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## Notes and Comments

By J. L. BYER

### The Crop for 1907.

The harvest has come and gone, and as far as our immediate district is concerned, results are of a disappointing nature. While the majority of the colonies in many places were not prepared to take advantage of the flow when it came, this was not the case with our own bees, which were in splendid condition for the flow—that never came. The crop never looked fair, and weather, as far as we could understand, was for some time the ideal, yet withal, with 100 acres of clover like within a mile and a half of the colonies, bees would rob almost any time during clover bloom. The only reason we can ascribe for failure of nectar collection is lack of moisture. But little rain fell previous to or during clover bloom, and towards the middle of August everything was parched. In other years, however, I have secured good crops when no more moisture was present than was the case this season. A peculiar feature of the season was that there was just enough nectar and pollen (principally the latter) in the fields to entice the bees to the fields. On bright warm days the bees would be flying around the yard in a certain way, but if a heavy cloud came

over they would come rushing in by the thousands. This continued "seeking" and little "getting" seemed to wear the bees out three times as fast as in a good honey-flow, and although the hives were at all times full of brood, at the present time (Aug. 1) the colonies are not as populous as they were at opening of the clover flow. Oh, well, "it might have been worse," as we have secured 25 pounds per colony, bees are in good condition, and, as far as actual numbers are concerned, we have exactly as many colonies as at this time last year. With favorable weather there should be enough buckwheat gathered for winter stores, but with us buckwheat, like basswood, is not to be depended on.

### Vitality of Queen's Eggs.

While in conversation with one of our well-known bee-keepers the other day, I was much astonished at a statement made relative to the vitality of the queen's eggs. He claimed that if a comb was inserted in the brood-nest in the fall, when the queen was yet laying, and then taken out again as soon as eggs had been deposited, that these eggs would develop the following spring if the comb was put in a hive again.

The comb could be stored any old place, as a zero temperature would not hurt the eggs in the least. I confess to being much surprised at the claim; in fact, I was inclined to scout the idea as preposterous, and had my informant been a novice instead of

one of our best-known and most successful apiarists, I would have treated the matter as a joke. Can any one tell us if he is correct or not? It certainly would be an easy thing to prove or disprove.

#### How Far Will Bees Go For Nectar?

Perhaps on no other subject, unless it be size of hives, are bee-keepers of such diverse opinions. Doolittle thinks that bees will by choice go three or four miles, and under certain conditions as far as seven miles. Whatever bees may do in New York state, certainly they will not work to any profit at three or four miles in our locality. While the bees at one yard are busy on buckwheat, another yard only  $3\frac{1}{2}$  miles away are doing nothing. This condition has occurred more than once in my experience, and I regard anything over  $2\frac{1}{2}$  miles away as useless as far as bee forage is concerned. C. P. Dadant, in the "American Bee Journal," gives his experience, covering many years, with a series of outyards, and his conclusions are much the same as have been forced upon me. No doubt the lay of the land has much to do in this matter, and it seems reasonable to believe that where the pasture is continuous bees will go much farther than they would if there was a gap of two miles or more to cross in which there was a dearth of forage. While I like the ordinary source of nectar supply as close as possible, this condition is especially desirable for early spring forage. The only early spring feed near our home apiary lies due east a little over half a mile away. Between the apiary and these willows there is a bush to cross, unless the bees take a circuitous route to reach them. Immediately opposite these willows a neighbor has an apiary, and during the early spring, when the days

are chilly, more than once have I left my bee-yard, where hardly any bees were flying, and walked to my neighbor's and found his bees working hard. His bees always build up faster in the spring, and I have been informed by my grandfather and uncle, formerly owners of the two yards in question, that this has been the case for many years since early spring feed for the bees has become scarce.

#### Extracting From the Brood-nest.

M. V. Facey, writing for the "Review," advocates extracting from the brood-nest as well as the upper stories during the honey flow, claiming that the colonies so treated are stimulated to extra efforts. Speaking about the brood being thrown out, he says: "When I start a new hand running an extractor I first and quite readily get him accustomed to the proper speed and then teach him the proper time to run for each set of combs. When he has his business learned he should not throw out over a gill of bees from the 100 colonies in extracting from the brood-frames." While there may be some advantages in extracting from the brood-nest, in the writer's humble opinion the disadvantages are so apparent as to discourage such a practice. Quite a few bee-keepers in Ontario extract from the brood-nest, but I am glad to note the number is each year growing less. A mixture of feeding larvae and larvae food does not look any too tempting to a bee-keeper—how do you think such a mixture impresses one who is not a bee-keeper? The only directions I ever give when information is asked as to extracting from brood-nests is: "Don't do it!"

Markham, Ont.

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## A No

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The following preliminary statement of one season's work has been intended to show through the past year in obtaining the results. I take pleasure in my indebtedness for kindly furnishing information. The object of the present prolonged observations has been the case so appealed to the writer's fundamental interest were carried out more of seeing, first, the rhythm of rest and activity, and second, what the difference, between the young bee and the old bee, obviously the wide problem. One of the yields some scattered interest in the present note. The statement of the results. These, in the writer's opinion, decide the main object, although more completely needed to determine interesting details, present results themselves. The observations were made in single comb colonies covered with glass in half an inch of cells of the comb. and thus be seen at work

## A Note on the Daily Life of the Honey Bee

(By Prof. F. Kuhlmann, Clark University, Worcester, Mass.)

The following few pages are a preliminary statement. The results are of one season's observation. It had been intended to continue the work through the past season, but mishaps in obtaining the required material prevented. I take pleasure in acknowledging my indebtedness to Prof. C. F. Lodge for suggesting the work, and for kindly furnishing me with material. The object of the task outlined was to determine through closer and more prolonged observation than has usually been the case some questions that appealed to the writer and others as of fundamental interest. The observations were carried out mainly for the purpose of seeing, first, what was the daily rhythm of rest and activity of the bee, and second, what the differences were, if any, between the activities of the young bee and the old. The second problem was obviously the wider and more difficult one. One season of study yielded some scattering results of considerable interest along this line. The present note will limit itself to a statement of the results on the first question. These, in the writer's opinion, decide the main object of the inquiry, although more observations are admittedly needed to decide a number of interesting details, questions the present results themselves have raised. The observations were made on two colonies in single comb hives, the combs covered with glass sides, placed in half an inch of the surface of the cells of the comb. All the bees could thus be seen at work in the hive.

Each colony contained about 1800 worker bees. Both queens were of the Italian variety, but had been mated with a mixed variety that was mostly Italian. The queen of the first colony was an old one, being in its third year. That of the second colony emerged in July in the hive on which the observations were made. The observations on the first colony were made in May and June, while most of the fruit trees were in blossom. Those on the second colony were made in July, August and September. The method was that of pure observation, the life and activities of the bees being in no way interfered with, excepting that they were given an empty comb when the old one became crowded with brood, and that, during actual observation, the comb was exposed to diffuse daylight during the day, and to a weak artificial light at night. When more light was required to see what they were doing with antennae, mandibles, or tongue a small artificial light was turned on at close range on the individual bee under observation, for a few seconds at a time. None of these things seemed to seriously affect their behavior, not at all noticeably to ordinary observation. It was particularly desired to make the observations as minute and detailed as it was possible to do, so that some sort of quantitative statement of the results could be made. Consequently they were summarized in notes at least every five minutes, generally oftener, and the exact time the bee was en-

gaged in each kind of activity noted. But, except where the occasion required it, no individual bee was kept under continuous observation throughout the day. Instead of this the observations were made generally in twenty minute periods, one every hour or every three hours. The observations on individual bees were limited to two queens, and eight marked workers. Further details and observations on special activities will be stated when I come to the statement of those results.

I shall give first the results on the two queens. Some statements will necessarily not be contributions to our previous knowledge, but are included for the sake of giving a complete picture of the bee's life.

The queen's work is all within the hive. She remains on the surface of the cells, never entering one except with the abdomen to deposit an egg at its bottom. The number of eggs laid in the course of 24 hours varies largely with the general condition of the hive, but it may normally reach two or three thousand. Says Cook: "The activity of the queen is governed largely by the activity of the workers. The queen will lay sparingly or stop altogether, in the interims of storing honey, while on the other hand, she is stimulated to lay to her utmost capacity when all is life and activity in the hive." At any time of the day or night she may be seen moving slowly over the cells, the workers generally making way for her, frequently several being arranged around her, patting and rubbing her with their antennae, and offering her food. But at times she may be quite unattended, and the workers even hardly getting out of her way. As she moves along she frequently pokes her head into a cell, and if it is empty and clean, may dip her abdomen into it, and deposit an

egg. She seldom persists in the same kind of activity for longer than ten minutes at a time, on an average much less than this. She may move along for several minutes without doing anything else, or may look into many cells, depositing eggs at the rate of two to several a minute. Then she may stop for an interval and sit more or less perfectly quiet resting or "barbering" (I use this term as descriptive of the activity common to most insects and termed by others "making their toilet") herself thoroughly or feed, for half a minute or so. I transcribe the following from my notes as a typical 20-minute period of observation: Observation on the young queen; time 4 p.m. "1. Rests, attended by 7-11 workers, licking and barbering her. An occasional slight move. Barbers herself 20 seconds. Rest 2 minutes and then moves. Deposits an egg in 10 seconds. Egg in 15 seconds. Egg in 15 seconds. Egg in 10 seconds. Seven cells looked into. 3. Egg in 2 seconds. Egg in 12 seconds. Moves. Four cells looked into. 4. Moves. Still 30 seconds, not attended. Sits two minutes, attended by 7-11 workers." The main characteristic of her doings is the greatest sort of irregularity. She alternates from one thing to the other often at only several seconds intervals. From merely serving her at different parts of the day and night it is not noticeable that light or darkness makes any difference to her. She seems about as active at night as during the day, and in about the same way. The following table, however, gives my results in figures on the two queens, with respect to three things, egg-laying, feeding and resting. The old queen was watched for fifteen minutes every hour for a continuous period of 24 hours, omitting three hours, from 12-3 a.m. It was

the latter part of was quite busy in the sector, and the called with brood grouped in three- expressed upon a

**Old**

A. M.

	3.6	6.9	
Eggs	12.8	9.4	
times fed...	1.5	4.0	
in rest...	4.25	6.6	

Above table covers tv

More observations on young queen. During period she was watched intervals for eight continuous observations, usually one minute, usually one the next table gives the next table gives the preceding.

