

# THE CANADIAN BEE JOURNAL

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BRANTFORD, CANADA

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Devoted to the Interests of Bee-keepers

JAS. J. HURLEY, Editor

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Vol. 20, No. 1.

MENDELIAN  
TO

BY F. V.

[We are able with Mr. Slad the *British Bee* following lecture Hall, Zoologic Park, London, by the new Doi culture, just pr Canada. The s not only to br general, but al we have no hesi reader to perus and if any doub in the mind of suggest that an to us. We will to such who care to The Mendelian of investigating and heredity in t portant principle after its discov monk, and afterw in Austria, who s Although Mendel published in a fai scientific journal, of them until the and verified by t vestigators in 19 thrown a flood of characters are tr formed one of the new science of euge improvement, whic

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# The Canadian Bee Journal

PUBLISHED MONTHLY

JAS. J. HURLEY, EDITOR, BRANTFORD, ONTARIO, CANADA

Vol. 20, No. 12.

DECEMBER, 1912

Whole No. 574

## MENDELIAN METHODS APPLIED TO APICULTURE

BY F. W. L. SLADEN, F.E.S.

[We are able, by special arrangement with Mr. Sladen and the publishers of the *British Bee Journal*, to print the following lecture given at the Lecture Hall, Zoological Gardens, Regent's Park, London, on September 10th, 1912, by the new Dominion Assistant in Apiculture, just prior to his departure for Canada. The subject is full of interest, not only to breeders of live stock in general, but also to bee-breeders, and we have no hesitation in advising every reader to peruse the article carefully, and if any doubt upon any point arises in the mind of any reader, we would suggest that an enquiry be addressed to us. We will endeavor to help any such who care to write us.]

The Mendelian method is the method of investigating the laws of variation and heredity in the light of a most important principle of heredity named after its discoverer, Grégor Mendel, monk, and afterwards abbot, of Brünn, in Austria, who announced it in 1865. Although Mendel's conclusions were published in a fairly widely-circulating scientific journal, no notice was taken of them until they were rediscovered and verified by three independent investigators in 1900. Mendelism has thrown a flood of light on the way characters are transmitted, and has formed one of the starting points of the new science of eugenics, or breeding for improvement, which is destined some

day to be one of the most important of the applied sciences.

It is necessary to have a clear idea of what Mendelism is.

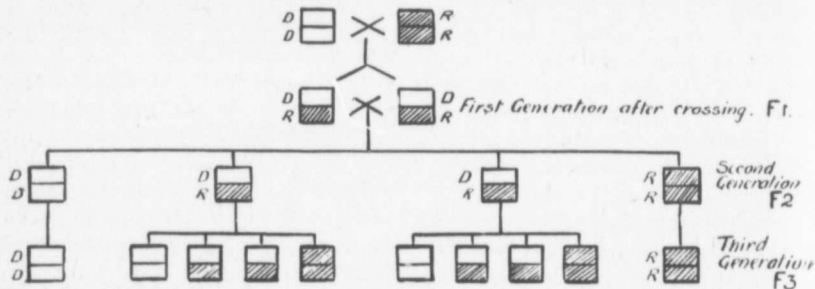
Mendel made his classic experiments with the common garden pea. In one series of experiments he crossed a tall pea with a dwarf pea, and found that all the resulting hybrids were tall like their tall parent. He named the character that prevailed in this first generation of hybrids—in this case tallness—the *dominant*, and the character which disappeared, namely, shortness, the *recessive*. He sowed the seeds from these hybrids, and found they produced tall and shorts in the proportion of three to one. He was able to prove that the tall in this second generation of the hybrids were of two kinds, those that produced tall only, and those that produced tall and shorts in the proportion of three to one, like the tall in the first generation of the hybrids, and also that the latter kind of tall were twice as numerous as the former kind, and that the shorts produced shorts only. Mendel showed that this remarkable train of inheritance was true for six other pairs of characters in the pea, namely, shape of seed—whether rounded or wrinkled, position of flowers—whether distributed along the stem or terminal, shape of ripe pod—whether inflated or constricted, and color of seed skin—brown or white, cotyledons—yellow or green, and unripe pod—green or yellow.

The phenomenon of dominance, remarkable as it is, is not the essential

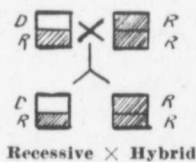
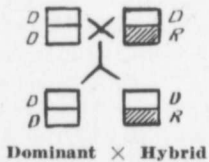
part of Mendel's discovery; indeed, it is not present in every case, the first generation of the hybrids being sometimes intermediate in character. We must bear in mind that an individual animal or plant is the product of the union of two marrying cells, or *gametes*, as they are called, the one derived from the male parent, and the other from the female parent. Thus an individual is of double origin.

Now the essential part of Mendel's discovery, recognized by the discoverer himself, is that the gametes are pure in respect of either of the characters in

the first generation contain and produce gametes bearing the elements representing tallness and shortness in equal numbers, and the results we get in the second generation are simply due to the segregation of these elements. As Bateson has remarked, the most striking consequence of Mendelian inheritance is the paradox that pure individuals may be bred from impure ones. Once the opposite character has been eliminated the individuals remain pure for any number of generations. Recent investigation suggests that the dominant may owe its dominance to a *factor*



ILLUSTRATING THE MENDELIAN SCHEME OF INHERITANCE



each of the pairs of alternative characters we have been considering; in other words, that a gamete can carry one of the characters of a pair, but not both.

In Mendelian language the individual animal or plant is called a *zygote*. If the two gametes that go to make a zygote carry the same character, the zygote is called a *homozygote*. If they carry opposite characters it is called a *heterozygote*.

By applying this theory to the results obtained from crossing the tall and the dwarf peas, we see how perfectly it accounts for them. The individuals of

which is absent in the recessive; therefore we are not concerned with two opposing factors, but the presence or absence of a single factor. When the heterozygote is intermediate, we have no means of knowing in which of the two pure kinds of individuals the factor resides.

The Mendelian scheme of inheritance has been found to hold good for a great diversity of characters in plants and animals, such as the absence or presence of horns in cattle, the pea comb and the single comb in fowls, the absence or presence of the waltzing habit in mice,

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and susceptibility or resistance to rust-disease in wheat, to mention only a few.

So far, we have considered the case of only one pair of differentiating characters in an individual, but the same results occur in the case of any number of pairs of characters. In the case of two pairs of differentiating characters we get in the first generation of the hybrids individuals all showing the two dominant characters. In the second generation we get nine individuals showing both dominants, three showing one dominant and one recessive, three showing the other dominant and the other recessive, and one showing both recessives. But it is not so easy to trace the results when there are several interacting factors modifying the same part or structure, or when the factors concerned fail to correspond with the characters that appear in the zygote, such as factors for inhibiting or developing color.

Further complications are met with as the result of the repulsion and coupling of certain factors, including sometimes the factors for sex, the inheritance of which in some cases it appears to be possible to express in Mendelian terms. It is often hard to trace the inheritance of utility characters because they frequently are the result of many factors with differences so fine that they can hardly be recognized.

The study of Mendelism in the bee is hampered by several special difficulties. First, we cannot control mating in the ordinary way. Then there is the parthenogenetic production of the drone, which is likely to have a disturbing effect. Thirdly, the honey-bee is a highly-specialized animal, and varies very little. There is some variation in size, the eastern races being smaller than those of the west, but apart from this the color of the upper or dorsal side of the abdomen is the only visible character that varies strikingly. The

variation consists in the extent to which the two colors, yellow and black, displace one another.

Turning our attention, firstly, to the workers, we find that in *Apis indica*, in the Abyssinian bee, and in the artificial varieties known as golden bees, the yellow extends over the three basal segments, and more or less of the basal part of the fourth segment. The scutellum on the posterior part of the thorax is also yellow. Extreme goldens, with the fourth segment entirely, and the fifth segment more or less, yellow, have also been bred, but it appears that they do not breed true. In Italians the three basal segments are bordered at the edges with black and the scutellum is darker. Italians from the Swiss Alps have the black bands wider than Italians from the Ligurian Alps, while Cyprians have them narrower. Races with the abdomen entirely black occur in Britain, France, Germany, Malta, and other places. For some years I have been engaged in breeding a golden bee known as the British golden bee. This bee was extracted from crosses between English blacks, Italians and American goldens. The golden character was soon isolated, and thenceforward it was found possible to maintain the pure golden breed, though, as may be imagined, many of the queens were mated with blacks and produced hybrids. No attempt was made to increase the area of the golden color. The diagram (Fig. 1) shows the coloring of the abdomen of a pure British golden worker. It is interesting to compare this with Fig. 4, which is the coloring of the abdomen of a pure British golden queen. It will be seen that the yellow in the queen extends much further than in the worker. The factor,\* or factors, that produce a half yellow and half black abdomen in the worker produce an almost entirely yellow one in the queen. There

\*The word "factor" is here used in the Mendelian sense only.

