

### THE NEEDS OF THE MIMETIC THEORY

PROFESSOR SHULL, in his reply to my criticism of his views<sup>1</sup> objects to being "called upon to accept mimicry until it has been clearly disproved." But why not accept a theory which does give an explanation of multitudinous facts in relation to the whole subject of the coloration of insects until some other equally comprehensive theory has been adduced to compete with it?

I take exception to Professor Shull's inclusion of myself among those who "are all agreed that mimicking color, form or habit arose by one mutation": indeed, I did not know that it was possible for any one to hold that view nowadays, for it is "ancient history." My statement that "genetics are primarily concerned with the basic changes which result in *production* of a certain appearance, whereas the problem for the mimetist is not 'how or why' a habit or pattern is produced but how or why it *survives*" does not justify Professor Shull's statement that this view "implies the one-mutation origin of the imitations," nor the conclusions which he draws from this view. He does not allude to the concepts of evolution of the gene complex or to modifying factors, and I venture to quote the following by E. B. Ford from "Mimicry":<sup>2</sup> "It is well known that some of the most elaborate mimetic adaptations, involving varied and profound modifications, are controlled by the operation of a single gene. This must

have arisen spontaneously by mutation, and consequently it has been argued that the mimetic resemblances which it controls did so too.

"Such reasoning is evidently fallacious, for it will now be apparent that we have no ground for thinking that a gene exercised the same effect at its first appearance as it does to-day; a consideration first clearly stated in its evolutionary aspect by Fisher."<sup>3</sup> Ford points out that certain mimetic forms differ from each other in a manner known to be due to single-factor differences. "But we are none the less entitled to regard each of them as the product of slow and continuous evolution."

Regarding experiments with animals I do not think Professor Shull is justified in saying that "I missed most of the point to this caution." I am in complete agreement as to the necessity of careful experiments.<sup>4</sup>

Reighard's work dealt with fishes, but I have no first-hand knowledge of the subject of coloration of marine animals and concerned myself only with insects, which I have studied in nature. McAtee's results have been so severely criticized for the manner of their presentation that I preferred not to discuss them.<sup>5</sup> Finally, I agree with Professor Shull that mimicry needs a deeper foundation, but I would not therefore pay no attention to its breadth.

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## SCIENTIFIC BOOKS

### RECENT BOOKS ON PHYSICS

*An Elementary Survey of Modern Physics.* By G. F. HULL, New York, Macmillan, 1936. 457 pages. \$3.50.

"MODERN physics" is pretty well established usage for that part of the science which has developed since about 1895 and which covers electrons, positive rays, x-rays, radioactivity, atomic and molecular structure. All this might well be called atomistics or corpuscular physics, for it can not go on being called modern indefinitely.

In the college curriculum it is generally found that there is no time for such topics in the traditional one-year introductory course, so more and more it has become the custom to have second-year courses covering these modern developments. It is for such a course that Professor Hull's book is intended, and for such use it seems to the reviewer to be admirably suited. The style used is quite breezy and journalistic, but apparently not at the cost of as great accuracy as is possible in an elementary account.

This book ought to be quite useful to scientists in

<sup>1</sup> SCIENCE, 85: 496-498, 1937.

<sup>2</sup> Methuen's Monographs on Biological Subjects, pp. 106-107, 1933.

other fields than physics who never took the second course or whose physics was taken many years ago. It seems to be the best book available at present for the biologist, chemist or astronomer, who would like to read about the new developments in physics in an elementary way while yet getting something more solid than is offered in the popular books of the book trade.

Some idea of the scope of the book is given by considering the chapter headings: (1) Molecules in swarms; (2) We discover and weigh the electron. We weigh atoms and discover isotopes; (3) Simple properties of orbits; the discovery of the nuclear atom; (4) Radiation; (5) The photo-electric effect; (6) Atomic spectra and the Bohr theory; (7) X-rays; (8) Electron tubes; (9) Electrical phenomena in gases and solids; (10) The Zeeman and Raman effects; (11) Radioactivity; spontaneous transmutation of elements; (12) The beginning of artificial transmutation; (13) Cosmic rays; (14) Transmutation of the elements. Induced or artificial radioactivity; (15)

<sup>3</sup> *Trans. Ent. Soc. Lond.*, 75: 269-78, 1927. See also Fisher, *Biol. Rev.*, 6: 345-68, 1931.

<sup>4</sup> *Trans. Ent. Soc. Lond.*, October 8, 1921, pp. 2-7.

<sup>5</sup> See *Proc. Ent. Soc. Lond.*, 7: 79-105, 1932 (1933) and *ibid.*, 8: 113-126, 1934.