Entomology

Introduction to Comparative Entomology. Richard M. Fox and Jean Walker Fox. Reinhold, New York; Chapman and Hall, London, 1964. xiv + 450 pp. Illus. $9.50.

Introduction to Comparative Entomology is novel and slightly unorthodox, but it is also a positive, dynamic, and refreshing approach to the subject.

In the first chapter, under the headings "Red Ink" and "Black Ink," the gigantic role of insects in the survival pattern of human beings is ably discussed in a comprehensive dissertation which includes a detailed summation of the injurious effects of insects on everything that man grows, wears, and uses. There is also a commendable treatise on the part that insects play in the transmission of diseases inimical to man's welfare, with a table of these diseases and their specific carriers. Internal and external parasites that cause discomfiture, and often threaten the existence of man himself as well as the livestock that he possesses, are given considerable attention, and the authors include a rather complete list of the offenders, the types, and the methods and effects of infestation, plus an excellent discussion of the biological significance of parasitism.

The role of insects as experimental animals in genetic research and an extensive review of the war against destructive pests, with analyses of methods employed and substances used in the fight, have been treated with unusual completeness by the authors. Statistics of the losses caused by insects, which reveal their general importance in the scheme of life, and a very informative and interesting treatise on the balance of nature are also in the wealth of information that develops an "inquisitive curiosity" and stimulates interest in what is to follow in the book.

The judicious incorporation of the other groups in Arthropoda for comparative studies makes more meaningful and clear the detailed exposition of anatomy, control and maintenance systems, embryogenesis, classification, and related topics. The studies are arranged in a logical sequence, presented in descriptive, convincing, and illuminating language, and supported by well-selected and well-prepared line drawings and choice bibliographical references. In all cases, origin, structure, and function are explained in terms of morphology, physiology, and ecology, often with pertinent comments on the evolutionary principles involved and, when germane, paleontological evidence.

The anatomical studies begin with the origin, formation, and articulation of the skeleton; all of the numerous and diverse appendages, with their derivations, variations, and adaptations, are described and illustrated in intricate detail. Body regions, legs, antennae, mouthparts, genitalia, wings, spines, and hairs all receive individual and scholarly attention.

The details of internal anatomy are equally voluminous and complete, including adequate consideration of the integument, musculature, blood and blood vessels, respiratory and reproductive organs and processes, nervous system, enteron, and structures for sensory perception.

The wide range of early and postovarian embryological processes is discussed under the more appropriate and comprehensive term "embryogenesis," with emphasis on life histories and genetic principles. The life stories of arthropods, from primordial germ cells to fully developed adults, are considered in two chapters, and the related and attendant physiological principles are fully explained. This extensive treatment merits far greater review than is possible in a limited critique. It is one of the outstanding features of the book, and its vast fund of detailed information represents a complete and well-illustrated account of every stage of development, which includes the most recent information and expert opinions.

This is followed by an interesting and enlightening discourse on the age-old and problematical subject of classification, including an historical résumé and consideration of all of the intricacies of group and species identification. Controversial aspects of nomenclature are reviewed, and reference is made to the efforts of the International Committee on Nomenclature to establish a universally understood procedure based upon the suitability of names that have real biological meaning. The entire story of biological names is summarized. The authors insist that taxonomy should represent a synthesis of all biological knowledge.

In the final chapters, the phylum Arthropoda is summarized in a definite classified scheme in which the general and specific features of its constituent classes and orders, with their individual characteristics, are combined. In addition to generous discussions which contain much of biological interest, there are well-organized summaries that can admirably serve for hasty major identifications.

A carefully selected bibliography and a complete index add to the worth and usability of the book, which is encyclopedic in its scope. It is a *must* for the student of entomology, a necessary handbook for the professional entomologist and agriculturist, and an invaluable reference for invertebrate and general zoologists.

SAMUEL H. WILLIAMS
420 Central Avenue, Maitland, Florida

The Muscular Dystrophies

Muscular Dystrophy in Man and Animal. Geoffrey H. Bourne and Ma. Nelly Golarz, Eds. Hafner, New York, 1963. xiv + 524 pp. Illus. $30.

The papers in this collection are from many sources, and the contributors, who were supported by a voluntary health association and, recently, by government grants, were working on a neglected problem, the muscular dystrophies. The summation of this field of interest, as it is here brought together, is helpful, although there is some unevenness that is probably inevitable in an encyclopedic undertaking of this size.

An informative section on pathology, by Pearson, serves as the introduction. Pearson's figures show striking microscopic findings that accompany degenerative changes in muscle. For making comparisons with effects of the dystrophies, a figure that shows changes after denervation would have been helpful. In a chapter on biochemistry, Schapira and Dreyfus outline creatine and creatinine metabolism associated with deteriorating muscle and discuss the electrolyte or enzyme changes of some of the myopathies. Muscular disorders with potassium imbalance and others with changes in the distribution and activity of such enzymes as aldolase, creatine-kinase, and the cathepsins are included. On the other hand, the authors include too little about the bio-

chemistry of the proteins, enzyme systems, and other constituents of normal and dystrophic muscle. Furthermore, they assert that finding an accelerated circulation time is a way to detect maternal carriers of a recessive dystrophy trait. Such a claim is out of place in a chapter on biochemistry and is moreover open to serious doubt.

