

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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