McCay cited evidence which he believed indicated that longevity in the rat is increased by limited diet. The present controlled experiments with Cladocera seem to demonstrate (1) that poor environmental conditions influence rate of development and reproduction in several different ways and (2) that longevity is influenced by environmental conditions. In the present case it is greatly influenced by suboptimal conditions. The writer's experiments are being continued.

LESTER INGLE

BIOLOGICAL LABORATORY
BROWN UNIVERSITY

ARTIFICIALLY INDUCED CROSSING-OVER IN MALES OF DROSOPHILA MELANOGASTER

SOME of our previous work on the artificial induction of breaks in somatic chromosomes in *Drosophila melanogaster* by means of x-rays[1] makes it highly probable that breakage of chromosomes in the somatic tissues of males occurs less easily than in those of females. On the supposition that this peculiarity of the male is also present in spermatogenesis, it may be expected that crossing-over is not absolutely impossible in the male, and that its absence is merely due to this low liability of male chromosomes to breakage. There is reason to expect, therefore, that crossing-over might be brought about in males by applying the same agents that increase crossing-over in females. We know that for females, temperature extremes[2] and x-rays[3] considerably increase crossing-over in the central region, *i.e.*, near the attachment point of the spindle fiber, of the long autosomes (chromosomes II and III). If our supposition that crossing-over is possible in males is correct, we may expect that these same agents will induce crossing-over in the central region of the chromosome in spermatogenesis also. In my experiments heterozygous males of *Drosophila melanogaster* in the second day of the pupal stage were placed in test-tubes and subjected to the action of x-rays (dosage – 4000 r.). About 4½ to 5 days later the adult males were crossed with homozygous females suitable for crossing-over tests. The multigenic second and third chromosome heterozygotes were chosen for the experiment.

In one of the series, the males carried in one of the second chromosomes the recessive genes atrura (a gene inducing a dark brown coloring of the eye, locus 18), plexus (inducing a plexus in the wing-veins, 100.5) and speck (inducing a black speck at the base of each wing, 107), and in the other one the normal allelomorphs of these genes. The 561 flies produced from this experiment gave 22 (3.9 per cent.) cross-overs between atrura and plexus (11 atr and 11 px sp). Another similar experiment, differing from the first in the structure of the males $\frac{\text{S} + \text{Br} + \quad +}{+ \text{ atr} + \text{px} \text{ sp}}$; S = Star, rough eyes, dominant and lethal in homozygous state, locus 2; Br = Bristled, extra sternopleural bristles, dominant and lethal in homozygous state, 21), was carried out with 830 offspring, including 17 (2 per cent.) crossovers between Bristled and plexus (9 atr and 8 S Br px sp). The control series, consisting of 1,756 flies, did not give a single case of crossing-over. In a third experiment, producing 988 flies, the x-rayed males had the structure $\frac{\text{S Br} +}{+ \; + \text{ bw}}$ (bw = brown eyes, recessive, 105) and 2 cases of crossing-over between Bristled and brown (1 S Br bw and 1 wild type) were obtained. In a fourth experiment with the second chromosome, the structure of the male being $\frac{\text{S Br} + + +}{+ \; + \text{ b cn c}}$ (b = black body, recessive, 48.5; cn = cinnabar eyes, recessive, 57.5; c = curved wings, recessive, 75.5) 142 flies gave two cases of crossing-over between black and cinnabar (2 S Br cn c).

In one experiment with a six-gene third chromosome, yielding 834 flies, (structure of the males = $\frac{\text{ru h st } \text{p}^{\text{p}} \text{ ss } \text{e}^{\text{s}}}{+ + + + + +}$; ru = roughoid, irregular eye facets and hairs, recessive, 0; h = hairy, extra hairs on scutellum, recessive, 26.5; st = scarlet, cinnabar eyes, recessive, 44; p^p = peach eyes, recessive, 48.4; ss = spineless, bristles very short, recessive, 58.5; e^s = sooty, dark body, recessive, 70.7) there was not a single case of crossing-over. But in a second experiment with the same chromosome, yielding 257 flies, the sires were males from the line atr px sp, which had given a high percentage of crossing-over in the second chromosome (see above), and 5 cases of crossing-over between scarlet and peach were obtained (2 ru h st and 3 p^p ss e^s). It may be that in the first experiment with this third chromosome certain conditions obtaining in the other experiments were absent. Nevertheless, it would seem, from a comparison of all the experiments, that the artificial induction of crossing-over in the male is accomplished with unequal ease in different lines. This problem must be investigated further.

