increase in rate with increasing temperature which we have observed in empty tubes.

The above provides a working hypothesis for the study of homogeneous, exothermic gas reactions. Whether or not additional hypotheses (such as that peroxide formation plays a rôle in oxidation reactions) must be provided, further study will reveal. We believe, however, that the formation and development of reaction centers with which are associated excessive amounts of energy must be of first importance.

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[4] Hinshelwood and Thompson, *Proc. Roy. Soc.*, **118A,** 170 (1928).

[5] H. A. Taylor, *J. Phys. Chem.*, **28,** 984 (1924).

ON THE MECHANISM OF CHROMOSOME BEHAVIOR IN MALE AND FEMALE DROSOPHILA

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The singular fact that the interchange of genes between a chromosome and its mate takes place only in the female of Drosophila offers a puzzle, the key to which is unknown. A clue is said by some to be furnished by the fact that this crossing-over takes place in the homogametic sex and may therefore be associated with the difference in the behavior of the sex chromosomes in the oöcytes and spermatocytes. This view is supported by the fact that in certain of the Lepidoptera where the homogametic sex is the male, the male is the sex to show crossing-over. On the other hand, rats show gene interchange between homologous chromosomes in either sex. The problem is thus open. It might be thought that were it possible through some agency to cause crossing-over in the male of Drosophila the processes through which the chromosomes pass might thus be made comparable to those of the female or vice versa if the female could be made to have complete linkage of the genes within its homologous chromosomes the mechanism could be interpreted as the same as that of the present male.

It will be recalled that in 1922[1] data were presented to show that the linkage relations of the female Drosophila could be changed from the normal percentages to complete linkage by the action of a recessive factor in the third chromosome. The influence of this factor extended to all chromosomes. Is the behavior of the chromosomes of such females like that of the males in the gonia and auxocytes? This question can be answered in the negative, the mold through which the chromosomes pass in the female is different from that of the male even where the female showed complete linkage. This is shown clearly in outcrosses of males and females homozygous for the factor for complete linkage and producing a high frequency of triploids, sex intergrades, non-disjunctional males and females, and a class of weak flies showing eyes of a fine ommatidial pattern, and slender, short bristles.

Table 1 shows the results of this cross. Where the cross is made with the male carrying the suppressor for crossing-over the progeny resulting were 862 males and 899 females. When the female is the animal carrying

TABLE 1

♀ $\frac{Bx}{+}\ \frac{Cy}{+}\ \frac{D}{+}$ X ♂ $\frac{+}{\ }\ \frac{+}{+}\ \frac{cx}{cx}$

CULTURE NO.	♂	♀
9006	147	135
9007	121	185
9032	86	67
9035	53	57
9040	75	79
9044	66	46
9102	15	22
9111	159	160
9134	140	148
	862	899

♀ $\frac{+}{+}\ \frac{+}{+}\ \frac{cx}{cx}$ X ♂ $\frac{Bx}{\ }\ \frac{Cy}{+}\ \frac{D}{+}$

CULTURE	+ ♂	BX^2 ♀	♂	♀	TRIPLOID	BX ♂	+ ♀	SLENDER BRISTLES
9033	53	43	2	1		12	13	1
9039	46	49	1	2	1	12	7	5
9103	22	39				6	15	1
9104	16	24				18	10	
9105	20	31		1		7	8	2
9106	45	61		2	2	9	18	
9107	25	23		1		11	4	1
9108	20	15			1	8	8	5
9109	37	39				10	8	2
9110	53	60				12	11	
	337	384	3	7	4	105	102	17

this factor the progeny are 337 normal males, 384 normal females, 10 sex intergrades, 4 triploids, 105 non-disjunctional males, 102 non-disjunctional females and 17 slender-bristled males. These results show clearly that the chromosomes of male and female Drosophila pass through phases which must be divergent in at least two particulars, chromosomal linkage and disjunction.

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[1] Gowen, Marie S., and Gowen, John W., "Complete Linkage in *Drosophila Melanogaster*," 1922, *Am. Naturalist*, **56**, 286–288.

NORMAL AND "RODLESS" RETINAE OF THE HOUSE MOUSE WITH RESPECT TO THE ELECTROMOTIVE FORCE GENERATED THROUGH STIMULATION BY LIGHT[1]

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I. *The Character of the Rodless Retina.*—For purposes of this paper, a very simple description of the "rodless" retina will suffice. The "rodless" retina is an arrested developmental condition of the retina in which the visual elements (rods), are completely lacking and the external nuclei are highly deficient in numbers. Differentiation of fibres from the few scattered cells representing the external nuclear layer have not as yet been detected in the external molecular layer. (Failure to demonstrate these minute fibres does not prove that they may not exist.) No visual purple is secreted in this type of eye. All other parts of the retina are normal both grossly and histologically. Complete descriptions of the character have been published previously (Keeler, 1924, 1926, 1927*c*, 1927*d*) with diagrams (Keeler, 1924) and photomicrographs (Keeler, 1927*c*).

II. *The Problem.*—Since the rods, proved to be the secretory organ of visual purple (Keeler, 1927*d*), are absent in the rodless retina, one would predict either abnormal visual function or none at all.

The second possibility, complete elimination of function, has been highly favored by training tests (Keeler, 1924, 1926, 1927*c*), by stereotropic behavior (Crozier and Pincus, 1926), by orientation upon an inclined plane when negative phototropism is opposed to negative geotropism (Keeler, 1928), by attempted luminary stimulation of animals highly sensitized by injections of strychnine (Keeler, 1928, unpublished), and by flashlight photography (Keeler, 1928, unpublished).

This latter view was attacked in three papers by A. E. Hopkins (Hopkins, 1927*a*, 1927*b*, 1927*c*). This author based his argument upon training tests conducted in Münich by himself and Prof. Karl von Frisch. He contended that (Hopkins, 1927*a*, p. 343) "the animal (with rodless