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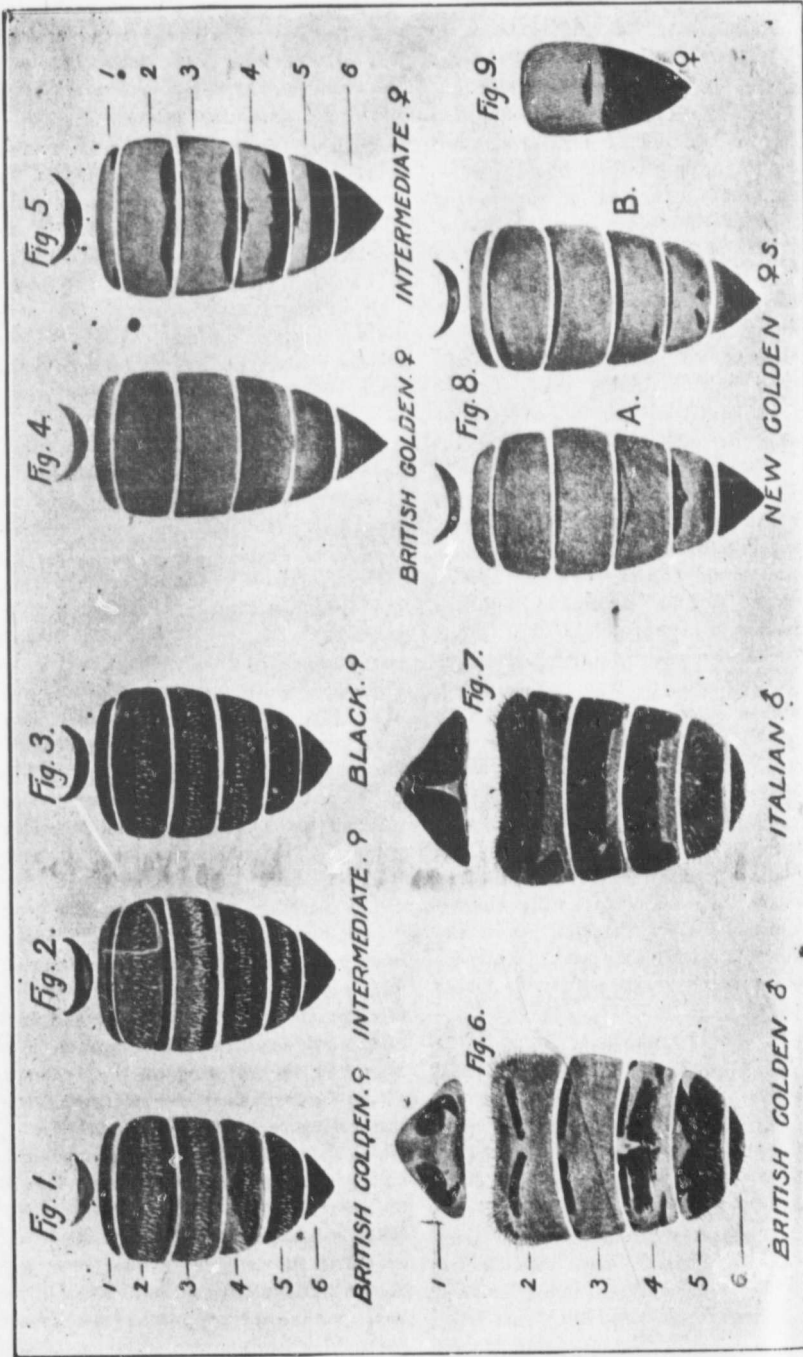
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is no difference in the gametes; the difference is merely a fluctuation in the zygote caused by a difference in the quality and quantity of food supplied in the larval stage. Since the work of breeding British goldens was begun in Ripple Court Apiary, in 1902, a very large number of pure golden queens have been bred; about 1,500 of them were kept until their young workers hatched, and notes were made of the coloring of these. These workers were of two types only, golden and intermediate (see Fig. 2). Not a single black worker was seen. Most queens produced a considerable proportion of each type, but some produced all goldens, and some all intermediates.

It was evident that the queens that produced all goldens had been mated by a pure golden drone, and this was confirmed by the fact that the all-golden families were most numerous (1) from the matings that took place at the end of each season, when most of the drones in neighboring apiaries had been killed off and only the golden drones in Ripple Court Apiary remained, and (2) from the matings that took place in cool and windy weather, and, therefore, close to the apiary.

There was also evidence to confirm the opinion that the families consisting of all intermediates were the result of the union of the golden queens with pure black drones. Such families were not very numerous from matings that took place in Ripple Court Apiary, but out of five queens mated at a spot nearly two miles from the apiary four produced all intermediates, and one about nine intermediates to one golden.

Among the families that consisted of both goldens and intermediates, which it is reasonable to suppose were the result of mating with heterozygous drones, the two types appeared in varying proportions. A common proportion was about seven goldens to three intermediates, perhaps two to one, but the

intermediates were sometimes in excess of the goldens. A case of 90 per cent. intermediates has just been referred to, and at the other extreme it may be mentioned that I have this year been breeding from a queen that produces about thirty goldens to one intermediate; the proportion of goldens to intermediates is the same in her queen progeny as in her worker progeny, and this has been so with every queen from which I have bred.

The queen corresponding to the intermediate worker is shown at Fig. 5. Notice that she, too, is somewhat yellower than the corresponding worker, and that her scutellum is black, not yellow, as in the golden queen. The worker offspring of about thirty of these intermediate queens were examined, and in every case they consisted of goldens, intermediates, and blacks, thus proving that segregation of golden from black takes place. The proportions of the three forms varied in different cases, but the intermediates were usually greatly in excess of the goldens and the blacks. In many cases almost every degree of coloration between golden and black appeared, but not in equal numbers.

Out of 475 workers produced by an intermediate queen bred in Ripple Court Apiary this year, practically every degree of color occurred.

11 had the first three segments of the abdomen yellow, but the edge of the second segment slightly darkened, more so at the sides, and the third segment narrowly edged with black.

47 had the second segment narrowly edged with black, the third segment broadly so.

252 had the first segment also narrowly edged with black, and the second and third segments more widely so.

6 had the abdomen black, with a yellow smudge across the second segment.

16 had it black, with a large yellow spot on either side at the base.



29 had it black with a small yellow spot on either side at the base.

114 had the abdomen entirely black.

Out of eighty-three workers produced by a lighter intermediate queen, also mated this season, nearly every degree of color was found, but the proportions were different.

6 had the first three segments yellow, the third being narrowly edged with black.

10 had the second narrowly, and in the middle faintly, edged with black, and the black edging of the third segment wider.

52 had the first segment narrowly edged with black, and the second and third segments more widely so; one had the first segment tinged with black, and the second segment broadly edged with black.

6 had the abdomen black, but a spot on either side of the second segment at the base yellow.

8 had the abdomen entirely black.

A few Italian drones were flying in the apiary this year (the first occasion in ten years), and one or both of these queens may possibly have been mated by one, but I do not think it probable.

In trying to analyze all these results, we find ourselves in the dark on a most important point, the drone fathers. But we can see that they indicate Mendelian inheritance. Indeed, up to a certain point, the simplest Mendelian rule seems to be followed. The golden queen mated by the black drone produces the heterozygous intermediate. Mated by the intermediate, she produces goldens, and intermediates, but no blacks. Again, the intermediate mated by the intermediate produces a small number of goldens, a large number of intermediates, and a small number of blacks. But the appearance of an almost continuous series of intermediates in the second generation shows that we are here probably dealing with more than one factor, though, as Punnett has

shown in the case of the cross between a "Silky" hen and a "Brown Leghorn" cock, there need not be more than two if it be assumed that they interact on one another in different ways and to different degrees.

It seems unprofitable to speculate further as to the inheritance of the golden and black characters in queen and worker till more evidence has been collected, and we may turn our attention to the more practical question of how far Mendelism can help us in our efforts to improve the bee. A lesson it teaches us that is perhaps of greater immediate value than any other is that if the characters that we want depend on the heterozygous nature of the heterozygotes, the way to get them is to breed together the two pure homozygotes. Thus from the union golden  $\times$  black we get all intermediates, whereas from the union intermediate  $\times$  intermediate we get only a proportion of intermediates.

Fortunately, hampered as bee-breeding is by great difficulties, the particular union golden queen  $\times$  black drone is practically attainable on a large scale, and, more fortunate still, the intermediate produced by it does possess certain qualities that are very desirable. In the first place, as in the case of heterozygotes in many plants and animals, it possesses the added vigor due to the crossing. This vigor shows itself in great energy, hardiness, and industry in honey gathering. The intermediate is considerably larger than the golden (in both queen and worker) and slightly larger than the black. With the cross under consideration, golden queen  $\times$  black drone, which is the only practicable one in this country, the colonies are very populous because they were headed by golden queens, which are more prolific than blacks. An undesirable consequence of crossing bees is the development of an increased tendency to sting, but in this particular cross the

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temper is usually good, though it becomes hotter in later generations when the black color predominates.

Reference has been made to the coupling of factors. Color characters are often associated with various qualities of a useful nature or the reverse. Punnett states that the National Portrait Gallery furnishes remarkable evidence of this in man. Here the pictures of celebrated men and women are largely grouped according to the vocations in which they have succeeded. It is rare to find anything but *blue eyes* among the soldiers and sailors, while among the actors, preachers, and orators the *dark eye* is predominant, although for the population as a whole it is far scarcer than the light.

In the honey-bee several qualities are associated with the golden and black colors. The goldens are more prolific, they are also less hardy and smaller. They make a peculiar singing sound when they are smoked. These characters I have found inseparable from goldens. It is said that goldens are greater robbers than blacks, and that they distribute themselves more to neighboring hives, but this I have not proved, and it is certain that they are more often detected doing these things on account of their bright outstanding color than they would be if they resembled the bees whose hives they enter.

As regards desirable utility characters that are separately inherited, we are not in the near future likely to make much progress in unravelling the factors that stand for them, and even if we could do so, how can we fix them without controlling mating by isolation? In this country there seems to be only one way, namely, by getting the character in our golden bee. During the last few years I have been trying to fix certain desirable qualities in my goldens. Having found the desirable quality in a stock one must be prepared

to sacrifice all one's other goldens in order to give it a chance to get fixed.

