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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
Circulated in all the Australian Colonies, New Zealand, & Cape of Good Hope.

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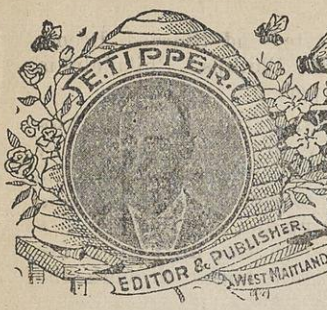

THE AUSTRALIAN BEE BULLETIN.

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

MAITLAND, N.S.W.—DEC. 31, 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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CHRISTMAS.

This happy time of year has again come round. With most beekeepers, ourselves included, it about ends our busiest time. With us, we began the year with much diminished number of hives, but have increased them steadily. There was no white box or ironbark honey, so we have only had the yellow box. This commenced about the middle of November, and by the time this is in print will be all over. Ours is more sheep and cattle country than agricultural, so corn and lucerne are out of the question. There was a great flow last year of the apple tree, with its dark, unpleasant-flavoured honey, so don't anticipate much of that this year. What will follow we have to leave to chance, and the great Controller of all. To our many friends we trust they have been no worse off than ourselves. The great thing is to keep the price up. Threepence per pound wholesale is what all good honey should be sold at. We wrote to a customer at a town some 100 miles away, stating our flow was commencing, and we should be glad to supply him at old rates. We got a reply he could now buy it locally at much lower terms. The conclusion we have come to is that either that storekeeper is telling us a falsehood, or that there are beekeepers who don't know the value of their honey. In the first instance, a lie of that nature is *commercially* not a sin. However, for this season we must try and forget these things, and

hopefully look forward, at all times doing our best. So conclude with wishing all a Merry Christmas and a Happy and Prosperous New Year.

For the past month the hives have needed much attention – a look through at least once a fortnight was necessary. If not, we would be annoyed to find a hive had swarmed, leaving several queen cells, but no larvæ to retain any swarms. In such cases we, if a good queen, cut out queen cells to utilise in other ways, and give a frame of larvæ from another hive. The latter kept the swarm from going away. We came across several just ready to swarm, and on one occasion found five swarms in the air, but the queens being clipped they all came back. We would remove old hive and put queen and swarm in old place.

In a good honey flow bees 15 days will be gathers.

Improve your stock. Introduce fresh blood into your apiary every year.

German scientists are now stating Bacillus clover is not the cause of foul brood. What next?

Pollen is borne from flower to flower on the breeze as well as on the bodies of insects; in fact that seems to be nature's prime method of carrying or conveying the fertilizing germs from the anthers of the staminate to the pointals of the pistillate blossoms.

The worst case of the kind we remember was where two boxes of bees had been placed on a shelf at one end of a guard van in a train which had some shunting to do. The two hives were jerked off the shelf, and the guard had a splendid time of it.

We acknowledge receipt from the U.S. Department of Agriculture, Bureau of Entomology, pamphlet "The brood diseases of bees." It treats of American and European Foul Brood, Pickle Brood, Chilled, Overheated and Starved Brood. It is by E. F. Phillips, Philadelphia Apicultural Expert.

Heather Honey.—A "press" is absolutely necessary to remove ling honey from combs because of its density. The only other way to get it from combs is to slice the combs up and hang them in a flannel bag before the fire; then use pressure to force the honey through the flannel, but it is a messy job.

Honey is a vegetable production, appearing in greater or less quantities in every flower that nods to the breeze or kisses the bright sunlight. It is secreted in the flowers for the purpose of attracting insects, thus securing the complete fertilization of the female blossom, and the keeping up of the vegetable world.

Selling the Crop.—Should you have comb-honey requiring to be got ready for sale, see that every particle of brace comb and propolis is scraped off every section, and if the number of sections to be dealt with is large, carefully grade them into first and second quality, and those not so well filled or less transparent along with those in which are seen a few unsealed cells, into third.

The "Beekeepers Review" published by W. Z. Hutchison at Flint, Michigan, U.S.A., is a splendidly got up journal and is not the organ of a supply company. Mr. Hutchison is an excellent photographer, and gives some beautiful pictures. He has lately started some outapiaries. We think, however, we in Australia, could have taught him a little. One thing we have learned, when a flow is on we rope the extractor to a tree some 30 or 40 yards away from the hives, and do all extracting in the open air. Trouble only begins when the flow ceases.

We take the following from the *Toowoomba Citizen* :—Dr. Hamlyn-Harris, delivered a most instructive and interesting address last Tuesday evening before the Chamber of Commerce on "The Commercial Importance of the Bee In-

dustry in Queensland." The lecturer pointed out the importance and value of the bee industry to a state, and deplored the fact that Queensland has done so little to encourage bee-keeping. Dr. Harris said he knew of no industry which yielded so much profit on the capital invested. The Doctor was accorded a hearty vote of thanks for his address.

The first of a course of our popular lectures in connection with the Technical College was given by Dr. Hamlyn-Harris in the Alexandra Pavilion last Wednesday evening, the subject being "The wonders of the bee-hive." There was no point of interest connected with bees and bee-keeping which the indefatigable Doctor did not touch upon in an educative and entertaining way. Before taking up the natural history of the honey-bee, the lecturer briefly referred to the keeping of bees and the uses made of their honey for medicinal and other purposes as early as the days of Job and Virgil. The instruments of bees, bees as architects, bee-keeping as it was, the modern management of bees, the enemies of bees, and bee-keeping in other countries than our own were other parts of his subject which Dr. Hamlyn Harris handled clearly and impressively by means of a number of lantern slides. The Doctor gave several touches of humour and descriptiveness to his lecture by the use of some very apt quotations.

We are very sorry to learn that Mr. W. Abram, of Beecroft, who tells us he has been 25 years in the colony is suffering not only from personal illness, but also members of his family. We are sure every one of our readers will sympathise with him. We wish also to acknowledge we have received a very beautiful queen from him, daughter of an imported mother.

AN EXPERIENCE.

Mr. F. Howard, Glenorchy, Vic., writing to Mr. Reid, Paupong, says:—"The three untested Cyprian queens arrived on the 6th in good order. They are safely introduced and laying away. I am sorry that I could not get them sooner, as I could have given them a good trial, but I suppose you had no better weather than we had. It has been the roughest spring for bees I have ever seen, cold wind and rain up to the 2nd of December, and now (12th) it is red hot, registered 102 in the shade on the 8th, enough to kill a horse, but the bees are enjoying it. They are fairly rolling the honey in, and extracting is in full swing. The tested golden is doing well, and I am pleased with her so far; she has her hive full of little golden bees now, and they do look pretty to my leather-coloured Italians, but I have not reared from her yet. I had a letter from a friend of mine, and he tells me that he tried a lot of the goldens, and that they are poor winterers, running down from good hives to about three frames of bees in early spring. He advised me not to breed too much goldens. Now I bought that queen to breed from to keep my bees from getting too far on the dark side. My dark bees as a rule are splendid winterers, so I would like you to let me know how they winter with you. As I am depending solely on my 140 hives for a living for myself and family, I would not like to go for in a strain that would run me down. I never had the goldens before, so I do not know anything about them.

QUEEN-MATING.

Do queens mate more than once?

Turning to Langstroth revised, page 53, we find this:

It is now well demonstrated that the queen is fertilised for life by a single mating, though in rare instances they are said to have mated two days in succession, probably because the first mating was insufficient.

A French apiarist reported recently that a queen had mated, laid a few eggs irregularly, then mated again a few days later and then laid abundantly.

The next question now is: Could the queen mate again later on during her

life ? That she may mate two or more times in succession during the first few weeks of her life seems to be well established. But as to mating later, that is something else. We cannot have direct evidence, for if no queen carefully watched did mate again, we never could say with absolute certainty that it should be the same with all others. But we have pretty strong circumstantial evidence that they do not. In the first place, no queen that has failed to mate during the first few weeks of her life has ever been known to be anything else than a drone layer during the rest of her life. Queens raised too late in the fall to mate never mate the following spring.