**Young Q**

A. M.

	3.6	6.9	9.1
Eggs	8.8	7.8	
times fed...	.66	.65	.3
in rest...	1.17	1.81	1.88

Above table covers twen

**Average for the**

A. M.

	3.6	6.9	9.1
Eggs	12.8	9.1	9.5
times fed...	1.08	2.33	4.69
in rest...	2.69	4.21	5.55

Above table covers twent

The observations were enough to establish differences there might be in the activities of the queens. The figures are not so great as it seems evident that there is some slight difference during the night. There is some slight difference she is a little more



the latter part of May when the hive was quite busy gathering pollen and nectar, and the comb about a fourth filled with brood. The results are grouped in three-hour periods, and then expressed upon a twenty-minute basis.

**Old Queen.**

	A. M.				P. M.			
	3-6	6-9	9-12	12-3	3-6	6-9	9-12	
Eggs	12.8	9.4	11.2	10.6	9.4	12.0	8.0	
Times fed...	1.5	4.0	9.0	3.0	0.0	3.5	2.5	
Rest...	4.25	6.6	9.2	9.4	10.0	8.8	8.4	

Above table covers twenty minute periods.

More observations were made on the young queen. During her egg-laying period she was watched at irregular intervals for eight days. The period of continuous observation was twenty minutes, usually one every three hours. The next table gives the results, expressed in the same way as in the preceding.

**Young Queen.**

	A. M.				P. M.			
	3-6	6-9	9-12	12-3	3-6	6-9	9-12	
Eggs	8.8	7.8	7.4	5.4	9.2			
Times fed.	.66	.65	.37	1.37	.55	.82		
Rest...	1.17	1.81	1.89	2.66	2.39	1.00	4.10	

Above table covers twenty minute periods.

**Average for the Two Queens.**

	A. M.				P. M.			
	3-6	6-9	9-12	12-3	3-6	6-9	9-12	
Eggs	12.8	9.1	9.5	9.0	7.2	10.6	8.0	
Times fed..	1.08	2.33	4.69	2.19	.28	2.16	2.5	
Rest..	2.69	4.21	5.55	6.03	6.18	4.90	6.25	

Above table covers twenty minute periods.

The observations were not extended in enough to establish any small differences there might have been between the activities of the day and night. The figures are too irregular. It seems evident that there is no great difference. She is about as active during the night as during the day. There is some slight suggestion that she is a little more active during

the very early morning, and then becomes gradually less so until midnight. See the lower column of figures in the last table. Another interesting suggestion is the difference in the amount of resting for the old and the young queen. The young queen rests less than a third as much as the old.

The observations on the worker bees were of three kinds. First, watching individual bees that had been marked with water colors, in the same way as the queens were watched. Counting the number of bees that came in per twenty minutes with pollen during the day, and, third, counting the number of resting bees in the hive every hour during the day and night. A mere glance at the hive at any time will show that the workers do not all rest or are all active at the same time. At any time of the day or night one may find "resting" bees in the hive. They rest either on or in the cells. On the cells they are usually along the margin of the comb where there are fewer bees to run into and over them, and usually here her rest is disturbed every minute or so by another bee running into her. When the number of resters is larger there is frequently a complete ring around in the margin of the comb where nearly all the bees are sitting quietly while the central area remains more or less active. As a rule a period of continuous resting on the cell is not longer than a minute or so, on an average probably less than this, although off on the side where the other bees do not run much it may reach half an hour. This would seem to depend almost entirely upon how crowded and active the hive is. In the cell she may rest for several hours, at least I have observed them remaining in the same cell for that length of time. When in a state of profound repose she has every appearance of a dead bee. She

seems to hang on loosely to the margin of the cell, and when in a vertical position frequently tilts backwards, apparently almost ready to fall off. Such dead rest periods are broken by a few seconds' breathing every several minutes, by movements of antennae and feet, and by disturbances from the other bees. I transcribe the following from my notes as a typical twenty-minutes' observation on a resting bee, on the margin of the comb: "Dead rest for 20 seconds, when touched by another worker, and she moves antennae about for five seconds. Dead rest for 30 seconds, when she suddenly starts, moves legs about for 15 seconds, and antennae for 30 seconds. Dead rest for two minutes, except slight tremor of right antennae, and breathing for a few seconds. Dead rest for 40 seconds, when touched by a worker and she sways to the other side and moves antennae about 50 seconds, when she is pushed out of the way by a running worker. Moves antennae about for two minutes. Dead rest for 30 seconds. Breathes for two seconds. Dead rest for 30 seconds, excepting a few jerky movements of antennae. Run into by a worker and she moves about for 15 seconds. Dead rest for 40 seconds, when touched by a worker. Moves antennae about for 10 seconds. Dead rest for one minute, when touched by a worker, and she starts and moves antennae for 5 seconds. Dead rest for one minute, except a few movements of antennae, and breathing once. Dead rest for one minute when she suddenly starts, moves antennae about for 30 seconds. Dead rest for one minute when she suddenly starts and tips forward. Dead rest for 15 seconds, when she moves antennae about for 30 seconds.

When not in the busy season of pollen and nectar gathering, or when

from other causes she does not go out she spends most of her time in the hive in what seems to be aimless moving about over the cells, looking in one now and then, and occasionally stopping to feed another bee or being by it. A very large proportion of time is spent in barbering herself, for which purpose she may stop as often every minute. The various duties of the hive, such as ventilating, building and capping cells, and feeding the larvae, queen and drones, seem to require such a small proportion of an individual's time that I have observed it but a few times with the eight managed bees of which I have individual records. Between these other activities she changes off from one to the other at frequent and very irregular intervals, and, like the queen, does not persist long at a time in any one. I transcribe the following again as a typical twenty-minutes' observation on a margin worker: Time, 1-2 p.m. "1. Moves about for four and a half minutes, looking into two cells. Barbers herself for 30 seconds. 2. Moves about for four and a half minutes, looking into six cells. Barbers herself for 20 seconds. 3. Is fed by a worker for 20 seconds. Moves about for a minute and a half. Rests three minutes. Rests a minute and a half. Moves about a minute. Rests two and a half minutes." When busy gathering pollen and nectar she has a quite different procedure to go through, to which I have not observed many exceptions. While moving slowly about in the usual way she may suddenly start to barber herself very vigorously and then start in a wild run all over the hive, lasting sometimes for several minutes. This running is an invariable performance before she leaves the hive. She may be gone

few minutes to probably mostly up as to go for flowers and enters hives or both alternative may stop in a minute or more, respiratory lateral movements this seems to be preventing the other of her pollen she is going through several workers are found her, making her pollen basket attempt at it but a few times with the eight managed bees of which I have individual records. Between these other activities she changes off from one to the other at frequent and very irregular intervals, and, like the queen, does not persist long at a time in any one. I transcribe the following again as a typical twenty-minutes' observation on a margin worker: Time, 1-2 p.m. "1. Moves about for four and a half minutes, looking into two cells. Barbers herself for 30 seconds. 2. Moves about for four and a half minutes, looking into six cells. Barbers herself for 20 seconds. 3. Is fed by a worker for 20 seconds. Moves about for a minute and a half. Rests three minutes. Rests a minute and a half. Moves about a minute. Rests two and a half minutes." When busy gathering pollen and nectar she has a quite different procedure to go through, to which I have not observed many exceptions. While moving slowly about in the usual way she may suddenly start to barber herself very vigorously and then start in a wild run all over the hive, lasting sometimes for several minutes. This running is an invariable performance before she leaves the hive. She may be gone

A. M.		
2-3	3-6	6-9    9
rest    2-3	1.97	1.44

with the exception of this, this gives a low figure of 1.14

few minutes to an hour, depending probably mostly upon the distance she has to go for flowers. When she returns and enters the hive one of two things or both almost always occurs. She may stop in a wild dance for a minute or more, consisting of a violent lateral motion of the abdomen. This seems to be for the purpose of preventing the other workers from robbing her of her pollen. At least, when she is going through this performance several workers are generally arranged round her, making an occasional dive into her pollen baskets. But this apparent attempt at robbing seems to be frustrated as often by her dancing as the reverse, for she often begins the same when no other workers are near to her. After this, or in place of it, she generally spends a minute or two in thoroughly barbering herself, and then proceeds to find a pollen cell and untypical trends.

a map of the distribution of her activity  
 "1. During the twenty-four hours of the day I have the results of the observations Barber stated before. The eight marked workers were watched on an average about twenty-four hours each. But they were generally watched twenty minutes every hour, instead of every hour, and at the times when they were apt to leave the hive they were watched all the time. Only seven figures in the results of the next day, which gives the average time spent in resting for the different three-hourly periods of the day, figured on a thirty-minute basis:

A. M.	P. M.
12-3 3-6 6-9 9-12 2-3 3-6 6-9 9-12	
rest 2 23 1.97 1.44 1.06 .75 68 1.14 2.29	

With the exception of the 6-9 p.m. period, this gives a fairly even curve. The low figure of 1.14 is undoubtedly,

I think, accidental, and would disappear in the results of more extensive observations. The remainder would seem to indicate that they do about twice as much resting from 9 p.m. to 3 a.m. as during the rest of the time.

