bees can't become field-bees earlier than at the regular age, even at the most pressing conditions. According to the Schoenfeld-Gerstung theory the young bee in a normal colony is engaged during the first 3 or 4 days of her life in cleaning the empty cells, just on that spot of the hive where she hatched from the cell. During this time she commences to prepare larval food or chyle, and at the same time the laying queen will arrive on her circling way on the comb here on this spot, and the first surplus chyle prepared by the young bees is offered to her.

Three days after the egg is laid the young larva is becoming a consumer of the larval food, and is fed during about 6 days, then the cell is capped by the same bees. This work is done during the first 9 or 10 days of the bee's life, and this is the age at which bees generally have the first play-spell in front of the hive. The young bee does other housework afterwards, and will become a field-bee when 16 days old This is the normal way, and it is no contradiction to this theory, that older bees, too, *can* feed the larvæ, if this should be necessary. The young bees prepare the larval food instinctively, and a single bee can feed more than one larva, consequently there will not be a surplus of chyle,—for which the young bees can't find enough consumers—causes an extension of the blood, and thereby the swarming-fever.

We see, if this theory is correct, that young bees in the first 9 or 10 days of their age only prepare the larval food, consequently a surplus of bees of this age only can cause the swarming-fever. Even suppose that under certain circumstances a bee could become a field-bee about 4 days earlier than usual, this could not have any influence in this respect at all.

We will now consider the condition of the dequeened colony at the time when all the brood is sealed. As soon as the queen is removed or caged no more eggs are laid. A worker-larva is capped on about the 9th day, and 4 days more make 13 days, during which time the queen must be kept from laying eggs. During these 13 days many young bees will hatch but less and less brood is to be fed. The colony will have the swarming-fever even more than before; queen-cells will be started, which have to be cut out at the proper time, so a swarm or further preparations for swarming are now impossible, as no queen, no eggs, and no young larvæ are present. This fact that the swarming-fever is not satisfied or cured by caging the queen—is one of the reasons why I do not like the plan.

A better explanation of the fact that such colonies do not swarm, seems to me is the following: During these 13 days of confinement of the queen a large number of cells will become empty by the hatching of young bees. As soon as the queen is now released, chyle will be fed to her in large quantities, stimulating her egg-laying power, and she will find plenty of empty cells in which to lay eggs. This is the first consumption of the surplus chyle; 3 days afterward young larvæ are to be fed, and will become consumers of chyle. In most cases this will be sufficient to do away with the swarming-fever.

But we will suppose that new preparations for swarming should be made, queen-cups started, and the queen should lay eggs in them, as it is natural with prime swarms. Before a swarm would issue normally, at least one of these cells must be sealed; this can't be before 8½ or 9 days after releasing the queen, or 21 ½ days after caging her. As a worker bee hatches from the cell 20 days after the egg is laid, *all the young bees* will have hatched from the cells at that time. The colony has many young larvæ to be fed compared with the young bees, and no more young bees are hatching. Under such a condition no desire to swarm can exist. If the colony had actually started queen-cells they would be destroyed. Cibolo, Tex. in *American Bee Journal.*

If a bee drops a pollen-pellet by accident at hive entrance it never returns to pick it up, for the good reason that while able to roll up the pollen-dust and store it in the pockets provided on the bees hind legs, it is unable to re-load its tiny burden in one lump.

A gentleman in India writes to the *British Bee Journal* as to the probability of making an average clear profit of from £100 to £150 per year by beekeeping given (a) an energetic and trained man who can make his own appliances (b) a capital of £1000 (one thousand pounds.)

PRICES OF HONEY.

Melbourne Australasian. — Honey and Beeswax.—Prime clear extracted honey is selling at 3¼d to 3½d. Medium quality is rather dull of sale at lower rates. Beeswax is quoted at 1/1 to 1/2.

Melbourne Leader. — Honey. — Prime clear is in fair demand from 3d to 3¼d., but several lots arriving are only of medium quality, which is dull of sale, and lower prices have to be accepted. Beeswax in good inquiry at 1/2 for prime; mixed lots lower.

S. M. Herald.—Honey, 60lb tins, choice extracted 2¾d to 3d, good 2½d, inferior 2d per lb. Beeswax—Dark 1/1½, prime 1/2.

Maitland Mercury.—Honey, 2d to 2½d. per lb. Small tins 2/- to 2/3.

HONEY.—

Owing to the partial failure in the Western districts, there is a better demand springing up, and choice samples are in request at 3d., and for odd lots 3¼d per lb. is obtainable. Medium and inferior lots are slow of sale at 2d. to 2½d. per lb.

BEESWAX.—

In strong demand at 1/1 to 1/2 for good samples.

HOW CALIFORNIA FIGHTS HER FRUIT PESTS.

There are missionaries and missionaries, but one of the most curious of missionaries in the world to-day is a little orange tree, which at this present moment is engaged in one of the most remarkable missionary enterprises that one could imagine. It is only a small thing, about four feet in height, and, when it started out from California on its mission, was enclosed in a strong wooden case, with openings to allow it breathing space.

At the present moment it is in the heart of China, at a point far away from the ordinary track of tourists. The mission of this little tree forms a text of the most interesting description of California's method of saving her fruit crops, as told by W. S. Harwood in the February number of *The Century Magazine.*

I have before indicated the extreme measures which America takes in order to enable her producers to get the best possible results from their work. This article gives a fine illustration of this paternal procedure with regard to insect pests. It is estimated that the work carried on under the supervision of the California Commissioner of Horticulture saves millions of dollars per year to the fruit industry of that country.

The method of treating insect pests adopted by the Commissioner is a remarkable one, and it insures, when successful, a two-fold saving. First, it puts a check upon the disease or pest; and, secondly, it does away with the need of elaborate spraying outfits.

What the little orange tree went out for was this: It had contracted a disease which, if allowed to go on unchecked, would do irretrievable damage to a great industry. Now it is becoming more evident as science extends her knowledge, that there exists in Nature a proper balance. Whenever, in any respect, there is unrestricted production, it is certain that in some parts of the world there is a force which would counteract it. Were this not so, certain forms of vegetable and parasitic disease would become widespread and impossible to check.