A valuable lesson that Mendelism teaches to breeders of all kinds of plants and animals, and one that the bee-breeder must not lose sight of, is that, in the words of Punnett, "every possible variety arising from a cross appears in the second generation if only a sufficient number is raised, and of all these different varieties a certain proportion of each is already fixed." More can be accomplished by a careful analysis and isolation of the individuals of this generation than by years of breeding by selection on the old lines. The fear of losing the original variety by crossing it is unfounded, for it can be recovered in a fixed state with all the superadded vigor that follows from a cross.

Mendelian analysis shows that many of the domestic breeds of plants and animals have been obtained by the removal of existing factors, not the addition of new ones. This process has also been going on in nature. The Darwinian idea that natural selection has built up new characters can now be expressed more precisely by saying that it has merely selected from factors already existing. This explains why new varieties often appear suddenly, and we are no longer under the necessity of attributing some special use to the individual characters, such, for instance, as yellow and black coloring in the bee, for there is no reason why a character not actually harmful should not exist and persist. How the factors carried by the gametes that we now know to be the foundation of variation originally arose we can only conjecture to have been by some disturbance in the processes of cell-division in the formation of the gamete. There seems to be no reason why new factors should not come into existence at the present day, but there is no need for us to suppose that the development

December, 1912

the cross between a "Brown Leg" and not be more assumed that they differ in different degrees. to speculate further of the golden in queen and has been color our attention question of how us in our efforts lesson it teaches eater immediate is that if the t depend on the of the hetero- them is to breed e homozygotes. golden × black s, whereas from × intermediate n of intermedi- d as bee-breed- ies, the particu- × black drone le on a large ate still, the in- it does possess e very desirable. in the case of plants and ani- dded vigor due gor shows itself ss, and industry he intermediate han the golden er) and slightly With the cross lden queen × the only prac- ry, the colonies use they were ens, which are s. An undesir- sing bees is the eased tendency icular cross the

of a new factor is anything but extremely rare, when we consider that in a species whose gametes carry only twenty factors, at least 1,048,576 varieties are possible.

The word purity has acquired a new and a more precise meaning in the light of Mendelism. It is a question of gametes. If two similar gametes unite, no matter what the nature of the parents from which they arose, the resulting individual is pure and will breed true. On the other hand, the phenomenon of dominance may make an individual appear pure, but only breeding tests will show whether it is really so.

We must remember that underlying Mendelism is the doctrine elaborated by Weismann that characters acquired during the lifetime of the individual as the result of changes in treatment or environment cannot be transmitted to the offspring, though it is true environment may and does exert selection in individuals carrying different kinds of gametes. It is, therefore, useless to try to fix acquired characters—fluctuations, as they are called—by breeding, unless the treatment that causes them is always applied, as in the case of worker characters as distinguished from queen characters.

Most of the characters in the bee that we wish to improve are in the workers. How, it may be asked, can these be propagated, seeing the workers are sterile? We must do it through their reproductive sisters—the queens. It is comparatively easy to propagate the character if it is recognizable in the queens, even though much changed, as, for instance, the color character. But we may wish to propagate a character that is not recognizable in the queen, such as industry. We may wish, for instance, to get the golden queen containing the factors contained by a particularly industrious golden worker in a hive where most of the workers are less industrious. Unfortunately, we

have no means of discovering such a queen, and characters of this kind that show themselves in individual workers are almost sure to be lost unless we can find them in a large proportion of the workers in a colony. For such characters we are compelled to test our bees in colonies, not as individuals. This is rather a serious limitation, for while we can study the characters of thousands of individual workers, comparatively few colonies are available. On the other hand, the enormous number of workers that a queen produces helps us very much in the study of what gametes she is producing, and as they are always surrounding her and continue to be produced for years, we can study them at leisure.

And here I may make a few remarks on estimating the proportions of the different colored offspring of a queen. My practice is to do this, if possible, on the twenty-second or twenty-third day after the queen begins to lay. Then only a few hundred of her workers have hatched, and they can be distinguished at once from the other workers in the hive by their downy, soft, and immature appearance. At this stage one can, with practice, estimate fairly accurately almost at a glance the proportions, if only two types are present. Often there is a risk of robbing, and then it is not safe to keep the hive open more than a minute or two. Later, when there are workers in all stages of immaturity, it is less easy to estimate the proportions. It is not usually possible to ascertain the proportions from mature bees until the spring, and then the results may be rendered inaccurate by the presence of bees from other hives. For accurate work it is best to chloroform a few hundred bees, and then pick out the young ones and count out the different varieties of them before they have time to recover.

I should like to say a few words on color inheritance in drones. *Fig. 6*

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shows a British Golden drone. The drone has seven dorsal segments—one more than the worker or queen, but only five of these are seen from above, for the first segment occupies the basal end of the abdomen, and the last one is underneath. I should state that British Golden drones vary a little in the extent of the black on the fourth segment. We all know that the drone is always produced parthenogenetically, *i.e.*, without sexual union. The production of a male by parthenogenesis is rather unusual in Nature. More often, as in Aphids, it is the female that is produced parthenogenetically, and then the species can reproduce itself through several successive generations without fertilization, and while this kind of reproduction is going on the male disappears completely, but with the bee this is not so. Fertilization by the drone is needed for each fresh generation of workers and queens. Most of us have proved to our own satisfaction that the drone can be produced parthenogenetically. A colony loses its queen in winter, and a new queen is reared, which fails to get fertilized, with the result that she produces drones only. But are *all* the drones produced by a *fertilized* queen the result of parthenogenesis? Perez, in 1878, thought not, for on examining 300 drones produced by an Italian queen, fertilized by a French black drone, he found 149 which he thought indicated hybridism. It is clear that if it is true that the drone is always produced parthenogenetically, the queen, provided her gametes are pure, must produce pure drones, no matter what kind of a drone has fertilized her. I have bred drones from about half-a-dozen of my golden queens every season for some years. Some of these golden queens were producing all golden workers, others certain proportions of intermediates, others all intermediates. Now the drones from the queens producing all golden workers were all

golden, as shown in *Fig. 6*, though they varied a little, as were also the drones from most of the queens producing some or all intermediate workers, but two of these queens produced certain proportions of darker drones. One of these was a queen raised last year. The workers she produced were all intermediates. On May 29 of this year I examined seventy-seven of her drones; twenty-six had the first four segments largely yellow, ten the fourth segment smudged with black, twenty-seven had only three segments yellow, the fourth segment being black, twelve had only two segments yellow, and two had the abdomen entirely black, with only the edges of the first and second segments yellow. One's first thought in trying to explain this remarkable result is to suspect that the queen was not producing pure golden gametes, but the facts that the queen had the scutellum, and the abdomen almost to the tip yellow, and that a queen thus colored had never been known to produce a black worker, oppose this view. On the other hand, up to 1908, golden queens, with the scutellum darkened, were occasionally produced, and black workers were often bred from these, indicating they were heterozygous. But latterly the separation between golden and intermediate has been more complete, and such queens have not been produced.

This incomplete separation is additional evidence of the presence of more than one factor for color. In review of the situation, the production by a golden queen of dark drones cannot be said, in the light of our present knowledge of the inheritance of color, to upset the universally accepted and apparently well-founded theory that the drone is always produced parthenogenetically, but, in view of the fact that in all our efforts to breed bees this theory plays a leading part in guiding the operations, such cases as this that seem to shake it should re-

ceive the fullest investigation. If we could control mating they would be certain to add valuable facts to our knowledge of the inheritance of sex.

Fig. 7 is of an Italian drone bred from a queen received from Bologna. Some of the drones produced by this queen had a more distinct tinge of yellow on the second segment, but none showed so great an extent of yellow as that exhibited by the British golden drones. It was the great variation in the coloring of the Italian drone—some are almost black—that led Perez's critics, for his statement raised a storm of opposition, to reject his idea of hybridism.

The inheritance of color in the Italian bee is remarkable in two ways. First, the workers all come perfectly true to a color pattern very like that of the cross between golden and black, though somewhat darker as a rule, and varying in different localities. Secondly, the queens, on the contrary, show immense variation, some are almost as yellow as goldens, though they lack the yellow scutellum and they have at least traces of dark spots on the segments. Others are broadly banded with black and have the last segments black. Are these differences in the queen mere fluctuations, or do they stand for factors in the gametes which do not manifest themselves in the workers?

The breeding true of an intermediate condition of color such as occurs in Italians has been found to be quite in accord with Mendelian views in a case where only two factors were concerned, when it was assumed that they interacted on one another in a certain way and to different degrees.

During the past two months I have been taking steps to secure a cross between a British golden queen and an Italian drone, and I had hoped to have been able to show you this evening what that cross is like. But the cold, dull, and wet weather we had in August

made the queens, as well as the holiday-makers, disinclined to leave home; the few that flew out and got mated during that month were nearly all mated late, and their young are not yet out.

Fig. 8A shows a remarkable coloration found in a British golden, bred this season. Fig. 8B shows an unusual coloring in several golden queens reared in August from a British golden queen bred this season that produces all goldens. Whether these are fluctuations caused by cold or some other agent, or whether they are new colorations, must be left to my successor, whoever he is, to say; but I have always been on the look-out for variations in goldens in the direction of darkening, for it is probable that only by isolating such a variation shall we succeed in much improving the hardiness and honey-gathering qualities of goldens. That a chill during the later stages of development darkens the yellow color and causes the black to spread in queens, every breeder of Italians or goldens knows. Fig. 9 shows a curious and striking distribution of color that I have obtained in intermediate colored queens chilled during development.

Till now we have been considering only the ground color of the abdomen. But there is another character that greatly affects its appearance in the worker, and that is the presence or absence of a pronounced band of short white hair on each segment, except the first and the last. This band is well developed in the Italian bee, but feebly so in the English black bee. The only outstanding difference between the appearance of the English bee and that of the Carniolan is the high degree to which these bands are developed in the latter race, giving the individuals a grey appearance. It would be interesting to ascertain if the inheritance of these bands follows Mendelian rules.