The number of bees resting in the whole hive were also counted every hour of the day and night for forty-eight hours, but this was done in about twelve-hour sections, on different days, so that the results are not of a continuous twenty-four hours' observation. The number of resters thus to be counted at the same hour on different days seems to vary very greatly, and a more even curve would be obtained from a larger number of counts. It is not very easy, in fact impossible, to make an accurate count, because of the fact that they will be resting one-half minute and moving about the next half minute, while it takes about fifteen minutes to complete the count. Besides, many are often in the cells and others so thick on top that the cells cannot be seen. However, this, a considerable source of error, should not differ much from hour to hour, so that the relative number counted from hour to hour would remain the same, and thus not affect the results except in absolute numbers. The following are the results of the counts. The figures are average number of bees resting at the different hours of the day and night:

A. M.		P. M.	
12-3 3-6 6-9 9-12	12-3 3-6 6-9 9-12	12-3 3-6 6-9 9-12	12-3 3-6 6-9 9-12
778 7-6 374 327	217 328 493 680		

These figures disagree with the results of the observations on individual bees in so far as in the previous table the maximum amount of resting at any time was only about two and a fourth minutes, while this table shows that

nearly a third of the bees are resting from 12-6 a.m. This may be due to an error following from the condition of the counting, or it may be a real difference in the number of resting bees for the different weeks when the observations were made. The latter would seem the more probable. The results agree on the main thing, the relative amount of resting done from hour to hour.

The number of bees coming in with pollen per twenty minutes was counted every hour for a number of days. Since they also bring in nectar besides pollen, this is not a measure of their total activity outside the hive. Also, the degree of their activity varies very much with the condition of the weather, the season, the general condition of the hive, and the distance they have to go for flowers and their abundance. On a cold and cloudy day they may not go out at all to gather, especially not if it is a little damp. Their period of greatest activity is in the spring months when the fruit trees are in bloom, unless they have a special and abundant crop of flowers at another time. Also, the number of larvae and

Two of them were younger than the age at which they are supposed to begin to go out. Of the former two, one made a 40-minute trip from 8-9 a.m., a 46-minute trip from 9-10 a.m., a 16-minute trip from 11-12 a.m. and a 18-minute trip from 2-3 p.m. of the same day. The other made an 18-minute trip from 8-9 a.m., a 40-minute trip from 10-11 a.m., and a 45-minute trip from 11-12 a.m. of the same day. Both remained in a state of dead rest for a but three of the 120 minutes they were observed at different hours during the afternoon of the same day.

The counts made on the number of bees bringing in pollen were as follows: On the first hive: May 13, counts recorded for every 10 minutes throughout the day, beginning at 8 a.m. May 20, counts made for twenty minutes every hour of the day, beginning at 10 a.m. May 21, counts made for twenty minutes of every hour from 8 a.m. to 11 a.m. On the second hive: Counts made for twenty minutes every hour for five days in July, excepting that on two of these days the counts did not begin until 8 a.m. The next table gives the results:

	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7
May 13 .....				253	177	114	114	84	83	67	60	47	22	0
May 20 .....						80	32	35		28	33	41	56	84
May 21 .....	3	13	167	142	38	19								
Av. July .....	10	12	28	49	64	37	26	30	29	30	34	14	3	0
Gen. Av. ....	7	13	98	148	93	63	57	56	56	42	42	34	27	28

thus the demand for pollen and honey determines the degree of their activity in gathering. Consequently absolute figures in this matter are of little value, since they may vary over a very wide range. Of the individual bees watched, only two ever went out to gather pollen while under observation.

These figures are upon a twenty-minute basis, the averages being the average number of bees coming in with pollen per twenty minutes. They illustrate well enough the differences in amount of pollen gathering from hour to hour, and from month to month. They also show that the changes in

activity during the day from the average shows near the middle, then a gradual decline at the day. But activity reaches a peak in the evening. May exceptionally hot account for both activity in the morning and increase in the evening. More observations decide the relation of their activity. The average gives amount of work done in the line assuming that the amount. Upon the average the probable made by the hive is 274. With 1,800 this gives a little (three-tenths) trip per worker. If the f

## Bee-k

When our attention is turned to a new line of business, our thoughts are, "How can we make out of it?" "How many dollars can be made?" "What expenses from capital invested?" "What are all these are of importance—question for consideration—there is a question on which is of paramount importance, above all others, we say, we seldom think of it. I naturally ask, "What is the principal require-



divinity during the day may be different one day from that of another. The average shows a maximum activity near the middle of the forenoon, and then a gradual decline during the rest of the day. But on May 20 their activity reaches a second maximum in the evening. May 20th and 21st were exceptionally hot days, and this may account for both the early decline in activity in the morning and the second increase in activity in the evening. More observations will have to decide the relation between the amount of their activity and the temperature.

The average gives some idea of the amount of work the individual bee does in the line of pollen gathering, assuming that they all do an equal amount. Upon the basis of this average the probable total number of trips made by the hive in a day for pollen is 274. With 1,800 workers in the hive this gives a little over 1.3 (one and three-tenths) trips per day for each worker. If the few observations on

individual bees were any indication at all of the truth, this suggests that not nearly all of the workers assist in gathering pollen. For according to their records the total activity of the hive should be higher. It must be remembered, of course, that the degree of activity varies over a wide range, and that the hives observed possibly represent considerably less than the average degree. Yet, a little figuring indicates that if their work were equally distributed the individual bee would have to do very little in order to make a very busy-looking hive. Cook estimates that a hive has from 1,500 to 40,000 workers. Assuming a hive of 20,000, and having each worker making five trips a day for pollen, gives a steady stream of bees with pollen entering the hive at the rate of 2.3 bees per second, for twelve hours of the day. This would make a quite active-looking hive.—"American Beekeeper."

## Bee-keeping as a Business

(By E. W. Alexander.)

When our attention is called to some new line of business, usually our first thoughts are, "How much money can I make out of it?" or "How many dollars can be made annually clear of all expenses from a given amount of capital invested?" While I will admit that these are questions of much importance—questions worthy of due consideration—there is still one question which is of particular importance. They have all others, which, I am sorry to say, we seldom think of. That is, am I naturally qualified for that kind of business? If so, then I have the principal requirements of success.

If not, then no amount of hard study or labor can fully take the place of my inability to fulfil its requirements." Oh how many of us spend our whole lives like water seeking its level, and never find the business that God fitted us best to follow? My young friend, if you have any thought of taking up bee-keeping as a business, then think this business over carefully before you invest much money. My advice would be to work one summer, at least for some successful honey producer—one who would take pains to teach you all he could in regard to rearing queens, forming nuclei, increasing

colonies, wintering, and producing the honey—yes, and a thousand and one little things that only experience can teach. In this way you could be earning your board and fair wages while learning your business.

In regard to the amount of money that can be made from bee-keeping, it is like all other rural pursuits—it depends to a great extent on the season. It is no get-rich-quick business; still, if rightly followed, it will give you as good returns one year with another as any business of a rural nature, considering the amount of capital invested and labor required. About five dollars per colony, spring count clear of all expenses, is a moderate estimate of the profits from the business—that is, run wholly for the production of honey without any special care to see what might be accomplished; but if run by an expert on high-grade methods, then \$15 or \$20 per colony.

Here is where the specialist has a great advantage over the man who divides his capital into two or more channels. These men soon find that they have twice or three times the trouble to contend with, and only a third or a half the capital to use in making a success of any one of the several lines they have taken up; but the lack of necessary capital is only a small factor, for that can be got at the bank, but the necessary intellect, business capacity, and experience cannot be borrowed, and without these elements to success there is only one alternative, and that is and always has been, simply failure.

Then there is another thing to take into consideration. It is pleasant to have a paying business that requires your time only about half the year, and that the pleasant part, when you can be out doors and enjoy all the

pleasures of nature's spring and summer. With me it is a real pleasure to breathe free air, unsullied by either bell or whistle calling me to labor.

I will now take it for granted that you have spent one or two seasons in learning all that you could during that time from some competent person, and you still want to follow bee-keeping. I can not advise you to go slow, as some do. That "go slow" is a blight on any man. First be sure that you are right, then go ahead with willing hands and a good stock of perseverance ever ready to overcome the unexepected troubles as you meet them. Make up your mind from the first to take good bee literature; have good bees; use good tools and hives and then produce good honey. Take pride in your business. If you have taken up queen-raising, forming nuclei for sale, or increasing your colonies for sale, or producing comb or extracted honey, don't forget to look well for quality. Then advertise and let the public know what you have, and you will in a short time not only surprise your friends, but yourself, with your success. You now have a clear track and a light grade compared with what some of us older men had fifty years ago. We then had a hard time of it—no bee journals—no Italian bee no comb foundation, no honey-extractors, no bee-smokers, and no market for the little honey we secured.