Acting on this fact, therefore, the California Commissioner of Horticulture has set himself to find the natural enemies which threaten the existence of American orchards. It is to find the natural enemy of the scale which is affecting it that the little orange tree has set out for the Celestial Land. In some roundabout way it was learned that in a Chinese province this pest of the Californian orange tree lived side by side with the tiny insect that was an enemy to it. The pest and the destroying insect developed in about equal numbers, so that the balance was preserved, and the pest did no harm. So the little orange tree goes to that district, that the destroying insect may lay its eggs upon the leaves of the tree. It always does this when it finds a place where its prey is living, and the tree will then be sent back to San Francisco for the eggs to be hatched, and then this rapacious little insect will be sent into the infected orange regions to destroy the pest.

When it got to China, the tree was met by a man who has made a life-long study of plant diseases and injurious insects, and who, being in the employ of the Californian Commission, spends his time travelling over the world searching for the foes of pernicious insects. Now he may be in Western Australia (which country helps to pay his expenses), now in Japan, in Spain, in Siberia, in fact anywhere where it is believed that he may get valuable information and insects. This man is Mr. G. Compere. an enthusiast in his work, who left Western Australia for China in order to be there when the little orange tree, which left San Francisco on July 6th of last year, arrived.

An instance of the valuable work done by Mr. Compere is illustrated by the success which has attended his efforts over the codlin moth pest, which is, by

the way, rampant in Australia. When in Spain a year or so ago he found a region where the codlin moth lived, but where the ravages of the worm were very slight. Mr. Compere discovered that this was due to an insect, whose sole aim in life seemed to be to kill the worm. Its method of attack was as follows:— The fly is about five-eights of an inch in length, and is equipped with a curious stiletto-like sting, about as long as itself. This it drives into the bark of the tree where the worm is found, and kills it.

It was naturally supposed that if this parasite could perform this benevolent work in Spain, it could do it in California; so the little fly was taken over, reared in large quantities, and distributed here and there throughout that wonderful fruit producing district, with the finest results.

It is estimated that the ravages of the codlin moth have caused a loss of about £4,000,000 a year in the United States alone, to say nothing of the large sums of money spent for insecticide, spraying apparatus, chemicals, and suchlike makeshifts. The results were signally successful. Reports have come in saying that the flies were appearing in large numbers, the apple crop prospects were never so bright, the flies bid fair soon to restore the balance of Nature where it has been overturned, and the codlin moth will be robbed of its terrors. Millions of pounds will thus be saved for America's fruit industry.

It is nearly twenty years since California first began this beneficent work. It is, of course, now pretty generally known how that, some years ago, a California nurseryman imported some lemon trees from Australia, and laid the foundation of the cottony cushion-scale, hitherto unknown in that part. The scale spread through the orchards like a pestilence, sometimes covering the trees till they were white, as if covered with snow. In a single year the shipments dropped from 8000 cartloads to 600. Nothing seemed to be able to stop its ravages. Even taking the trees up and burning them they found was useless, because the pest had spread to all manner of vegetation. Indeed, the orange industry would have been killed had it not been suddenly discovered that the little ladybird, so familiar an object to Australians, was the natural enemy to the scale. It was instantly introduced, with the result that the balance of Nature was restored, the scale was kept within limits, and the industry brought back to its original proportions.

It was this that started California in her policy of fighting bugs with bugs, and she is determined now to carry out this fighting policy until all her pests are kept under.

Similarly, the black scale was introduced into California some time ago without its foe, which eventually was discovered in Cape Colony, and, after almost interminable difficulties, transported to the State; and, although it has only been at work for one year, it is estimated that the scale has been reduced by 90 per cent.

The Californian apricot is subject to a brown scale, which not only destroys the fruit and foliage, but is likely to ultimately destroy the tree. It has a fondness for plum trees as well. The Commissioner keeps in hand a supply of a minute brown fly, and whenever a report comes to hand from any part of the State that the scale is appearing, a colony of the insects is despatched by the first mail. It is released in the infected parts, and soon begins its destroying work. Of course, it may be asked what there is to prevent the foe of the insect pest becoming an enemy itself. This is answered by the fact that, in nearly every case, the beneficent insect depends upon the injurious one for its own sustenance, and it will not thrive robbed of its prey, so that, if the pest were wholly destroyed, its foe would also disappear.

The Commission is working upon lines which will ultimately bring under its purview all kinds of pests, and every

orchardist knows how numerous and dangerous they are. It may be easily imagined, considering the dangers it has passed through from importing pests, that it is very rigorous in its measures to prevent any fresh ones coming in, and no plant is allowed to go into the country without being thoroughly examined and fumigated. Not even a single piece of fruit found in a passenger's luggage by the Commissioner can pass without special horticultural inspection. The vessel is thoroughly searched, and the crew is allowed to bring in nothing in this line without rigid scrutiny.

Sometimes semi-humourous or pathetic incidents may arise, as when a small child is deprived of an orange, or the floral decorations from the casket of some departed citizen, who has died abroad and who is being brought home for interment, are confiscated.

But the necessities of the case demand severe treatment. A visit to the insectary of the Commission would be interesting. Thousands of little colonies of pest destroyers are being cared for by the Commissioner. It is not always that there is such a keen demand for destroyers, but they must be preserved, so that they may be ready for work whenever called for.

Plans are now being perfected for a larger insectary, with cold-storage departments, in which the eggs of a given foe may be kept indefinitely, ready for hatching at any time needed.

The Department of Agriculture in Washington has prepared a statement as to the loss by insect pests in the United States each year. The losses each year in all plant products or the soil exceed the entire expenditure of the National Government. Placing the value of these products at £1,000,000 a year it is estimated that an annual shrinkage of 10 per cent., and in many cases of 50 per cent., takes place from insect pests. Even reckoning 10 per cent. loss on £1,000,000, it is enough to warrant the small expenditure necessary to keep an arrangement like the Californian one going.