The section on histochemistry, by Golarz and Bourne, reproduces microscopic illustrations from many publications, including contributions by Hill and by Dempsey and his coworkers. Parts of this chapter reflect the difficulty of new subject matter in which there are occult problems in intermediary metabolism and in which the specificity of multiple tissue-enzyme findings is difficult to assess microscopically. There are also some routine demonstrations made by established methods of neuropathology —a stain for cholinesterase of motor-end-plates, for example—and the conclusions of a series of investigators like those cited here are useful for bibliographic purposes. However, the discussion is inadequate and not what one would expect in a chapter on histochemistry of dystrophic muscle, and some of the terminology could be improved. The periodic-acid-Schiff stain is mentioned several times but is identified in the text, and in the index, only as "the PAS method." There is also a problem of critical evaluation of the reported data. For example, on page 125, optimistic claims from histochemistry for effects of treatment by "injected nucleotides (that is, procaine-3′-adenylate and nicotinamide-3′-adenylate)" should have been omitted. (The index does omit these compounds.) The authors write: ". . . it is important to recognize that histochemical methods have severe limitations. . . ." The next two chapters, one in which Pearce discusses electron microscopy and another in which he treats tissue culture methods as they are applied to muscular dystrophy problems, are both too brief in view of the importance of these subjects and the amount of work now under way on them.

The chapter on the application of electrophysiology to the myopathies contains precise data that have been gathered as a result of the long experience of Buchthal and his associates in measuring action potentials of skeletal muscle; some of these data are an extension from cited observations made by Kugelberg. Rosenfalk and Buchthal provide a careful analysis of the electromyography, although it is one in which some of the detail probably could have been summarized and tabulated. The findings in successive types of muscular dystrophies, as classified here, are quite similar to one another. The figures are instructive, and it is possible for the reader to see for himself evidence, from microelectrodes *in situ*, indicating that the excitability of dystrophic muscle exceeds that of normal muscle. Furthermore, the authors report that single-unit fibrillation potentials, such as those seen with neuropathies, also occur, not uncommonly, along with the usual low-voltage feature of the primary muscular dystrophies. This evidence may help to discourage an overemphasis on electromyography for differential diagnosis of primary myopathies where there is no myotonia problem.

Walton's instructive section on the medical management of muscular dystrophies presents examples from a rich background of clinical experience. His classification is based on natural history, and it takes genetic factors into account. In time this nosology will perhaps be simplified even further. There is now a rare category identified by Walton as congenital. The genetic types are also congenital, unless the term here is used in a special sense with respect to development. Morton, Chung, and Peters contribute a detailed analysis of genetic patterns for man and indicate some of the related developmental problems of importance in the muscular dystrophies. The nutritional myopathy attributed to dietary deficiency for several species is helpfully outlined by West, although here too the reported histochemistry offers a problem of interpretation, and West mentions that he has elected to omit an important aspect of nutritional myopathy, the biochemistry. Harman and his associates review background information on the autosomal-recessive muscular dystrophy of mice. The recent discovery of murine muscular dystrophy at the Jackson Memorial Laboratory has made possible some new investigations, including comparison of the tissue findings and analysis of the hereditary patterns. Genetic linkage of mouse dystrophy to nonpigmented pink eye color is an example of the results obtained by successful ovarian transplantation and by artificial insemination with mixed sperm for reproduction of dystrophic mice.

The chapter on another autosomal-recessive muscular dystrophy, that of New Hampshire chickens, by Julian and Asmundson, reads well. In 7 years much has been learned about dystrophy, thanks in part to the remarkable result obtained by a chicken breeder in scientific pursuit of bigger breasts and fatter thighs. The genes that control such features have proved to be complex. In this chapter the microscopic pathology is nicely demonstrated, and there is also an account of gross changes: the opaque, firm, and rubbery characteristics of these enlarged and eventually fat-filled muscles. The description of life cycles and the peculiarly localized alterations of pectoralis and other white-fiber muscles of the dystrophic chicken is useful.

In the concluding chapter Cordy offers a well-analyzed short account of the nutritional myopathies of cattle and sheep. For example, there is an epidemic type of white-muscle disease which is fatal for lambs, possibly a selenium deficiency. Cordy's discussion of such dietary problems should stimulate investigative interest.

A large body of pertinent information is available in the contributions brought together here, mainly from prior publications. There are obvious shortcomings in the editing with respect to laboratory language, repetition, and speculative digression, and there is an inconsistency in the inclusion of nutritional myopathies with muscular dystrophies while other important myopathies are not considered.

Furthermore, with such a wealth of information from laboratory studies, it is important that readers of this volume not be left with the impression that familiar types of muscular dystrophy are being distinguished diagnostically by enzyme assay, muscle biopsy, or electromyography. Reliance can be placed with more assurance on history and physical findings. The book does bring together some good contributors. Considered in its entirety, the volume is therefore a useful new reference source, the most complete now available on muscular dystrophies. The selective reader who digs for facts in any chapter will be rewarded.

JOHN F. MARCHAND
Cornell Medical College