THE CHROMOSOMES OF PARTHENOGENETIC FROGS.

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Among the important features of interest in connection with parthenogenetic frogs are the chromosome number and the sex-determining mechanism. At the suggestion of Doctor Loeb, I have undertaken the investigation of these problems by using some of the parthenogenetic frogs and tadpoles which he has thus far raised.

Previous to 1919, Doctor Loeb had succeeded in raising twenty frogs to the adult condition. Fifteen of these were males, three were females, and the sex of the remaining two was undetermined. In 1919, he succeeded in raising 65 tadpoles to metamorphosis. One of these has metamorphosed, seventeen have been fixed for cytological purposes, five have died, and the rest are still tadpoles.

The chromosomes of the gonads of one of these adult males and of thirteen of the tadpoles have been examined. In all these individuals the number is clearly diploid. The only two spermatogoniai complexes of the adult male, sufficiently clear for study, show about twenty chromosomes distinctly and others superimposed, as previously stated. Among the cells undergoing maturation are tetrads in the late prophase stage. These tetrads appear as rings, either completely closed or slightly open at one point. They are apparently of the same form as tetrads of the normal material. Their number is clearly haploid, but an exact count has not yet been obtained. In the sections of the gonads of the thirteen tadpoles there are many complexes in which all but one or two chromosomes are entirely clear, and several mitoses in which all the chromosomes are well separated but cannot be counted with certainty because the cell has been cut in sectioning. However, the number of chromosomes in a limited number of complexes of two individuals is definitely twenty-six.

Since none of the individuals studied has the haploid number, it is probable that the diploid number is characteristic for the majority, if not for all the parthenogenetic individuals. The diploid number, as well as the similarity in form of the tetrads of the parthenogenetic and normal animals, may have been brought about by the retention of the second polar body, or by a premature division of the chromosomes without the division of the cell body just before the first cleavage. It is hoped in the near future to determine how this condition has arisen.

At the present time the mechanism producing the two sexes in both the normal and parthenogenetic frogs is undetermined. Levy in *Rana esculenta,* and Swingle in *Rana pipiens,* describe a sex chromosome in the normal male. But the evidence of neither of these authors is convincing. There are some interesting theoretical possibilities by which a predominance of parthenogenetic males over females, as indicated by the numbers so far obtained, might be produced, and it is hoped that further observations will reveal the exact mechanism.