How different now, with our large markets established, where our honey is annually sought for, either in small lots of by the carload, and with our new inventions and improved methods enabling us to produce five times the amount per colony as we then did. To me now bee-keeping seems like quite a good business. Still I never advise one to take it up, not even

own sons, for I that, when it comes to business, each himself. While to a great extent, still it circumstances to the man.

I am well acquainted who was born on hard on it for was married. He of excellent habits; but still his perfect failure. After circumstances for his friends got him to New York city. There He struck a place him for, and for had a net income of thousand dollars in this case to show are trying to make business to which adapted; also to of trying hard work.

You should look as your bank; and add a dollar to it return in due time pride in having ; remember there is man than in the business keeper in the field leading bee journals their advice, shun that we older men it is almost like and out that it is still discouraging conditions ability to have an season is and always tature. But all line some troubles with When the farmer

own sons, for I have always thought that, when it comes to choosing a life business, each one should choose for himself. While it is true that man to a great extent makes his circumstances, still it is also true that circumstances to a great extent makes the man.

I am well acquainted with a man who was born on a farm, and worked hard on it for several years after he was married. He was temperate and of excellent habits, working early and late; but still his farm life was a perfect failure. After toiling in close circumstances for several years his wife's friends got him a situation in New York city. Then the scale turned. He struck a place that God had fitted him for, and for thirteen years he has had a net income of over twenty thousand dollars a year. I speak of this case to show that many of us are trying to make a success of some business to which we are not at all adapted; also to show the importance of trying hard while young to start right.

You should look upon your business as your bank; and whenever you can add a dollar to it, do so, and it will return in due time many fold. Take pride in having a good apiary, and remember there is far more in the man than in the business. If the bee-keeper in the future will take our leading bee journals he can, through their advice, shun so many troubles that we older men had to bear, that it is almost like another business—not that it is still subject to many discouraging conditions; and our inability to have any control over the season is and always will be its worst feature. But all lines of business have some troubles with which to contend. When the farmer loses his stock it

is hard and costly to replace, and it often takes some time to do it; or when his crops are ruined by untimely frosts or protracted droughts the loss is hard to bear and overcome. But when the bee-keeper loses a large per cent. of his bees he still has the hives and combs left; and if he has some good colonies he can soon have his original number again with but little expense, and usually secure some surplus besides.

Here is one great advantage our business has over many others. Taking our bees safely through long cold winters and very changeable spring weather, with small loss, has been a hard problem to solve; but this part of the business is now so much better understood by nearly all bee-keepers than it was a few years ago that we feel much encouraged in eventually overcoming other troubles as we have this.

Each year brings some new methods whereby our business is placed on a more reliable basis than it formerly was, enabling us to produce honey cheaper than we ever could before. Still, we have some dark clouds of losses and disappointments hovering over us. I have seen many through which it has been almost impossible to see a ray of silver lining; but as the mariner's compass will guide the ship safely through ocean storms, so will continual perseverance lead you on and on through these trying hours until a clear unclouded sunset welcomes you to a land of rest.

It is not so very many years ago that bee-keeping as a specialty was in its infancy; and bee-keeping as a sole business was very seldom attempted. The solving of the wintering problem for northern bee-keepers, the overcoming of foul brood, increased fac-

ilities for transportation, methods of controlling increase whereby one man may manage several apiaries, and, most important, a steadily increasing demand for honey, all these are rapidly leading men to make bee-keeping a sole business. Many men will always keep a few bees as a recreation, others will follow it as a specialty, but no man who has a love for the business, is adapted to it, has a good location, or will secure one, and stock it with a good strain of bees in sufficient numbers, and adopt the right kind of hives, implements and methods, need fear to make of bee-keeping his sole business for life. The prospects for bee-keeping as a business were never brighter for the man who will follow it in a business-like manner.—“Gleanings in Bee Culture.”

\* \* \*

## Drone-Laying Workers

By C. P. Dadant.

When a colony of bees becomes hopelessly queenless, it often happens that a number of the worker-bees—sometimes only one or two, sometimes dozens of them—begin to lay eggs in the cells here and there. Scientists affirm that the drone-laying ability is found in bees that have probably received a greater amount of the royal jelly than the average larvae during the course of their development. This jelly or pap, produced by the salivary glands of the nurses, is fed exclusively to the queen larvae during the entire time of their development, while a coarser food, containing pollen or bee-bread, is fed to the larvae of the worker-bees during the last stages of their larvae existence. It is asserted that those workers that receive a little more than their share have ovaries partly

developed; and while they are entirely unable to become impregnated, owing to the rudimentary condition of both spermatheca and ovaries, yet the rudimentary ovaries may produce eggs in small quality. These eggs, like those of queens that have been unable to mate, hatch drones only. It is probably unnecessary to state the well-known fact of parthenogenesis in bees, which is the faculty of laying eggs by virgins, eggs that invariably produce males. This discovery is due to the immortal Dzierzon and was long doubted by many, but is capable of absolute demonstration.

When a colony becomes hopelessly queenless, that is, when there are no eggs or young larvae from which may be reared queens, such bees as may have the ability to lay eggs seem to consider it a duty to replace the missing queen within the limit of their powers. One or more worker bees assume this duty. But their eggs are laid at irregular times, sometimes several in one cell, and sometimes on the side-walls of the cells instead of at the bottom. I have myself seen a half-dozen or more workers laying, at the same time, on a comb which had been taken out of the hive for inspection. Such a sight may be witnessed more readily with the Italians than with the common bees, because they are less excitable and do not become frightened and rush about when the combs are removed from the hive with a little care.

Sometimes the laying of an old queen that has lost her fertility is mistaken for that of drone-laying workers. This is of some importance, for although a queen may be successfully introduced to a colony containing a laying worker, it is almost impossible to succeed in the introduction of a new queen, if there is an old queen in the hive.

The only way sure of the fruit is to search for slight differences in a worn-out queen more laying workers lays but few ways at the be rarely lays more this incongruity by laying workers very young which lack reached their laying.

I have stated produce a queen ing a laying worker containing an queen has been know that this concurred in by have often seen possible to intr colony having I have never failed experience. have succeeded, a colony having ly worth saving. when such colon enough to make queen is successful in the season. I cide this point for In order to sho will state under tried the introd drone-laying colo port queens on a was in the '80's. from Italy about month during the these queens were long journey, we them to full colo apiary, before res customers in the price obtained ward us for such a queen had beer weeks weeks in a fully regained all



The only way to make positively sure of the presence of an old queen is to search for her. But there is a slight difference between the laying of a worn-out queen and that of one or more laying workers. The old queen lays but few eggs, and these are always at the bottom of the cells. She rarely lays more than one egg in a cell, this incongruity being committed only by laying workers, or sometimes by very young and very fertile queens which lack room, and have not yet reached their full ability in regular laying.

I have stated that it is easier to introduce a queen to a colony containing a laying worker than to a colony containing an old queen, unless this queen has been found and killed. I know that this statement will not be concurred in by many others, for I have often seen it stated that it is impossible to introduce a queen to a colony having laying workers; yet I have never failed. I speak from actual experience. Before I state how I have succeeded, permit me to say that a colony having laying workers is rarely worth saving. Yet there are times when such colonies are still powerful enough to make a good colony if a queen is successfully given them early in the season. The apiarist must decide this point for himself.

In order to show how to succeed, I will state under what conditions I tried the introduction of queens in drone-laying colonies. We used to import queens on a very large scale. This was in the '80's. We used to receive from Italy about a hundred queens per month during the summer months. As these queens were fatigued from their long journey, we always introduced them to full colonies of bees in our apiary, before re-shipping them to our customers in the United States. The price obtained was sufficient to reward us for such a course, and when a queen had been for three or four weeks weeks in a full colony, she had fully regained all her lost vigor, and

was much more likely to be satisfactory to the purchaser than if she had been held in a very small nucleus or in a queen-cage. Besides, this introduction gave us new blood in the apiary. Owing to this course we had to kill a number of queens each month, usually of the common race or the hybrids. These spare queens were quite often prolific, and it seemed a pity to kill them. It was then that I attempted to save a good queen and a worthless colony at the same time, by introducing the one into the other, by the ordinary method of caging the queen for 48 hours in the hive, and releasing her by inserting a piece of comb honey in place of the stopper of the cage. This method has never failed, and I attribute it to the fact that the queen introduced was in each instance a vigorous laying queen in the fullness of her power.

In the introduction of queens that have been traveling there is almost always a delay in the laying; the new queen does not take possession of the empty cells immediately, and for this reason the bees that have one or more laying workers will have an animosity towards her that they will not entertain toward a queen that is able to lay eggs at once, and thus show her ability to fill the needs of the colony.

My conclusion, therefore, is that although it is more difficult to introduce a queen to a drone-laying colony than to a normal colony, this may be successfully done by the above method. But I would never risk a queen which has been confined to a cage for some days to any but a normal colony made queenless just before introducing her.

A good laying queen introduced to a drone-laying colony in May—if this colony has still enough bees to look after her brood—will rear a populous colony for the fall crop of honey, and will often prove a paying investment. For this reason, queens bought from reliable southern breeders in early spring are a great help to the northern bee-keeper.—Illinois Convention.