A genetic analysis has shown that the observed crossing-over in males is not imaginary and is not the result of chromosome aberrations, *e.g.*, translocations, duplications, deficiencies or mutual translocations between two homologous chromosomes in nonhomologous points. A cytological examination, for

[1] Friesen, 1932, *Biol. Jour.* (Russian), I, Nos. 5–6.
[2] Plough, 1917, 1921.
[3] Mavor and Svenson, 1924, and Muller, 1925.

which I am indebted to Dr. I. E. Trofimoff, has also revealed a normal chromosome complement.

The fact that in all cases where it could be proved, the crossing-over in males took place in the central region of the chromosome, *i.e.*, in the same region where crossing-over is increased by x-rays in females, seems to indicate an identical mechanism of crossing-over in both sexes, and shows that the absence of normal crossing-over in males is not due to its impossibility during spermatogenesis.

HEINRICH FRIESEN

INSTITUTE OF EXPERIMENTAL BIOLOGY
MOSCOW, U. S. S. R.

THE ACTION OF AMMONIA ON PHENOLS

THE recent article by Van Slyke and Hiller on the determination of ammonia in the blood,[1] in which the blue color developed with ammonia, phenol and hypochlorite is utilized, suggests comment from us, since we have been engaged on a somewhat analogous problem.

It has long been known that ammonia (or one of its salts, or some of its organic derivatives) gives an intense blue color with phenol in the presence of an oxidizing agent, such as sodium hypochlorite. The mechanism of this reaction has not been fully cleared up, though it is believed by some that quinonechlormid is one of the products.

Phenols, in general, give various colored solutions with ammonia (or its salts) and an oxidizing agent; and from our own experience, it may be suggested that for a qualitative test, the reaction compares very favorably with the ferric chloride test. We were hopeful that one of these phenol-ammonia color reactions might lend itself to the quantitative estimation of ammonia in urine. Orr[2] had already used phenol itself for this purpose; and for a time we confined our attention to the possibility of using some phenol other than phenol itself. Some 20 different phenol and phenol-like compounds were investigated. Of this number, thymol held out the most promise; but actual comparison of thymol with phenol forced us to the conclusion that the color developed with the latter was more stable and more pronounced than that developed with thymol; and that, therefore, phenol itself was more adapted for use in quantitative colorimetric determinations.

Incidentally, we have had occasion to repeat Orr's work, and to confirm it in its main essentials. We first made up solutions of ammonium sulfate of known strength and estimated the ammonia colorimetrically by adding phenol and sodium hypochlorite, as outlined by him.

Original solution mg per cc	Estimated
.025	.026
.05	.05
.06	.06
.07	.07
.08	.08
.09	.09
.15	.16
.20	.20
.25	.24
.30	.28

We next determined the ammonia in several samples of urine (obtained from patients at the hospital) and compared the results with those obtained by Folin's aeration method.

Same	Folin method	Colorimetric estimation
1	0.36	0.39
2	0.27	0.26
3	0.31	0.32
4	0.48	0.51
5	0.54	0.54
6	0.26	0.32
7	0.44	0.45
8	0.49	0.49
9	0.50	0.51
10	0.38	0.37

It will be seen that the phenol-ammonia method compares very favorably with the method devised by Folin.

BENJAMIN HARROW
I. M. CHAMELIN
HARRY WAGREICH

THE CITY COLLEGE, COLLEGE OF
THE CITY OF NEW YORK

[1] *Jour. Biol. Chem.*, 102: 499, 1933.
[2] Orr, *Biochem. Jour.*, 18: 806, 1924.

BOOKS RECEIVED

Annual Report of the Rockefeller Foundation, 1932. Pp. 455. Illustrated. Rockefeller Foundation.

Carnegie Institution of Washington. *Contributions to Embryology.* Pp. 201. Illustrated. W. F. Roberts Company.

DARROW, KARL K. *Elementare Einführung in die Quantenmechanik.* Pp. 123. S. Hirzel, Leipzig. RM. 6.

LOTHROP, SAMUEL K. *Atitlan: An Archeological Study of Ancient Remains on the Borders of Lake Atitlan, Guatemala.* Pp. v + 122. 74 figures. Carnegie Institution of Washington.

MACELWANE, JAMES B. and others. *Physics of the Earth —Seismology.* Pp. viii + 223. Illustrated. Bulletin No. 90. National Research Council.

SCHWESINGER, GLADYS C. *Heredity and Environment.* Pp. 484. Macmillan. $4.00.

Tôhoku Imperial University. *Science Reports.* Vol. XXIII, No. 4. Pp. 633–914. Maruzen Company, Tokyo.