In examining with a microscope a young queen recently mated, the spermatheca will be found completely full of spermatozoa. If an older is examined, the spermatheca will not be so full. The older the queen the less is the amount of spermatozoa found, and in queens three or four years the spermatheca eventually becomes empty and finally they lay only drone eggs. If there was any possibility of a second mating, some of the old queens would have been found with a "re-filled" spermatheca. But it has never happened.

There is another consideration : In dissecting queens of different ages, it is found that the entrance of the sexual organs shrinks to some extent after they are a few weeks old. That the shrinkage takes place cannot be doubted, whether it is sufficient to prevent further mating cannot be told positively. At any rate, Cheshire does not make any positive assertion. We may add also that clipped queens, which certainly cannot mate a second time, retain their prolificness as long as any others.

EGG-LAYING.

What causes or prompts the queen to lay worker eggs in small cells and drones eggs in large ones? That is another of those debatable questions which take periodical rounds in the bee papers.

Is it instinct or is there any physical cause for it ? So far as physical causes are concerned, there is only one possible and only that one has been advanced. That is the pressure os the small cell on the abdomen of the queen forces her, or, at least, induces her, to lay a worker egg. Among the writers whose opinions have some weight, only Wagner, Quinby and L. C. Root have held that theory. They thought that the eggs found in the queen cells might be put there by the worker bees themselves. Foundation at that time was very little used. Now we know positively that the queens deposit the eggs in the queen cells themselves. We also know that they lay worker eggs in foundation barely drawn, where the cells are not much more than one-eighth of an inch deep. In either case, no compression is possible. So the compression theory has been abandoned, and we now say that her instinct prompts the queen to put unimpregnated eggs in the drone cells. This is the only explanation possible as far as we know. Furthermore, it is in perfect conformity with the laws of nature. A larva in a worker cell is fed with a particular food. Place the larva in a queen cell and the bees will change the food. Reverse the process; put a queen larva in a worker cell and the bees will feed her with worker food. Now, if the size of the cell induces the bees to change the food; why could not the size of the cell induce the queen to lay a certain kind of egg in the cells destined to that purpose ?

Instinct is something in the brain or mind of the animal that induces him to act in a certain way under certain circumstances. Here are a few examples :

There is a young chick, perhaps only one day old; a hawk appears in the sky; the chick has not seen it, and, if he had, he would not have known what it was; the hen gives a peculiar cluck, and the chick immediately lies down flat, and perfectly still, in the grass or the dead leaves until another signal from the hen calls him back. His instinct prompts

him to act so under these circumstances, though he certainly cannot know why and what for.

Another example is furnished by a kind of mason bee which builds a nest of clay, puts a certain quantity of food in it, lays an egg on it, and builds a cover on the whole. If, when the nest is built, a hole is made in the bottom, the bee will put in the usual amount of food, lay the egg, and then cover the empty nest as carefully as if nothing had happened and the food and egg were in, instead of having fallen out through the hole.

That's instinct, absolutely nothing else. And it is largely the same way throughout the whole animal kingdom.

But we say it is nature, not instinct, though, after all, instinct *is* nature.

Again the supposition that the compression of the cell determines the sex of the egg, it might also be stated that, if true, with other bees, it would be also true, with other kinds of bees, and allied insects, such as wasps, etc; but we find at once that it cannot be. The drones of Apis Dorsata are raised in the some cells as the workers. In Apis Indica the drones are smaller than the workers. Among wild bees, there are no cell at all in many cases.

Balling Queens.

Here you have struck on one of the most perplexing things which occasionlly happen in the swarming season in a large apiary. The general cause is that a few strange bees from another swarm or elsewhere go in with the swarm, and for this reason the queen is balled for safe keeping, or for some other purpose, just what I never knew, nor have I found anyone else who could give a satisfactory reason therefor. When the queen in a newly hived swarm is thus balled, the bees seem to think that they have lost their queen, and so return to the old hive, all except a few which are near the ball of bees, and realize that the queen is there all right. If they are stopped from going home by covering the old hive so they can not get in, they will go to other hives near by, rather than stay where we put them. I used to get a large proportion of them killed in this way by their trying to go into other hives, or else I had to let them go back, until I learned how to keep them from going back where enough strange bees got into a swarm to cause the swarm to ball the queen.

I hunted out the queen by smoking the ball of bees until they released her, when she was caged and the cage hung down in the middle of the hive. In about half of these cases this satisfied them, while at other times they would ball the cage, so it did no good. Thinking on the matter one day I made a large flat cage that would reach clear across the frames. Into this I put the queen and lay it on top of the frames, when the bees can get at her through the wire cloth between every frame in the hive, which prevents shutting her off from all but a few, as was the case when she was not caged, or with the small cage used at first.—*Doolittle in Gleanings.*

"Emergency Cells" in rearing Queens.

It has been pretty well tested and proved that "emergency cells" do not, as a rule, produce so good queens as those built in a leisurely way by the bees, say during swarming, when they have plenty of time to shape them in fine style. So, for best results, we must either procure our queens from a reliable party, or by our own selection and manipulation produce them from our own colonies.

Emergency cells are generally understood to be those reared by bees, which have been made queenless, from larvæ in worker-cells, as distinguished from swarming-cells or supersedure-cells, in which the bees of their own initiative have started with the egg in a previously constructed queen-cell. The mention of cells "built in a leisurely way" probably has reference to the tradition still somewhat in vogue

that when bees are made queenless they are in such haste to supply the deficiency that they select for the production of their future queen a larva of such advanced age that the result is something that is not "every inch a queen," but having to some degree the characteristics of a worker. Like many another error, this libel upon the intelligence of our pets dies hard.

It does not require a scientist to prove the falsity of the tradition. It is known that during the first 3 days of the life of a larva in a worker-cell the feeding is the same as that of a larva in a queen-cell. Then the worker-larva is "weaned," as it is called, and fed on coarser food, while the more costly food is continued to the royal larva throughout its entire feeding period as a larva. The doctrine of the tradition is that when the bees are suddenly made queenless they are in such haste to rear a queen, and so lacking in good judgement, that the candidate for future royalty is chosen from among the larvæ that are "weaned," or more than 3 days old.

The requisite proceeding in the case is very simple, costing little trouble to the operator, and little hindrance to the work of the bees. All that is necessary is to remove the queen of a colony with 2 or three frames of brood and adhering bees, putting the same in a nucleus, and then a day or so later to look and see the size of the larvæ in the queen-cells that are started, when the queen can be returned. It will be found that not only are the chosen larvæ not over 3 days old, but what they are considerably under. From that it would appears that the bees seem to know that although a 3-days-old larva may not be weaned, it is not as good for their purpose as something younger. *American Bee Journal.*

Cuban honey is sold in the United States at lower rates than that raised in the States. Cuba could supply if necessary all the sugar wanted in the world.

BEES IN A RAILWAY STATION.

A hive of bees caused a wild commotion at Burgess Hill Railway Station, in Sussex, a little while ago. A large parcel addressed to a local resident was tumbled out on to the platform by a railway employee. The parcel, which contained a hive, gave way, and out streamed the bees, causing the porter to run for his life. The stationmaster ordered, threatened offered rewards, but none of the porters was daring enough to remove the parcel. Finally an outside porter, an elderly man, was induced to lift the parcel by the offer of a shilling, but when the bees buzzed round his head he dropped the package and fled. All day the bees held the staff at bay, but at eight o'clock at night they returned to the hive, which was then hurriedly closed up and carried to its destination.—*Daily Mail. England.*

ARE BEES WILD ANIMALS.

SINGULAR COUNTY COURT APPLICATION.

An exceptionally interesting application was heard in the Sheffield County Court recently, before his Honour Judge Mansel Jones. The matter arose out of an execution issued by the High Bailiff in an action by George Slater and Sons, printers of Sheffield, against John Hewitt, a bee-keeper, of Totley. The High Bailiff seized a number of hives of bees, and the application was by the Registrar for directions to the High Bailiff as to whether the bees constituted goods and chattels, under the County Courts Act, which the High Bailiff was entitled to seize. Mr. J. E. Wing appeared for the defendant, and Mr. E. W. Clegg for the plaintiff.

