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THE OCCURRENCE OF A DOMINANT SPOTTING MUTATION IN THE HOUSE MOUSE

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The gene *W* for dominant spotting in mice was identified by one of us (1915) as having a lethal effect when present in a homozygous condition and as being independent in inheritance from the gene for piebald spotting (*sp*).

Investigations by de Aberle and others (1927) showed that the lethal effect of the gene *W* was due to anemia and that while some *WW* individuals might remain alive for ten days after birth, the majority died earlier—many of them in utero.

Recently in a strain of silvered black self mice of the formula *wwBBslslSS* an exceptional male appeared (No. 638). He had a number of small irregular white spots or streaks on his dorsal surface and a white streak on the mid-ventral line. The colored areas of his coat were also markedly paler than the typical coat color of the black silvered stock from which he arose. Various crosses of this mouse and of its descendants have given clear evidence that either a mutation of *w* to *W* or to a new allele *W'* has occurred.

Experimental.—Male 638, the exceptional spotted animal, was crossed with his self black silvered sister 639 and gave a total of 23 young of which 13 were "exceptional" spotted silvers like himself, 7 were ordinary black silvered self mice and three died before the color could be recorded.

Beginning with the offspring of the 639 × 638 mating and continuing through several generations a number of matings were made between "exceptional" spotted mice. These matings gave a total of 98 young. Of these, 52 resembled the parents, being "exceptional" spotted, 36 were self silvered and ten were *black-eyed whites*. Of these, one died at some unidentified date during the first three weeks, *one lived to be an adult mouse* and the others died at 17, 20, 20, 22, 22, 23, 25 and 26 days, respectively. In external appearance they did not differ from the black-eyed whites previously described, but their length of survival was strikingly different from that of other strains previously recorded.

We may for convenience designate the new gene for dominant spotting as W'. The formulae of the "exceptional" spotted mice would then be *W'wSSBBslsl*. Certain of these mice were then crossed with two black self females from strain *C*57. These animals were *wwSSBBS^{L}S^{L}* in formula. As expected there were two color classes in F_1. One class was black self of the fomula *wwSSBBslsl*. The other consisted of animals all of which had some ventral white and which usually had one or more small white patches on the dorsal surface. These were *W'wSSBBS^{L}sl* in genetic formula. Their ground color was not clear deep black, but was distinctly more brown and more gray than would be expected in *BB* animals.

Since the *W'wBBslsl* "exceptional" spotted mice were distinctly modified in ground color as compared with the ordinary black silvered mice, it would appear that *W'* and two "doses" of *sl* produce this change. In the *S^{L}sl* mice one would ordinarily expect that dominance of *S^{L}* would be complete as far as superficial appearance was concerned. Apparently, however, the presence of *W'* changes this expected relationship between *S^{L}* and *sl* and the ground color is definitely modified.

Through the kindness of Dr. Law of the Bussey Institution, animals heterozygous for the gene *W* were obtained. These mice were crossed with black silvered *ww* mice of the same stock as that in which the *W'* mutation had occurred. A total of 24 young was produced. Of these 17 were self and 7 spotted. Little, if any, difference between the ground color of the self *wwS^{L}sl* and the spotted *WwS^{L}sl* mice could be observed. If there is any interaction between *W* and *sl* it is very definitely less than that between *W'* and *sl*.

Further crosses between the mice derived from *C*57 black $\times$ *W^{l}w* mice were next made. Self mice from this cross, presumably *wwS^{L}sl*, were crossed *inter se* and gave 17 selfs (none of which, however, were visibly silvered). The expectation was 3 self non-silvered to 1 self silvered. The significance of the absence of silvered mice in this mating is doubtful. The *W'wS^{L}sl* mice crossed *inter se* gave a total of 17 "modified" black spotted mice like the parents, 4 self and 6 black-eyed whites of which 1 died before 30 days, *one is alive at 35 days and four grew to be adult mice.*

Attempts at breeding the adult black-eyed whites have not been very successful. One male out of two and one female out of three are all that have been found to be fertile. There are also signs that the fertility is temporary and lasts only for a very limited time.

One litter was obtained from black-eyed whites crossed *inter se.* It consisted of three black-eyed whites of which one died at 15 days, one at 19 days and one at between 35 and 40 days. One litter from a *C*57 black female *ww* was obtained by a homozygous black-eyed white male *W'W'*. It consisted of five mice all "modified" black and spotted as would be expected if they were *W'w* in formula. One outcross litter of ten young was

obtained from a *Ww* female by a *W'W'* male. There were three black-eyed whites *W'W* which died at 19, 20 and 22 days, respectively, and seven modified black spotted probably *W'w* in formula. *The one fertile black-eyed white male thus sired a total of 18 young, all of which showed that they had obtained the W' gene in the gamete derived from him.*

There remain a large number of tests both physiological and genetic which should be carried out. We shall be glad to send mice with the gene *W'* to anyone caring to do such work.

Discussion.—From even the preliminary results, it seems probable that the lethal action of the *W* gene is a manifestation of that gene itself rather than a different gene closely linked to *W*, as has been suggested by Kobozieff (1934) and others.

The gene *W'* prolongs the life of homozygotes but still has a delayed lethal or sub-lethal action resulting in complete or partial sterility. This would seem to indicate a gradation of lethal effect more difficult to reconcile with the conception of a recessive lethal gene than with a new possible allele of *W* itself. It would be necessary to assume two simultaneous mutations in nearby loci to account for the appearance of dominant spotting and lethal action in animals with gene *W'* if Kobozieff's theory is correct.

Conclusion.—We may, therefore, conclude that a new dominant spotting mutation has occurred and that *W'* probably represents a new allele of *W* definitely more viable in a homozygous condition than was the original *W* gene.

[1] de Aberle, S. B., *Amer. Jour. Anat.*, **40**, 219–249 (1927).

[2] de Aberle, S. B., Hoskins, W. M., and Bodansky, M., *Jour. Biol. Chem.*, **72**, 643–648 (1927).

[3] Kobozieff, N., *Compt. Rend. Acad. Sci.*, **198**, 617–619 (1934).

SUCCESSION OF FOSSIL FLORAS IN PATAGONIA

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The present note is devoted to the more recent discoveries of fossil plants in Patagonia and makes no attempt to review what is known of fossil plants in that region from strata older than Upper Cretaceous. The theme has to do with the Age of Flowering Plants.

Although fossil floras, made up largely of diocotyledonous leaves, have been known for many years, especially from the region on both sides of the Straits of Magellan, there has been great uncertainty regarding their age, and a tendency to confuse them with younger floras, such as those known since 1891 from the Concepcion-Arauco coalfields of Chile, and those