The good results of this easy and natural method of killing an insect pest are evident when it is estimated that it costs America £1,000,000 a year to spray apple trees, in order to keep down the codlin moth. If the little pest which has been introduced from Spain goes on as it is doing, however, the absolute control of the pest is within measurable distance.

It may be mentioned that the Californian Commission of Horticulture and he United States Department of Agriculture are rivals in their efforts to establish their respective rights to the initiative of these experiments.—"Review of Reviews."

SIMPLE TALKS ON BEES.

The Abdomen.

The abdomen of the worker bee is enclosed by six belts, consisting of twelve plates—the six dorsal plates on the back, and the six smaller, ventral plates below. Minute openings in the sides admit air to the tubes which form part of the breathing apparatus, and of which some are so exceedingly slender that, as Cheshire says, a bundle of them containing a quarter of a million would scarcely exceed the bulk of a human hair. Through the openings air is drawn in and expelled, and if these should become choked (say by immersion in honey) the insect, if the obstruction be not removed, will die. When a bee has had her abdomen messed with honey, the familiar leg movements upon her body are efforts to remove the liquid which, through closing her breathing holes, is smothering her.

Wax is not a substance gathered outside the hive, as not more than a hundred years ago, some writers on bees supposed. It is a natural secretion in the body of the bee, and, in wax pockets under the ventral plates, is moulded in the shape of scales to be removed for use in comb building. The tax imposed upon the bee by the pro-

duction of wax is very considerable. Of the many advantages that under the principles of modern beekeeping, have accrued to the bee as well as to her owner, not the least is that which results from the preservation of comb through the use of the extractor, and the supply of foundation for comb-building.

Contained in the abdomen are the honey sac, the chyle stomach, the intestines, and the sting. The honey sac receives the gathered nectar until it is either ejected into the comb cell or admitted to the chyle stomach as food for the little gatherer. At the bottom of the honey sac is the "stomach mouth," by which the bee can take her food, as required, into the chyle stomach. When forsaking her old home at swarming time, she does so with honey sac well filled, thus carrying sufficient food to sustain her during a period of uncertainty which may extend to several days, and little by little, with due economy of her supplies, drawing through the stomach mouth sufficient to sustain her life. Thus also, in weeks of inclement weather, when to leave the winter cluster daily in search of food would be impossible, the bee can take advantage of any offered opportunity to fill her honey sac from adjacent cells, providing honey where, by movement of a muscle, it can be fed upon. The honey sac, however, is so small that Cheshire estimates its capacity at one-third of a drop, which quantity, he says, will provide her with "sufficient food for a week's necessities." This means that a bee can, when put to it, drag out an existence upon less than a twentieth part of a drop of honey per day; in other words that she can live for twenty-one days upon one drop. If one were to calculate how many drops go to make up the hundred weight of surplus honey which may be taken from one colony in a season, and were to multiply the drops by three, he would arrive at some idea of the amount of labour that had been carried on by his little pets in filling their honey sacs from the distant flowers, and laying up for him the store of sweetness with which they reward his affection and care.—J. G. D in *Irish Bee Journal.*

WHAT IS WAX.

All bee-keepers and others perhaps have watched the bees entering the hives with their hind legs covered with large masses of colored matter which we have learned from various sources was pollen. We have also noticed the different colors produced, most generally some shade of yellow, or orange, although crimson, green or even black, may be seen. This pollen was considered by the ancients to be wax and was called by Reamur, a French natural philosopher of the early part of the thirteenth century, 'crude wax.'

This opinion was overthrown by the discovery of a French peasant in 1768 that the substance used in the construction of a comb emanated from between the rings of the abdomen.

On the abdomen of the bee there are 12 plates, 6 on a side. If the abdomen be elongated there will appear extremely smooth and delicate expansions upon which plates of greater or less size and thickness may be discovered. These pale yellow, tender discs are 8 in number, 4 on a side. The contour of the membranes determines the form of the wax scales which are molded upon their surface as the secretion passed from the glands beneath.

Cheshire says: "Wax, like every secretion, vegetable or mineral, is at first a liquid. It is derived from the blood by cell-action, and then transuding the structureless membranes, assumes the solid form of the scale. Wax is not chemically a fat, yet it is nearly allied to the fat in atomic constitutions.

Langstroth says: 'Wax is a natural secretion which is produced by bees, as cattle produce fat by eating. The first condition indispensable for bees to produce wax is to have the stomach well filled. Nearly all authorities tell us that wax is formed after gorging or overeating.

It takes about 24 hours for a bee's food to become transformed into wax. It is more noticeable in young bees than old, working on the general supposition that it is more difficult to fatten an old animal than a young one. These wax scales are so small and light that 100 of them hardly weigh as much as a kernel of wheat. That these scales also differ from the wax of the comb has been readily shown. The scales are carried to the mouth of the bee and there masticated with a salivary secretion, imparting to it the quality of ductility.

Of the principal uses of wax:—Wax enters largely into the make-up of candles. Several authorities state that the Roman Catholic church prefers candles made of pure beeswax, while one authority says: It is prescribed to priests to use exclusively wax produced by bees.

Women are very familiar with waxed threads. Floors are polished with wax. Wax also enters into ointments. Sculptors and painters have a use for wax. Nearly every farmer uses wax; that is, if they do any grafting at all. In many cabinet shops, in shops where wooden patterns are made, pure wax is used to fill up cracks, cover up screw-heads and preferred everywhere for finished work. There are a thousand and one uses for wax.

There are several vegetable waxes used in adulterations. Japanese wax is obtained from the small-stone fruits of several species of rhus cultivated in Japan. This rhus is akin to our stomach.

Then there is the myrtle-berry wax, obtained from the fruit of the myrica.

Carnuba wax is an exudation on the surface of the growing leaves of the carnuba palm, which flourishes in tropical countries of America.

Palm wax is also an exudation found on the stems of two other South American palms.