Mr. Wing contended that the High Bailiff was only authorised to seize the goods and chattels of the defendant, and the question arose as to whether bees constituted goods and chattels. He suggested that there were certain things exempt from distress, among them being certain wild animals. He contended that bees came under this definition, were wild

and belonged to no one, and were not seizable by the High Bailiff. All wild birds, such as partridges, and several wild animals came under the same law. Mr. Wing quoted several cases illustrating his point.

Mr. Clegg, replying, stated that in his opinion, if the bees belonged to no one, plaintiff could not complain if they were seized.

His Honour asked if there could be any objection to the hives being seized.

Mr. Wing could not suggest that the hives were not goods and chattels.

Mr. Clegg then thought that the hives could be seized while the bees were in them.

Mr. Wing: The bees might object to that, and it is risky to annoy them? (Laughter.)

Eventually his Honour, stating that point raised was an interesting one from an academic standpoint, said he must hold that the High Bailiff was justified in seizing the hives and bees.—*Sketch Independent Sheffield.*

STINGING OF HORSES.

Mr. Morley Petitt, of Canada, has been compelled to stand suit for the loss of 2 horses from stinging of bees. The verdict awarded was $400 damages as the value of the team. The case was appealed, but it seems the higher court upheld the original verdict. It seems that on Aug. 10, 1905, Freeman Lucas led his team into an oat-field which was across the road and at a safe distance from one of Mr. Pettit's bee-yards. His intention was to cut the oats. He went back to close the gate, and when he got to the horses he found a cloud of bees around them, and stinging them. He attempted to drive the bees away with his hat, and was stung himself, so that he ran away and rolled in some mud, and then went home. The horses both died. The indications were that the swarm had clustered in the oats, and that the horses had gone into them and stirred them up. Local prejudice against bees, and sympathy, influenced the jury so that they saddled $400 and costs on Mr. Pettit. Messrs. E. D. Townsend, W. F. Marks, R. F. Holtermann, F. J. Miller, R. H. Smith, Edwin Trinder, Jas. Armstrong, Dr. Burt, and a number of other bee-men were kind enough to attend the trial, and the National Bee-Keepers' Association also helped Mr. Petitt in the cost of the appeal, as he evidently was keeping his bees in a perfectly legitimate and proper manner.—*American Bee Journal.*

CORRESPONDENCE.

G.W.V.H., Port Macquarie.—Honey here is of prime quality. I am getting 15s. per 60lb. tin readily.

J. C,, Mitta Mitta, Vic.—The prospects for the coming season are bright over this way. My bees secured about a ton of messmate honey in October, and they are more than holding their own ever since. Red gum will be out at Christmas and peppermint also, followed by apple tree, which is a kind of box; it blooms in February, and yields well.

J.J.P., Gosford—I hope you and all the care are quite well, and that you will have a merry Xmas and a prosperous New Year. The bees are doing alright. Had some splendid honey last season from the blackbutt and peppermint; got 80 colonies going strong. I hope there is a better time in store for the fraternity, and that all will have a merry Xmas and a prosperous New Year.

H.G.P., Port Macquarie.—I received specimen copy of A.B.B., and think it a very useful publication. Find enclosed my subscription for twelve months.

PRICES OF HONEY.

Melbourne Australasian.—Honey, prime clear garden honey in fair demand at 3d; inferior cloudy lots, down to 2d. Beeswax in good demand, 1/2 to 1/3 per lb.

Melbourne Leader. — Honey. — Prime clear garden samples are selling at from 3d to 3¼d.; second quality from 2½d to 2¾d. per lb. Beeswax — Prime clear wax is inquired for at 1/3; medium lots, more or less discoloured, selling at from 1/1 upwards.

S. M. Herald.—Honey, at present dull, choice extracted 3d to 3¼d, medium 2¾d to 3d, inferior 2d per lb. Beeswax.—Demand good, 1/1 to 1/2 per lb.

Maitland Mercury.—Honey, 2d to 2½d. per lb. Small tins 2/3 to 2/6.

HONEY.—

From current reports, we anticipate that the new seasons take will start to come forward freely during December. At the moment the market is dull, the top price for choicest quality being 3¼d. Medium lines 2½d to 3d. Dark and strong-flavoured lots from 2d lb.

BEESWAX.—

In splendid demand from 1/1 to 1/2 per lb.

HONEY VINEGAR.

TIMELY HINTS FOR FARMERS. ISSUED BY THE UNIVERSITY OF ARIZONA AGRICULTURAL EXPERIMENT STATION.

A. E. VINSON.

The method of making honey vinegar now in use among farmers, often results in the loss of enormous quantities of saccharine material, which would have been fermented, had they been treated differently. This fact is brought out most strikingly by the analysis of a small number of samples collected within the Territory.

COMPOSITION OF ARIZONA HONEY VINEGAR.

	Acetic Acid.	Unfermented Matter.	Ash.
(1) Fort Lowell	2.11	0.87	0.29
(2) Phoenix	4.24	22.81	0.39
(3) Buckeye	3.81	6.58	0.44

No. 1 is a vinegar, six months old, in which the honey is nearly all fermented to alcohol, but is still under-going acetic fermentation.

No. 2 is a very striking example of saccharine matter. Alcoholic fermentation is very seriously retarded by even small percentages of free acid and in this case it is doubtful if any of the remaining sugar ever becomes vinegar. Furthermore, the unfermented honey sweetens the sourness to such an extent that it tastes but slightly more acid than a vinegar of half its actual strength.

No. 3 also shows considerable material which escaped fermentation. This is often due to adding fresh washings to partially made vinegar. The alcoholic fermentation must, in all cases, preceed the acetic, for even small amounts of acetic acid greatly retard or entirely prevent the activities of the yeast cells. In other words, acetic acid is a direct poison to yeast, and no further addition of washings or honey should be made.

The Alcoholic Fermentation.—As already indicated, we notice that the process of changing sugar to acetic acid, or vinegar, takes place in two principal stages. First, sugar to alcohol; second, alcohol to acid. The first stage is the work of yeast cells; the second, that of the acetic acid forming bacteria. In attempting to shorten the time required for these changes, we must, therefore, provide those conditions which are most favorable for their development in the order named. The most essential conditions for the rapid development of any micro-organism are a complete nutrient medium and a suitable temperature.

Honey diluted with ordinary well water falls short of meeting the first requirement, i. e. providing sufficient and proper food for the yeast. From the honey analysis given in "Timely Hint" No. 48, we at once notice the very small amount of mineral matter, ranging from 0.06 to 0.46 percent and of nitrogenous matter, which was about 0.25 percent (0.04 percent nitrogen.) For their best development, yeast cells make the same demand for potash, phosphoric acid and nitrogen on the medium in which they grow as the field crops do. The time in which yeast will convert a given amount of sugar into alcohol, depends not only on the temperature, but upon the quantity of each of these fertilizing substances present.

These facts were put to test by means of a series of cultures similar to those often made with grain in pot experiments. Six flasks of about 400 C. C. capacity were

fitted with sulphuric acid valves, by which the free escape of carbonic acid gas was provided for, but the evaporation of moisture prevented. Exactly 250 C. C. of dilute honey, containing 400 grams of honey in 2000 C. C. of well water, were placed in each flask. The well water used supplied sufficient lime and magnesia. Flasks 1 and 2 received no further fertilizer. Flasks 3 and 4 received 1 part per 1000 (0.25) of ammonium chloride each. Flasks 5 and 6 received the same amount of ammonium chloride and, in addition, 1 part per 1000 of potassium phosphate. Each flask was then inoculated with 10 C. C. of yeast culture made from a boiled potato with a little sugar and commercial hard yeast. The cultures, with flask and sulphuric acid valve, were weighed at the start and once a w ek afterwards. The loss in weight, due to the evolution of carbonic acid gas, is a measure of the activity of the yeast cells. The following abridged table shows these losses:

TOTAL LOSS IN GRAMS, AT THE END OF EACH PERIOD, DUE TO EVOLUTION OF CARBONIC ACID GAS.

