could still be detected, though not under ordinary conditions. It is therefore not unreasonable to ascribe the results of Erikson to some such process.

The question is one of considerable interest and importance for the gas ion problem. It seems it should also be of some interest from the radioactive point of view. It could easily be verified by a positive ray investigation of recoil atoms of the active deposits and it is hoped some laboratory equipped to do this work will find it worth while to undertake the measurement.

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CROSSING-OVER BETWEEN THE W AND Z CHROMOSOMES OF THE KILLIFISH PLATYPOECILUS

THROUGH the aid of a Heckscher Research Grant from the university, the writers have been conducting over the past three years a series of investigations on inheritance in certain of the Cyprinodont fishes. One of these studies has involved two sex-linked genes in the killifish *Platypoecilus maculatus:* a dominant gene for red body-color (R) and one for black spots (Sp). Bellamy[1] (22) showed that both of these characters are sex-linked and he concluded that they are members of the same allelomorphic series. He also showed that the mode of sex-determination in *Platypoecilus* is of the WZ type. Gordon[2] (27) confirmed the findings of Bellamy regarding the sex-linkage of red and spots, but believed them not to be allelomorphs since a normal red, spotted female will transmit both characters to her sons.

In the present work, crosses have been made between red, spotted fish and non-red, non-spotted (the *Gold* race of the fanciers). Two breaks have occurred in the linkage of these genes by crossing over between the W and Z chromosomes of the females. In at least one other case there is evidence that a crossover has taken place in such a way as to transfer both genes, *R* and *Sp,* from the *Z* to the *W* chromosome. The exceptional female resulting from this process was apparently of the constitution $Z_{r\ sp}\ W_{R\ Sp}$, where a normal red, spotted female is $Z_{R\ Sp}\ W_{r\ sp}$. Two different breeding tests of this exceptional female strongly support the belief that her genotype was $Z_{r\ sp}\ W_{R\ Sp}$. These tests show further that this type is best explained as the result of crossing over between the W and Z chromosomes in a female which was heterozygous for red and spots, and that such an individual can not be accounted for by non-disjunction or sex reversal. There is, of course, the very remote possibility that this fish arose by a coincidental mutation of two recessive genes to dominants. However, the fact that other crossovers have occurred between the W and Z chromosomes in the course of these studies renders the *mutation explanation* even more unlikely.

The exceptional red, spotted female was crossed to a male heterozygous for both red and spots ($Z_{R\ Sp}\ Z_{r\ sp}$). Two types of daughters were obtained from this cross: $Z_{R\ Sp}\ W_{R\ Sp}$ and $Z_{r\ sp}\ W_{R\ Sp}$. The first of these presents the unusual condition of homozygosity of sex-linked factors in the heterogametic sex. Aida[3] (21) had the same condition in the red males of *Aplocheilus latipes* ($X_R\ Y_R$). The further breeding of these homozygous females gives unusual results which might well prove confusing to one who was attempting for the first time to investigate the mode of sex determination in this fish. Crosses of such females with *Gold* (r, sp) males will give only males in the double recessive class in F_2. In this respect the cross is similar to that of a red-eyed female Drosophila with a white-eyed male, and it would suggest the XY type of sex determination. However, in the reciprocal cross of *Gold* female with red, spotted male ($Z_{r\ sp}\ W_{r\ sp} \times Z_{R\ Sp}\ Z_{R\ Sp}$), the W-Z type of sex determination is exhibited.

Another cross of the exceptional female with a Gold (non-red, non-spotted) male gave red, spotted daughters like the mother and non-red, non-spotted sons, like the father. Evidently this constitutes a case of "one-sided feminine inheritance" similar to the "one-sided masculine inheritance" observed by Schmidt[4] (20) in his studies of the *maculatus* spot in the fish *Lebistes reticulatus.* It is expected that further crosses of these red, spotted daughters with Gold males will give in turn, red, spotted female offspring, barring occasional crossovers.

Crossing over has been reported previously between the two Z chromosomes of the male fowl, and between the X and Y chromosomes of *Aplocheilus* (Aida '21) and the X and Y of the *Lebistes* (Winge[5] '23). The present work seems to involve the first case of crossing over between the sex chromosomes of an heterogametic female. A detailed report of these investigations will be published later.

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