## THE CANADIAN BEE JOURNAL

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Editor, **W. J. Craig.**

AUGUST, 1907.

### THE EDITOR'S CORNER.

The white honey harvest is over for this year, and in the majority of districts there is nothing more to follow, but to put the colonies in condition for winter. There are lots of lean hives throughout the country, and the bee-keeper, above all men, is called upon to exert a large amount of "faith and good works," and especially the latter, if he is going to bring his bees successfully through to the fields of another spring.

\* \* \*

The Ontario Bee-keepers' Association has issued the following circular to its members:

Toronto, Aug. 10, 1907.

The Honey Crop Committee of the Ontario Bee-keepers' Association met in the Secretary's office, at Toronto, on Friday, August 9th. Over one hundred reports from different parts of the province and a number from Quebec were laid before them. Reports would indicate that a very great loss in bees has been sustained since last season, and that probably over 50 per cent perished during the winter and spring. The honey-flow in a few localities is reported good or fair, others light, and in many nothing has been harvested; probably an average of less than one-third crop in all.

In view of these conditions and the shortage of the fruit crop in all varieties, and the higher prices prevailing,

it is the opinion of the Committee that an advance over last season's rates should be reasonably expected, and suggest the following:

No. 1 Light Extracted, 11½c to 12½c per pound, wholesale; retail, 14c to 15c.

No. 1 Comb, \$2.50 to \$2.75 per dozen, wholesale.

No. 2 Comb, \$1.75 to \$2.25 per dozen, wholesale.

On the darker grades not yet harvested a reasonable advance over last season's prices should be obtained.

H. G. Sibbald, Claude,  
Wm. Couse, Streetsville,  
W. J. Craig, Brantford.

Committee.

P. W. Hodgetts, Secretary.

As one of the Committee, might say that the Committee considered very thoroughly the whole situation, and we believe that the prices suggested are about as near right as possible. Almost another hundred reports have come to hand since that meeting, and all very similar to those upon which the Committee based their conclusion.

\* \* \*

Re honey crop, would say that I have been as far east as Trenton, and north as far as Peterboro. In the territory as well as in our immediate district 25 lbs per colony would be a liberal estimate. What little honey we have, while fair in flavor, is off in color. J. L. Byer, Mount Joy, Ont.

I find honey flow fairly good in most sections here, but the trouble is the lack of bees to gather it.—Jacob Alpaugh, Dobbington, Ont.

**Honey Ginger-Snaps.**—1 pint honey, ¼ lb butter, 2 teaspoonfuls ginger. Boil together a few minutes, and when nearly cold put in flour until it is stiff. Roll out thin, and bake quickly.

MR. ROBER

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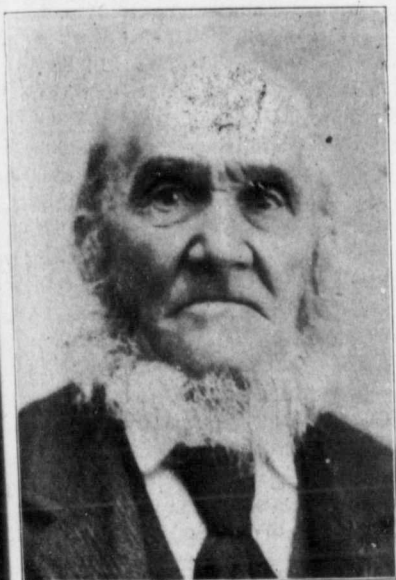


MR. ROBER

"I was born near England, in the year 1840, who was a weaver by trade. I came to this country when I was 15 years of age and first settled in Nelson, Halton County. I am now a member my father's hives. I bought a Mr. Rober from a Mr. Rober near Lawville, about 1870, and I brought

**MR. ROBERT COVERDALE DEAD.**

Another of our bee-keeping friends passed away recently in the person of Mr. Robert Coverdale, of Cayuga, at the good old age of 83 years, and who for over 60 of these kept bees more or less extensively. Our aged friend was very industrious, of a bright, cheerful disposition, and an earnest Christian. We repeat the brief story of his bee-keeping experiences, as he gave it to us a few years ago:

**MR. ROBERT COVERDALE.**

"I was born near Whitby, Yorkshire, England, in the year 1824. My father, who was a weaver by trade, emigrated to this country when I was seven years of age and first settled in the township of Nelson, Halton county. I can remember my father keeping bees in England in the old fashioned straw hives. I bought a hive of bees for my father from a Mr. Lagdon, in Nelson, near Lawville, about the year 1845. A friend and I brought them to my fa-

ther's place—about ten miles distant—on horse-back, a sheet tied around the old box hive, and a pole put through to carry it by.

"I moved with my father to near what is now called the village of Canfield, in the township of North Cayuga; in the year 1848, and commenced to hew out a home from the surrounding forest for myself soon after I arrived.

"I commenced to keep bees for myself in 1851. I now have in my apiary about 83 hives, which are descendants of the bees I carried on horseback in Ne'son about 1845.

"I have been very successful in the business, as I never suffered a total loss of my bees in that long time. I abandoned the old box hive for the better rack hive about 20 years ago.

"I have been a subscriber to the Canadian Bee Journal since its first publication and would very much recommend it to bee-keepers."

Mr. Coverdale will be much missed in his family and in the community, where he has been so long and favorably known.

We are in receipt of the following message from the Secretary of the Central Canada Exhibition Association:

"Ottawa, Aug. 9.

"We desire to inform you that the fire which destroyed the grand-stand at our exhibition grounds, and also the Experimental Farm Building and damaged the Ladies' Building, will not affect the Fair, Sept. 13th to 21st. Already work has been started on a grand-stand that will provide sufficient accommodation for all. The Ladies' Building is being repaired, and the Experimental Farm exhibit will be placed in Horticultural Hall. We are putting forth every effort to make this the most successful Fair in every respect in the history of Ottawa, and we are sanguine that our work will be duly appreciated."

## The Beginner's Page

Department Conducted by E. G. HAND

### About Robbers and Robbing.

There is nothing that will give the beginner, or any one else engaged in bee-keeping, more trouble in less time than a bad case of robbing. Where only a few hives of bees are kept there is seldom any danger, unless there be a larger apiary within half a mile or so, but it is well for the beginner to know how to recognize it, when to expect it, and how to deal with it. In the first place, it is comparatively easy to prevent an outbreak of robbing when one knows the habits and inclinations of bees fairly well; and in the second place it is pretty hard to cure a bad case so it will stay cured.

When the honey flows from clover and basswood comes to an end, all the bees which were working so hard at carrying home the nectar are suddenly thrown out of employment, and immediately commence looking about for something to do—for some new source from which to gather nectar, or honey, or anything sweet. An observant person, who knows what he observes, can detect this state of affairs as soon as he approaches his apiary. Whereas, at the height of the honey-flow, the bees were going in and out of the hive in large numbers, wasting no time in standing about, but attending strictly to business, when the flow slackens fewer bees will be seen at work, and there will be more of a tendency to loaf around on the alighting board and the front of the hive. When the hive is opened it will be seen that there are many more bees at home than when

the flow was good, and they will probably be in not so good humor and show more inclination to sting. When the honey-flow stops completely, as it does in many localities in early August, the above symptoms are more pronounced. Very few bees will be at work in the fields, though the hives will be overflowing with them. Though there is nothing to be had from the flowers, there are always a certain number of bees on the wing, looking for the nectar which is no more to be found where they have been gathering it. These bees will be observed nosing around the hives, looking for a chance to get in and secure a load of the honey which they can smell and know is there. They poke all around their neighbors' hives, and fly down close to the entrances, jumping quickly away when the bees on guard on the alighting board try to catch them. Not a great many bees will be seen at this work, but just one here and there. If every hive is well populated, there will be no trouble, for a robber-bee cannot steal honey from a comb protected by the bees that own it—that is, a lone robber cannot, and the would-be robbers travel alone at this stage of the game. But let any honey be left where these prowling bees can get a taste, whether it be in a hive having so few bees that they cannot properly protect their combs, or in a comb left standing outside a hive while the bee-keeper is working at the colony, or in superfluous combs from which the honey has been extracted and just the drippings re-

main, and the first prowling detected honey taken home. The robber is like a prospector, finding a prospecting camp with the honey immediately there, and the bees who were resting before were rushing there for the source of the honey. They soon find this time the robber in full possession, transformed from a citizen into a prospector, no longer a case of a thousand upon anything, though a free get possession, the same effect will crowd into is being preserved means of screening pulp thrown out made from it, or through a board boards where the to get into the entrance. The only thing get to such a state thing down tight. must have their small that they can Houses and every is kept must be tight, and kept the colony is being robbed times be saved by completely, robbers are cellar or some such of days, and then taken on a new stand, which hive is doing one or two hives is responsible for most



main, and the trouble begins. The first prowling bee to find the unprotected honey takes a load and carries it home. The effect is wonderful. It is like a prospector coming into a mining camp with a sackful of gold. Immediately there is a ... outdoors, and the bees which a few minutes before were resting quietly in their hives are rushing through the air in a search for the source of the new flow of honey. They soon find it and clean it up. By this time the "get-rick-quick" fever is in full possession, and the bees are transformed from decent, stay-at-home citizens into perfect fiends. It is no longer a case of a few prowlers, but of a thousand bees ready to pounce upon anything that promises honey, though a free fight be necessary to get possession. Anything sweet has the same effect as honey, and the bees will crowd into a kitchen where fruit is being preserved unless prevented by means of screens, or pile on to fruit-pulp thrown out after jelly has been made from it, or try to chew a hole through a board, or between two boards where there is a narrow crack, to get into the extracting house.