No.	Nutrient	1st week.	2nd week.	3rd week.	4th week.	5th week.	6th week.	10th week.	13th week.	Per cent alcohol by wt. in wine produced.
1	None	4.36	7 40	9.87	11.55	12.52	13.52	16.31	17.18	7.04
2	None	4.74	7.79	10.47	11.37	13.53	14.71	17.76	18.28	7.42
Ave.		4.55	7.65	10 7	11.95	13 03	14.12	17 04	17 73	7 23
3	Am. Chlor	7.99	11.96	13 81	14 82	15.28	15 78	17 13	17 43	6 69
4	Am. Chlor.	7.96	11 65	13 34	14 53	15 26	16.74	17 61	17.89	7 09
Ave.		7 98	11.8	13 58	14 73	15 27	16 01	17 37	17.66	6.89
5	Am. Chlor. and Pot	10 39	16 70	17 62	17 94	18.03	18·11			7 12
6	Am. Chlor. and Pot.	11 27	17 08	18 01	18 26	18 36	18 40			6.98
Ave.		10 83	16 94	17 82	18 10	18 20	18 26			7 05

This experiment shows that the addition of ammonium chloride alone accelerated the fermentation in the early stages, but that complete fermentation was secured very little sooner than with unfertilized, diluted honey. When both ammonium chloride and potassium phosphate were added, the fermentation was practically complete at the end of the third week.

A number of small casks of dilute honey containing about 10 per cent of sugar, were then prepared and one part each of ammonium chloride and potassium phosphate per 1000 were added. One of the casks was left to catch wild yeast from the air, and the others inoculated with good cake yeast. The fermentation was a day slower in starting from the wild yeast, but after two weeks, was as nearly complete as those that had been inoculated. The percentage of alcohol produced, however, was somewhat lower than with commercial yeast. This may have been due to a mixed fermentation. As is well known, different species of yeast produce different fermentations, some yielding more alcohol from sugar than others. The fermentation is never purely alcoholic, for some glycerine and succinic acid are always formed, and sometimes lactic fermentation takes place. A commercial yeast has probably been grown from a species which has proved to give a pure alcoholic fermentation. The brewer and distiller are very careful about the yeast they use, because the quality of their product depends so greatly upon it. Thus it would always be advisable to add a little pure yeast as a starter. The added expense is insignificant. Some of the experiment stations, moreover, have found such a practice to shorten appreciably the time required to make cider vinegar.

The cider produced from fermented honey makes a very palatable beverage especially if used at just the right time. This cider, though of lighter color, resembles apple cider very much. The

wine obtained by adding a small amount of vinegar to the completely fermented honey, after it has cleared up can scarcely be distinguished from a grape wine, and has a clean, pleasing flavor. In all cases the cask must be perfectly clean. It should be steamed, or, at least, thoroughly scalded, before the diluted honey is put in. One of the casks used in these experiments was slightly tainted, and, although thoroughly soaked and cleaned with cold water, the fermented honey took on a most disgusting flavor. Ordinarily, if the honey undergoes a rapid fermentation, the honey flavor is practically obliterated.

Having once obtained good wines and insured practically the complete fermentation of the sugar, we are ready to arrange the best conditions for the rapid oxidation of the alcohol to acetic acid. This is accomplished by the vinegar bacteria known to science as Mycoderma aceti or more accurately as Bacterium aceti, and other allied species. There remains then only to know the conditions most favorable to the activity of these organisms, and we will know the way in which to produce honey vinegar in a minimum amount of time. This way, fortunately, has been clearly marked out for us, since the success of the carefully worked rapid processes of vinegar making depend upon it.

The vinegar bacteria require, above all else, abundant supplies of oxygen, best furnished as fresh air. They tolerate rather strong alcohol, but do not flourish in solutions of over 10 per cent. They develop only slowly in very weak acid solutions, but increase in activity, as the acid becomes stronger. At about 2 percent acid, and 75 degrees to 85 degrees Fahrenheit they find their optimum conditions.

Rapid progress. By the rapid process, these conditions are so well fulfilled that complete acetification takes place in a very few days, or even hours. One part by volume of ordinary alcohol is diluted with 10 parts of water and sufficient strong vinegar added to give the total about one percent of acetic acid. This mixture is allowed to percolate slowly through deep vats, filled with beech-wood shavings, which have been boiled and afterwards inoculated with vinegar bacteria The vat is provided with a perforated false bottom, between which and the real bottom rows of holes, slanting downward, as bored through the sides of the vat. When the generator is working properly, a match flame will be drawn into these holes. The rapid oxidation of the alcohol generates much heat, which if not controlled, will result in the volatilization of alcohol, aldehyde and acid. When there is danger of loss by heating, some of the holes are plugged. No metal can be used in such a factory as the acid vapors corrode it very rapidly. The piping is all glass with rubber connections, and the necessary pumps are of hard rubber The dilute alcohol is distributed evenly over the surface of the shavings with a glass Barker's mill.

A very good vinegar was produced in this laboratory with a simple apparatus consisting of a keg filled with beech-wood shavings over which dilute alcohol was allowed to trickle from a vessel arranged above. Due to the small size of the apparatus, the dilute alcohol has to be passed through it several times, to accomplish complete oxidation. The temperature frequently reaches 95 degrees Fahrenheit and there was, consequently, considerable loss. A small rapid process apparatus, while quite effective, would hardly prove satisfactory in the hands of a farmer, as it requires too much supervision. A large plant, however, located in a good bee district, should prove remunerative, as the washings and low grade honeys for that region could then be worked at a central factory. This should prove especially successful if worked in connection with a local pickling works, since an adequate supply of good vinegar, at a reasonable cost, is essential to that industry.

Cask process. On the farm, however, the most practical method is the open cask In this case the formation of vinegar is most rapid when the bacteria from a film

on the surface of the liquid. Under such conditions, the writer has observed the formation of acetic acid at the rate of one-tenth percent a day. The film, however, rapidly becomes heavy, and is submerged after which the acetification takes place much more slowly. The film therefore, should be preserved. Shaking, or adding fresh wine, is sure to destroy this film if present and for that reason the vinegar barrel should never be disturbed. To obtain a good supply of air, the cask should not be more than two-thirds to three-fourths full.

A moderation of a French generator, devised at this Station, will prove especialy serviceable where only small amounts of honey wine are to be made into vinegar from time to time. A good wine or alcohol barrel is carefully painted on the outside to prevent corrosion of the hoops. A hole is now bored in each end of the cask near the chime on the side next the bung and covered with a fine screen to keep out insects. At the bottom of one end, a spigot is fitted and a perpendicular row of gimlet holes bored and fitted with wooden plugs to act as a gauga. Fresh wine, which must first be fully fermented can be added from time to time through a tube passing in at the bung-hole and ending near the bottom of the cask. In this way the active film will not be disturbed by drawing off a little vinegar, or adding a little fresh wine. The tube must not be of metal, but can be of glass where available. In this region, a large stalk of native cane, the joints of which have been perforated with a hot iron, makes a very serviceable tube. A tin funnel may be used in pouring the wine into the tube. A similar apparatus has been found very serviceable in France for converting table wine waste into vinegar. Such wastes, under suitable temperature conditions, yields good vinegar in ninety days. The generator is started with a mixture of about three-fourths wine and one-fourth good vinegar. When once started, no new vinegar need be added.

Degenerative Fermentations. After vinegar has become strong enough for ordinary use, about 4 percent, it should be poured off from the mother, filled into casks, and tightly bunged. Just as the vinegar bacteria oxidize alcohol into acetic acid, so other organisms, in turn, destroy this acid and the vinegar loses its strength. Air is necessary for this degenerative process, as well as for the formation of acetic acid, and consequently, its exclusion preserves the strength of the vinegar. In this laboratory, honey wines which were progressing nicely and contained as much as one percent acid, have suddenly become infected and lost all acidity in a few weeks.

THE MAKING OF HONEY VINEGAR.

Apple juice of good quality contains, usually from 10 to 12 percent of sugar and yields a vinegar containing 6 or 7 percent of acetic acid. In making vinegar from honey it is desirable to start with a solution containing as much or more sugar than apple juice. When low grade honeys are used, as the raw material, it is very easy to obtain the proper dilution. Most honey produced in the arid region contains about 80 percent of fermentable matter and may be weighed off and diluted with the requisite amount of water. Where washings are used, however, they may need strengthening or diluting. This can be easily governed by the use of a specific gravity spindle, which may be obtained at small cost. The Brix saccharometer is such an instrument, arranged to read percentages of sugar directly at 17.5 degrees C. (about 65 degrees Faht.) but for the present purposes no attention need be paid to temperature. In case an ordinary hydrometer is used, it should read from 6.8 degrees to 8.5 degrees Baume. or from 1.048 to 1.061 specific gravity. This will give a sugar solution of from 12 to 15 percent, which is a very advantageous strength for fermentation. If the finished product is stronger than necessary it can be watered just as honestly, in this case, after as before the fermentation is complete. The honey will depend largely upon the purity of the fermentation, and

upon the extent to which degenerative processes are absent.