In conclusion, I would again draw attention to the value of the bee pro-

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duced in the first generation of a cross between two distinct breeds. When a bee-keeper introduces a new race or breed into his apiary he has two, not one, new bees to study, the pure breed and the half-breed, and in addition the host of varieties that follow in the second and later generations. The generality of bee-keepers do not sufficiently distinguish between pure breeds and half-breeds. The term "Italian," for instance, is often applied indiscriminately to the young of an imported Italian queen, and the young of her daughters, reared and mated in Britain, and even sometimes to the later generations—in fact, to any bee that shows yellow bands. In this way many observations that have been made about Italians have failed to be of value, and have even been in conflict, one bee-keeper blaming them for lacking the very qualities that another bee-keeper praises them for possessing. Italians are a very fine race, easily first in the opinion of the majority, taking the world all over, but in this country, owing to our cool summer climate, they seldom show themselves to the best advantage; Italian-English half-breeds, however, behave differently, and usually produce excellent results. One of the best qualities of Italians is their undoubted power of resistance to the disease that, in the *land that is about to adopt me*, is known as "European Foul Brood," and I may now call "melting foul brood" to distinguish it from the copy form. Whether this most useful quality is shared by the Italian-English half-breeds, and, if so, to what degree, it would be well worth while to try to discover. If so, bee-breeders might succeed, with the aid of Mendelian methods, in separating a highly resistant strain, just as Professor Biffen, of Cambridge, has by this means been enabled to bring out a rust-resisting variety of wheat. We might, perhaps, breed a strain to resist that still greater

scourge, the "Isle of Wight" disease.

The fixed types of bees that occur in Nature in different localities should always be named after the localities from which they come, for variation in appearance is so limited that it often fails to enable one to separate one type from another. For instance, we have no right to suppose that the British black bee is the same as the American black bee, which seems, indeed, to have had a Spanish origin. We have seen how closely the golden and black hybrid may resemble the Italian in appearance, and there are several different kinds of Italians in the Alps of Northern Italy and Switzerland.

To those who wish to know more about Mendelism I can heartily recommend Punnett's book, entitled "Mendelism."

An account of the work of breeding the British golden bee in Ripple Court Apiary was published in the *British Bee Journal* two years ago.

#### MIDDLESEX B.K. CONVENTION

The annual meeting of the M.B.K.A. was held the last Saturday in October instead of the first Saturday in November, as formerly, in the County Council chambers, London. The President, Mr. Robert Wallace, being absent, Mr. H. Gibson of Lucan occupied the chair. The election of officers was the first item of business and resulted as follows: President, E. T. Bainard, Lambeth; Vice-President, H. Gibson, Lucan; Secretary-Treasurer, E. Robson, Ilderton. The committee appointed to arrange for a honey exhibit at the Horticultural Show reported that they had found difficulty in securing honey, but promised to put up an exhibit if they had the approval of the meeting, which was heartily given.

Mr. Jacob Haberer of Zurich gave an address on "Preparing Bees for Winter." Mr. Haberer has rather unusual conditions in his locality, the fall flow of buckwheat, aster and goldenrod inducing a good deal of swarming, especially the last season. There was considerable discussion as to the best feeder to use, the general opinion being that for late feeding nothing equalled the glass jars or 10-lb. honey pail. Mr. Bainard preferred to feed after his bees were packed, as he thought it least trouble.

Mr. Pettit, the Provincial Apiarist, was present and gave an address on "Re-queening." Although he had always been an advocate of keeping down swarming, yet he was of the opinion that for many bee-keepers natural swarming was the surest and easiest method of re-queening. Of course, discretion had to be used in getting the queens from the best colonies.—Ethel Robson, Secretary.

## Notes and Comments

### Fruit, Flower and Honey Show.

By far the finest exhibit of honey ever seen in Canada was one of the features of the exhibition. The Ontario Bee-keepers' Association put up an immense pyramid under the central dome of the building, containing 3,000 receptacles containing about 5,000 pounds of honey. On one side of the pyramid the Counties of Halton and Peel occupied the space and showed about 2,000 pounds of honey of all classes and of high quality.

An imposing display was staged by the Middlesex Association. It comprised 1,200 pounds of comb honey in sections, 1,100 pounds of honey in glass, and 1,500 pounds in tin pails. This exhibit was most artistically arranged and showed that Middlesex is one of the largest producers of fine honey in the province.

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### Massachusetts Short Course.

We are requested to call the attention of beekeepers to the opportunities offered by the Extension Service of the Massachusetts Agricultural College, in the Ten Weeks course, beginning January 6. A course in beekeeping is designed which will be a general practical survey of the maintenance of bees, not only for their products, but as an adjunct to modern agriculture. Special effort will be made to correlate the subject with the various phases of horticulture, namely, fruit growing, cranberry culture, market gardening and greenhouse crops. Particular emphasis will be laid upon the most recent and approved appliances and systems of manipulation. The fine collection of appliances of the College will give exceptional opportunity to the serious apiculturist.

For further information apply to the

Director of The Extension Service, M.A.C., Amherst, Massachusetts.

\* \* \*

### The Foul Brood Situation.

At the request of the editor of the *Farmer's Advocate* to furnish him with a summary of the prospects of bee-keeping in Canada, R. F. Holtermann sent in an article to our contemporary, which we are pleased to publish elsewhere in our current issue. Mr. Holtermann's remarks respecting the Foul Brood situation are none too strong—in fact, in view of the grave danger now threatening the bee-keeping industry, they are exceedingly temperate. It is, without doubt, a wise policy of any Government to foster the growth of the bee-keeping industry, but at the same time we believe that the efforts of the Canadian Governments in this respect—especially that of Ontario—are ill-directed, and are rendered nugatory on account of the inadequate manner in which the Foul Brood situation is being met. Our officials are not to blame. On the contrary, they fully recognize the impossibility of checking the scourge with the scanty means placed at their disposal by the Government. If, however, the *whole* of the funds now being spent for apicultural purposes in the province could be used for taking vigorous repressive measures against bee diseases, better results would ensue. The first duty, then, of the Governments is to render the bee industry safe to the present generation of bee-keepers. This can only be done by the wise expenditure of largely increased grants for this specific purpose. We suggest, then, that bee-keepers, both individually and collectively, should agitate, and not rest satisfied until their end is gained and the authorities compelled to recognize the urgency of the matter of placing more money at the disposal of our Foul Brood authorities.

From the *Far*

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## BEE-KEEPING IN CANADA

BY R. F. HOLTERMANN.

*From the Farmer's Advocate.*

When we cast even only a superficial glance over the Canadian agricultural horizon, there may be some difficulty in stating the exact condition of bee-keeping. This much, however, we know. There is an immense influx into the West by people who have been lured into that country by either the results of the labor of those already there or the decision that the country promises to them what they are looking for, which in the majority of cases is comfort and affluence as far as this world can give it. They expect two things, a good crop, taking one year with another, and they expect to reap in dollars or assets the increase in value of the land which they homestead and pre-empt or purchase. Their produce is largely grain, and their necessities for living, or their desires, which are often much beyond this, compels them even for food to draw upon the produce of the farms of older Canada.

I have no desire to enter into any controversy over this matter; more, I will not be drawn into it—but it is my humble opinion, in my estimation, based upon sober judgment and experience, that the Ontario producer of foods is in a measure, a considerable measure, reaping the advantage of this demand; also that the spirit of the times is to enter employment where the beauty of the hands is not marred by the evidences of manual labor, forgetting or not knowing that the decree, "In the sweat of thy face shalt thou eat bread," cannot be ignored without its consequences to individuals, and still more to families, if it is continued from generation to generation. As far as actual physical enjoyment goes, the individual who enjoys food, rest and shelter to the full is the one who knows what hunger, toil

and exposure to the elements are. But the far-off view of the city is fair indeed, and it is only when we can see beneath the surface of city life that we find less to value in it.

With the spirit of the times there is every likelihood that the production of farm produce is going to be an attractive proposition for Ontario, at least, and if a financial exigency should arise, the farmer then is always the man in the best position, for he can produce his own food.

Coming to bee-keeping. The prices at present paid for honey make this industry an attractive proposition. The demand for honey in Canada is quite equal to the production. Again, bees are well known to be very important agents in the pollenization of blossoms, from which come fruit and seed of value to the farmer. This question need not be enlarged upon here. But why is it that so many have gone into bee-keeping and made a failure of the business? When we look over sections of country where years ago dozens of men kept bees, we often find none or very few in the business now.

Bee-keeping is a business requiring skill, intelligence and application. Successful and extensive bee-keepers are not made at colleges and schools, but by coming in contact with the practical operations of the apiary on an extensive scale. The theory of bee-keeping is only a step in its mastery. The lines of operation vary so much, according to conditions, that no set rules can be laid down to carry out the season's operations. For instance, I once heard an address given on the prevention of swarming, when the bee-keeper was instructed to break up the brood-chamber of the hive as soon as the bees built cell cups. I do not agree with that practice, but there may be good bee-keepers who advocate such. But it so happened that at that very time I and others had a lot of colonies in that con-

dition, but the weather had suddenly changed, fruit bloom was passing away—in fact, was practically over—and the bees had received a severe check. Cold nights would have made it suicidal to do as was directed. It takes a great many years of experience to size up the situation in the honey-flow or during the active season with the bees, and, more, being constantly in touch with the bees. The bees need the most attention at a time when the ordinary farmer has his hands already more than full, when he must neglect something, and it is generally the bees that suffer. When we remember that a colony of bees left without a queen for ten weeks is practically a ruined colony, because the lifetime of the bee in the active season is only some six to eight weeks, we will see how easily bees may be lost.