Other adulterations are: Paraffin, a product of distillation of many organic substances.

Beeswax is used by jewelry manufacturers, saddlers, trunk and bag makers, tailors, and in many other trades. It is really surprising how many different industries use it and how much they use of it.—*Exchange.*

The Sense of Smell Among Bees. Some experiments.

Translated from "The Bulletin de la Societe Romande D'Apiculture"

BY C. P. DADANT, in *American Bee Journal.*

In July, 1902, while sojourning a few weeks in the Cevennes, I was perusing some old journals found in the sitting room of an inn, while I was seeking to kill time in a long, rainy day, and the following lines fell under my eyes. I found them in the "France Agricole and Horticole" for April, 1900, and the title was, "Ants Recognize One Another by the Smell."

"The ants," said this article, "recognize one another very readily. When an ant enters a colony which is not its own, it is almost immediately put to death. A German naturalist, Mr. Albrecht Bethe, of Strasburg, has sought to recognise by which sense could be exercised so subtle a recognition, and has ascertained that it was a question of smell. Mr. Cook had already observed that if an ant touched water, it was infallibly attacked by its sisters at its return home, and he had concluded that the washing causes the ants to lose a special property enabling them to be recognized by one another. Then Mr. Forel ('The Ants of Switzerland' page 263 and following) had confirmed this hypothesis, by showing that ants from different nests can be put together if previously their antennæ, which are the olfactory organs, have been cut off.

"Adding to these considerations a new proof, Mr. Bethe crushed a few ants, and with the juice thus obtained he painted an ant which he then introduced into an ant's nest. When the ant was perfumed with juice of ants from this same nest, it was well received; in the contrary case it was at once attacked.

"A larva, washed in alcohol at 35 degrees, then put back in its nest, was similarly attacked as a stranger. Put aside 24 hours before being returned to the nest it was on the contrary well received, that lapse of time having been sufficient to allow it to reproduce its family smell. It seems, therefore, most likely that in the phenomenon of recognition it is the sense of smell which is in action."

These lines have impressed others besides myself, for I have found them reproduced in L'Apiculteur, of June, 1900, as well as in divers other agricultural or apicultural publications.

The thought has come to me, while reading them, that that which applies to ants is applicable to bees whose customs and instincts differ but little from those of the former. I therefore resolved to repeat with bees the experiments of Mr. Bethe as soon as I would return home. But time failed me, and the entire year passed before I could make the projected experiments.

Last year, in April, as I was classifying some notes, the above quoted lines came back to daylight and reminded me of my projects. I happened to have a few days of quietude, the season was propitious, and I decided at once to make a few trials.

All the experiments made upon ants by Messrs. Bethe and Forel, with the exception of that on cutting the antennæ, repeated by myself upon bees, ended in the same results; they no longer recognized their sister taken away half a minute before, when she had been washed in diluted alcohol. They accepted without difficulty the drones and the workers of another hive than their own when they had been previously painted with juice from crushed drones from their own hive. A few larvæ daubed with diluted alcohol were found thrown out a few minutes later. Returned the next day with their sisters, those bees that had been washed with diluted alcohol and had been held long enough away from the hive to permit this odor to evaporate, were again well received in their home.

Flight-Hole Above Brood-Nest.

Some years ago a Mr. Richard, a preacher at Amsterdam, took a notion to a hive of bees. Not having any other place for them he put them in the garret.

The shape of the roof was such that it became necessary to have the entrance at the top of the hive instead of the bottom. The following year the hive was taken to the country and another bought besides. The result was that the hive with the entrance at the top of the brood nest gave three times as much surplus honey as the other. The same results were obtained the following year.

It is needless to say that a large number of apairists began to experiment on the question. The results as far as the reports I have been stated, are an increase from 2 to 5 times and in one case 6 times as much surplus honey that would be obtained with the entrance at the usual place. Only one case is on record where no increase was obtained in the supers but considerably more than usual was in the brood-chamber.

The following points were asertained;

1st. The brood-nest remains where it is; the queen does not go up in the supers.

2nd. The bees manage to keep the hive, including the bottom-board, as when the entrance is below.

3rd. It is absolutely necessary that when the upper entrance is open, the the other should be closed, and no crack of appreciable size should be permitted below the upper entrance.—*Exchange.*

BEEKEEPING.

THE STINGLESS BEE.

The following article was prepared by a "Gleanings" representive, Mr Stephen N. Green, who was in Cuba one season helping to run a yard of 500 colonies.

While on the island he made a special study of some varieties of stingless bees found there and on coming back to Medina he continued these studies, keeping up a correspondence with several

in the tropicial regions, including Mr. W. K. Morrison. The latter sent Mr. Green various specimen lots of stingless bees that he had secured in the tropics. Among these was a mailing-cage of some extra large ones, including a queen. As these arrived late, and as it would be impossible to unite them with ordinary common bees the editor of "Gleanings" concluded to do the next best thing—take some micro-photos of them. They accordingly sent Mr. Green with the bees to Prof. Hines, at the Ohio State University, Columbus. The photos were taken showing the bees about three times larger than life size. The illustrations alongside of the common honey-bee, also enlarged, gives an idea of their comparitive sizes and general structure. Unfortunately they were unable to learn the name of this variety of the species. For the purpose of more ready distinction it will be noted that Mr. Green refers to the common hive bee as Mellifera, and the stingless variety under consideration as Melipona. The former is the name of a species of the genus Apis, and the latter the name of the genus for stingless bees in general; but as there is no name for the particular species here shown he calls it by its generic name.

To understand clearly the stingless bee question it is well first to have fixed clearly in our minds its position as to natural classification, and specially its position with regard to the common honey bee. Both belong to the same family but are separate genera, the scientfic name, Apis, being applied to our common honey bee, and Melipona being the "stingless" bee.

The Trigona is another genus, but it is so nearly like the Melipona that it is often classified as such.