Having prepared the diluted honey of proper strength, we next add the fertilizing materials and a little yeast. As previously shown, the best material is ammonium chloride and potassium phosphate, about one part of each per 1000 parts of solution. Unfortunately, potassium phosphate is seldom to be had in the drug store and we must rely on other chemicals to take its place. This is best done by using sodium phosphate; of each about one part per 1000. This combination is much cheaper than the rather expensive potassium phosphate and is to be recommended where large amounts of honey vinegar are made. These chemicals can all be obtained in large quantities for about 15 cents per pound. The small producer, who cannot afford to buy large amounts at wholesale, will experience much difficulty in getting potassium sulphate, but experiments in this laboratory have shown that potassium bicarbonate, a chemical to be had in every drug shop, can be substituted with nearly as good results. The chemicals are absolutely harmless and are in no sense of the word to be considered adulterants. Care should be taken to secure well water of good quality, preferably hard but not too salty.

Formula. When a barrel of honey vinegar is to be made for family use or by the small producer, we offer the following formula:

Strained honey	40 to 45 lbs.
Water	30 gals.
Ammonia chloride.	4 oz.
Potassium bicarbonate	2 oz
Sodium phosphate	2 oz

One quarter cake of dry yeast softened in luke warm water.

The chemicals for making thirty gallons will cost about 25 cents in a small way, but on a large scale not more than 10 cents. Somewhat larger amounts of potassium bicaronate and sodium phosphate, would give even better results, but the amounts are here cut to the minimum to bring the cost low enough to make it profitable.

In from three to four weeks all visible fermentation will have ceased and the yeast settled out. Now rack off the wine, add ten gallons of good vinegar, containing a little mother, and let stand undisturbed in a place having as near as possible an even temperature of from 75 to 80 degrees Fahrenheit. The acetic fermentation may be started by floating mother or the scum from an older cask on the surface of the mixture by means of thin cork shavings. Carried out in this way and a suitable temperature (temperature over 85 degrees Fahrenheit will retard the process and cause loss of both alcohol and acid) a good honey vinegar can be produced in from four to six months. *American Beekeeper.*

DIETETIC AND HYGIENIC RELATIONS OF HONEY.

BY DR. EATON, OF CHIGAGO.

Food-stuffs are divided into three great classes, protein, fat and carbohydrates. Honey belongs to the carbohydrates. On a strictly scientific basis, standards have been prepared showing the amount of each of these food-stuffs a given animal doing a given work should consume. Using Atwater's standards, we find if honey supplied all the fuel except that derived from protein, a man could eat two and eight-tenths pounds, or in round numbers, 3 pounds of honey per day. This is using strictly the amount of food necessary to maintain man in perfect health as determined by scientific experiment. As a matter of fact, it is probable that a smaller amount of protein in connection with carbohydrates will suffice for body maintenance.

A late investigation by H. Labbe, shows that a healthy man may maintain nitrogen equilibrium on from 1 to 14 grams of nitrogen per day—an amount much less than required in Atwater's standards, Luigi Cornaro, a Venetian nobleman. lived to a ripe old age, subsisting during

the last 50 years of his life on less than 12 ounces of solid food a day, and a part of the time on but one egg and a bottle of wine a day. Edison, the inventor, recommends food reduction, and claims to have subsisted for a time on 12 ounces of food a day.

If less protein were employed in the diet, more honey could be used. Of course, it might not be practical to replace all fats and carbohydrates by sugars for an indefinite period, as nature has provided means for the digestion of fats and starches as well as sugars. However, *this* is undoubtedly true as regards the substitution of sugars for fats snd starches.

(1). That sugar are more quickly assimilated than any other food, and the energy derived therefrom is more immediately available. For this reason sugar in the form of candy is employed in army dietaries, and especially in emergency rations. Queen Victoria's present of chocolate candy to the British soldiers in the South African War was more than a demonstration of her affection and gratitude; it was an illustration of applying the discoveries of science to practical use. Honey might be used much more freely than at present in soldier's rations.

(2). The digestion of sugars is performed at less expenditure of energy than other foods; in fact, some sugars are immediately and in natural form taken into the blood. Glycogen, the emergency food of the body, manufactured and stored by the liver, is itself a sugar. Sucrose merely requires splitting into dextrose and levulose. Commercial glucose and honey is practically predigested. Milk sugar is so easily digested as to be nature's food for the young.

(3) Sugars increase the flow of saliva and other digestive ferments, or more properly speaking, "enzymes," and thus stimulate appetite and aid the digestion of all food. It was once thought that the rapid essimilation and muscular activity shown on feeding sugar was due to this stimulation, but experiments substituting dulcin, saccharin and other sweet substances devoid of food value for sugar proved that such was not the case. The influence of sugar on the digestion of other foods is, however, a strong argument for the generous use of sugars in the dietary.

(4) Sugar as pure sucrose or as honey is a most concentrated food. Sugar contains practically no water, mineral or other non-digestible impurities, and will keep in perfect condition in any climate.

(5) Sugar is even an economical food. The cheaper varieties of candy, such as stick candy and those so freely advertised at 15 cents a pound, and honey at almost any market price, may displace many carbohydrates and fats at an actual monetary saving. Butter fat, olive and other oils are more expensive, and so are the fats in high-priced meats and poultry. Many vegetables, especially out of season although greatly inferior to sugar in food value, commanding more than 15 cents a pound, however, can replace even the cheaper varieties of starches at an economic saving.

It has been argued against the use of candies, honey and other sugars that they create digestive disturbances; that they are deficient in iron, lime and other inorganis salts necessary it nutrition, and that they injure the teeth. The first objection may be true in *some* instances with *particular* individuals, and undoubtedly not too concentrated solutions of sugar should be digested at a time; the same may be said of other favourite food materials. The objection that sugar contains no inorganic salts is not worthy of notice, unless sugar were to be employed as a food to the exclusion of all other foods. This, of course, is impossible, because sugar cannot supply the necessary protein. When sugar is used as an auxiliary to other food, as it should be, the objection has no weight as iron and lime are only found in relatively small amounts in the human body and most articles of food contain all the mineral ingredients the body demands, and more.

The prevailing idea that sugar is espec-

ially injurious to teeth is probably erroneous, as the West Indian natives as well as the darkies in the sugar belt, where naturally much sugar is consumed have exceptionally good and sound teeth. Exposed nerves are sensitive to sweets, as most mature people know through sad experience. This, however, does not argue that sugar caused the decay. Sugar like other organic material, will decompose with the formation of acids, such as butyric and lactic, and it is undoubtedly proper, wise and Godly to use a toothbrush and antiseptic mouth-wash occasionally, whether sugar, honey, candy or other foods are eaten. Sugar however is so completely soluble that it would seem that there would be less danger of decomposition in the mouth with it than with other less soluble foods.

In conclusion, notwithstanding the fact that the consumption of sugar has greatly increased in the most progressive countries, reaching almost 100 pounds per capita per year, and in the form of glucose, honey and other sugars, much more than that amount, I see no reason from the standpoint of the physiologist, chemist, or dietist, why sugar in the form of pure candy, honey or other wholesome sweets might not be used much more extensively than it is now, to the satisfaction, and not to the physical detriment of the people.

I made no dis inction in the paper between ordinary commercial glucose and honey. As to the food-value of them, they are perhaps something similar, although I should think the honey would have the greater food value. Commercial glucose contains one ingredient, the same as honey, and that is dextrose; but dextrin is not a sugar proper, and, therefore, does not have as great a food-value as honey. I think I am safe in saying that, although I don't know of any experiments that have been made that are directly upon that subject. But my impression is that dextrin is not as digestible or as valuable as a food as sugar proper; and therefore I would say honey is of more feeding value than glucose, even just considering the solids; and usually glucose contains considerably more water.