Bee-keeping is not a business for a farmer to have to look after with 100 or more acres of land. Those who are invited to engage in the business should have its advantages and disadvantages put before them fairly. There are good seasons, very profitable seasons, but some of us who have been in the business over thirty years—yes, and a much shorter time—testify that there are unprofitable seasons—seasons where not enough is got out of bee-keeping to make even a bare living.

#### Foul Brood

Then there are European and American Foul Brood. The former is a new disease in Canada. It has been predicted by experts that it will sweep the entire country. From near Trenton it has swept into the Ottawa Valley; it is in Quebec, and it has obtained a foothold in Niagara Peninsula. Anyone doubting my statements need only look at the annual report of the Ontario Bee-keepers' Association to find material which will more than verify them. Just now, it seems to me, to advise men either in Ontario or Quebec to go into

bee-keeping is like advising a man to go into hog-production with an outbreak of hog cholera in the vicinity—only far worse.

Bees can carry the germs of the disease home long distances. In that sense foul brood has wings. We are told that the reason why this disease is not followed up better and stamped out more effectually is because the Province cannot supply more money for the purpose. I shall let the public judge as to the need and wisdom of such a policy, and whether it is wise to seek to develop, at expense, the industry, on the one hand, and allow those already in it to be wiped out, on the other, for lack of funds.

I had one young man from England, one from West Virginia, and another from Ohio, studying bee-keeping with me this summer. There is felt more and more the realization of the need of experience and adequate information upon this line of agriculture, but it will not be a safe industry, especially for the comparatively inexperienced, until more effort is made to stamp out these two dread diseases.

This autumn I was twice in Quebec Province. I was for a considerable time in the presence of two of Quebec's Foul Brood Inspectors, and secured what information I could about the condition there, and Foul Brood has destroyed many apiaries there. For my own part, I have said for years Foul Brood appears to be the only animal disease of a contagious nature which the Dominion Government does not see to the stamping out thereof. Why has it not long ago contributed to the cost of its eradication?

For late feeding in December, J. L. Byer, in the *American Bee Journal*, recommends candy, provided it is properly made. In Europe it is commonly the custom to put a slab of candy over the frames just before closing down for wintering.

Mr. Selwyn speaks of his in August, a else experien Yes, I, for on swarming up on which date headed by la son's rearing "catchy" we coming in ba bees going.

Most of my hives, but th Swarms issued as from the Selwyn, "I sh hard with the yards," only t is only in good the keeping of able or possible more or less of but not much f a clover district trict—that is, tl of growing alsit ure or seed, sprinkling of re pressed for expo is never a rush pounds of surplus 20 or 25 is near pounds surplus fr the yearly aver little less being "dribbling" in f seems to cause th swarming, a larg comes early in was rather less t clover season, but August. For the thirty pounds per ces I had to conte or less for three n We read and h

## LATE SWARMING

BY GEO. WOOD.

Mr. Selwyn, in November JOURNAL, speaks of his experience with swarming in August, and asks, "Has any one else experienced the same trouble?" Yes, I, for one, have. Mine continued swarming up to Sunday, September 1st, on which date two prime swarms issued, headed by laying queens of this season's rearing. And yet, owing to "catchy" weather, honey was only coming in barely enough to keep the bees going.

Most of my bees were in ten-frame hives, but that made no difference. Swarms issued from them fully as much as from the smaller ones. Like Mr. Selwyn, "I should think it would go hard with the man who has large out-yards," only that, as I understand, it is only in good clover districts where the keeping of out-yards is either profitable or possible. Here we usually have more or less of a flow from fall flowers, but not much from clover. This is not a clover district, but a "timothy" district—that is, the farmers here, instead of growing alsike clover for hay, pasture or seed, grow timothy, with a sprinkling of red clover, for hay, to be pressed for export. Consequently there is never a rush from clover. Thirty pounds of surplus is a good return here; 20 or 25 is nearer the average. Fifty pounds surplus from all sources is about the yearly average, about half or a little less being from clover, and this "dribbling" in for two or three months seems to cause the maximum amount of swarming, a large percentage of which comes early in August. This year it was rather less than usual during the clover season, but abnormal all through August. For the munificent returns of thirty pounds per colony from all sources I had to contend with swarms more or less for three months.

We read and hear of many systems

of swarm control and prevention, which in the hands of some are successful, but, in my experience, not in this locality.

Wesley, Ont.

## THE CANADIAN NATIONAL EXHIBITION

Editor,

THE CANADIAN BEE JOURNAL,  
Brantford, Ont.

DEAR SIR: We are in receipt of yours of the 1st instant, enclosing galley proof of an article which you are printing in THE CANADIAN BEE JOURNAL.

In reply, we would say that we think Mr. Laing is confusing the two departments, viz., the Manufacturers' section and the Prize List section. The one is an exhibit for competition for prizes only, the other is a sales right, and it was decided by our Board that, as the selling of honey was a nuisance on account of the dirt and mess it made about the building, we would cut it out altogether this year, and each of the honey-producers who had made entries were so notified.

The honey this year was again exhibited in the Horticultural Building, from which it was removed three years ago on account of the mess which the selling of honey created.

No sale right was granted to any exhibitor in the Honey Section.

We enclose a copy of a letter which was mailed to Mr. Laing on August 12th.

Yours truly,

JOHN G. KENT, *President.*

Toronto, Nov. 14, 1912.

[COPY]

August 12th, 1912.

ARTHUR LAING, ESQ.,

Simcoe, Ont.

DEAR SIR: It has been decided by our Board to place the Honey Exhibits this year in the Horticultural Building.

The exhibit must consist only of honey entered for competition; no selling will be allowed. If this arrangement is satisfactory to you, kindly let us know by return, and we will reserve a space for your exhibit.

Yours truly,

J. O. ORR,

*Manager and Secretary.*

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## A FEW OBSERVATIONS

BY JOHN A. M'KINNON.

## Italians and Robbing

My Italian bees did some robbing from hives four miles distant this last season, and there was no possibility of mistaking their identity. In another direction, six miles distant, black queens were mated to Italian drones from my apiary.

## Large Entrances and Cellar Wintering

Too large entrances produce bad results in wintering in my bee cellar. My bees winter best with small entrances and temperature ranging from 36 to 45 degrees. I wintered 165 colonies in my cellar last winter, in which the temperature varied from freezing point up to 50 degrees, with three of the windows open most of the time. At times the snow drifted in enough to completely cover the fronts of those hives the entrances of which faced the windows, resulting in the death of two colonies. With one exception, the remainder came through in first-class shape, and even small queen-rearing nuclei wintered O.K. In March there was a foot and a half of water in the cellar, and in places it touched the bottom-boards.

## King Birds

King Birds are expensive boarders when rearing queens. Last season queens were a little too frequently lost on their mating flight, and I began to look around for the cause. A King Bird flitted past. "That's the chap!" said I. So I got out the .22 and knocked over fifteen that afternoon, and the next day I got several more. It seems that they had flocked in from all parts to feed on my bees. After I had shot off most of them, only an occasional queen was lost, and it was usually found at the entrance of the next hive, balled or already dead.

## Some Strains Difficult to Introduce

Some strains of Italian queens are easier to introduce than others. During the latter part of the season I purchased two queens from Geo. B. Howe, and reared about twenty-five queens from them to replace some mismated queens. I don't remember caging any one of those queens any longer than to transfer them from the mating hive to the colony to receive it. I killed the undesirable queen in the forenoon, and in the afternoon I would cage what queens I wanted to introduce, which I would do by removing a frame of bees and brood into an empty hive for a few minutes and running the queen out among the bees. These queens seemed to make themselves at home at once, and the bees took no more notice of them till the queen circle was formed as a bodyguard. Queens of other strains that I have had would hump their backs, stick their heads sidewise into the cells and squeal until they were balled. That seemed to satisfy them, and when I had a surplus of young queens I did not take the trouble to take her out. In one instance I have known, a queen was balled for two days, after which she was accepted. She had one hind leg paralyzed. Can any one tell me why, in rare instances, after introducing a young queen, there seems to be a division among the bees? About one-third of the colony will be stung to death—a few at a time—for about forty-eight hours. There will occur no robbing, but to me it seemed to be mostly the field bees, as a lot of them were stung on the alighting board.

St. Eugene, Ont., Nov. 21, 1912.

Coal cinders, according to the *American Bee Journal*, are excellent for the surface soil of an apiary location. Cinders under the hives and in front keep the moisture away and prevent the growth of weeds.

## ANNUAL

"The best consensus of opinion of the convention of the last month. The keepers was doubtful whether the program has been in this country some of the convention in

One of the meetings was 14th November. The session Morley Pettit read the annual report of the Association of Apiculturists. He said, no change in the last convention in the decision that there should be a re-organization of the courses of instruction for inspectors to the best ways to prevent and cure a further aid to be given by circular letters to aid in counteracting the publishing statistics and giving support and giving support. Moreover, these are the best ways for the inspector to finish his work more quickly. These bulletins contain a large amount of editorial material for bee-keepers.

The organization of the Association of Apiculturists was changed by Morley Pettit. Now one of the inspectors was made to report on the new system of reporting to the bee-keepers did the extra visits. The number of apiaries was decreased. The American Foul Brood Commission, European Foul

## ANNUAL CONVENTION OF THE O. B. K. A.

"The best ever held!" is the general consensus of opinion regarding the convention of the O.B.K.A. held in Toronto last month. The attendance of bee-keepers was a record one, and it is doubtful whether a more interesting program has ever before been provided in this country. We hope to publish some of the papers delivered at the convention in our early issues.

