V. THE GENETIC EVIDENCE OF A MULTIPLE (TRIPLE) ALLELOMORPH SYSTEM IN BRUCHUS AND ITS RELATION TO SEX-LIMITED INHERITANCE

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This paper concerns the origin and genetic behavior of three body color mutations, which have manifested themselves in my cultures of the so-called "four-spotted cowpea-weevil," *Bruchus quadrimaculatus,* Fabr. The wild type (male and female) have tan body and elytral color. The first mutation observed was a red body color dominant to the wild type. This mutation although it was transmitted by both sexes regardless of the previous combination manifested a marked sexual dimorphism; the females appear with red elytra and body color but the males are of the wild type (tan body and elytral color). The second mutant female was black and was likewise sex-limited in behavior because the female in pure cultures were always black while the males were always of the wild type (tan). Both sexes carried the same genes regardless of the nature of the cross. Black was dominant to the wild type (tan) but recessive to red. The third mutation to be considered in this paper was a white female. After pure lines had been isolated, it was discovered that the females had always a white body and

elytral color, but its males were of the wild (tan) type. It was found, however, on breeding these insects that both male and female transmitted white body color. It was found that white is a recessive to either red or black, but a dominant to the wild (tan) type. This order of dominance suggested to the author that these four body and elytral colors (red, black, white, and wild) might be allelomorphs. This proved true for the following reasons.

The following arguments, taken from Morgan, and others (1915) are in favor of a multiple allelomorph series. It is found that the experiments result as observed for *Bruchus* for these four factors a multiple allelomorph series.

1. That multiple allelomorphus seem to affect the same character. This is true for *Bruchus*, because each body color red, black, white, and wild or tan, affect the entire body and elytral color.

2. That an individual may contain only two genes of the allelomorph series. These may be the same gene or different members of the series. This breeding behavior was manifested in all combinations of these genes; therefore, this is true for *Bruchus*.

3. When any two mutant types of an allelomorphic series are crossed, they give a type that is like the dominant parent or intermediate, because neither brings in the normal allelomorph of the other, consequently the wild type is not reconstituted. For these mutants of ours in *Bruchus* the individuals of the second generation are like the dominant parent in each case.

4. The strongest evidence of a multiple allelomorph series is that there is no crossing over between the genes because of the nature of the theory, which demands that such genes occupy the same locus. In the thousands of offspring produced by means of various tests no crossing over was observed between the four body colors of *Bruchus*.

In all these four respects the mutants (red, black, and white) of *Bruchus* fulfill the requirements of a multiple allelomorph series.

SUMMARY

1. This paper demonstrates the genetic behavior of the inheritance of four body and elytral colors in *Bruchus quadrimaculatus*.

2. The experiments prove that any one of the four color factors can be an allelomorph with any other factor for body color. The order of dominance is red, black, white, and wild or tan.

3. The tests prove that the four factors (R, Rb, Rw, and r) for the four body colors—red, black, white, and tan constitute a multiple allelomorph system.

4. It is also proved that this allelomorphic series is a sex-limited one and not sex-linked, because every male was tan.