The object of this article is not to dwell upon the species of melipona so much as upon one variety, which, to the bee man's standard, is of the most importance. To this species and variety I am, unfortunately, unable to give scientific names. The genus itself is so little known, and this variety so rare, that some of the best authorities in the United States have so far been unable to classify it definitely. This variety finds its home in the Orinoco reign of Venezuela. Only a few colonies, so far as known are kept elsewhere.

To give a more definite idea of this, the largest melipona we yet know of, I have obtained micro-photos, taken from life, showing the variety along side the Italian honey-bee. In such photos, the magnification of each set is the same (about three or four diameters), so that the relative is plainly shown.

The difference between the common every day queen and the melipona queen is very striking indeed. First it will be noted that the entire size of the melipona queen is smaller than mellifera. Next the long graceful abdomen of the mellifera contrasts strongly with the globula abdomen of the melipona. In short, the mellifera queen is much more beautiful than its clumsy relative.

The difference between the workers of the races is much less marked. Aside from the shorter abdomen of the melipona worker, it might be easily mistaken for the mellifera worker. The side views show more distinctly the difference, the abdomen of the melipona appearing still shorter in comparison. For still further comparison I have taken the measure of the tongue and thorax of the workers. The thorax measure of the melipona is about .156 inch, and the mellifera .158. The tongues of the melipona run from .16 to .20; and the mellifera, as we all know, average from .18 to .23. These figures are not supposed to be exact, but will show the approximate measures of the few specimens I have.

The side view of the melipona shows immense pollen-baskets. As pollen-gatherers the melipona are, no doubt, superior to the mellifera. Not only do they carry larger loads, but as verified by my observation of the little stingless bee in Cuba, they work when the honey-bee does not. Beginning early in the morning, and working late at evening, it flies in bad weather when the mellifera does

not venture out. Of course, this pollen-gathering quality does not rank in commercial importance, as does the honey-gathering of the mellifera, but it is still of value in another way. The cross-pollination of flowers is coming to have more and more attention from the agricultural scientists. There is undoubtedly, much room for improvment in this respect.

More bees mean more fruit, and the introduction of another race of bees means better pollinat on of flowers. The introduction of the great pollen-gathering bees, such as the melipona, would doubtless mean an improvment. The superior quality of the Mexican vanila is attributed to these melipona, because of this ability to work when other insects will not. The very slightest increase of the seed or fruit of any of our great crops will more than justify their introduction.

The honey production of the melipona at the present is of no great importance. The large melipona illustrated has been reported to yield as much as eight quarts at one extracting. The smaller melipona of Cuba gives only a few pints a year. The honey is of a light amber color, light in body, but of a very pleasant flavor. This honey is esteemed by the native Cubans as a remedy of great value, and finds ready sale at good prices for this purpose. While the yield is not yet of much importance, the yield of the mellifera in similar circumstances is not much greater. The surplus of the honey-bee in an old log or box hive can scarcely be counted as of commercial importance. Who would not say that, after the study and work that has been bestowed on the mellifera has been placed on the melipona the yield of the melipona would not increase as has that of the honey bee? Surely there is a chance of improving this stingless bee to a great extent. True, the method of storing honey is radically different between the bees; but do not the great honey cups of the melipona offer the ingenious inventor a chance upon which to improve his talent? Again it is true that this melipona has not been wintered successfully in the North; but it is possible that, when we learn their habits better, we may be able to do this. At present Florida and California seem to be the only places outside of our is and possessions in which these bees can be kept the year round, though it is entirely possible that they can be wintered in some other favored regions where the winters are mild.

The wing of an insect is of as much value to an entomologist in the identification of species as the leaves of a tree are to a botanist. Every species has some distinctive marking of veins and cells that vary but a trifle in the individual. The veins and cells of the melipona and mellifera are quite different.

"But," you ask, "can this stingless bee defend itself against the bee armed with a fatal sting or any other enemy?" I think it can. They are remarkably quick in action. The honey bee is slow and clumsy compared with them. Then they build their nests and guard them so that it is next to impossible for the honey bee to enter. If we can induce them to live in hives with wide entrances no doubt a honey excluding zinc built for this special purpose can be devised. When these bees are once angered they make an attack with all fury. Their lightning like sallies are certain to scare one, as the painful stings of the mellifera under such conditions are surely remembered. The bite of the melipona is not painful; in fact, they cannot cut the tenderest skin; but they pinch and cling with the tenacity of a bull dog, and do not hesitate to attack anything. However, these bees are not easily aroused, and attack only when their nest is broken. They are, indeed, extremely docile.

One strange thing about the melipona is that the bee-men have failed to discover drones in the nest. All of the family Apidæ have what corresponds to the queen drone, and worker of the honey-bee, so the stingless bee can be no exception. However, the life habits of the different genera are not alike in many details.

The drones of some of the varieties of the melipona are reared at long intervals under some special conditions. The drone of this large melipona no doubt exists, but has so far escaped the notice of the bee-keeping fraternity. Only long scientific investigation can probably clear this point. Another strange thing is about swarms. Like drones, these melipona seem to be non-swarming. But how do they increase? The natives know enough to increase them by simply dividing; but how they increase naturally still remains for the patient investigator; and he will doubtless bring to light some interesting facts.

The nests of the melipona are radically different from those of the mellifera. Their construction seems to be something of a hybrid between the honey-bee and the bumble-bee. The colour of the brood-comb is something like that of the bumble-bee, being light brown in color, tough and fibrous. The combs are built in parallel tiers held apart by columns of wax. The cells are constructed of a shape similar to that of the mellifera, but in only one layer, like that of a wasp, and not in double sets with common base as with the honey-bee. The honey and pollen are not stored in the brood combs, but separately in large egg shaped cells scattered along the edge of the brood.

These cells are quite large, and hold considerable quantities of honey or pollen. The brood-rearing of the melipona, too, is different from that of the mellifera. The brood cells are first filled with a mixture of honey and pollen, then the egg his laid on the top of this mass and the cell is scaled. The necessity of this is seen by the shape of the abdomen of the melipona queen, which would not allow of the laying of an egg in the bottom of the cells as in the case of the mellifera. As to the time taken to develop a perfect worker or queen I cannot say, this being another point that remains to be investigated.

