

SOME LINKAGE TESTS WITH WAVY MICE.

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THE wavy fur character in mice was described by F. A. E. Crew (1933). It is already visible in very young animals which have curled instead of straight whiskers. Very marked waves on the fur of the body are found when the animals are about a fortnight to a month old; later in life the waving disappears slowly and is hardly recognisable at all in old specimens. The character was shown to be a simple autosomal recessive. Recently, a very similar mutation in the mouse has been found by Keeler (1935). The new gene (waved₂, **wv**₂) is phenotypically almost identical with the waved₁ factor, and is also an autosomal recessive character. It is, however, not allelomorphic to **wv**₁.

Some **wv**₁ mice were kindly given to us by Prof. F. A. E. Crew for further studies. A few tests for linkage were carried out. Since these experiments have been discontinued and are not likely to be resumed in our laboratory in the near future, it seems advisable to communicate here briefly the results, incomplete though they are.

Mice heterozygous for pink-eye dilution (**p**₁) and **wv**₁ were back-crossed to animals homozygous for these two factors. The result is shown in Table I.

TABLE I.

$$\frac{\mathbf{P Wv}}{\mathbf{p wv}} \text{♀} \times \frac{\mathbf{p wv}}{\mathbf{p wv}} \text{♂.}$$

P Wv	P wv	p Wv	p wv	Total
64	62	67	66	259

There is thus a very good approximation to a 1:1:1:1 ratio demonstrating free segregation of **p**₁ and **wv**₁.

Another test involved the characters agouti *v.* non-agouti hair pattern (**A v. a**) and black *v.* brown coat colour (**B v. b**). A small *F*₂ generation was bred (Table II).

TABLE II.

$$\frac{\mathbf{A B Wv}}{\mathbf{a b wv}} \text{♀} \times \frac{\mathbf{A B Wv}}{\mathbf{a b wv}} \text{♂.}$$

A B Wv	A B wv	A b Wv	A b wv	a B Wv	a B wv	a b Wv	a b wv	Total
22	6	7	4	8	1	3	—	51
(21.6)	(7.2)	(7.2)	(2.4)	(7.2)	(2.4)	(2.4)	(0.8)	

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These small numbers agree sufficiently well with the expectation for independent segregation, viz. a 27 : 9 : 9 : 3 : 9 : 3 : 3 : 1 ratio.

The result for a back-cross involving the same genes is given in Table III.

TABLE III.

$$\frac{\mathbf{A B Wv}}{\mathbf{a b wv}} \text{♀} \times \frac{\mathbf{a b wv}}{\mathbf{a b wv}} \text{♂.}$$

$\mathbf{A B Wv}$	$\mathbf{A B wv}$	$\mathbf{A b Wv}$	$\mathbf{A b wv}$	$\mathbf{a B Wv}$	$\mathbf{a B wv}$	$\mathbf{a b Wv}$	$\mathbf{a b wv}$	Total
18	18	29	23	24	23	19	24	178

There is no significant deviation from the expectation for independent segregation, viz. equality of all eight classes.

A further experiment (Table IV) involved the characters intense *v*. dilute coat colour ($\mathbf{D v. d}$) in addition to the factors of Table III.

TABLE IV.

$$\frac{\mathbf{A B D Wv}}{\mathbf{a b d wv}} \text{♀} \times \frac{\mathbf{a b d wv}}{\mathbf{a b d wv}} \text{♂.}$$

$\mathbf{A B D Wv}$	$\mathbf{A B D wv}$	$\mathbf{A B d Wv}$	$\mathbf{A B d wv}$	$\mathbf{a b D Wv}$	$\mathbf{a b D wv}$	$\mathbf{a b d Wv}$	$\mathbf{a b d wv}$	Total
14	14	7	10	8	12	8	10	192
16	16	19	9	15	15	9	10	

Here again, no significant deviation from equality of the classes is found, the expectation being twelve animals in each class. Combining the data of Tables III and IV so far as \mathbf{A} and \mathbf{B} are concerned, we get the following figures (Table V).

TABLE V.

$\mathbf{A Wv}$	$\mathbf{A wv}$	$\mathbf{a Wv}$	$\mathbf{a wv}$	Total
84	87	102	97	370
$\mathbf{B Wv}$	$\mathbf{B wv}$	$\mathbf{b Wv}$	$\mathbf{b wv}$	Total
98	90	88	94	370
$\mathbf{D Wv}$	$\mathbf{D wv}$	$\mathbf{d Wv}$	$\mathbf{d wv}$	Total
53	57	43	39	192

In the case of \mathbf{A} and \mathbf{D} there is a slight excess of the two "cross-over" classes as compared with the "non-cross-overs", demonstrating that there is no linkage; in the case of \mathbf{B} there is a similarly small and similarly insignificant shortage of "cross-overs". We may therefore conclude that there is no indication in our data for linkage of \mathbf{wv}_1 with \mathbf{a} , \mathbf{b} or \mathbf{d} .

The single factor ratios of the five factors followed up in the experiments are given in Table VI.

TABLE VI.

Wv	:	wv	=	317	:	312
A	:	a	=	171	:	199
B	:	b	=	188	:	182
D	:	d	=	110	:	82
P	:	p	=	126	:	133

The only serious disturbance found is a deficiency of dilute animals, which, however, is equally distributed over "cross-overs" and "non-cross-overs", thus not influencing the result.

SUMMARY.

Breeding tests show independent segregation of the waved₁ (**wv**₁) gene in mice with the factors for pink-eye dilution (**p**₁), agouti (**a**), brown (**b**) and blue dilution (**d**).

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