corded observations of this weird phenomenon by Ranger Marguerite Arnold."

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THE NORMALITY OF THE MATURATION DIVISIONS IN THE MALE OF DROSOPHILA MELANOGASTER

IN a recent article in SCIENCE, "Recent Discussions of the Reduction Division in *Drosophila melanogaster*," Jeffrey[1] has assailed Belar's[2] conclusion that the maturation phenomena in this form are normal. For the past six months the writer has been studying maturation and allied phenomena in the male gonads of *D. melanogaster* and, since my observations seem to explain quite simply the anomalies reported by Jeffrey in his preparations, a brief description of my results is given below.

The gonads of larvae of varying ages were quickly dissected in a 2 per cent. urea solution and transferred immediately to strong Fleming's fluid containing 1 per cent. of urea by volume. After fifteen to thirty minutes the tissue was placed in Herman's fluid containing 1 per cent. urea and fixed for three hours. This is the technique used by Painter in his translocation studies.

When primary spermatocytes stained with iron hematoxylin were first studied, the number of darkly staining elements observed was larger than was expected from the diploid chromosome number in the male, but further examination revealed a great variation in the number and size of these stained bodies. On close study, these structures could be separated into two groups, the first made up of the four tetrads, identified by their shape, and the second containing the other bodies which did not stain so intensely as the tetrads and whose shape was usually spherical. Often these spherical globules appeared quite hollow, and they exhibited no definite relation to the equatorial plane. It was variation in the amount of this second type of material which gave the impression of variable chromosome number. As these observations suggested that the material included in the second group was not chromatin, differential strains were used. After being stained with Auerbach's acid fuchsin-methyl green, the tetrads were green, while the other elements were bright red. More extensive study of numerous preparations gave the following facts: (*a*) a very large acidophilic nucleolus is present in the growth period of the first spermatocyte. It is usually spherical but it may appear as a mass of globules. (*b*) There is no regularity in the time at which the nucleolus breaks up and loses its capacity to retain the stain. In some instances it ceases to stain before the first maturation spindle is formed, while in other cells it breaks up into a number of globules which take the stain well, even as late as the telophase of this division. This behavior of the plasmosome explains the variation in the amount of the apparent chromatin in the first maturation spindle. If it disintegrates before the spindle is formed, only the tetrads are present at the time of division, while if it has fragmented but has not lost its capacity for staining, the products lie in the region of the spindle and stain with iron hematoxylin, giving the appearance of true chromatin.

There are four tetrads in the first maturation spindle, conforming in size to what might be expected from the diploid chromosomes. They divide normally with the X and Y elements segregating to the opposite poles. If plasmosomes are present in the cell, they tend to be roughly distributed to the two poles, but they are never included in the new nucleus. By the second maturation division the plasmosomes have usually disappeared and the chromosomes are easily studied. Their division at this time is normal.

These facts seem to give a simple explanation of the figures published (and demonstrated) by Jeffrey. In his cells there were two types of material, chromosomes and plasmosomes; but, due perhaps to the preservative used, the true tetrads could not be identified by their shape, as in my material. The structures described by him as "chromosomes . . . far removed from the equatorial line" are obviously the same as the deep-staining bodies which I have found in similar cells and which give an acidophilic reaction with differential stains. The irregular distribution of the plasmosome material to the cytoplasm of the two daughter spermatocytes, in my opinion, has been misinterpreted by Jeffrey as the elimination of true chromatin.

From my observations I am forced to conclude that the maturation process in *Drosophila melanogaster* is normal as far as chromosomes are concerned. Why the plasmosomic material should show such variation in the time it loses its staining capacity is not clear, unless it be due to the great rapidity with which maturation is carried on in this form.

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SAND-STORM ELECTRICITY

I HAVE read with much interest the discussions on atmospheric electricity in SCIENCE for March 30, 1928; May 3, 1929, and October 18, 1929. On June 23, 1927, I read a paper on "Some Remarkable Elec-

[1] SCIENCE, 70: 579–580, December 13, 1929.
[2] "Die cytologischen Grundlagen der Vererbung," Berlin, Gebrüder Borntraeger, 1928.