It is a self-evident fact that a stingless bee would be of untold value, providing its honey gathering capacities were as good as those of the mellifera. Burbank has bred the spine from the cacti, and will in time make the desert blossom as the rose. The man who breeds the sting from the bee will make the air hum with bees where no bee flew before.

The large melipona which I have illustrated is one of a great genus found in Mexico, south of Argentina. A large melipona was domesticated by that great nation of Incas of South America long centuries before the Spanish Conquest. It may be that we shall find a bee more highly developed than the one we now have in the little-known central Andes region, where this ancient civilization made its home. I am doubtless optimistic regarding these melipona. Many consider them absolutely worthless as a commercial asset. I accord them but little value as yet.

Some others of them are large enough to receive attention from the beekeeper. The small stingless bee found commonly in Cuba is the most familiar. Reports come from Mexico of a large green bee, and another black bee. From South America comes the report of a white bee. I have yet to obtain authentic information regarding these. Some hope to find a still larger bee than is now known, and there is no reason why such should not exist. The fact is, the genus is comparatively unknown. Indeed, such scientific data has been gathered, but it is very scattered, and would take months of labor and waiting to present in form to the beekeeper such as would be of interest and value.

Mr. W. K. Morrison, of Porto Rico, deserves much praise for the discovery of this large melipona, which to date is the best of its kind known. He obtained these bees only after long waiting and a considerable personal risk.—Exchange.

Live Bee Work in a Church or Public Hall.

I had an idea for some time that this

same plan could be used in a lecture hall or church at night. At the request of the young people of our own church I tried the experiment by taking a cage and mounting it on the pulpit platform. The audience was first treated to the natural history of the bee, general facts about the honey business, and then was presented with a series of stereopticon slides, followed by a moving-picture exhibition showing many of the familiar operations in a bee-yard as they actually occur in every-day practice.

The evening's entertainment was then closed with an actual live-bee demonstration inside of the cage. A colony of bees right from their winter quarters outdoors had been put inside of the cage some hours before the evening's entertainment, to allow the cluster to warm up and expand over the combs. I felt some misgivings as to the success of the experiment, but nevertheless decided to take my chances, come what might. I took off my coat and vest, rolled up my sleeves, so the bees would not get up the sleeves, stepped into the cage, lighted my smoker, and opened up the hive just as I would do in the summer. Just how the bees that had just come from a long sleep would behave, whether or not they would spot up everything with their liquid fæces, was largely a matter of conjecture. However, I pulled out the combs, patted the bees on their backs, and, contrary to what you might expect, they were not affected by the artificial lights. Indeed, they behaved in every respect like bees that had been having flights every day in summer. There was no spot of any kind, and I had no difficulty whatever in shaking the bees into a big dish-pan, and scooping them up by the handfuls before the audience. I then told them that anyone could do that the same as I; and in proof of the assertion I asked a young man who had never had any experience with bees to step into the cage, with bare hands and arms, and do exactly as I told him. I cautioned him, of course, about making any quick motions, and explained how he must run his hand down gently under the mass of bees in the dishpan, which bees I had shaken up into a heap. He secured a good handful and held them up before the audience. I had previously picked out a man of good nerve, who, I felt sure, would do as I told him, and he did. This stunt pleased the audience perhaps more than any work that I did. Then I told him how to disengage the bees from his hand by one quick shake. He stepped out, without having received a single sting. Then I invited into the cage one of our regular apiarists, and we together did some more acts.—A. I. Root in *Gleanings*.

What Colour Shall We Paint our Hives ?

BLACK, NOT WHITE, PREFERRED—AN INTERESTING ARTICLE.

By Allen Latham in "Gleanings."

Though the advisibility of painting hives at all has been questioned, and not a few bee-keepers advocate leaving hives unpainted, whenever (if hives were to be painted) the proper colour has been inquired after, the answer has invariably been "White." I shall try to show in this article that here we have another instance in which error has been upheld in the practice of agriculture.

To understand why one colour is better than another, and why black and white are brought to opposition in this matter, one must be familiar with the laws of absorption and radiation of heat. There is a law in physicial science which put in simple words, reads: "Good absorbers are good radiators." This means that a surface of such a colour or texture that it readily gains heat will lose that heat, or other heat, with equal readiness. It is also true that a surface which gains heat slowly will part with heat slowly by the process of radiation.

The first half of each side of this law is well known; namely, that some surfaces absorb heat rapidly, others slowly. It is because of this knowledge that man-

kind, especially the gentler half of it, has decided to wear white in the summer and dark colours in the winter. Whether this choice is wise is open to doubt.

If one studies nature closely he finds that most animals which live in warm climates are dark in colour, and that animals of white fur must be sought in the fridgid zones. Of interest in connection with this fact is the change of fur which certain animals of the temperate zone undergo contemporaneously with the shifting of the seasons. It has been argue that animals put on white fur in the winter and that animals of the frigid zone are clothed in white for the purpose of concealment from foes or from victims. Personally I believe this to be a minor cause, if any cause at all, and would argue that the true cause must be sought in the phenomenon of heat-radiation.

Before going deeper into the consideration of the great question which we are approaching, I wish to suggest a simple experiment which anybody can easily try, and from which he may gain a deeper insight into the philosophy of heat radiation.

Let the reader select two empty tomato cans and paint one white, the other black, a dead black by preference. Pour boiling water into each, and, setting them a few inches apart, hold the hand midway between them. It will quickly be seen that the side of the hand which lies next the black can is sensibly warmed. Let the experimenter be blindfolded, and, while his hand is extended, let a second person shift the cans. If his sense of heat is at all like mine he can without error tell which is which.

The experiment just described furnishes solid ground for certain deductions, and will let me say: "Dress in white if you are to work in the sun; in black if your work is in the shade." "Animals are clothed in white in winter that they may the more completely retain their own heat." "Bee-hives should be painted white if exposed to full sunshine, but black if protected from the mid-day sun."

