Insect Physiology

Advances in Insect Physiology. vol. 1. J. W. L. Beament, J. E. Treherne, and V. B. Wigglesworth, Eds. Academic Press, New York, 1963. xiv + 512 pp. Illus. $15.

In the preface to this first volume of what is to be a continuing series, the editors point out that "during the past twenty years the insects have become increasingly recognized as an ideal medium for the study of all aspects of physiology." The use of "all aspects" may seem too sweeping to some, but, if we interpret it to mean fundamental structure, mechanisms, process, and relations to the environment, it is true. Individual phyla of animals all have their idiosyncrasies, but their fundamental processes of living, growing, reproducing, and reacting have much in common. So, insects are no longer studied only by entomologists; they are studied by all sorts of zoologists who find within the class Insecta ideal material for almost every sort of problem. The geneticists learned this first about 50 years ago; next came the experimental ecologists, and now in recent decades physiologists, who are commonly not primarily entomologists, are discovering the advantages of using insect material. In keeping with this view that insects are, after all, animals, the authors compare data from other phyla whenever appropriate.

This first volume contains seven review articles that range in length from 46 to 84 pages, all written by well-known workers. Four of the articles are by English authors, one by a Canadian, one by an Englishman now in the United States, and one by a Japanese. It is thus international.

It should be noted that the articles are considerably longer (two to three times longer) than those published in the *Annual Review of Entomology*. Hence, the authors have adequate space to develop their subject fully, and to include pages of tabular data.

E. H. Colhoun treats pharmacologically active substances, especially acetylcholine; R. H. Dadd treats the feeding behavior and nutrition of grasshoppers and locusts; R. A. Kilby gives an extensive treatment of the biochemistry of the insect body fat (which is metabolically far more active than vertebrate fat, since it includes a number of the activities of vertebrate liver); T. Narahashi treats the properties of insect axons, including the use of insecticides as analytical tools; K. M. Rudall discusses the chitin-protein complexes of insect cuticles; J. Shaw and R. H. Stobbart treat osmotic and ionic regulation; and D. S. Smith and J. E. Treherne treat functional aspects of the organization of the insect nervous system. The last article is the longest because numerous electron micrographs are included.

This volume is so laudable as a whole that no adverse criticisms are evident. To be sure, there are some points that I would interpret differently, but such is the prerogative of an author. In most cases the authors have carefully made clear the identity of the animal to which they refer, but Americans may smile to find reference to the "roach gall-bladder," since "roach" in the United States is a shorter name for cockroach whereas in England it is a fish. Even greater care on the part of the editors in making scientific and common names clear to both entomologists and nonentomologists would be desirable.

The appearance of this new series is most auspicious.

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Plant Analysis

Moderne Methoden der Pflanzenanalyse. H. F. Linskens and M. V. Tracey, Eds. vol. 6. B. D. Sanwal, Ed. Springer, Berlin, 1963. xxiv + 512 pp. Illus. DM. 98.

This volume in the "Modern Methods" series was designed to add to the range of compounds dealt with in volumes 2, 3, and 4. At the time volume 4 was published (1956) several growth substances, including kinetin and kinetin-like compounds, and the gibberellins were being evaluated. Some classes of compounds—for example, those with sulfhydryl groups, the phosphatides and glycolipids, lichen substances, and plant toxins—were not dealt with because of limited space and interest. Plant enzymology was just beginning to come to the fore. The present volume is designed to correct those deficiencies and bring the series up-to-date.

The individual authors follow the tradition established in the previous volumes and treat both theory and methodology. In some instances the articles are excellent general reviews, with minimal description of methods. This is particularly true when the methods available are few in number and comparatively simple to execute. Fourteen of the chapters are in German and ten are in English.

The first portion of the book is devoted to methods for determining numerous unrelated compounds. The opening chapter, on silicate binding, is competently handled by Heinen. All living cells actively in the process of dividing and growing possess relatively high concentrations of compounds that contain sulfhydryls. Stern has done an excellent job of discussing the kinds of sulfhydryl compounds that occur in tissues and then of describing suitable techniques for their determination. Although studies of the phosphatides and glycolipids in plants are in their relative infancy, Beiss has provided a useful and much needed treatment of these compounds, and we may confidently expect that plant phosphatides and glycolipids will receive more attention from plant physiologists as a result of their treatment in this volume.

Bohlmann and Sucrow consider the naturally occurring acetylenic compounds in plants. These compounds, which seem to be particularly rich in the Compositae, received little attention until about 25 years ago. One finds in this volume the most complete, available review on acetylenic alcohols and hydrocarbons. Hesse and Schmid describe what is known of the chromones and the means of analyzing these unsaponifiable lipids which, although they have figured in medicine for centuries, have received comparatively little attention from plant physiologists. The little known antibiotic, orchinol, produced by *Orchis militaris* L. is treated in detail. Perhaps the methods used to isolate it will encourage other workers to modify accepted techniques in an effort to find principles that convey relative natural immunity to disease-producing organisms. This discussion is followed by a chapter on substances that impart flavor and aroma to hops. These compounds are resins called humulones and lupulones.