There is so much confusion in the use of the terms "glucose" and "pure glucose" that I don't believe I can answer the question. When I refer to glucose I refer to the commercial product which is obtained by the action of acids or other material such as *inverts* and ferments upon starch; and that product is only partially composed of sugar—composed of dextrose and dextrin—if you would say pure glucose in the meaning of pure dextrose, it was once a synonymous term with glucose, then I don't believe there would be any great difference in the feeding value of pure dextros and honey, because there is no difference in the composition or feeding value as far as I know between dextrose and levulose, which are the sugars which compose honey; and so if you add just one of those sugars to honey there would be no difference in the feeding value. But using the term commercial glucose you have quite a different proposition, because there you have dextrin, which is a gum and not a sugar, and not as digestible as dextrose; and in addition to that you have perhaps some *sulphurous* acid in glucose which would interfere with the problem of digestion of the glucose very materially, in my judgment.

I use the term sugar as a generic term covering a large number of sugars; and if I should use sugar in the sense perhaps that you are more accustomed to using it, meaning cane or beet sugar, I would use the term sucrose, chemically, to determine that sugar matter—sugars that have been obtained from the cane, and maple, and palm tree, and also, to some extent, in other vegetables. But there are a great many other sugars, as the generic term implies; we have the levulose and dextrose; those two sugars are found in honey. We have the dextrose, that is found in commercial glucose, and then we have milk sugar which is very similar to cane-sugar, and a large number of other sugars which are not so well known,

but, so far as I know, there is no great difference in the feeding value of these different sugars. Certainly there is no difference in the fuel-value of the different sugars. That is, one sugar when burned should create just about the same amount of energy as another sugar when burned. That is practically what occurs in the human body. But there may be yet some difference in the digestibility of these different sugars, and there probably is, as milk-sugar has been found to agree better with infants than other sugars.

I do not see why children should not eat a large amount from a scientific standpoint; nature craves it, and children want their sweets, and I don't believe there is any harm in it, provided you use the pure article. There are a great many of the cheap, inferior candies on the market that I do not think should be placed in the hands of children. But giving them pure sucrose candy, honey-candy, or anything of that variety, and allowing them to use it judiciously, I believe it would be used to the benefit rather than the ill health of the children, providing they were fed on other foods to balance the candy rations.—*American Bee Journal.*

WESTERN AUSTRALIA.

The efforts of our bee-keepers have practically resulted in the requirements of the local market being overtaken. Indeed the minds of apiarists have been much exercised on the question of how to give relief to a glutted market, and how best to develop our export market. Several suggestions have been advanced and promises of practical assistance have been made by the Department in order to foster and develop an export trade in honey. Unfortunately, however, the negotiations have for a time been suspended owing to the lack of response on the part of the majority of bee-keepers in coming forward and sharing with those more enterprising members of their Association the responsibilities which the project would entail. In spite of the full market, some honey is still imported, to the value of £1,500 worth, but this is said to be mostly of an inferior grade; its cheaper value unfortunately has a disturbing effect on the local market.—W. A. Journal, Department of Agriculture.

BEES STING HORSE TO DEATH.

We take the following from a contemporary:—Several swarms of bees were being conveyed in carefully sealed wooden hives from Charlotenburg beekeepers a few weeks ago on a lorry to the goods station for despatch by rail. On the way the fastenings of one box became loose, and the bees, having been infuriated by the jolting, flew out and wildly attacked the driver and his horse. The driver escaped with a few stings by running away, but the maddened horse rushed at a railing and fell. The bees now attacked the poor animal furiously, and did not leave their prey until driven off by a deluge of water from a hydrant. The horse however, was so severely stung that he died in a few minutes.

The honey crop in the United States the year has been a short one.

Buckwheat is said to have double this percentage of formic honey than clover honey has.

Large and deep frames will allow a colony to develop greater strength than a small one.

The drone, when emerging from his cell, bites the cover of the cell entirely off by a smooth cut, while the workers leave only fragmentary pieces of their cell-covering when they gnaw their way out. The queen cuts the covering of her cell in a way similar to what the drones do theirs, except, as a rule, a little piece on one side is left which acts like the hinge of a door, the door often closing after the queen has gone out, so that many times the beekeeper is deceived into thinking that there is a queen in the cell.

Comb Foundation.

When and How to Use It.

By R. F. Holterman, Brantford, Canada.

The commercial value of extracting combs has often been under discussion, and a very varied estimate put upon them. It will be found that, if a sheet of foundation between medium and light be put in a frame, and this be inserted in the hive, and the bees draw out and build upon the foundation when the comb is completed, the bees have just about double the amount of wax. To a beekeeper who has 50 colonies of bees (say he buys them) which he intends to run for extracted honey, and who has not in stock any combs for the supers, to such a person combs up to a certain number are very valuable. With nothing but comb foundation in the extracting supers, it is a difficult matter to draw the bees into the super. To put up a comb of brood, and replace it by a sheet of foundation is, in such circumstances, common, and perhaps the best practice, but it is very far from the equal of having the drawn comb. How much, then, can a person afford to pay for combs built in proper frames, and on comb foundation wired? Until I had at least one-third to one-half the number of surplus combs required for the first extracting super, I would pay 25c. for each comb, and, of course, as much less as I could get them for.

As years go by I have less and less inclination to put anything but full sheets of foundation in frames. Even in the production of comb honey, when all that is for or against the practice of starters in the frames of the brood chamber has been weighed in the balance, in my estimation the practice is found wanting unless one can secure at least up to 2 dol. per doz for No. 1 and fancy comb honey, sections 4¼ x 4¼ x 7 to the foot.

There are many beekeepers who baulk at the idea of buying full sheets of foundation for their hives; there are many who are not prepared to make such an outlay upon bees of which they know little, and of which profitable returns are to them problematical. Truth to tell, I have not much use for beekeepers who are not prepared to put time, thought or money into their business. I never rebel at people who keep bees about me so long as they keep them properly; but the slipshod beekeeper is a constant menace to those who are about him, be he a beekeeper on a small or on an extensive scale. If any of the readers of this are inclined to keep bees on "the cheap," grudging the expense of foundation and the like, let me say, comb foundation is to the hive what a good solid foundation is to a brick or stone house. Put a poor foundation under the house, and it is a constant and ever present annoyance, menace, and, in the end, loss to the builder. Or for the beekeeper not to buy comb foundation for his apiary, on the ground of expense, after getting good hives, would be something like the dairy man building fine well ventilated and properly constructed stables and barns, and then running round and buying 25 dol cows, which, for the same feed and care, will give him only half the milk in return that 50 dol cows would give.

To those who are beginners it might be well to say that comb foundation is valuable over the empty frame in that the bees have a guide to build straight comb, and in that the bees have a greater inducement to go into the compartment where the foundation is placed, be it brood chamber or super, providing the frame is properly spaced. I say "providing the frame is properly spaced," because of an experience I have had. My hives and supers are 17 inches in width inside; these normally contain 12 frames. In spacing the super frames I now put ten frames in the 17-inch space. The bees will take to foundation spaced 12 frames to 17 inches much better than when the foundation is spaced at the rate of 10 frames to 17 inches, yet after the comb is once built I find no difference in the readiness with which the bees enter the supers with frames more widely spaced.

It may be that, when building the comb, the bees want to construct it so that it is right for a brood chamber, while, when entering the supers for a honey flow, it is with the immediate object of storing surplus. No doubt many may think that we find wide combs in box hives. True, but there are then reasons which compel the bees so to build. In the above, let me say when reference is made to the 17 in. spacing for 12 combs, I do not mean to say foundation in this way is more readily accepted than when spaced 1½ inch; but I speak of greater variation. That bees will enter frames with foundation more readily than when there is none, can be seen by sections. Those with drawn out comb and foundation are sometimes filled or almost filled out with honey before the empty section has been touched. This is particularly true if the flow is moderate or light. I will admit that, in a very heavy flow, the bees appear sometimes to delight to build comb, and will build it in an empty frame when there is still plenty of room for storage in the combs at each side of it. To build on such a flow is, however, unsafe and unwise; and, more, such a comb is almost, if not invariably, drone comb.

