

eyes and other head parts. Organs may entirely fail to arise, or develop abnormally after they do arise.

In the series of double fish when both individuals or both heads, as the case may be, are of equal size they are both normal, but whenever one component is larger than the other, the larger one is almost invariably normal and the smaller is *invariably* defective. This is not only true in the present series of specimens but also in all illustrations and descriptions of double monsters which I have been able to collect from the literature.

These embryos furnish material for an analysis of the causes of many common structural defects about which there has been considerable discussion, a consideration of this phase of the subject will be given in the complete review of the experiments.

55 (1430)

A semi-lethal in *Drosophila funebris* that causes an excess of males.

By O. L. MOHR and A. H. STURTEVANT (by invitation).

[From the Zoölogical Laboratory of Columbia University, New York City.]

In the course of the genetic work on *Drosophila melanogaster* cases have been found rather frequently in which the sex ratios showed marked deviations from the usual approximate equality. Those cases in which there is a deficiency of males have been the most frequent, and the explanation of many of these has been worked out by Rawls, Morgan, Bridges, Stark, and others. They are now known to be due to sex-linked lethal genes. Less frequently cases have been noted in which there was a deficiency of females (see Quackenbush, Science vol. 32). In none of these has the explanation hitherto been discovered.

From a culture of *Drosophila funebris* we obtained one female and 87 males. This female, mated to a few brothers, produced 60 females to 103 males. Descendants of this mating have been inbred for many generations, and have given sex ratios ranging from 0 ♀ : 76 ♂ up to approximate equality. There is no obvious

relation between the sex ratio of a culture and the pedigree of the parents—in fact, two cultures from the same parents may give quite different sex ratios.

Preliminary experiments indicate that environmental conditions—especially temperature—affect the sex ratio in this line; but we are not yet able to control it at will.

In this race the females frequently have abnormal abdominal bands; but this character appears in the males only very rarely. The evidence indicates that it is this character that is influenced by environmental conditions, and that the very abnormal females do not emerge from their puparia. Dark pupæ, evidently dead, are always to be found in cultures that give a significant excess of males. A few of these have been dissected, and have been found to contain dead flies with abnormal abdomens. In the few cases in which the sex was determined, these were females.

When the race here described is crossed to unrelated races, the sex ratio in F_1 approximates 1 : 1, and the F_1 females do not have abnormal abdomens. Both characters, however, reappear in the next generation. These crosses show also that the characters are both transmitted by males as well as by females.

These data indicate that abnormal abdomen is a recessive sex-limited mutation. It commonly affects only females, and the degree of the abnormality produced is dependent on environmental conditions. When the abnormality is extreme the females do not emerge, and an excess of males results.

56 (1431)

The construction of chromosome maps.

By T. H. MORGAN and C. B. BRIDGES.

[From the Zoölogical Laboratory, Columbia University, New York City.]

The accuracy with which a chromosome map may be constructed depends upon several conditions. (1) The mutant characters employed should be carefully restricted to those cleanly separable both from the wild type and from each other, and whose viability is practically the same as that of the wild type. (2)