The only thing to do when things get to such a state is to shut everything down tight. Any small colonies must have their entrances made so small that they can defend themselves. Houses and every place where honey is kept must be made absolutely bee-tight, and kept that way. If a small colony is being robbed, it may sometimes be saved by being closed up completely, robbers and all, and set in a cellar or some such place for a couple of days, and then taken out and placed on a new stand. Or if one can find which hive is doing the robbing (often one or two hives in a yard will be responsible for most of the trouble), the

robbed hive and the robbing hive may be transposed. This so confuses the robbers that they are completely bewildered, and give the whole business up. But the best cure is prevention. Watch for the slackening of the honey-flow, and keep all honey out of reach of the prowlers, or "snoopers," as I have heard them called. Small colonies and nuclei should have their entrances contracted to a safe size before a robber tries to get in. Kitchen doors and windows should be screened, and nothing containing sugar thrown out where the bees can get it. And keep the honey-house bee-tight, or you may find your pets indulging in a Cobalt rush some fine day. If necessary to open a hive, do the work as quickly as possible, and don't leave a comb out of the hive longer than is absolutely necessary. If many robbers come buzzing about the open top of the hive, and fighting begins—you will know when that time comes, whether you ever saw it before or not—close up the hive and wait until things quiet down, unless you have a bee-tent to set over yourself and the hive while working. A tent is a nuisance to work in, but is sometimes a necessity, and every apiary needs one.

Fenelon Falls, Ont.



.....  
Honey Vinegar  
 .....

I believe that a great many bee-keepers might very profitably engage in the manufacture of honey vinegar, at least to the extent of working up their waste and off-grades of honey. I know that many have tried it without satisfactory results, and have given it

up in disgust in consequence. Indeed, it is not so long since I made a failure myself of my attempts to make honey vinegar. I think it is quite right that a knowledge of what **not** to do is of just as much importance to many as any further instruction in processes. If you have decided to make vinegar, the first step is to get something to make it in. Usually the best and most convenient receptacle for this purpose is a barrel, and here is where the first mistake is usually made. Nine out of ten people, in getting a barrel to make vinegar in, will select an old vinegar barrel, with the idea that something is necessary to start the vinegar-making process. To understand why this is wrong we must glance briefly at the chemistry of vinegar-making.

Ordinarily the process of vinegar-making consists of two distinct steps. In the first, sugar in some form is by fermentation changed into alcohol. In the second, this alcohol is by a somewhat similar process changed into acetic acid. The alcoholic fermentation must always precede the acetic, and should be allowed to become complete before the acetic fermentation begins. They may be carried on together, but it is usually at the expense of both time and quality, as the presence of acetic acid in even small quantities greatly retards the alcoholic fermentation, and sometimes a degenerative fermentation sets in and spoils the entire product.

Accordingly, your barrel should be one that has never contained vinegar. A whiskey or wine barrel is good. If it is necessary to use a vinegar barrel, it should be scalded out very thoroughly before it is used. For a small quantity of vinegar a jug or small jar is all right.

Next comes the question of the proper strength of the mixture to be made into vinegar. Whilst this may vary considerably I think the best results will be obtained when there is not less than a pound and a quarter or more

than a pound and a half to the gallon of water. If you have the honey in bulk, simply measure your water and add the proper amount of water or vice versa. Usually, though, the beekeeper will want to use the rinsings of cans or the honey soaked from cappings, etc., and for this some means of testing the strength of the solution must be used. A hydrometer is best and most convenient for this. One made for the purpose can be bought for about fifty cents. A photographic hydrometer can be had for half this. Any hydrometer will do, but you may need to test it by a solution of known strength, as they are graduated differently for different purposes. Mine was made for testing silver solutions, and on it a pound of honey to the gallon registers 20 degrees on the scale; and a pound and a half, which is the strength I prefer, 30 degrees, which makes it easy to judge of the amount of honey or water that must be added to make the solution the right strength. You can make a hydrometer of a homeopathic vial, or any tall bottle, corked and weighted so that it will stand upright in the solution. Mark with a file where it stands in a solution of known strength. Or make a ball of beeswax with a small piece of lead imbedded, so that it will just float in a solution of the right strength. Or you can use a fresh egg, which should float or show a spot not larger than a dime above the surface. I have always used rain water, and this is usually recommended.

Put your barrel in a place where a temperature of as near 80 degrees possible will be maintained. If the place is too hot, alcohol is wasted; but if too cool, fermentation is retarded.

Never add fresh solution to vinegar partly made. I think this is a very common cause of poor success. If you

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want to make additions to your vinegar stock, keep them by themselves until they have passed through the alcoholic fermentation.

For the alcoholic fermentation a barrel with one head out is best; if a closed barrel is used, there should be a hole in each end, and the barrel should not be quite full. All openings, of course, must be covered with cheese-cloth or very fine screen to keep out insects, and yet admit as much air as possible. If fermentation does not begin promptly, add about a quarter of a cake of yeast, softened in warm water to a barrel of stock. When the alcohol fermentation is finished, which should be in from two to six weeks, you can use your old vinegar-barrel to good advantage. Or it will be well to add a few gallons of good vinegar, containing a little mother if you have it. Usually this is not necessary, but it hastens matters and insures good results. Give it plenty of air, keep it as nearly as possible at the right temperature, and you should have good vinegar inside of a year. When the

vinegar is strong enough, pour it off from the mother and bung it up tightly, otherwise a degenerative fermentation may set in that will spoil the vinegar entirely.

I have just received from the Arizona experiment station a bulletin on the subject of honey vinegar, in which some ideas that are new to me are advocated. The writer, Prof. A. E. Vinson, considers hard water preferable to soft, if not too salty. He likewise thinks that fermentation is greatly aided and hastened by the addition of small amounts of ammonium chloride and potassium phosphate. In place of the latter, which is rather hard to procure, as well as something expensive, we may use sodium phosphate and potassium sulphate. As the latter is likewise sometimes hard to get, we may use potassium bicarbonate in its place with nearly as good results. The formula he recommends is as follows: Honey, 40 to 45 lbs; water, 30 gals.; ammonium chloride, 4 oz.; potassium bicarbonate, 2 oz.; sodium phosphate, 2 oz.; yeast,  $\frac{1}{4}$  cake.—G. A. Greene in *Bee Culture*.

## How to Examine Apiaries & Cure them of Foul Brood

(By Wm. McEvoy, Woodburn.)

Before opening any colony go from hive to hive and give each colony a little smoke at the entrance of their hive. This will check the bees for a time from coming from other colonies to bother you when you have a hive open and are examining the combs. When you take out a comb to examine it, turn your back to the sun and hold the comb on a slant, so as to let the

sun shine on the lower side and bottom of the cells. There look for the dark scales left from the foul matter that glued itself fast when drying down, for where you find punctured cappings and ropy matter you will find plenty of cells with the dark stain marks of foul brood on the lower side of the cells. Every bee-keeper should know the stain mark of foul brood. It is

more important for him to learn to tell it at a glance than to have to use a pin head to lift a little of the matter out of a cell to see if it will stretch three-fourths of an inch. Dead brood of other kinds often have pin hole capings and several cells in the same combs will be found with scales in them. For this reason every bee-keeper should learn to tell the one class of dead brood from the other, for we often find both classes in the same colony with a very little foul brood that the bee-keeper did not notice. After testing the other kinds, and not finding any to stretch he felt sure that that colony was not diseased when it was, and in time it would get worse, and get robbed out by the bees from other colonies, and then the disease would be spread all through the apiary.

I have often been called to come at once by parties who felt sure that their colonies had foul brood, but when I got there I often found that it was not so. In some cases I found a very sudden loss of the most of the old bees, and nearly all the brood dead and decaying. This was the result of some foolish people spraying fruit trees while in full bloom, and the bee-keeper, not knowing what caused the sudden loss of nearly all of his old bees, and finding so much decaying brood, felt sure that his colonies had foul brood. The only sure way for those people who cannot tell foul brood at a glance is to put the head of a pin into the matter in the cells and lift it, and if it stretches they may be sure that it is foul brood. The most important thing to learn is to know the stain mark of foul brood, because the bee-keeper would then detect the disease at a glance and stamp it out. Honey to become diseased must first be stored in cells where foul brood matter has been dried down, and the bees feeding their

larvae from the honey stored in these diseased cells spread foul brood. More brood dies from this disease at the ages of six, seven, eight or nine days than at any other age.

The disease is spread by bees robbing foul brood colonies, and is carried in proportion to the amount of diseased honey they convey to their own hives.

Every diseased apiary should be treated according to the exact condition in which it is found, so as to not only drive out the disease, but to make considerable increase in colonies, and end by having every colony in first class condition. In the honey season when the bees are gathering freely, is the safe time to make increase in a diseased apiary, and I make this increase by tiering up two hives full of the best brood with about a quart of bees until the most of the brood is hatched. By that time I will have a very large swarm of young bees just in the prime of life, and when these bees are all shaken into a single hive and treated I will have a first-class colony made out of them. In every apiary that I had treated in the honey season I always had increase made by having the best brood tiered up with about a quart of bees, and left until most of the brood was hatched, and then had these bees treated just the same as the old bees that I shook off the brood and treated first.