Another advantage in comb foundation is, of course, that material is supplied the bees which would require honey, and the time and energy of the bee to produce. I am inclined to think, but am not positive, that the secretion of wax, while largely voluntary, is partly involuntary. If involuntary, it is so only after and during a good honey flow, when the bees have become thoroughly fat; for bees will vary just as much individually in percentage of weight as any other animal when in and out of condition. When the heavy honey flows are on, where bees gather from 15 to 26 lb. of surplus honey in a hive, then the bees cannot build comb rapidly enough to store and ripen the nectar, and, through lack of storage room, the beekeeper must lose a portion of what he might harvest had he given the bees comb foundation.

The time when bees are most disposed to draw out foundation is after they have swarmed. If short of drawn comb, such stocks should be given foundation in the brood chamber and super, and by taking away partially drawn comb, putting these in the supers of colonies not swarmed, and the swarm kept at comb building as long as they take readily to the foundation.

Another very fair way to force bees at the beginning of the honey flow into the supers, and accept foundation, is to uncap all the honey capped in the brood chamber. If the brood chamber cells are occupied with either honey or brood, and it would be useless to super them unless they were in this condition, the bees cannot find a place for the leaking honey, they are forced to accept the foundation in the super, and build comb in which to store the honey.

As to the method of fastening in foundation, I prefer the hot plate machine, by means of which the edge of the foundation is heated to the melting point. The hot plate recedes, and the foundation falls upon the under side of the top bar and is there attached. Next to that I use a rubber bulb and glass tube of large size. By means of this the melted wax and resin are distributed along the edge of the foundation and the lower side of the top bar. I use two large boards, each having three minor boards over which the frame will half slip. The foundation is first placed upon this; the wired frame next, and the foundation is inserted, and the wire put embedded before the frame and foundation are removed. Of course, a beekeeper with only a few hives, and inexperienced, has a reasonable excuse for using a groove in the top bar, or some such device; but an extensive beekeeper is not only thus weakening his top bar, but is wasting large quantities of foundation, and worse than wasting it, for it is much needed on the lower side of the sheet in the frame. Foundation should not buckle, but touch at the sides; better still, the upper half touch the lower, al-

most so. When this is the case the bees attach the sheet to the side bar almost as quickly as they go on it, and relieve the sheet of a good deal of strain and a proportionate danger of sagging. The sheets could be cut off in this way, even by an automatic cut off machine. I should like to see foundation made so the mill will roll out a sheet as wide as the Langstroth frame inside the side bars. By hanging the sheet in as it comes from the mill, it is much stronger than when turned the other way. However, unless swarms are thrown upon the foundation, when there is an extra strain, I find three strands of horizontal wire and light brood foundation with the weed process all right. I have to say weed process, for it is less liable to sag than the old dipped process —at least, of such as I have made and used.

In the prevention of sagging foundation, there are a good many points to be considered. Some of these I know, and probably there are others. Naturally, beeswax is not subjected to the same strain, which a sheet of foundation suspended only from the top is. The bees build a little septum at a time, and immediately add cell walls to strengthen it. The comb is attached to the top, and circles more or less toward the centre as it is built. When the swarm is put into the new hive, or enters it of its own accord, it is generally the heat of the day, and the bees are much excited and give off great heat. What can we expect but sagging, with a hive standing in the sun, poorly ventilated, and with excited bees clustering on and covering these sheets of foundation? When a swarm is put upon foundation the hive should, for 48 hours, be shaded. There should be plenty of bottom ventilation as well as in the super; and an empty extra brood chamber without frames put under the proper or true brood chamber is a very great help, not only to the proper drawing out of the brood chamber, but to make the bees contented in the hive. Next, to get evenly built combs the bees must not be given too much room. This is true of brood chamber, extracting and comb honey super. Give the bees no more foundation than they can well cover, and they will do their best work. If more surplus comb is desired, honey must be left in the combs already full, and foundation added. Many a time I have seen beekeepers add frames with foundation just before extracting, only to have the bees after extracting first utilise the drawn comb, and perhaps chew holes in the sheets of foundation, these holes to be filled with drone cells when the comb is built out.

By means of taking away a portion of the frames in the brood chamber, two days after the swarm has been thrown upon them, and replacing with dummies, the same beneficial results can largely be secured that are sought by hiving the swarm on starters and the drone comb done away with. Whether in brood frames, surplus combs, or sections I see in economic beekeeping no place for anything but full sheets of foundation, and I have to buy every pound I use, or at least have my own wax made into foundation, which is the same thing. In moderate flows or in heavy flows I see the need alike. It should be avoided, to have foundation in the hive when the bees do not require it.

Commenting on the above, the editor of "Gleanings," from which we reproduce Mr. Holtermann's article, adds:— "This is one of the best and soundest articles on foundation that we have ever published, and I commend it to the careful attention of every reader. Especially would I place emphasis on Mr. Holtermann's treatment of a newly hived swarm, to keep it contented and from over heating and stretching the foundation."

SWARMING.

We arrive at the kernel of the matter: "The size of the first swarm is varied a great deal by the amount of reverence the bees possess for the old queen." This does not refer to the size of the swarm as it issues from the old hive. It refers to

the number of bees that will stay after hiving, and without brood or other inducement. It may have been an induced swarm through lack of ventilation, restriction of the queen's laying space, or an aged queen which should have been replaced the previous season. Then again, swarms may be delayed by the sudden addition of room for brood or stores, ventilation of the hive, or unfavourable weather, and many beekeepers destroy the queen-cells one or more times. All these things tend to make swarms artificial and unnatural.

I have the following from a prominent Eastern beekeeper: "A clustered or clustering swarm is not fussy as to the queen it has, as you know, as 'after-swarms' not infrequently have many virgin queens, and I have seen 'prime' swarms with the old and several young queens."

I have often seen the same. For several years I clipped queens. Several times I saw the old clipped queen come out and hop about on the ground, until finding she could not go with the swarm turned to re-enter the same hive she came out of but a moment before. As soon as she approached the alighting-board she was seized, and although she moved lively to get past the guards, she became balled, and would have been killed had I not opened the hive and rescued her. And the cage I placed her in was balled for one or two days. Is that not somewhat "fussy?" It shows that the young queens which go with a "prime" swarm are not in their intended place, although the bees of the swarm would not object to the young queens. If the swarm is hived, however, and no brood put in, most of the bees would desert and return to the parent hive during the following few days. Such are not natural swarms, because the procedure is not in accordance with what Nature intended. It is two swarms in one.

After we find out a successful method for the treatment of natural swarms, by a slight variation we can manage the freaks. When there is less tampering with the colonies to prevent swarming, there will be less freaks. Freak swarms are apt to be more or less freakish in their work and call for freakish management, which is the complete annihilation of system.—*American Bee Journal.*

Queen cells are discovered in the combs. If a good queen, cut nearly all of them out, put in West cell protectors. In hives with inferior queen kill such and put a cell in such hive. In eight or nine days give a frame with eggs or very young larvæ in such. This will prevent the young queen from swarming when mating.

When a swarm issues there are various ways of dealing with it. If the queen is clipped search for it, and put in a cage. The swarm will soon gather round it, it may be dealt with as the beekeeper desires, either put in a fresh hive with starters, or returned to the old hive. A spray pump is very useful for controlling swarms. Where a swarm has settled on a limb too high for the swarm catcher, we have brought some down by firing a gun inside the swarm and so breaking the branch it was on, and so the swarm came to the ground, placing a hive quickly on top of it.

ODDS AND ENDS.

W. REID, SEN.

The last spring has been subject to cold spells in Victoria, South Australia, and many places in N.S.W. A. R. Bell, beekeeper, writes from Border Town, S.A., recently: "We have just had four inches of rain, weather very cold. We also had a heavy hail storm, destroying wheat crops, etc., which promised five bags per acre."

Some bee men claim that certain races of bees are better than others to enter top story and fill the 1lb. sections. In my experience, I have taken 4 top frames, 4¼ inches deep, well filled, and every cell capped. Now take four frame holders,

filled with one pound sections containing starters. Hang these between the frames of honey, and watch how the little creatures will draw out and finish these sections if honey is now coming in. If the centre sections are finished first place them on the outside, and the unfinished sections in the centre; as soon as complete, replace these sections, but leave the narrow extracting frames.

