

FANCY MICE

COLOR CROSSES IN MICE

By C. B. COLLINS.

I WAS much interested in the article by F. E. H. in the July number of this magazine, because I too, have been crossing house mice with albinos. My motive was not purely to satisfy my own curiosity, however. I sell them to schools and to others interested in demonstrating Mendel's law. F. E. H. is certainly right about the wildness of the hybrid mice, but he neglected to say that the house mice are also extremely wild. It is commonly supposed that if a house mouse be taken while young and raised by an albino foster mother, it will develop into a tame mouse, but it will not. The wildness is inherited, and it takes more than one generation to breed it out.

F. E. H. made one slight error, but he found it out. Gray color is dominant in mice. Therefore, a cross between a gray and an albino will always produce gray offspring—not spotted or mixed in any way, but as gray as the gray parent. They seem darker while young, but that is true also of wild mice.

These all gray offspring are not contrary to Mendel's law but in accordance with it. The recessive color

(white) is there all right as will be shown later, but it cannot be seen by looking at the mice. They must be marked or kept in separate cages to prevent mistakes. They are extremely vigorous, they like to fight, may gnaw out of their cages if given a chance, and because of their extra vigor may grow a little larger than either of their parents. They breed readily with either grays or albinos, and it is only by breeding that we can be sure they are not pure gray.

If these hybrid grays are mated to each other, we might expect (according to Mendel's law) one-fourth of the offspring to be albino, one-fourth pure gray, and one-half grays like their parents. If, however, these hybrid grays are mated to albinos, half of the offspring may be expected to be albino and the other half hybrid grays. There will be no pure grays. (Zoologists call the pure grays *homozygous* grays and the hybrid grays or those carrying hidden albino inheritance *heterozygous* grays.) If the hybrid or heterozygous grays be mated to pure or homozygous grays, the offspring will be half hybrid and half pure, but they will all be gray.

All of these expectations might be realized except that the gray color in a mouse is due not to a single factor but to two factors working together. One of these factors gives the mouse color, the other gives it the cream-colored tipping of the hairs that makes the mouse gray. It takes both factors to make the characteristic color. If they become split apart as they do in this cross breeding, some of the mice will have the factor for color but not for tipping. These are the black mice F. E. H. mentions. Others will have the factor for tipping but not for color, so the tipping cannot show. These mice will be white but carrying the tipping inheritance. It will never show up, however, until some color factor is brought in. These white mice mated to blacks produce grays. (It would be interesting to see what they would produce when mated to other solid colors.)

The mating of hybrid grays with hybrid grays, then, should give us the following kinds of progeny: pure albino, albino carrying tipping inheritance, pure gray, gray carrying albino inheritance, pure black, and black carrying albino inheritance. This is probably shown best in the diagram known as Punnett's checkerboard. Let C stand for color and c for lack of color (albinism). Let T stand for tipping which gives the gray color when color is present, and t for the lack of this factor. Thus a pure albino mouse would be represented by ct, a pure gray by CT, a pure black by Ct, a gray with albino inheritance by CcTt, an albino with tipping inheritance by ccTt or ccTt, etc.

If we let the letters at the top and left of the checkerboard represent the gametes of the two parents, a mating between a pure gray and an albino would be represented as shown in figure 1. The offspring represented by the letters in the square have four gametes, CT, Ct, cT, and ct. If two of these individuals be mated, their offspring would be represented thus:

		CT
ct		CT ct

Fig. 1

		CT	Ct	cT	ct
CT		CT CT	Ct CT	cT cT	ct cT
Ct		CT Ct	Ct Ct	cT Ct	ct Ct
cT		CT cT	Ct cT	cT cT	ct cT
ct		CT ct	Ct ct	cT ct	ct ct

Fig. 2

Thus, according to the law of averages, from each sixteen young we would have one pure gray (CCTT), eight heterozygous grays, one pure black, two heterozygous blacks, three heterozygous albinos, and one pure albino.

Of course, the simplest way to test a gray mouse to see whether it is pure of heterozygous is to mate it to an albino. If the litter contains

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albinos, the gray is heterozygous. This is also the way to test blacks, but to test an albino for tipping inheritance, it is mated to a black to see if the offspring are gray.

Heredity is an absorbing study, and there are still deeper questions that might prove interesting. For example, where did F. E. H.'s "pretty cream" come from? Why do some of the third generation mice have white-tipped tails? Why are black mice gentler than grays in the same litter? Is wildness due to a factor linked with the tipping factor? I suppose it would cease to be interesting if we knew all the answers.

Dutch Mouse Markings

There is not much data available on the make-up of the Dutch pattern and less still about Dutch mice. Hence, it is interesting and profitable to carry out various experiments as a side-line—a great deal can be learned in a few years.

In head markings, two opposites persist, heavy head and light head. It will be understood that if all in a strain are heavy, then they will breed only heavy heads and the same with the light ones, just as a strain of small mice cannot be made into big ones without an outcross. But that is not the only persistence of the markings. It seems they increase in either direction, despite endeavours to bring them to the medium size of marking. One can have them in varying degrees of heaviness from the desirable medium and they will not only stay heavy but will increase the proportion of heaviness.

Consequently, one must have both heavy and light heads in a strain. Also to make it easier it is advisable to have as good percentage as possible of medium heads. If some of these mediums are of good outline then a control will be kept on the outline of the markings.

Judging Dutch Cavies

Since I am a breeder of Dutch Cavies exclusively for the past seven or eight years, and during that period having imported from England and several from Canada, I sincerely believe I know how this variety should appear.

After spending considerable time, money and patience at this delightful hobby, showing where I was able and getting the finest of results, considering that all were not the best of marking, I must at this time challenge a judge who made the awards

(Please turn to page 95)

Golden Hamsters

F. G. Carnochan writes: "I note what ALL-PETS says of the Hamster in the July Issue. The animal referred to is the European Hamster, but you should see and handle the Golden Hamster (from Syria) that we have here at our place—you would change your mind about Hamsters as pets. These are really attractive animals, not vicious and are tame as White Rats."

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