If any doubting reader will experiment with white shirt and with black shirt, in sunshine and in shade, he will quickly give assent to the statements in the preceding paragraph. When the thermometer is 95 degrees and creeping up put on a thin black suit and sit down in the shade—better than ice-water, better than ice cream.

A few years ago I began covering my hives, side-walls, and tops with "paroid" roofing-paper. This was done for the purpose of keeping out the wind and wet. Phenomenal results along other lines led me to consider the colour question. This paper, at first a grayish black, soon becomes almost black. I observed that colonies in hives covered with this paper never swarmed where well shaded, and that, in the trial of wintering, all colonies thus housed fared splendidly.

Now, a colony of bees has not only the heat of the sun to get rid of, but its own heat. If a white hive is in the shade it will not absorb heat rapidly, to be sure; but it at the same time can not lose heat readily. Hence the bees must ventilate vigorously during a hot day or night. If a black hive is in the shade it will not absorb heat rapidly, but it will let heat escape rapidly. A colony in a black hive which is well shaded does not ventilate much.

In the sunshine, however, the white hive gains less heat from outside than does the black hive, and the black hive may, and probably will, gain heat on a sunshiny day more rapidly than the radiation can take care of it. Still, towards sundown, while the white hive still has its front covered with bees, and while the little insects are wearing themselves out trying to cool off their home, the front of the black hive will be free from bees, and there will be but few bees fanning the entrance. These are facts.

BLACK THE BEST COLOR THE YEAR ROUND.

I consider that black is the proper

garb for hives in snmmer, provided the hives can be protected from the mid-day sunshine. If unprotected there will be too many cases of melted-down combs. It is in winter, however, that the greatest gain comes from the use of the black hive.

The last statement may seem to contradict a previous statement concerning the furs of animals, but allow me to explain. Possibly, during the winter, surely to be exact, a white hive will lose less heat by radiation than will a black hive; but when one studies further into the matter he will find that colour of the hive will have but little to do with loss of heat from the cluster of bees inside the hive. This cluster is surrounded by cold air most of the time, and hence little heat will get into the walls of the hive to be radiated, regardless of the colour of the hive. How, then, does black help in winter?

That last question is one which every beekeeper should know the answer to, and he should have unbounded faith in that answer. What kills most bees in winter with the exception of bad ventilation? Is it not too long a confinement in a semi-torpid cluster? Is is not true that bees wintering out of doors must break cluster in order to eat and live? A white hive does not help in this matter, but a black hive does.

During every sunny day in winter the front wall of the hive, facing south, if painted black, gets thoroughly warmed, freed from frost, and dried out. The bees loosen out on that side of the cluster, stretch their limbs, and are happier.

During the hard winter of 1903, when so many lost their bees, my colonies in black hives came through alive, except two which starved. Again, last winter there was no loss except one colony by an unforseen accident.

What I have said is based upon experience with hives having a dead-air space. I do not know whether single walled hives would show the same results. Those who wish to investigate this can do so by tacking a piece of tarred paper over the front of a few hives this coming winter.

Time now to prepare for winter. In our own case there was a very heavy apple tree (angophoibie Intermedia) flow in January, and the hives were crammed with inferior honey from that source. There was no room for working. Many drones in some of the hives. We would take a solid comb of honey out of the brood chamber, so giving the queen room to lay. I leave the rest to keep the bees during winter. Our first gathering of honey in the coming spring will therefore be spoilt by being mixed with the inferior apple tree honey. It would not do to extract now, as robbing may follow. Most of the inferior honey may perhaps be eat during the winter months. A cluster of bees in centre of brood nest will retain more warmth than this being divided by combs of solid honey.

We would recommend reading up all numbers of the A. Bee Bulletin, during the winter months.

CORRESPONDENCE.

G. K., Dungog.—Bee news very bad here. The worst season I have ever known here. Considerably over half of the bees in this district have died, and only one or two living very high up the river getting any honey at all. We have now had some nice rain, and what is alive now may come through. I think they will. Hoping you have had a better time up there.

[Unfortunately, no.—Ed.]

W. K. P., Claremont, W.A.—Herewith please find my subscription to your paper, which I have well appreciated. I regret that owing to my present state of health I will have to abandon beekeeping, consequently I will have no practical use for

your paper, so I have decided to discontinue taking same. Things apiculturally are not too good over here. Our market is kept constantly flooded by the Adelaide merchants, hence no room for our own product. A crying shame, I think; but everyone for himself is the present day motto. Although going out of the practical work of the industry, I can never thoroughly sever myself from same. So I expect you may here from me again. I hope soon, but from where I cannot tell.

B. B., Rheola, Vic.—I have had some very bad luck, and this season is the worst I have experienced here, but at present bees are doing very well from grey box.

T. E. W., Moruya.—Herewith please find one year's subscription to A.B.B. To-day I extracted the darkest coloured honey I ever handled; about the colour of treacle. It is probably from native apple tree, which bloomed heavily some time back. Altogether it has been a very bad season for honey.

J. B., Kelvin Grove, Brisbane, Q.—I am well pleased with the A.B.B. The bees are having hard times about here. They will have enough to do to get stores for the winter. We are having a lot of rain here lately.

B. B., Kaupokonui, N.Z.—Received sample copy of A.B.B. from a gentleman in Okaiawa, and like it. By it we see 'behind the scenes,' as it were. One point I don't agree with is the cause of Foul Brood. It is said to be a common germ. In a book by Dr. Howard, I find he attributes it to a special baccilus. However, on this question a great many differ, and I hope in the near future it will be better understood.

[Dr. Howard's book was written in 1894, and is no doubt somewhat behind the times.]

W. A. S., Whangaru, N.Z.—I have lost everything I had in land. My bees died out, and I am now an old age pensioner, and have nothing else to keep me, so please do not send the A.B.B. again if you expect payment. I am trying to start bees again, but as I have to make my boxes out of kerosene cases, I do not expect to do much. I have not done much in honey, but have enough swarms to give me a start next season.