THE SELLING PRICE OF HONEY.

Why is it so low in Australia as a rule? In many country districts there are beekeepers who look at the returns from their bees as so much pocket money only. Their principle incomes are from other sources. Consequently they sell their honey at first price obtainable, without a thought that their doing so causes those persons whose principle income is from their bees to suffer in consequence of having to sell at the same low price. At the same time honey consigned to large centres is at the mercy of the consignee, whose statement of this and that being wrong is not likely to be disputed as the consignee being perhaps hundreds of miles away. Beekeepers think over these things.

FEEDING SWARMS.

The bees when swarming carry with them in their honey stomach sufficient honey to last them about four days, part of which is utilized for converting into wax for comb-building. and the balance is used up as food. During this time, if the weather is favourable, they gather nectar to store in the combs as they are being built, and everything works smoothly along. But in the case of bad weather setting in after the swarm has been hived, lasting, say, for several days, a different state of things confront the beekeeper which he must be prepared to meet, that is to say, he must feed the newly-hived swarm or the bees will begin to die of starvation on the fourth day. In such cases feeding should be resorted to immediately bad weather comes on, and should be continued while it lasts.

CAPPINGS.

Putting a weak colony over a strong one, after the Alexander plan, was an utter failure here. That does not condemn the plan. So many have succeeded with it that I believe it's a good thing—a big thing. The thing now to learn is the conditions of success and failure. Did I fail because I had hybrid bees? You say, Mr. Editor, that on first trial you failed. Can you tell us why? I have said that our first trials of the Alexander plan of uniting were not all of them successful. In some cases it worked and in some it failed. This was before our Mr. Wardell had come to take charge of the bees. I explained to him that I wished him to try it and discover if possible wherein was the possible cause of failure in the few cases. He did so, and in every case he was successful. Now, why did he succeed when the other boys failed, in some instances? He does not know, except that he says he was very careful to have always a strong colony below, as Mr. Alexander stipulated. Then he thought it was very important, when putting the weak nuclei over the strong one, to be extremely careful not to disturb the lower bees. He accordingly put perforated zinc on top of the strong colony two days in advance of putting the weak nucleus on top; then when ready to do the uniting he lifted the cover only partly; sealed to the perforated zinc honey-board. He next put on the upper story very gently with its one or two frames of bees, placing a division-board next to the outside frame. This was done very quietly so as not to force the lower bees up into the upper bunch. In every case of colonies so treated he found in a few days

both lots of bees thriving tremendously, the lower bees having come up in the mean time supplying the nucleus with its lack of bees, at which time the queen would begin to "spread" herself in egg-laying. He says it is surprising how such a nucleus will increase in strength and apparently, too, without any diminution in the force below. The philosophy seems to be this. When the two forces of bees are put together, one on top of the other, the work is done so quietly that the lower bees do not for a matter of 24 hours mingle with the upper ones. In the mean time both lots of bees gradually take on the same scent. When the two lots of bees begin to mingle they smell alike and there is no fighting. As the queen has the queen has the same scent she is not molested. The result is that the two forces of bees together can do far better than either one of them separately, because they have the egg-laying capacity of two queens.—*Gleanings*

In order then to test the power of bees to appreciate colour I placed some honey on a slip of glass, and put the glass on coloured paper. For instance, I put some honey in this manner on a piece of blue paper, and when a bee had made several journeys, and thus become accustomed to the blue colour, I placed some more honey in the same manner on orange paper about a foot away. Then, during one of the absences of the bee, I transposed the two colours, leaving the honey itself in the same place as before. The bee returned as usual to the place where she had been accustomed to find the honey: but though it was still there she did not alight, but paused for a moment, and then dashed straight away to the blue paper. No one who saw my bee at that moment could have had the slightest doubt of her power of distinguishing blue from orange. Again, having accustomed a bee to come to honey on blue paper, I ranged in a row other supplies of honey on glass slips placed over paper of other colours, yellow, orange, red, green, black and white. Then I continually transposed the coloured paper, leaving the honey on the same spots; but the bee always flew to the blue paper, wherever it might be. - Exchange.

DAIRYING.

There are two distinct causes of abortion, firstly, from contagion passed from one cow already in calf to another, and secondly by contagion from the bull. The first cause, when observed, frequently occurs when pregnancy is so far advanced that a certain milk yield may be assured, and the mere loss of a calf is considered of comparatively little importance. The sterility, however, which so often follows, expressed by the cow persistently, returning to the bull and failing to conceive is a far more serious matter, meaning as it does in a dairy herd that the cow will not come into profit the following year until too late for much revenue from her product. The purchase of one of these cows at a sale means the introduction of the disease into a clean herd. A cow that has aborted will, after a certain period, return to the bull, then it is feared that she fails to conceive, and returns periodically to the bull. Other cows, after being served later by the same bull, also fail to conceive, and become sterile for lengthy periods, although repeatedly served. The farmer then forms the opinion that the bull is impotent, and borrows his neighbour's, with the result that he receives no benefit whatever, but in return conveys the trouble to the obliging neighbour. Later, either the bull or the offending cows are sold, to the disadvantage of the buyer.

When abortion proper is about to occur in cows far gone in calf no symptoms sufficient to attract attention as a rule are noticeable, uneasiness, with attempts to prepare for calving, may occasionally be observed, but usually abortion occurs without warning, consequently it will be

seen that the symptoms of the disease are practically only that some cows persistently "return to the bull" in some cases regularly every three weeks, but more often irregularly. It is wise to always adopt proper means to eradicate the disease

Treatment.—When a cow aborts search immediately for the foetus and destroy it by burning it on the spot where it lies if possible. Isolate the cow and keep her isolated. In the case of the failing to conceive and returning to the bull at short intervals, treatment by irrigation should be applied to both sexes. From the experience of Government veterinary surgeons the best results have been obtained by the use of the antiseptic drug known as mercuric chloride (corrosive sublimate). This drug for such purposes is put up in flat circular pellets, and can be conveniently prepared by dissolving one pellet in an ordinary clear glass whisky bottleful of water which has been boiled and allowed to cool to about blood heat. All else that is required is a three foot length of india rubber tubing of half inch diameter, and a small glass or enamelled metal funnel, both of which should be thoroughly disinfected before using on another cow by boiling for five minutes with an antiseptic soap For the treatment of the bull an ordinary enema syringe with vulcanite fittings should be obtained. The method of using the syringe was fully explained and illustrated by means of diagrams.

STRIPPING COWS.

Writing to the "Dairy," a British monthly journal, Professor M'Connell says that all his life he was accustomed to see the cows stripped, but recent events have caused him to change his mind as to the advisability of the practice. Many authorities have pointed out aforetime that if milk secretion was intimately connected with the nervous organisation, the stopping of the milk flow and then coming back to start it again was doing the cow harm, as it amounted to retarding the nervous energy. About a year ago Professor M'Connell stated his belief that stripping was absolutely necessary, but he now takes back that statement as since then he has tried the rapid milking out at one setting with most satisfactory results. He thinks that if a small quantity of milk be left in the bag it does the cow no harm, but helps to swell the total yield at the next milking If there is a gain in stripping he contends that it is discounted by the harm done to the cow by again starting her nervous force.

FARM MEMORANDA.

Upon milking and stripping cows a dairy farmer of experience says :—"Cows like to have always the same milker, so let each milker have the same set of cows. If you have a good milker, one the cow likes, never change unless forced to do so, and you will receive from the cow her best possible yield. By no means have another, follow a good milker to strip the cow."

The surplus grass available in spring if conserved in a silo will make honey to the owner further along in the shape of nutritious fodder for stock, but if left to dry will become a dangerous menace as a feeder of bush fires.

A process of making indiarubber from wheat has been patented.

Mr. John Boyle, of Saltpans, near Casterton, has a cow 32 years old, which has given birth to no fewer than 27 calves.

In Western Australia there are some of the largest cattle stations in Australia. One of the oldest is the Ord River Station in the Kimberley district, which has an area of about 5,000,000 acres. It carries 75,000 head of cattle, brands annually about 18,000 calves and sends away 6000 fats.