One of the most important of the meetings was that held on Thursday, 14th November. At the morning session Morley Pettit, Provincial Apiarist, read the annual report on the Inspection of Apiaries. There had been, he said, no change in foul brood legislation in the last year, but it had been decided at the inspectors' conference that there should be a more rigid inspection of bees. Moreover, special courses of instruction were now given for inspectors that they might know the best ways to aid the bee-keepers in preventing and curing Foul Brood. As a further aid to bee-keepers, a series of circular letters would be sent to them to aid in counteracting the disease by publishing statistics showing its development and giving methods of fighting. Moreover, these bulletins paved the way for the inspector, so that he could finish his work more quickly and cheaply. These bulletins contained also a large amount of educational matter for bee-keepers.

The organization of the inspection of apiaries was changed, continued Mr. Pettit. Now one visit from the inspector was made to be sufficient. A new system of reports signed by the bee-keepers did the work of the former extra visits. The number of diseased apiaries was decreasing. But while American Foul Brood was losing ground, European Foul Brood was rap-

idly advancing. Nothing, he said, could be done to check this but the Italianizing of the apiaries. The inspection department was now better equipped with trained men from the Agricultural College, and good results were expected.

Discussion on the subject of management of out-apiaries followed, and it was interesting to note that some Ontario bee-keepers had as many as three or four large apiaries, kept five or six miles apart for purposes of pasturage.

Mr. J. E. Dunn, of Ridgeway, addressed the afternoon meeting on the "Preparation of Bees for Winter." It was most important, he said, that they should get proper ventilation, though without being chilled. Shavings and forest leaves were the best packing material, and magazines and building paper were splendid for keeping in heat. Even last winter bees packed in this way survived splendidly.

Hon. J. S. Duff, Minister of Agriculture, then spoke briefly on the necessity for co-operation in farm work, as had been evinced by the various conventions held during the week in this city. He knew, he said, that bee-keepers had a great enemy in the Foul Brood, but anything that the Department of Agriculture could do to help would be done.

The treasurer's report showed receipts of \$1,069.35, and a balance of \$384.56 on hand.

The report of the Honey Crop Committee showed a remarkable and unaccountable shading from no crop in the Eastern Counties to a good one in the southwest. The general crop was not as good as usual, owing probably to adverse weather conditions.

Addresses given by Mr. E. B. Tyrrell, Detroit, Mich., Secretary of the National Bee-keepers' Association, and by some of the other speakers will appear in full in a later issue.

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**SHORT COURSE IN BEE-KEEPING  
AT THE MASSACHUSETTS  
AGRICULTURAL COLLEGE**

May 28—June 11, 1913

The college has recently come into possession of a number of swarms of bees, which, with the other equipment to be added, will afford a fine opportunity for those interested to get some practical information on the subject.

The course will be under the direction of Dr. Burton N. Gates. The following courses will be given:

1. Practical Phases of Bee-keeping  
Dr. Burton N. Gates
2. Crops for Honey Bees  
Dr. William P. Brooks
3. Relation of Bees to the Pollination  
of Plants....Dr. George E. Stone
4. Origin and Evolution of the Honey  
Bee.....Dr. Henry T. Fernald
5. Bees and Bee-keepers' Supplies  
Dr. James B. Paige

**Annual Convention and Field Day—  
June 11-12, Inclusive**

The features of this convention will be lectures, demonstrations by authorities of national reputation, as well as displays by inventors, manufacturers, supply merchants and queen-rearers.

A special invitation is extended to all bee-keepers to display and demonstrate inventions, implements or methods. If table space is desired, or special equipment is to be prepared, notice should be sent to Dr. Burton N. Gates, Amherst, Mass., at least two or three weeks before the convention. The college will provide covered tables for the exhibits.

By correspondence in advance every effort will be made to arrange for the comfort of visitors.

**DISTRIBUTION OF SEED GRAIN  
AND POTATOES**

**From the Dominion Experimental  
Farms**

By instructions of the Hon. Minister of Agriculture a distribution of superior sorts of grain and potatoes will be made

during the coming winter and spring to Canadian farmers. The samples for general distribution will consist of spring wheat (5 lbs.), white oats (4 lbs.), barley (5 lbs.), and field peas (5 lbs.). These will be sent out from Ottawa. A distribution of potatoes (in 3-lb. samples) will be carried on from several of the experimental farms, the Central Farm at Ottawa supplying only the provinces of Ontario and Quebec. All samples will be sent free, by mail.

Applicants must give particulars in regard to the soil on their farms, and some account of their experience with such kinds of grain (or potatoes) as they have grown, so that a promising sort for their conditions may be selected.

Each application must be separate and must be signed by the applicant. Only one sample of grain and one of potatoes can be sent to each farm. Applications on any kind of printed form cannot be accepted. If two or more samples are asked for in the same letter only one will be sent.

As the supply of seed is limited, farmers are advised to apply early; but the applications will not necessarily be filled in the exact order in which they are received. Preference will always be given to the most thoughtful and explicit requests. Applications received after the end of January will probably be too late.

All applications for grain (and applications from the provinces of Ontario and Quebec for potatoes) should be addressed to the Dominion Cerealists, Central Experimental Farm, Ottawa. Such applications require no postage. If otherwise addressed, delay and disappointment may occur.

Applications for potatoes from farmers in any other province should be addressed (postage prepaid) to the Superintendent of the nearest Branch Experimental Farm in that province.

J. H. GRISDALE,

Director, Dominion Experimental Farm

December,

APICULTURE  
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**APICULTURAL SOCIETY OF THE PROVINCE OF QUEBEC**

The annual meeting of the Apicultural Society of the Province of Quebec was held in the Government Offices, Montreal, on the 13th of November, 1912, at 10 a.m., at which were present about a hundred members of the Society, Dr. Emery Lalonde, the President, being in the chair.

The proceedings of the last meeting were read and unanimously adopted, after which the nomination of officers took place, as follows:

Dr. Emery Lalonde (Rigaud), J. O. Levac (Rigaud), Jacques Verret (Charlebourg), Arcadius Bellemare (Yamachiche), Gaspard Comtois (St. Barthélemi), Omer Giroux (St. Clet), Xavier Morin (Maskinongé), F. W. Jones (Bedford), R. B. Ross (Westmount), Michel Dufault (St. Roch), Elzéar Girard (Ste. Monique), Prudent Lapointe (St. Henri de Mascouche), Uldéric Paradis (Cavignac), A. L. Beaudin (St. Chrysostôme), Directors.

It was proposed by A. L. Beaudin, seconded by Uldéric Paradis:

That the Hon. J. E. Caron, Minister of Agriculture, be elected Hon. President; Dr. Emery Lalonde, President; F. W. Jones, Vice-President; A. O. Comiré, Secretary-Treasurer, of this Society for the present year.—Carried.

The Secretary-Treasurer then read out the following financial statement:

**Expenâiture**

Four journeys of the Secretary.	\$ 15 00
Announcements in the press...	18 10
Cleaning of hall.....	6 00
Subscriptions to <i>Apiculture Nouvelle</i> .....	80 00
Printing .....	20 00
Carriage upon printing.....	1 60
Preparation of circulars.....	10 00
Postage .....	34 43
Secretary's salary .....	50 00

\$235 13

**Receipts**

Balance on hand, Nov. 8, 1911..	\$ 49 01
Subscriptions, 108 members....	108 00
Surplus of expenditure over receipts .....	78 12

\$235 33

which was unanimously approved of and passed.

Mr. Beauine, of the Exerimental Farm at Ottawa, then gave a very instructive lecture upon the anatomy of the honey-bee.

The meeting passed a unanimous vote of thanks to the learned speaker.

The Rev. Fr. Liguori, of the Agricultural Institute of Ofa, attending on behalf of the Minister of Agriculture, gave, at the request of the President, an account of the Comptoir Co-opératif Agricole de Montréal; and was followed by Mr. Bruno Wilson, Secretary of the Comptoir, who dealt with the financial side of the Society.

It was then proposed by Dr. Landry, seconded by Dr. Comiré:

That the Apicultural Society approve the idea of the Comptoir Co-opératif Agricole, and that the Society subscribe collectively to the said Comptoir Co-opératif Agricole.—Adopted unanimously.

In the afternoon the President opened the gathering by proposing that steps be taken with the view to bringing about a union of all the bee-keeping societies of the province, and he supported his proposition by an appropriate discourse.

Mr. Jacques Verret, President of the Société d'Apiculture de Québec, replying, said that he thought such union was not desirable.

Mr. M. L. Grignon, who spoke in favor of the union of these societies, put forward a proposition for the same, which was seconded by Léonard St. Laurent and adopted by the meeting.

It was unanimously resolved that the Minister of Agriculture be requested to amend the law in such a manner that it

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J. H. GRISDALL  
Experimental Farm

be made illegal to keep bees in hives with fixed bars or frames, because such hives encourage foul brood, and also it is impossible to treat the disease conveniently in them.

This was adopted.

It was also resolved unanimously that the Minister of Agriculture be asked to cause the law to be amended in the manner that inspectors may be authorized to destroy at their discretion diseased colonies which the owners refuse or neglect to treat according to their instructions, and that the said owners may be indemnified according to the valuation made by the inspector.—Adopted.

It was resolved that inspectors who shall be nominated in the future shall be obliged to undergo examination before a committee of examiners named by this Society.