#### How to Cure the Apiaries of Foul Brood.

In the honey season when the bees are gathering freely remove the combs in the evening and shake the bees into their own hives; give them frames with comb foundation starters on and let them build comb for four days. The bees will make the starters into comb during the four days, and store the diseased honey in them which they took with them from the old comb.

Then, in the take out the comb found completing t of treatment removed from sheets of fo Where you find brood with brood in the have shaken fill two hives brood, place other, and sh from the sur hatched. In bees into a frames with on and let th days. Then, fourth day, t and give the work out to c the brood is combs the la wax or burned made out of four days mus to wax on a honey.

Where the di in bees, put th four together, s swarm to star does not pay with little weal ing or treating should be done to have any re the bees from mix and go in colonies. By the evening it g to settle down v ing and then th trouble. When thering honey a of foul brood by



Then, in the evening of the fourth day, take out the new combs and give them comb foundation to work out, thus completing the cure. By this method of treatment all the diseased honey is removed from the bees before the full sheets of foundation is worked out. Where you find a large quantity of nice brood with only a few cells of foul brood in the most of your colonies, and have shaken the bees off for treatment, fill two hives full with these combs of brood, and shade this tiered up brood from the sun until the most of it is hatched. In the evening shake these bees into a single hive, give them frames with comb foundation starters on and let them build comb for four days. Then, in the evening of the fourth day, take out the new comb and give them comb foundation to work out to complete the cure. After the brood is hatched out of the old combs the latter must be made into wax or burned, also all the new combs made out of the starters during the four days must be burned or made into wax on account of the diseased honey.

Where the diseased colonies are weak in bees, put the bees of two, three or four together, so as to get a good-sized swarm to start the cure with, as it does not pay to spend time fussing with little weak colonies. All the curing or treating of diseased colonies should be done in the evening, so as not to have any robbing or cause any of the bees from the diseased colonies to mix and go in with the bees of sound colonies. By doing all the work in the evening it gives the bees a chance to settle down very nicely before morning and then there is no confusion or trouble. When the bees are not gathering honey any apiary can be cured of foul brood by removing the diseased

combs in the evenings and giving the bees frames with comb foundation starters on. Then, also in the evenings feed the bees plenty of sugar syrup, and they will draw out the foundation and store the diseased honey which they took with them from the old combs. In the fourth evening remove the new combs made out of the starters, and give the bees full sheets of comb foundation, and feed plenty of sugar syrup each evening until every colony is in first-class order. Make the syrup out of granulated sugar, and put one pound of water to every two pounds of sugar, bring it to a boil.

Where you find the disease in a few good colonies after all honey gathering is over, do not tinker or fuss with these in any way until an evening in October. Then go to the diseased colonies and take out every comb and put six combs of all sealed or capped stores in their place, taken from sound colonies, and on each side of these all-capped combs place a division board. This will put these colonies in first-class order for winter with little or no bother at all, and the disease crowded clean out at the same time. But some say that the disease cannot be driven out so simply in the fall by taking away the diseased combs and giving the bees six combs that are capped all over right down to the bottom of the frames. It can and does cure every time when properly done, and if you will stop to think you will see quite plainly that the bees must keep the diseased honey they took out of the old combs until they consume it, as they cannot find any place in all-capped combs to put it, and that will end the disease at once. Many bee-keepers will no doubt say that this fall method of treatment will not work in their apiaries at all, because they would not have enough of the all-capped combs to spare from

the sound colonies, even if they could find some all-sealed. Very true; but you can very easily secure abundance of all-capped combs by putting Miller feeders on your sound colonies in the evenings in September, and feeding these colonies all the sugar syrup you can get them to take. Then in October each of these fed colonies can spare the two outside combs, which will be nicely capped all over right down to the bottom of the frames, and with these combs you will be provided with plenty of good stores to carry out my fall method of treatment. I finished the curing of my own apiary in the fall of 1875 by this sealed comb treatment. All of my methods of treatment are of my own working out, and none of them ever failed when properly carried out.

Empty hives that had foul brood in do not need disinfecting in any way.

In treating diseased colonies never starve the bees, because it unfits them for business and makes them thin, lean and poor, and is also hard on the queens. I never starved any bees, but always tried to see how fat I could make them while treating them by feeding plenty of sugar syrup when the bees were not gathering honey.

If you have nice white combs that are clean and dry, and that never had any brood in them, do not destroy one of these, as they are perfectly safe to use on any colony of bees just as they are, and are very valuable to any bee-keeper. I have always saved this class of combs for every bee-keeper. I have always advised bee-keepers to convert into wax all old combs that ever had one cell of foul brood in them, and the only article that will take all the wax out of the old combs is a good wax press. As these will pay for themselves many times over their cost, I urge the bee-keepers everywhere to buy one.

Woodburn, Ont.

Note:—Any bee-keeper suspecting that foul brood exists in his apiary should notify at once the inspector for his district, or the Department of Agriculture Toronto. Below will be found the divisions and counties contained in each, together with the names of the inspectors.

Division No. 1—M. B. Holmes Athens—Counties of Lennox, and Addington, Frontenac, Leeds, Grenville, Dundas, Cornwall, Glengarry, Prescott, Russell, Carleton, Lanark and Renfrew.

Division No. 2—J. L. Byer, Mt. Joy—Counties of Victoria, Peterboro, Northumberland, Durham, Prince Edward, Hastings and Ontario.

Division No. 3—H. G. Sibbald, Claude—Counties of York, Peel, Simcoe, Dufferin and Halton.

Division No. 4—J. Alpaugh, Dobbington—Counties of Wellington, Waterloo, Perth, Huron, Bruce, Grey.

Division No. 5—J. Armstrong, Cheapside—Counties of Norfolk, Brant, Oxford, Elgin, Kent, Essex, Lambton.

Division No. 6—Wm. McEvoy, Woodburn—Counties of Wentworth Lincoln, Welland, Haldimand, Middlesex.—Circular to Bee-keepers by Ontario Department of Agriculture.

#### Rape For Bee Pasture.

Can you give me any information re rape for bee pasture? How late can it be sown to be available before fall frosts come, or buckwheat the same? Any information will be thankfully received.—J. B., Uffington, Ont.

I would not advise sowing rape for bee pasture. The variety that blooms is the German, and is of very little value either as a honey plant or for fodder. The Dwarf Essex rape, which has been found the most useful sort for feeding purposes, does not bloom the first year. Should any plants remain in the soil over winter they will bloom similar to turnips. Buckwheat—I would not advise any one to sow buckwheat if their soil will grow clovers.—John Fixter, Macdonald College, St. Anne de Bellevue, Que.

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## The Difference Between Ripening Nectar in the Hive and Evaporating it Artificially

(By R. F. Holtermann.)

The subject which has been assigned to me has, I am sure, much about it as yet unknown, and yet probably of much practical value to the bee-keeper in making him put a better article upon the market, and assisting him in the sale of it; and to the consumer in showing him wherein lies, in part at least, the superiority of honey to all other sweets, fats and starchy products, as a food.

The apiarian body will contradict itself in the value of honey as long as some of its members claim what has been proven as to the nature of honey, and other members claim that honey or nectar taken from the hive freshly gathered and evaporated outside of the hive is the equal of that which has gone through all the stages in the hive until capped and fully evaporated to the consistency of well-ripened honey.

The obvious superiority of honey over many other products as a food, lies in part in its source—fragrant blossoms. It is gathered by the most fastidious and cleanly insect known; this insect storing the honey, and in the process of ripening the nectar in the combs, and moving it about from cell to cell, inverting the saccharine substance and making in reality a predigested food. Such foods are highly prized, and in other lines very high prices must be paid for them. Nor is this all. Honey is not only a sweet, but it contains an essential oil, imparting to it an aroma peculiar to the source from which it springs; this with our commercial honey pleasing the pal-

ate and bringing into beneficial action the organs of digestion and assimilation. That the honey in the process of production before explained is inverted has been proven, the latest evidence being by Prof. Phillips, of the Washington Apiarian Experimental Station.

We know that during the process of evaporating nectar outside of the hive, no honey will be inverted. We can therefore not contend that the product of this artificial ripening is as valuable as that of the more natural process. Some may not be willing—more, I know some are not willing—to recognize this inversion by the bee. The question of the fact is not dependent upon such a recognition any more than that the fact that my friend will not recognize me proves that I am non-existent.

### Formic Acid.

That the percentage of formic acid varies in various honeys we know. Some eight years ago, when conducting a series of experiments for the Ontario government, I discovered this, and the experiment has since been verified in Europe. Finding that when bees worked on buckwheat the sting was more painful, I thought that the percentage of formic acid in buckwheat honey might be greater than in white honey. A sample of clover and also of buckwheat honey was analyzed, and it was found in the sample sent that buckwheat had about twice as much formic acid as clover honey. I have since realized that this experiment was

very crude, and in this direction (formic acid) there is still open a wide field for research. We do not yet know if the percentage of formic acid in honey varies in varieties of bees. That is, do Italian, black, Cyprian, Caucasian, etc., show a marked difference in this respect? If not, do individual colonies show the difference? Does honey gathered early have less formic acid than honey gathered late, irrespective of the source. If so, may it be because honey gathered early has longer time and more favorable conditions under which it can thicken and be less liable to ferment than that gathered later? At what stage, or stages, of ripening is the formic acid put in by the bees, and how? Is it added to as are the secretions which invert the honey, or is it added through the organ of defence? I am not afraid to uphold or condemn the "sting trowel theory." In part it may be correct. Is this formic acid valuable, and do the bees keep adding it as it is being ripened? If so, nectar evaporated outside of the hive will vary in this respect. I would guess that formic acid is added to the nectar in its early stages of evaporation, to prevent fermentation, for without the formic acid in warm and muggy weather, the condition would be favorable to start fermentation, the temperature of the hive never being high enough to destroy the germs of fermentation floating in the atmosphere passing through the hive.

