12 (537)

The method of inheritance of two sex-limited characters in the same animal.

By **T. H. MORGAN.**

[*From the Department of Zoölogy, Columbia University.*]

At the last meeting of the society I reported the occurrence of a white-eyed mutant in a pedigree culture of the fly *Drosophila ampelophila.* The mutant bred to his red-eyed sisters produced 1,237 red-eyed (male and female) and 3 white-eyed (male) individuals. This sporadic occurrence within the strain is due to further sporting in the eggs of certain females. The same strain has continued to produce white-eyed mutants and these are always of the male sex.

This white-eyed condition has shown itself to be sex limited in its inheritance, *i. e.*, in certain combinations the character is transferred to one sex only. For instance—If a white-eyed male is bred to a red-eyed individual all of the offspring are red-eyed (males and females). These inbred produce red-eyed males and females and white-eyed males. The reds are to the whites as 3 to 1. Thus half of the grandsons inherit the new character but none of the granddaughters.

This result can be explained by means of a very simple hypothesis. If R = red eyes; W = white eyes, and X = the sex factor (one X being a male and XX a female); then the red female fly will be RXRX and her eggs RX and RX; the white male will be WXW and his two classes of spermatozoa WX and W. When crossed the following combinations result.

RX – RX
WX – W
RXWX – RXW
red female red male

When these individuals are paired the outcome is shown by the following formulæ:

RX – WX
RX – W
RXRX = red female
RXWX = red female
RXW = red male
WXW = white male

Another mutant that shows itself to be sex limited in inheritance has appeared in these same cultures. A few males appeared with wings half the normal length.

One of these short-winged males bred to a normal female of another stock produced long-winged males and females. These inbred have produced 5,856 long-winged males and females, and 85 short-winged males (no short-winged females). Here again the character is transmitted from the grandfather to some of his grandsons but to none of his 3,000 granddaughters.

The next question to determine is the relation in inheritance of these two characters, both sex limited. At present I can give only a provisional statement, since the experiment is still in progress.

In the experiment last described the short-winged male had red eyes. He was paired to a long-winged white-eyed female. The offspring consisted of red-eyed females and white-eyed males (the normal result for this combination). All had long wings. These were inbred and produced in the second generation red-eyed, long-winged males and females, white-eyed long-winged males and females, white-eyed short-winged males and red-eyed short-winged males.

In other words, neither white eyes nor red eyes were limited to the short-winged males.

The results are difficult to explain fully owing to the great deficiency of the short-winged forms, due possibly to incompatibility. Let R = red eyes; W = white eyes; L = long wing; S = short wing; X = the sex factor; then: RXSWS = the red-eyed short-winged male, and WXLWXL = the long-winged white female. Their germ cells will be

WXL – WXL
RXS – WS
———————————
WXLRSX – WXLWS
red ♀ long white ♂ long

The germ cells of these individuals, and the results of their combination should be:

WXL – WXS – RXL – RXS, red ♀
WXL – WS white ♂
———————————
WXLWXL = white ♀ long wings
WXLWXS = " " " "
WXLRXL = red " " "

WXLRXS = red	♀	long	wings
WSWXL = white	♂	"	"
WSWXS = "	"	short	"
WSRXL = red	"	long	"
WSRXS = "	"	short	"

NOTE ADDED NOVEMBER 20.

The converse cross, viz., short-winged, white males by long-winged, red females gives also in the second generation besides long-winged, red- or white-eyed, males and females, short-winged red- or white-eyed *males.*

Heterozygous white females (WXLWXS) by short-winged red males gives long-winged red females, short-winged red females, long-winged white males and short-winged white males.

13 (538)

The glycogenolytic strength of blood serum from the pancreatico-duodenal vein and from the femoral artery, and of lymph from the thoracic duct, as affected by stimulation of the great splanchnic nerve.

By **J. J. R. MACLEOD** and **R. G. PEARCE.**

[*From the Department of Physiology, Western Reserve University Cleveland, Ohio.*]

The distribution of diastatic ferment (glycogenase?) in the animal body would lead one to conclude that its site of production is in the pancreas. Thus:

1. Extracts of this gland possess a glycogenolytic activity which is enormously greater than that of extracts of any other gland, or of blood serum.

2. Blood serum contains the next largest amount of glycogenase.[1]

These considerations prompted us to see whether blood from the pancreatico-duodenal vein is stronger in glycogenase than blood from the femoral or carotid arteries. They were found to be the same. We have recently repeated the observations with the modification that some of the samples of blood were collected during

[1]Macleod & Pearce, *Amer. Jour. of Physiology,* 1910, xxv, p. 255; *cf.* also Wohlgemuth and Benzur, *Biochemische Zeitschrift,* 1909, xci, p. 460.