The Secretary then reported to the meeting that, following the resolution passed at the meeting of Directors last spring, and in compliance with the request of the Minister of Agriculture concerning the statistics upon the production of honey in the province, he had had printed and distributed to all bee-keepers of whom he had been able to procure the addresses over 1,500 circulars upon this subject. Of this number, about 175 have replied; this is a big increase over the last year, when about thirty only replied. A summary of these replies is shown in the following table:

Number of hives.....	5,000
Pounds of honey.....	190,540
Pounds of wax.....	3,510
Average No. of lbs. of honey per colony .....	41

In spite of the bad season which we have had this year, the result for the small number who have replied is satisfactory enough, and if we add to this the reports furnished by the inspectors and published in the last report of the Minister of Agriculture, it cannot be denied that apiculture is making rapid

progress in this province, and that it forms already one of the important branches of agriculture.

It was then proposed by Mr. Joseph Vachon, seconded by Mr. Norbert Bérmeche, that the Government be requested to establish a bureau of agricultural statistics for this province.—Adopted.

It was proposed by Mr. Clermont, seconded by Mr. Bouleau, that the Minister of Agriculture be asked to be good enough to continue to this Society the grant which was given to it last year.

Mr. Sladen, of the Experimental Farm at Ottawa, delivered to the meeting a very interesting lecture upon scientific bee-breeding, the improvement of the races, and the Italianizing of the colony.

He was followed by Mr. Beaulne, already referred to, who gave a talk upon the fertilization of fruits by the bees.

The thanks of the meeting were unanimously accorded to the two speakers.

The President suggested to the meeting that the date of the annual reunion of the Society be changed so that it be made to coincide with the seasons when reduced railway fares are available.

It was then proposed by Mr. Prudent Lapointe, seconded by Mr. L. M. Grignon, that the board of directors be authorized to fix the date of the annual reunion of this Society.—Adopted.

After which the meeting adjourned.  
A. O. COMIRE, Sec.-Treas.

#### SOCIÉTÉ D'APICULTURE DE LA PROVINCE DE QUÉBEC

Assemblée annuelle de la Société d'Apiculture de la Province de Québec tenue au Bureau du Gouvernement, Montréal, le treizième jour du mois de novembre, mil neuf cent douze, à deux heures de l'avant-midi, à laquelle

December, 1.

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semblée sont présents: audelà d'une centaine de membres de la société sous la présidence du Dr. Emery Lalonde, président de la Société.

Les procédés de la dernière assemblée sont lus et unanimement approuvés.

On procède ensuite à la nomination des officiers, et cela de la manière suivante:

Dr. Emery Lalonde (Rigaud), J. O. Levac (Rigaud), Jacques Verret (Charlesbourg), Arcadius Bellemare (Yamachiche), Gaspard Comtois (St. Barthélémi), Omer Giroux (St. Clet), Xavier Morin (Maskinongé), F. W. Jones (Bedford), R. B. Ross (Westmount), Michel Dufault (St. Roch), Elzéar Girard (St. Monique), Prudent Lapointe (St. Henri de Mascouche), Uldéric Paradis (Cavignac), A. L. Beaudin (St. Chrysostôme), Directeurs.

Il est ensuite proposé par A. L. Beaudin, secondé par Uldéric Paradis:

Que l'Honorable J. E. Caron, Ministre de L'Agriculture, soit nommé président honoraire de la Société; Dr. Emery Lalonde, Président; F. W. Jones, Vice-Président; A. O. Comiré, Secrétaire-Trésorier, de cette société pour la présente année.—Adopté.

Le Secrétaire-Trésorier donne ensuite lecture à L'assemblée de l'état financier de la société, comme suit:

**Dépenses**

voyages du secrétaire.....	\$ 15 00
annonces dans les journaux...	18 10
Lavage de la salle.....	6 00
Abonnements <i>Apiculture Nouvelle</i>	80 00
Impressions .....	20 00
Prêt sur impressions.....	1 60
Préparations de circulaires....	10 00
Postages .....	34 43
Salaires du Secrétaire.....	50 00

\$235 13

**Recettes**

Surplus au 8 nov. 1911.....	\$49 01
Subscriptions 108 membres....	108 00
Surplus des dépenses sur les	
recettes .....	78 12

\$235 33

lequel est unanimement approuvé.

Mr. Beaulne de la Ferme Expérimentale d'Ottawa, division de l'Entomologie, donne ensuite à l'assemblée, une très instructive conférence sur l'anatomie de l'abeille.

Et l'assemblée vote unanimement, des remerciements au savant conférencier.

Le Rev. Fr. Liguori de l'Institut Agricole d'Oka, représentant à cette assemblée, l'Honorable Ministre de l'Agriculture donne ensuite sur la demande du président des explications sur le Comptoir Co-opératif Agricole de Montréal.

Il est suivi par Mr. Bruno Wilson, secrétaire du Comptoir qui traite du côté financier de cette société.

Il est alors proposé par le Dr. Landry, secondé par le Dr. Comiré:

Que la Société d'apiculture approuve l'idée du Comptoir Co-opératif Agricole, et que la Société souscrive, une part collective, au dit Comptoir Co-opératif Agricole.—Adopté unanimement.

L'Assemblée s'ajourne alors à 2 hrs. P.M.

A la reprise de l'assemblée, le président ouvre la séance, en proposant que des démarches soient faites dans le but de réunir, en une seule, toutes les sociétés d'apiculture de la province, et il appuie sa proposition par un discours approprié.

Mr. Jaques Verret, président de la société d'apiculture de Québec, lui répond en disant que d'après lui, cette union n'est pas à désirer, et il donne ses raisons à l'appui.

Il est suivi par Mr. M. L. Grignon conférencier agricole, qui parle en faveur de l'union des sociétés et qui propose, secondé par Léonard St. Laurent:

Que des démarches soient faites dans ce but.—Adopté.

Résolu unanimement:

Que l'Honorable Ministre de l'Agriculture, soit prié de faire amender la loi, de manière qu'il ne soit plus permis

December, 1912

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sed by Mr. Prudent by Mr. L. M. Grig- rd of directors be he date of the an- Society.—Adopté meeting adjourné IRE, Sec.-Treas.

**APICULTURE DE LA PROVINCE DE QUEBEC**

lle de la Socié Province de Québec u Gouvernement, ne jour du mois cent douze, à midi, à laquelle

de garder des abeilles dans des ruches à cadres ou rayons fixes, parce que ce sont ces ruches qui entretiennent la loque, et qu'il est impossible de la traiter convenablement dans de telles ruches.—Adopté.

Il est aussi résolu unanimement:

Que l'Honorable Ministre de l'Agriculture, soit aussi prié de faire amender la loi, de manière, que les inspecteurs soient autorisés, à détruire suivant leur discrétion, les ruches malades, que les propriétaires refusent ou négligent de traiter suivant leurs instructions, et que les dits propriétaires soient indemnisés, suivant l'évaluation faite par l'inspecteur.—Adopté.

Résolu aussi unanimement:

Que les inspecteurs qui seront nommés à l'avenir soient tenus de subir un examen de compétence, et que les dits examens soient passés devant un comité d'examineurs, nommés par cette Société.—Adopté.

Le secrétaire fait ensuite rapport à l'assemblée, que suivant la résolution passée à l'assemblée des directeurs du printemps dernier, et conformément à la demande de l'Hon. Ministre de l'Agriculture, concernant les statistiques, sur la production du miel, dans la province, il a fait imprimer et distribuer, à tous les apiculteurs dont il a pu se procurer les addresses, au-delà de 1500 circulaires, sur ce sujet.

Sur ce nombre, environ 175 se sont donné la peine de répondre; c'est un grand progrès, sur l'année dernière, alors que une trentaine seulement avaient répondu.

Le résumé de ces réponses est indiqué dans le tableau suivant:

Nombre de ruches.....	5,000
Livres de miel récoltés.....	190,540
Livres de cire récoltés.....	3,510
Moyenne de lbs. de miel par ruche	41

Malgré la mauvaise saison que nous avons eu cette année, ce résultat pour

le petit nombre qui ont répondu, est assez satisfaisant, et si on y ajoute les rapports fournis par les inspecteurs, tel que publié dans le dernier rapport du ministère de l'Agriculture, on ne peut s'empêcher de reconnaître, que l'apiculture fait de rapides progrès, dans cette province, et qu'elle forme déjà une des branches importantes de l'Agriculture.

Il est alors proposé par Mr. Joseph Vachon, secondé par Mr. Norbert Ber-mèche:

Que le Gouvernement soit prié, d'établir un bureau de statistiques agricoles pour cette province.—Adopté.

Proposé par Mr. Clermont, secondé par Mr. Bouleau:

Que l'Hon. Ministre de l'Agriculture, soit prié de bien vouloir continuer à cette société, l'octroi qu'il lui a accordé l'année dernière.—Adopté.

Mr. Sladen de la Ferme Expérimentale d'Ottawa, donne ensuite à l'assemblée, une très intéressante conférence, sur l'élevage scientifique des abeilles, l'amélioration des races, et l'italianisation du rucher.

Il est suivi par Mr. Beaulne, déjà cité, et qui donne une conférence sur la fertilisation des fruits par les abeilles.

Et des remerciements sont unanimement votés par l'assemblée, aux deux conférenciers.

Le président fait ensuite rapport à l'assemblée, qu'il serait à propos de changer la date de la réunion annuelle de la société, de manière à la faire coïncider avec les temps où il y a des réductions dans les taux de chemin de fer.

Il est alors proposé par Mr. Prudent Lapointe, secondé par Mr. L. M. Grignon:

Que le bureau de direction soit autorisé à fixer la date de la réunion annuelle de cette société.—Adopté.

Et l'assemblée s'ajourne.

