PUBLICATIONS REVIEWED

HUMMINGBIRDS. By Crawford H. Greenewalt. American Museum of Natural History and Doubleday and Company, New York, xxi + 250 pp., 69 color plates, 37 unnumbered ills., 1960; $22.50.

This is a truly extraordinary book for its technical achievements in photography and excellent and artistic reproduction of the results and for the scientific findings described in the text. The author, with superb command of the problems and facilities of high-speed photography, has devised a means of producing rapid electronic flashes, of thirty-millionths of a second duration, which makes it possible to stop completely the motion of flying hummingbirds. The main feature of the book is, then, the display in the color plates of 55 hummingbird species. Ten of these are of the United States and the remainder are representatives of the spectacular hummingbird fauna of the American tropics, with samples drawn chiefly from elaborate field undertakings in Venezuela, Ecuador, and Brazil. The reviewer has met in the field about half of the species and generic types portrayed and can state without reservation that these reproduced photographs yield for him esthetic and scientific values which he never could have attained fully from watching the highly active birds or from the study of the specimens of them that he has taken.

To point out but one example, the plate of the male Broad-tailed Hummingbird shows the attenuate rattle- or whistle-producing outer primary while the wing is active and loaded; this is a feature the operation of which one can only partly surmise from inspection of preserved specimens. This special device is however not, as the author states, unique, for related, although less exaggerated, structures and sounds are produced by at least two other species of the same genus.

The great effort required to obtain these photographic records leads the author to express relief that the job is finished. We hope he is not serious about this, for the work is only partly done. There are some 300 species of hummingbirds and we would like to see Dr. Greenewalt go after all of them and similarly photograph and analyze. I am sure that he, as head of the Du Pont Company, does not intend to shirk the difficult job of analyzing and making new chemicals and I think the hard work on hummingbirds is esthetically more rewarding; I would say scientifically rewarding too, but with molecular science riding high in the present era I suppose I will get few takers for that viewpoint.

The text of the book, set out in widely spaced lines, supported with excellent text figures and adorned with vignettes, comprises four chapters. The first on Behavior and Characteristics is informative and introductory but not exhaustive either of subject or the patience of an amateur reader. Greenewalt's style is lively, informal, nicely focused on essential truths, and often turned to poking a bit of fun at himself and occasionally at other persons. Chapter 4 is a brief, definitely non-technical account of equipment which lets the reader understand how in general it has been developed, but few real details are supplied. Included is information on several novel field techniques of approaching and capturing hummers.

Chapters 2 and 3 deal with iridescent color and flight, respectively. These constitute the principal scientific matter of the book and are discussions of real substance, simplified insofar as possible and devoid of technical trappings, although much aided by well-devised diagrams, drawings, and simple formulae. This material and the considerable new discoveries embodied in it are stated to be covered in more formal treatments yet to be published. It is to be regretted that there is no bibliography, nor are there really adequate modern references in text, especially in connection with these chapters. I think that neither the author nor the American Museum should feel compelled to try so hard to meet the untrained reader as to fail to provide him an avenue of access to source articles should his interests become aroused. He should not be so assiduously walled off from the pursuit of scholarship.

Some of the high points of these two chapters are: the demonstration of the importance of angle systems in the efficacy of iridescent display areas; the discussion and diagramming of the mechanism of interference colors; the finding through electron microscopy of the number, complex nature, and role of the layers of reflecting platelets, each with an optical thickness of about one-half the peak wave length of the light or color type in which it specializes; the analysis of wing length and wing beat rate in terms of the theory of mechanical oscillators; the checking of maximum horizontal air flight speed, at 27 miles per hour, and of wing position in a wind tunnel device to which the hummers voluntarily subject themselves; and the demonstration of wing position and wing thrust during hovering flight and reverse flight while the body is essentially vertical. —ALDEN H. MILLER.