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Heterochromosomes in mammals.

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Heterochromosomes have now been reported for the male germ cells of the following mammals: man and rat (Guyer, '10); armadillo (Newman and Patterson, '10); opossum (Jordan, '11); guinea-pig (Stevens, '11); and bat (Jordan, '12). Winiwarter and Sainmont, '09, report a longitudinally split "monosome" in the oöcyte of the cat.

A comparative study of mammalian spermatogenesis reveals the absence of typical heterochromosomes in mongoose,* cat, squirrel, rabbit and pig. Heterochromosomes are clearly present at synapsis and prophase in the primary spermatocytes of the following forms: white mouse, sheep, horse, mule, dog and bull. Regarding dog, rabbit, and the monkey, the evidence is not yet decisive.

At certain stages the heterochromosomes (chromosome-nucleoli) appear single (accessory; monosome), at others double or bipartite. The latter appearance suggests a pair of idiochromosomes; but the body is more probably a split accessory.

The absence of discernible heterochromosomes in the male, and their conspicuous presence in the female, of the cat indicates their presence in one or the opposite sex in all forms. If this hypothesis can be supported by evidence from the oöcytes of mongoose, squirrel, pig, rabbit and similar forms, cogent additional confirmation is given to the idea of a special significance of heterochromosomes, probably in connection with the determination of sex.

A simple explanation of sex-determination suggested by these and other facts — and one in apparent accord with a large body of experimental and cytological data — would seem to be to regard

* This material was collected at the temporary Marine Biological Station of the Carnegie Institution of Washington at Montego Bay on the expedition to Jamaica, B. W. I., in February and March, 1912, under the directorship of Dr. Alfred G. Mayer.

the heterochromosome-complex or "X-element" (Wilson), contributed by the spermatozoön, as an inhibitor to male sex. Regarded in terms of Mendelian concepts, however, an apparent contradiction results in that the *presence* of a determiner (inhibitor to maleness) would here have to be recessive to its *absence*. But in terms of a quantitative interpretation two X-elements in the zygote would prevent, one X-element permit, the development of male sex. Similarly with respect to the phenomenon of sex-limited heredity: the X-element may act as the inhibitor in the female to the male-limited character.

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A comparison of chemical with microchemical methods for the determination of varying amounts of glycogen in the liver.

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In collaboration with Dr. F. P. Gay, a study has been made of the glycogen in the livers of 22 rabbits, comparing the chemically determined amount with the histological appearance with a view to finding the value of the latter for comparing small differences in glycogen content. Pflüger's method was employed as far as the conversion of glycogen to glucose and for the quantitative estimation of the latter Bertrand's method was used. For the histological picture, Best's carmine method and Langerhans' modification of Ehrlich's iodine method were employed.

The following table gives the comparative results. The chemical factors are reduced to a common denominator, viz., the amount of copper which is reduced by 100 gm. of liver, and arranged from the highest to lowest amounts. The histological results are placed in a parallel column. While in the main there is faily close correlation, yet there are two striking discrepancies (No. 23 and No. 24).

This study presents, so far as we can determine, the first attempt to correlate chemical and microchemical findings with a view to utilizing the latter for comparing slight differences of glycogen in the liver. The results do not warrant the assumption