A. O. COMIRE, Sec. Trés.

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## HOW THE DRONES OBTAINED THEIR COLOR

I have read in Langstroth that an unmated queen lays drone eggs only, and that a mated queen lays worker and drone eggs. It is also stated that worker and drone eggs are essentially the same, and that fertile workers are reared in cells near queen cells, and thus obtain a little royal jelly. If this is the case, how is it that a black queen mated to an Italian drone gives drones with yellow bands on them? Perhaps some of your readers may be able to explain how this is. If the drone eggs are not impregnated in some way while being laid, the drones could not obtain the yellow coloring from black queens.

ALEXANDER BRADLEY.

Marathon, Ont.

[Scientists tell us most emphatically that the drone results from an unfertilized egg, but that the worker arises from a fertilized egg. In the latter case, a male cell, and only one, enters into the egg, and what is called fertilization ensues. Our correspondent, in common with many others, has an idea that even though the egg is not fertilized, it may be affected in some way or other by the male element. This is not the case, and we believe also that such is a physical impossibility. The coloration of the yellow drone is, we imagine, due to the fact that possibly the black queens were not of pure black brood, in which case the yellow color would be explained. There are other possible explanations, but this is the one that we have always accepted. The manner in which color is inherited in bees is a matter that is at present being thoroughly investigated by one or two scientists. In this issue appears an exhaustive article by Mr. Sladen, dealing largely with this question, which Mr. Bradley will find most instructive and useful. We ourselves are thoroughly convinced that the drone inherits absolutely nothing from its mother's mate.

[Ed.]

## THE NYASA BEE

BY L. W. J. DEUSS.

My object in putting these notes at the disposal of the Editor is not to teach others—for that I am not qualified—but to let others teach me how I can avoid the failures I have had, and to draw attention to a bee that through its excellent qualities has won my sympathy. The observations were made at Fort Johnston, on the south end of Lake Nyasa, lat. 14 deg. 28 min. 30 sec. south, long. 35 deg. 18 min. 30 sec. east, about 1,600 feet above the sea level. In different altitudes many things might differ considerably.

Even a casual observer of our little friend the Nyasa bee, when it is busy on a flower, must be struck by its beauty in color and shape. The worker is rather slender and wasp-like, with abdomen more pointed than that of the common black bee. Its length is about the same—a little less than half an inch when hungry, and a little more when full of honey.

The color of head, thorax, and legs is black, and these are covered with light-yellow hair, with a tinge of red. The first three of the six visible segments of the abdomen are of a beautiful orange color, with narrow black bands at their bases. The first segment being very small, they appear to have two yellow bands. The next two segments are black, with a bright silver band at the base of each. The last is black. The workers are not very dissimilar to Italians.

This may also be said of the queens. A dead Italian queen I have is not to be distinguished from one of my dead Nyasa queens. But the queens are not so uniform in color as the workers. As a rule, they have the first three segments of the abdomen orange, like the worker, only the dark bands at their bases are dark-brown instead of black, and the rest of the abdomen is dark-

brown, too. A very fertile queen generally has the abdomen so much extended that the yellow joints between the brown segments show and give the whole a brighter appearance. I have one queen that has the whole abdomen yellow, and another that has not even the two orange rings of the worker. Yet their progeny seem to come out all alike. Their bellies are orange in every case, and their legs and feet very dark-red. By the latter alone the queen can easily be recognized when she runs along the excluder at the entrance of a newly-hived swarm that has departed and is waiting for her to follow. The length of the queens is about  $\frac{7}{8}$ ", but of course varies considerably.

The drones also vary much in color and size. Some are  $\frac{3}{4}$ " in length, and some are only  $\frac{5}{8}$ ". Perhaps these latter were reared in worker-cells. Head, thorax and legs are black, with less hair than the worker has. The abdomens of the drones of some colonies are so light that they are not easy to tell from the workers by color alone, and one of mine last year had drones practically quite black all over. This same colony this year has light drones like the others. They have the brush of hair at the extremity of the abdomen, like all drones in Europe. The segments of their abdomens are generally dark-brown, with a faint light ring at their base.

That my carpenters work within ten yards of my apiary, which is situated direct against the kitchen; that numbers of natives work near it, handling cargo and produce; cats, fowls, ducks and children play about without interference from the bees, is a surprise to everybody who first sees it, as it proves a sweetness of temper otherwise only associated with Carniolans. Until the hives are full they can be examined without smoker, carbolio cloth, or veil, provided the weather and time of the day is suitable, and one does not jar

them. On a cold, windy day the hives should not be opened, nor after noon, when the sun shines very hot, as then the bees seem inclined to go at sight for the face of the person who lifts their quilt.

At all times they strongly object to certain odors; oil of eucalyptus provokes a furious attack. They will sting the leather strap that carries my watch on my wrist, when they will not worry about my hand. Sweat irritates them, and natives who have partaken of native beer are much stung. Apifuge and muscatel have no pacifying effect on them. Under circumstances, in my apiary, that must be trying to the bees' tempers, I only had two colonies that would sting people, and had to be re-queened. This can be done quickly and safely in twenty-four hours, so that the breeding is hardly interrupted, by caging their queen alone from, say, 9 a.m. to 5 p.m., then replacing her by the new fertile queen in the same cage and place. The next morning, say, 9 a.m., she is released. Their activity is great, and they are splendid honey-gatherers, judging by what they do in this arid place.

The queens are fertile, but are not prone to drone-breeding, nor are they inclined to swarming if they are only given enough room and ventilation. In my hives, which take twelve or thirteen frames, I had only one swarm, and that was because I forgot to remove the division-board and give the bees the last three frames. One of my colonies, though, that built more drone-comb than the others, did not gather less honey, but *more*, and did not swarm, but filled most of the drone-comb with honey. Thus it is not certain that the building of drone-comb should be objected to.

The brood-nest is usually arranged in Europe; one or two combs of honey and pollen near the entrance, then from

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If left without guidance, as in a box with smooth cover, they space their combs  $1\frac{1}{4}$ ". I have observed once as little as  $1\frac{1}{8}$ ". But  $1\frac{1}{4}$ " is certainly their rule, indifferently whether the combs contain all worker-brood or drone-brood as well. The thickness of sealed brood-comb varies from  $\frac{3}{4}$ " to  $\frac{7}{8}$ ", not leaving much unnecessary space between the combs, either for the queen or for ventilation.

I have never yet found them build their combs at right angles to the entrance, rarely parallel, but generally more or less in the diagonal direction.

The measurement of the worker-cells in the diameter between two opposite sides I found to vary between 0.188" and 0.192". We may thus assume 0.19" as their normal diameter, against the 0.22" of "Weed" foundation. The small diameter harmonizes with the slender shape of the bee. They will, however, draw out imported foundation readily and breed in it; but if you give them half a sheet, they will, beneath it, continue in their own smaller measurement, after drawing out the foundation in the larger.

It would be an interesting experiment to see if, by giving the bees for several years full sheets of foundation and spacing them  $1\frac{7}{16}$ ", the size of the Nyasa bee would become larger. I wonder if experiments in that direction with other small bees have been made.

There are 65.6 worker-cells per square inch of comb on both sides together, or about 6,030 cells per frame of 8"x12" internal measurement.

The drone-cells, of which there are hardly more than one-tenth, measure on side to side 0.256", one-third more than the worker-cells. There are 49.2 per square inch of comb on both sides, or about 4,730 per frame of 8"x12" internal measure. But such a frame as

had drone brood only I have not yet come across, except in the honey-combs beyond the brood-nest.

The honey-comb is beautifully white, as they do not quite fill the cells as long as they are not cramped for space, but leave a very small layer of air between the honey and the capping. In this the Nyasa bee compares favorably with the Italian, which seals its cells hard on the honey, and therefore cannot make white combs, and is less suitable for section production. On the other hand, if for any reason these native bees are cramped, be it narrow spacing of frames or that pollen is at the bottom of the cells, they often lay the capping right on the honey, thus making it look dark.

(To be Continued)

#### SHORT COURSE AT O.A.C., GUELPH

Beginning on January 7th, and ending January 18th, a course of practical lectures and demonstrations in bee-keeping will be given by the regular college staff and other specialists from various parts of Ontario. The following are some of the subjects to be considered: Method of Management Throughout the Whole Season's Work; Diseases of Bees and Their Treatment; Queen Rearing, etc.

Those who purpose attending this course are recommended to read "Langstroth on the Honey Bee," and also, if possible, "The A B C and X Y Z of Bee Culture," before coming. Either of these books can be obtained from the Apiculture Club of the College.

For the benefit of those who cannot attend the whole course, arrangements are being made to hold a two days' convention sometime during the course.

Information regarding the particulars and program of this course may be secured by writing to Morley Pettit, Provincial Apiarist, O. A. College, Guelph.

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**ITALIAN QUEENS**—3-banded, finest quality; raised in latitude 59°. Tested: June, \$3.00; July, \$2.50; August, \$2.00. Breeders: June, \$6.00; July, \$5.00; August, \$4.00. Rebate of 25 per cent. when purchased by the dozen. Alexander Lundgren, 12 Tomtebogatan, Stockholm, Sweden, Europe.

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**LAST** Spring we were a hundred or more colonies short in filling orders. We are prepared to book orders for ten-frame Langstroth colonies, 75 per cent. pure Italian, balance Italian and Carniolan mixed; all from Southern States in Spring. Guaranteed free from disease. R. F. Holtermann, Brantford, Ont.

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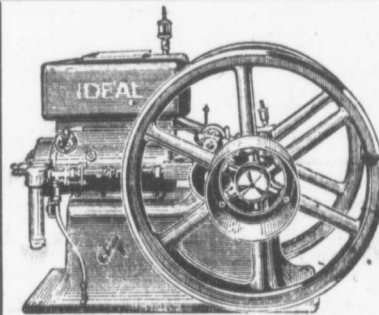
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