The formic acid may also be there to disinfect the honey to be fed to the larvae, to prevent the spread of diseases peculiar to bees. The constitutional strength of the bee, the vigor of the bacillus, and the percentage of formic acid in the honey, may all have a bearing upon the spread of disease in

the hive, and may be a factor in the degree of immunity from diseases of certain strains of bees. When the above points are answered, we can better answer what is the difference between ripening nectar in the hive and evaporating it artificially.

#### Aroma.

As to the difference in the aroma or flavor, it may be that the formic acid in combination with the essential oil causes the flavor or aroma to undergo a change. This I do not know. The milder honey, however, changes its flavor less than more pronounced flavors in the process of ripening. It may be that if there is no essential oil, the formic acid would not have an oil to combine with, and so the change would not take place. We know that the odor in the apiary, especially marked at night, during the gathering season must be at the sacrifice of something. Is this odor not a combination of the peculiar odor of the hive in union with the odor from the nectar? If so, no similar artificial condition can be created. This odor is certainly not similar to that from a ripening tank of nectar.

To illustrate the change: The past summer we had 240 colonies located in an apiary in the neighborhood of a species of mint. I tasted a peculiarly strong flavored honey in the hive, but could not discover its source, until I traced through, first capped and then uncapped honey, back until I tasted the nectar shaken from the comb, and then the smell of the mint blossom. All formed a perfect chain when there appeared to be no connection in flavor between the ripe honey and its fresh nectar. Several of my apicultural students remarked the same thing.

In closing, let me say that we as bee-keepers do not realize how much there is yet to learn in our profession.

We do not realize the tactical need of we unitedly a done. The U gratulated u Washington, thing to encour demn in all th ment of ineffic fui not to de rapidly. In re mire the meth countries, whe and work, upc results again : given to the p gest that the as far as posi tion and cor practical bee-l individual apiar (advisedly) to discuss all th which must be par: the meri should be of er a suggestion fr ation would sur might—in fact, greatly.—Paper tional Bee-keep

#### HONEY

Friend Craig track of more l will have to g Very little offer the prices and for honey in t the assistance of If they will on there will be wholesale prices short crops and the only way to is to get better this, and there



We do not realize how great the practical need of learning is, and how little we unitedly are doing to have this work done. The United States is to be congratulated upon the work begun at Washington, D. C. Let us do everything to encourage good work, and condemn in all these positions the appointment of inefficient men. Let us be careful not to demand definite results too rapidly. In research work I rather admire the methods of the best European countries, where they study, and study, and work, upon a question, confirming results again and again before much is given to the public. I would also suggest that these experimental stations, as far as possible, seek the co-operation and corroboration of our best practical bee-keepers in their own individual apiaries. A committee even (advisedly) to advise as to work, and discuss all the points or conditions which must be alike, in order to compare the merits of points not alike, should be of very great value, and such a suggestion from the National Association would surely have its weight, and might—in fact, should—aid the work greatly.—Paper prepared for the National Bee-keepers' Convention.

#### HONEY WAIN, ED.

Friend Craig.—I wish I could get track of more honey. Unless I can, I will have to go out of the business. Very little offering. I hope to advance the prices and increase the demand for honey in this country and want the assistance of every honey producer. If they will only keep up the retail, there will be no trouble about the wholesale prices. In fact, in view of short crops and heavy losses in bees, the only way to make the business pay is to get better prices. If we can do this, and there is no difficulty what-

ever, then we will be compensated to a certain extent. As I said before, honey need never go so low again. Could not every bee-keeper assist by telling his neighbor bee-keeper of those of us who are buying. Unless they do it is hard for us to reach those who do not take any bee journal. I wish you would give this letter a place in next "C. B. J."

Yours very truly,

G. A. DEADMAN.

Brussels, Ont.

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#### Cutting Burr Comb—Foul Brood.

Editor "C. B. J.":

I find it a very good plan to take a hot knife to cut the burr comb between the comb-honey sections and the dividers. It cuts it off clean without causing the combs to leak.

We have much need of more rain and warmer nights for the bees.

Will you be kind enough to give me your opinion as to how soon, or the shortest time, that foul brood will produce itself when old comb from brood chambers of diseased colonies of bees are placed in the chambers of clean colonies in May?—J. B., Bracebridge, Ont.

Your plan for cutting the burr comb is all right. Presume you have noticed that some colonies are inclined to build burr and brace combs. Would change the queen or run them for extracted. Re foul brood, the disease will appear in the first larvae hatched in the infected comb.—Editor.

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**Moore's Honey Ginger-Snaps.**—1 pint of honey, one teaspoonful of ginger, and 1 teaspoonful of soda, dissolved in a little water, and two eggs. Mix all, then work in all the flour possible, roll very thin, and bake in a moderately hot oven. Any flavoring extracts can be added, as you may wish.

## Honey as a Food and as a Medicine

That honey was an excellent and healthful, as well as a strength-giving, food was well-known to the ancients. Witness Jonathan's wearied and famished army in the wood of Ephraim having their strength restored and their energy revived by partaking of the providential supply discovered by them, no doubt gathered and stored by native bees in their homes within "the hollow oak." The wisest man that ever lived advised his son to eat of honey "because it is good." And Democritus, who lived to be a centenarian, attributed his want of illness and prolonged life to partaking of so much honey as a regular part of every meal. Just lately we heard of a young lady, whose life was despaired of by the doctors, being spared, and recovered by the regular use of honey as a food.

Scientists inform us that it contains almost all the requirements of life-supporting food, added to which it requires little or no digestion, so that a weak stomach is greatly relieved of the heavy duties of converting it into a heat and strength-giving force, as it is so easily assimilated. It has thus a great advantage over sugar and other saccharine foods. We are also informed that its use helps the intestines and the kidneys in performing their special functions, a consideration of great importance in weak subjects. For growing children who crave for sweets nothing better than honey could be given, and it is my belief that more of it used would give us healthier members of the rising generation. Mahomet discovered this important truth before he wrote the Koran, because in that important volume he speaks of honey as "this sweet, wholesome substance, which sustains and strengthens the

body, which cures all maladies, a thousand times preferable to the poisons administered by the doctor to the human race"; and again, "From their stomach (or honey sac) issues a liquid of varied colors, in which is a medicine intended for man."

This appropriately introduces the second head of my subject, viz., Honey as a Medicine. Even a bad case of insomnia, I am credibly informed, was cured by the regular use of honey. The patient, on lying awake for some time, would get up and take a drink of liquid honey dissolved in milk. This had a soothing and soporific effect on the system; for, as a rule, he fell soon after into a sound and refreshing sleep, from which he rose in the morning feeling thoroughly rested.

Quite recently I read of a doctor who declared that he cured several stubborn cases of constipation by the steady use of honey, prescribing no other medicine. It has a laxative effect on the patient, and acts rather as a preventive than a cure, thus yielding the best results.

In cases of nervous disorders it has been long recognized as an excellent tonic. Nervous debility yields to this treatment, and the patient gradually regains his wonted energy after a regular course of careful nursing and a generous use of this life-giving and strengthening food.

A University professor, a strong devotee of Lady Nicotine, on the advice of his doctor, gave up his pipe, and when having a hard set-to to resist temptation, found a soothing sedative in a liberal use of honey with a light meal before starting any hard work.

Cuts, scratches, small wounds, chips, scalds, burns and many similar small ills have been cured by an application of honey or a salve in which honey formed the chief ingredient. Colds,

coughs, sore throat, are frequently cured. Bronchitis has been cured at least greatly by this Heavenly substance.

Many very good remedies are made from honey. It is a parching summer thirst calls loudly for no better use than converting it into a refreshing and refreshing drink. Cuts are pleased to find a place on the table. Honey is agreeable and palatable, and a bit are worthy of use. Honey is the best and which this bitter Mead has been by both ancient D.M.M., in Bee- (ish).

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coughs, sore throats, asthmatic irritation, are frequently treated with honey Bronchitis has been, if not cured, at least greatly relieved by a free use of this Heaven-sent sweet.

Many very palatable drinks can be made from honey, and in the hot, parching summer weather, when our thirst calls loudly for being quenched, no better use can be found for honey than converting some of it into a cooling and refreshing drink. Honey biscuits are pleasant eating, and should find a place on every afternoon-teatable. Honey sweets have a very agreeable and appetizing effect on the palate, and as a safe and soothing tit-bit are worthy of more general favor and use. Honey vinegar, so I am told, is the best and most pleasant form in which this bitter relish can be found. Mead has been praised and belauded by both ancient and modern writers.—D.M.M., in Bee-Keepers' Record (British).

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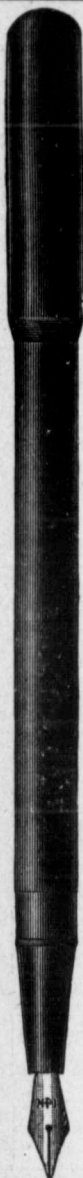
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