

DISCUSSION AND CORRESPONDENCE

THE SEX-CHROMOSOMES OF SEA-URCHINS

AT page 758 of the recently published new (third) edition of my book "The Cell in Development and Heredity" will be found a confusing inconsistency that somehow escaped attention until too late for correction in the proof-sheets. Its source lies in the following passage relating to the observations of Tenent, Baltzer and others on the sex-chromosomes of sea-urchins:

The critical evidence was obtained from forms in which the sex-chromosome is characterized by its atelomitic or non-terminal attachment, and has accordingly the shape of a V or U (*Parechinus microtuberculatus*) or of a J (*Paracentrotus*, *Toxopneustes*, *Hipponoë*, *Moira*). All the observers named, beginning with Baltzer, have found the segmenting eggs to be of two kinds, some containing one such sex-chromosome and others two, in addition to certain atelomitic chromosomes common to both.

Two errors occur in this passage. One is the inadvertent inclusion of *Toxopneustes* (which has a V-shaped "sex-chromosome") with those in which it is J-shaped or hook-shaped (*Hipponoë*, etc.). The other and more serious one is the statement that some eggs "contain one such sex-chromosome and others two." The word "two" here should be "none"—a slip which I can only explain as the result of a *lapsus calami*, and which causes the passage to be quite inconsistent with the correct statement of the facts given a few lines below.

The confusion is increased by the unlucky designation, in the succeeding paragraph, of the "sex-chromosome" or "heterochromosome" in these animals as an "X-chromosome." In point of fact, the nature of this chromosome has never been finally demonstrated. Miss Pinney labeled it as "x" in *Moira*, and elsewhere referred to it as an "odd chromosome"; but both Tenent and Baltzer proved that in fertilization it is derived from the sperm; that it is present in only half the fertilized eggs and that it is never doubled. The natural interpretation of these facts, evidently, is that the chromosome in question is a Y-chromosome, the synaptic mate of which is a rod-shaped X-chromosome that is single in the male and paired in the female. This harmonizes with Baltzer's (1913) comparison of the condition in sea-urchins to that of the *Lygaeus*-type in insects; but its correctness should be tested by study of the spermatogenesis.

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OLDER PUBLICATIONS ON COLLOIDS

I TAKE this means of calling to the attention of all scientists interested, a book entitled "On the Influence

of Colloids upon Crystalline Form and Cohesion, with Observations on the Structure and Mode of Formation of Urinary and other Calculi," by William Miller Ord, M.D. (Lond.), Fellow of the Royal College of Physicians in London, of the Linnaean Society, of the Royal Microscopical Society, etc. It was published by Edward Stanford, of London, in 1879, and sums up work that had been done by the author over the preceding 12 years. It also refers to splendid work done by Mr. George Rainy, lecturer and demonstrator at St. Thomas's Hospital as far back as 1857, most of which is buried in oubliette journals. These men and others working with them were far in advance of their time. They saw and recorded important truths at a time when the prevailing professorial practice was to relegate to the sink or the waste can anything that would not crystallize. *Bone formation* is one of the points discussed.

Attention should also be directed to a doctor's thesis of the University of London, "On the internal pressure of liquids," by H. Kneebone Tompkins, D.Sc., which Professor F. G. Donnan resurrected and published for the first time in the report of a general discussion on colloids (Faraday Soc. and Phys. Soc. of London, 1920). On pages 185 to 188 the analogies between vulcanized caoutchouc and *metals* is treated at some length.

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HONOR TO WHOM HONOR—

IN the issue of SCIENCE for September 5, 1924, pp. 208-9, I note the following:

Former President Charles W. Eliot, with his inimitable style, wrote for this tablet [on one of the buildings of the Harvard Medical School] a few words which embody so perfectly the spirit of research that they should be on the wall of every educational institution. The inscription reads: "Life is short and the art long, the occasion instant, experiment perilous, decision difficult."

A little further on comes this sentence: "Here we might well repeat Dr. Eliot's words, 'The occasion instant, experiment perilous.'"