Shibata, one of the best known lichen chemists, has contributed an authoritative article on lichen substances, many of which are sufficiently specific to be of use in classification. In bringing together available information on the

chemical structural systems and R_f values for a large number of substances associated with lichens, Shibata has rendered a valuable service. Miller has provided details of biological assay systems for kinetin and kinetin-like compounds. His principal concern is that the procedures he describes be used in searches for kinetin-like activity in plant extracts. The tests presented should serve satisfactorily for such surveys. Adequate chromatographic and colorimetric tests for kinetin have been developed, but Miller cautions that really satisfactory chemical methods for kinetin-like compounds wait upon future analytical methods.

Knapp gives a comprehensive treatment of methods used in work on the gibberellin family. His description is thorough and brings together a wealth of information in tabular form. Braun's article on plant toxins provides a catalog of low, medium, and high molecular-weight toxins. Several of the high molecular-weight toxins are treated in detail. Enough examples are given to furnish a usable guide for future work. In a thorough review of the world literature on erythrocyte agglutinins produced by plants, Tobiska performs an admirable job of bringing together the widely scattered literature on the subject.

In recent years, an enormous amount of attention has been given to isolating and analyzing bacterial cell walls. The scope, objectives, and general methodology are well presented by Zilliken and Lambert. While it is likely that relatively few bacteriologists will own this volume, physiologists who are concerned with algae, fungi, and higher plants will profit from the described procedures.

The last 200 pages are devoted to general methods of enzymology and to methods of preparing, purifying, and estimating metabolites by enzymatic means. Individual groups of enzymes will be covered in another volume.

Heinen has contributed a chapter on the nature of enzymatic activity, a second chapter on the general characteristics of enzymes, and, with Linkens, a chapter on the Thunberg technique. Tracey writes perceptively on the interpretation of results from enzymatic experiments. Sanwall reviews and evaluates general methods of preparing tissues, cells, and subcellular particles for enzymatic assay. His chapter is logically followed by the chapter in which Bowman and Björk consider purifying and characterizing enzymes. Bowman then draws on his extensive experience and, in a separate chapter, ably discusses the several approaches to purifying enzymes by means of ion exchange chromatography. A valuable, though, in some sections, slightly dated chapter (by Bendall) on the inhibition and activation of enzymes is included.

The final two chapters are on the use of enzymes in estimating amino acids, keto acids, coenzymes, and respiratory intermediates.

The detailed German-English and English-German index contributes greatly to the usefulness of the volume.

This volume merits a place alongside its predecessors in the series. It is of value not only to plant physiologists but can be profitably used by all who are actively working on biochemical aspects of physiology.

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Nematodes

Systema Helminthum. vol. 3, *The Nematodes of Vertebrates*. Satyu Yamaguti. Interscience (Wiley), New York, 1962. 1261 pp. Illus. $90.

Satyu Yamaguti, a well-known parasitologist, whose primary interest is trematodes, has described numerous genera and species of nematodes in this work, the third volume of a series in which the author plans to cover "all the known parasitic worms in the world." Volume 3 is divided into two parts. Part 1 begins with a 6-page account of the general morphology of nematodes; this is followed by 673 pages of keys and diagnoses. Part 2 contains a 23-page outline of the author's system of classification, 213 pages of references, 102 plates (909 figures), and a 136-page index.

The classification is divided into parts that treat the nematodes of fishes, amphibians, reptiles, birds, and mammals; each part begins with a table of contents which is followed by a key to the orders of nematodes from the particular group. An order diagnosis, key to families of the order, family diagnosis, keys to genera, generic diagnosis, and a list of species follow. The characters used in the keys are chosen for expediency. Diagnoses are concise, usually adequate, sometimes without differentiating characters; some genera are separated on the basis of host classification rather than according to morphological characters. Orders with *idea* endings, following Baylis, 1926, are used instead of superfamilies as used by Yorke and Maplestone (1926) and by B. G. Chitwood (1937), whose classification is the generally accepted standard for modern nematode taxonomists. Yamaguti's new taxa include 8 orders, 6 families, 20 subfamilies, 12 new genera, some new species, and some new combinations.

The figures, photocopies of original illustrations, are greatly reduced; sometimes they are excellent, sometimes poor. Figures of pertinent details—for example, of the esophago-intestinal complex of anisakids—are lacking. The figures are grouped on plates according to the host in a random fashion, and related genera and species are sometimes widely separated. This arrangement does not allow one to quickly classify specimens according to groups. The bibliography is up to date, and its coverage is extremely inclusive. The usual typographical errors are present, some unfortunately in scientific names, especially on the explanation of plates.

Yamaguti has improperly revived *Tropisurus* Diesing, 1835, for *Tetrameres* Creplin, 1846; and I can find no justification for his use of *Filocapsularia* Deslongchamps, 1824, for *Anisakis* Dujardin, 1845, since larval forms of both *Porrocaecum* sp. and *Contracaecum* sp. have been reported from the type host. He has improperly amended the following names, changing *onch* to *onc: Haemonchus, Onchocerca, Onchocercella,* and *Paronchocerca.*

Although Mirza (1957) emphasized the morphological similarity of the species of *Dracunculus*, Yamaguti has divided the genus into *Dracunculus* (mammals), *Ophiodracunculus* (snakes), and *Chelonidracunculus* (turtles). The artificiality of his keys sometimes results in placing species incorrectly—for example, *Monodontus floridanus* in *Necator.*

Despite the above criticisms, the enormous value of this concise two-volume work can not be overemphasized. To the serious worker and to the novice, the volume will be of inestimable value.

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