Drosophila simulans by the action of a mutant gene. He concludes with the remark:

> It has been assumed by Goldschmidt, Hertwig, Banta, and others working with intersexes that in their animals the normal sex-determining mechanism itself was failing to function as usual. The present example shows that such an assumption can not be accepted without proof.[1]

May I be allowed to point out some very important distinctions between this present example and the best worked-out of the others, namely Goldschmidt's intersexual moths (*Lymantria*). (1) Sturtevant's intersexual *Drosophila* are all females. Goldschmidt has obtained intersexes in both sexes. (2) The gonads in Sturtevant's example are described as "minute, if present." In *Lymantria,* instead of such marked reduction occurring, the gonad is transformed, partly or wholly, into that typical of the other sex. (3) Most important of all, Sturtevant's flies appear to be all of one type or grade of intersexuality. Goldschmidt's moth intersexes, both male and female, form a continuous series from normality to complete sex-reversal. (4) Goldschmidt's analysis of his material has shown that the *Lymantria* intersexes are zygotes which have started development as individuals of one sex, but at a given point have been switched over to continue as individuals of the other sex. The degree of intersexuality depends on the point of time in development at which the change occurs. It is essential to have an analysis of the *Drosophila* case from this point of vew, before further comparison is profitable. (5) When a highly intersexual female *Lymantria* which is functional as a male is mated with a normal female, the sex-ratio in the resulting broods is what would be expected if both parents were of Z W chromosome constitution; the same is true when, instead of high-grade intersexes, such individuals of all male broods as must be supposed to be transformed females are bred from.

With these differences between the intersexuality of *Drosophila* and that of *Lymantria,* we can not be sure that the two are quite comparable, or due to the same set of causes. In conclusion, it may be said that the Columbia School itself has made it exceedingly probable that the function of the sex genes is normally to initiate one series when present in two doses; the one series of reactions allowing of the appearance of the structures and instincts of one sex, the other of those of the other sex. If this is so, then there is theoretically nothing whatever against the possibility of these series of reactions, and the physiological states to which they give rise being altered, (1) by the mutation of independent genes (as appears undoubtedly to be the case in *D. simulans*); (II) by an alteration in the balance between the sex-genes and other factors influencing development, (as would seem more than probable in *Lymantria*); or, (III) by external agencies (as apparently in Hertwig's and Kuschakewitsch's experiments on frogs and Miss King's on toads). The burden of proof, in the present state of our knowledge, lies even more on the upholders of gene-produced intersexuality than on the upholders of the balance theory, but quite possibly both are right.

Julian S. Huxley

New College, Oxford,
May 1, 1920

[1] To this list should be added Harrison, *Jour. Genetics,* 9, 1919, p. 1.

THE ORIGIN OF OIL

A. W. McCoy has published in *Journ. Geol.* XXVII. (1919), pp. 252–262, evidence that crushing oil shale converts some of the solid organic matter into oil. The conditions of the experiment seem to preclude any chance for much general heating of the mass of shale used.

Can some mathematical physicist tell us whether a strain or shear would cause a high temporary temperature at the point of rupture? The heat would be absorbed by the adjacent rock and would not greatly increase the temperature of the whole mass, unless the quantity of heat were large. Yet the temperature at some points *might be* high enough for a very short time to cause the dissociation of the organic molecules adjacent

to these points. The effect probably would be concentrated on the surfaces of maximum strain and shear.

The results of this enquiry may be of fundamental significance in theories of the origin of oil. The writer will appreciate any information thereon.

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THE CAUSES AND PREVENTION OF AFTER CORROSION ON THE BORES OF FIREARMS[1]

THE report of an experimental study, containing also a careful review of the scientific, patent, and trade literature and a compilation of empirical experiences which have variously attributed after-corrosion on oiled bores as due to powder acids, diffusing gases, primer acids, metal fouling, and chlorides.

Humidity relations, chemical examination of the corrosive residue, special ammunition, and a study of many so-called "gun oils" and "nitrosolvents" showed:

The infantry service cartridge leaves no nitrocellulose or acid residue. The after-corrosion is caused by (1) the deposition of a water soluble salt or salts capable of giving corrosive solutions, (2) the presence of a humidity high enough to form a liquid film, and (3) the presence of oxygen. In the service ammunition, the decomposition of the chlorate of the primer furnishes the only water soluble salt. Pits and tool wounds retain this, so that it can not be removed mechanically. It may be dissolved by water. Corrosion may also be prevented by stoppering the bore or by altering the composition of the primer. A number of the non-aqueous compositions sometimes recommended for cleaning rifles are of no value. Their virtues apparently rest on tests conducted at humidities so low that no corrosion could occur.

The paper is illustrated with photographs and photomicrographs. It presents a simple test for differentiating between worthless and useful "nitrosolvents" and also discusses the corrosive effects of black powder and low pressure nitrocellulose powders.

WILBERT J. HUFF[2]

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[1] Published by permission of the director of the U. S. Bureau of Mines.

SCIENTIFIC BOOKS

An Introduction to Entomology. By JOHN HENRY COMSTOCK, Professor of Entomology and General Invertebrate Zoology, Emeritus, in Cornell University. Ithaca, N. Y., Comstock Publishing Company. 1920, xviii + 220 pages, 220 figs.

The dean of American entomologists has just issued the first part of a second edition, entirely rewritten, of his long-known text-book called "An Introduction to Entomology." It covers the structure and metamorphosis of insects, and it covers these subjects in such complete and thoroughgoing way and, at the same time, in such compact manner, as to make the book by all odds the very best of extant texts to put into the hands of entomological and zoological students. It will be indispensable for beginning students; it will be very useful for advanced ones.

Such large compendiums as Berlese's (as yet only available in the original Italian), and Sharp's (in the English "Cambridge Natural History") and Packard's "Text-book of Entomology," are all of a character which limits their use in the laboratory to that of reference books; they are too extended and expensive, to say nothing of their less adapted organization and general make-up, to permit their use as actual individual laboratory handbooks. Comstock's book fills exactly the long-felt need. It contains all the knowledge up to the very present, carefully analyzed, sifted, and a great part of it actually contributed or tested by Comstock and his students, that the general student of insect structure and post-embryonic development needs to know. And it is all packed away, in perfect arrangement, with elaborate analytical contents, sufficient index and bibliography and carefully chosen illustrations, in about two

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