J. W. G., Wavertree, Gramzow, Logan River, Q.—I take very little interest now in the bee industry, after 18 years, as there is no encouragement to produce a superior article, as I know to my cost. The German farmers about here get just the same price as I did, always underselling, and no expense except a gin case; they are the class that ruin the industry; and the demand so very limited, and impossible to export at a profit, as I also know. However, I wish you every success in your enterprise, which I consider you well deserve, and only trust it may reward you financially I am about leaving this district when I can sell out, and should I get anywhere where there is an opening for honey, etc., shall again go in for bees, but am heartily sick of this underselling. No matter how low I go others go lower and it won't pay me.

G. F. S., Okaiawa, N.Z.—The bees around this part of Taranaki have not done much this season, owing to so much high westerly winds. At Christmas time and before we had splendid weather, and afterwards it set in to blow. In fact, all the field bees were blown away. The nights here are very cold, so the bees have a poor chance in getting home. Our paddocks here were full of white clover. I am beginning to think black bees are as good as Italians, as far as honey-producing and foul brood. Which do you place faith in? I have purchased several Italian queens, and have often found the black queens as good, if not better, for egg laying.

E. McL. H., Tatong, Benalla, Vic.—Please let me know at once if hives are moved about a mile will the bees find their way back to old place. As I have to move mine in a few days, you will oblige.

[A good many will.—Ed.]

CAPPINGS

The white sage of California, so named from the nearly white colour of the leaves and stalks; growing, as it does, from three to eight feet high on the sides of the vast canyons of that State. With scores of flowers on every stem, and continuing in bloom for many months, it yields an abundance of excellent honey, and forms probably the finest gathering ground for bees in the whole world.

Here in the South we are not troubled much with cold weather during the blooming of honey-plants. The bees will visit the bloom, but of all bad weather for honey-gathering it is windy weather. It not only hinders the bees in their flight and work on the bloom, but it is detrimental to honey-secretion. If it rains we have many flowers that the rain will not wash the nectar out of, and the bees will store between showers.—*Californian Beekeeper.*

At the late Brandford (Canadian) Convention, the consenous of opinion was that sugar syrup is quite equal to honey for brood-rearing, provided pollen is present in the hive. Also a good idea brought out was to have bees in a valley. They get more early flights with less loss from winds than in an exposed place.

Herbert Kirkham, Vladimir, Russia, writing in the "Canadian Bee Journal," says their bees are practically in the cellar six mouths and outside six months. About 90 per cent. of the bees are in log hives. Their principal crop is from buckwheat, yielding 30 to 40 pounds per annum. He concludes by saying the principal foods of the Russian peasants are "salted cucumbers, rye-bread, sour cabbage, and buckwheat porridge."

E. W. Alexander gives in "Gleanings" his reasons why he does not shade his colonies: We don't like any shade among our bees, and for these reasons: First, we find the colonies that stand in the shade do not commence work within an hour in the morning of as soon as the colony that gets the morning sun; neither do they work as late in the afternoon; and if the air is somewhat cool for bees to fly in the shade, as is frequently the case, then we can see hundreds of them that have dropped on the grass in the shade around their hives that are heavily loaded with honey, and not able to rise and fly to the entrance. Many times a cold rain will catch thousands of them outside of their hives, where they will become chilled, and never fly again. This is the principal reason why we never get as much surplus from our colonies that are so handicapped as we do from the colonies out in the sun. We also lose a larger proportion of our young queens when they take their fly to mate, from hives which are under trees, than we do from those in the sun. Then another reason is, that invariably the colonies in the shade give us much thinner honey than the hives that have the sun all day. This, with us, is the principal reason why we dislike shade in the apiary; for we must have our honey just as thick as we can get it without putting our bees to the useless trouble and expense of capping it before it is extracted.

SHOW AWARDS.

Sydney Show.

Bee hive (open to all, any pattern): W. T. Seabrook, 1; H. R. Roberts, 2. Comb foundation: H. R. Roberts. Products of Apiary—Beeswax—Natural yellow: A. Burton, 1; W. T. Seabrook, 2; W. Abram, 3. Natural white: W. Abram, 1; W. T. Seabrook, 2. Honey—Extracted (liquid): One dozen lbs (reputed), glass jars or bottles, metal tops, standard colour, water white: W. Abram, 1 and 2; H. R. Roberts, 3. One dozen lb (reputed) glass jars or bottles, metal tops, standard colour, golden; Thos. Murphy, 1; W. T. Seabrook, 2; W. Abram, 3. One dozen lb (reputed), glass jars or bottles, dark, to be judged on all points except colour: T. Murphy, 1; W. T. Seabrook, 2; W. Abram, 3. Extracted —(Granulated)—One dozen 1lb (reputed), glass jars or bottles. metal tops, fine grain: Thos. Murphy, 1; W. Abram, 2; W. T. Seabrook, 3. One dozen 1lb (reputed), glass jars or bottles, metal tops, coarse grain: H. R. Roberts, 1; W.

Abram, 2 and 3. Comb—One dozen 1lb (reputed) sections (light colour honey), uniform size: W. T. Seabrook, 1; H. R. Roberts, 2. 1 doz. 1b sections (dark honey), uniform size; W. Abram, 1; W. T. Seabrook, 2; W. Abram, 3. Frame of comb honey, not less than 100 square inches; H. R. Roberts, 1; W. T. Seabrook, 2; W. Abram, 3. Frame of comb honey, not less than 50 square inches; W. T. Seabrook, 1 and 2; H. R. Roberts 3. Bees—Queen bee (Italian) and her progeny, leather-coloured; A. Burton, 1; H. Abram, 2 and 3. Queen bee (Italian) and her progeny, golden; W. Abram, 1; A. Burton, 2; W Abram 3. Special Prize—Collection and display of the apiary in trophy form; first prize (champion), £7, second prize £3, third prize £1 10s; H. R. Roberts, 1; W. Abram, 2 W. T. Seabrook, 3 Mr. Trahair's non-competitive exhibit was highly commended.