Now I am not moved by envy of Dr. Eliot's "inimitable style" for which I have all due respect, and I heartily concur in the general estimate of the value of the sentiment, but of course the inscription is nothing more than an English version of a portion of the first of the *Aphorisms* of Hippocrates, the founder of scientific medicine. It is also, I confess, a bit disconcerting to think that at the most magnificent medical establishment in the world, anybody at all, even a janitor, if it so be, could, in answer to a visitor's inquiry, ascribe the most famous saying of the most

famous physician of all time, a veritable commonplace, to a local celebrity.

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ANOTHER ADULT "HOWLER"

THAT ancient legend about the figures in Haeckel's "Anthropogeny" seems still to be extruding pseudopodia. Thus in the *Baptist Beacon* (April, 1924, p. 14), from a page-long letter of Professor George McCready Price, one learns that "the fraudulent photographs of imaginary embryos which were published by Ernest Haeckel . . . are still going the rounds of books published in the interest of the evolution propaganda."

Remarkable man, this Haeckel! Not only did he photograph imaginary embryos—he did it twenty years before any one else had photographed real ones!

E. T. BREWSTER

LABORATORY APPARATUS AND METHODS

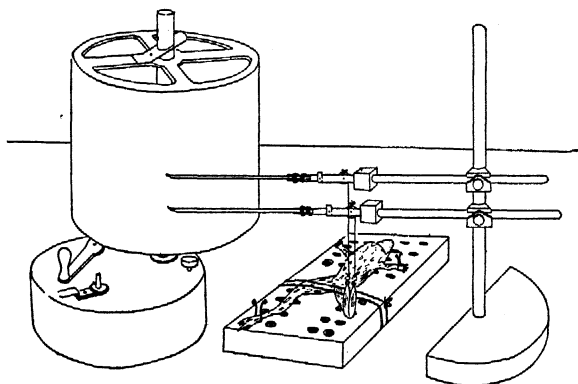
RECIPROCAL INNERVATION IN THE FROG AS A LABORATORY EXPERIMENT

AFTER examining a number of laboratory textbooks in physiology, we noticed that there was no mention made of any experiment which would illustrate the phenomenon of reciprocal reaction of antagonistic muscles. Perhaps this is due to the fact that the authors considered this experiment too difficult for elementary students of physiology, or, perhaps, that suitable apparatus was not on hand for that purpose. The only place where we did find mention made of this experiment was in Porter's textbook.

In our laboratory this has been a routine experiment for several years, and since the students have obtained such good results, with ordinary laboratory apparatus, it has been suggested to us that this fact be called to the attention of other teachers of physiology.

The apparatus we use consists of two muscle levers (Harvard Apparatus type). To the pulleys of these levers are attached the tendons of the gastrocnemius and the tibialis anticus by means of pieces of thread. The after-loading screw of the lever to which the tibialis anticus is attached is raised in order to permit the lever to descend when this muscle relaxes. The frog is fastened on the frog board which is placed under these levers. The diagram shows the exact setup of the apparatus.

We are consistently obtaining many good tracings of the antagonistic action of these two muscles, show-



ing that the experiment may be successfully and easily performed with the type of apparatus found in many physiological laboratories.

Good results may be obtained by applying a small amount of dilute acetic acid on the perineum of the frog, by stimulating in the same region with a weak tetanizing current, or with single induction shocks. We have also obtained good results by pinching the toe of the opposite foot, and by stimulating the gastrocnemius directly with single induction shocks and with the tetanizing current.

This experiment is of such fundamental importance that it occurred to us that other teachers of physiology might be interested in introducing it to the students as a standard laboratory experiment. We believe that the student can gain much by actually observing this important fact for himself.

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SCIENTIFIC BOOKS

Dynamic Psychology, An Introduction to Modern Psychological Theory and Practice. By DOM THOMAS VERNER MOORE, Ph.D., M.D. Monk of the Order of St. Benedict, professor of psychology, Catholic University of America, director of the Clinic for Mental and Nervous Diseases, Providence Hospital, Washington, D. C. Lippincott, Philadelphia, Chicago and London, 1924, pp. viii + 444.

APPROACHING the field from the points of view of physician, philosopher and psychologist working in both classroom and clinic, the author defines psychology as "the science of the human personality." His attitude on questions is a resultant of his historical knowledge of philosophy and psychology, his metaphysical dualism and practical knowledge of physiology, applied psychology and psychoanalytic method.

Among the strong points of the book may be listed the following: the treatment of the physiological and