Book Reviews

Rattlesnakes. Their habits, life histories, and influence on mankind. Laurence M. Klauber. University of California Press, Berkeley, 1956. vol. 1, xxix + 708 pp., vol. 2, xvii + 709–1476. Illus. + plates. $17.50 per set.

The most striking thing about this work is its emphasis on man's relationship to rattlesnakes. While making his numerous highly technical studies of their taxonomy, the author developed a deep interest in the effect that rattlesnakes have had and still have on man; his two volumes fully reflect this interest. An invaluable chapter is devoted to Amerindians and rattlesnakes, one to post-Columbian knowledge of them, and another to myths and other popular beliefs. In addition, the man-rattler relationship appears on innumerable pages because of the author's keen sense of history: he always traces the development of sound knowledge from its beginnings in myth and fancy. For example, the 74-page chapter on the rattle includes an excellent history of the incredibly varied and often ridiculous beliefs about this unique structure. We read that the rattle-a-year belief, first printed in 1615, was seriously questioned as early as 1800. Everyone knows that its death is not yet in sight.

The next characteristics that I want to emphasize are the style and method of exposition. The author is never more technical than necessary, and his style is lucid. He takes little for granted, explaining difficult points as he goes along. The clarity and simplicity, combined with the historical approach, mean that anyone who is the least bit interested in natural history can open the book and read with fascination almost anywhere. The preceding statement is advisedly qualified because certain descriptive sections near the beginning are inherently technical and should be skipped by nonherpetologists. The general reader will find the book more and more interesting as it goes along, whereas the reverse may be true for the herpetologist.

Finally, it should be stressed that *Rattlesnakes* is definitely broader than its title. Time and time again the author goes out of his way to set forth information somewhat remotely connected with rattlesnakes. For example, three pages are devoted to the venomous snakes of the United States other than rattlers, and this discussion even includes the backfanged species, reptiles scarcely dangerous to man. Scores of additional examples could be cited. This breadth makes the two volumes a major, up-to-date source of general information on snakes for both lay reader and student. However, controversial matters often have been dealt with in too great detail, and there is repetition here and there. I believe that shorter discussions and less repetition could have reduced the length enough to have made a wider distribution certain.

The monograph as a whole can be considered to be an encyclopedia of the rattlesnakes, with this qualification: physiology as such is all but omitted, and anatomy is largely confined to structures that are important to taxonomists. Being the product of a single mind, it has a consistency lacking in some of the best encyclopedias.

Besides being one of the two leading students of rattlesnakes, Laurence M. Klauber is a pioneer in the introduction to herpetology of the statistical approach. It is not surprising, then, to find many nicely simplified explanations of statistical methods as applied to snakes. This is no mean contribution in view of the penetration of statistics into every field of science.

The first volume begins with lists of all the known forms of rattlesnakes and includes an abbreviated synonymy of each. Ranges are mapped as well as described verbally. Technical keys of the forms of six appropriate regions promote ready identification; rattlers are notoriously hard to run down in keys, and every aid will be appreciated. No detailed descriptions of species by species are given. Next comes a general account of the morphology, including the long chapter on the rattle. The rest of the volume is devoted to general natural history—such subjects as bodily functions, behavior, population, food, and reproduction are included.

Much of the second volume is a consideration of the poison apparatus and the effects of and treatment for the bite. This gives tehnical information invaluable to physicians, as well as advice that is useful to all persons who live where rattlers or even other vipers abound. Two hundred and eighty-eight consecutive pages deal, for the most part, with the relationship of man to rattlesnakes. (A chapter on legless rattlesnake enemies and those with more than two legs is included here.) It is surprising to learn in the chapter on Amerindians that 62 tribes used arrowheads poisoned with venom or another rattlesnake product. A bibliography of some 3500 titles and an extensive index conclude the book.

Both volumes are well illustrated, and each has a beautiful frontispiece in color. There are half-tone reproductions of portrait photographs of all but four of the twenty-nine known species of rattlesnakes and a great majority of the subspecies. Sixty-eight more half-tone illustrations and 121 line drawings are distributed throughout the work. Sixty-six of the latter are placed in the keys, greatly simplifying their use. A vast amount of information is summarized in 11 graphs and 58 tables.

This unique contribution stands as a monument to the erudition, industry, and literary ability of the author.

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Solid State Physics. vol. 2. Advances in research and applications. Frederick Seitz and David Turnbull, Eds. Academic Press, New York, 1956. xii + 468 pp. Illus. $10.

This is the second volume in this series to appear; present plans envision a total of about a dozen. Of the five articles comprising this volume, that by Seitz and Koehler on the displacement of atoms during irradiation accounts for a third of the pages. Seitz and Koehler's discussion is restricted by choice to the effects produced by light charged particles, with only minor mention of neutron collisions. De Launay has contributed an interesting summary of the theory of specific heats and lattice vibrations. He begins with the first theoretical explanation of the Dulong-Petit law and leads up to the present day along a path well paved with elementary derivations and ample comparison with experimental results. The application of neutron diffraction to solid-state problems is discussed by Shull and Wollan. They give an impressive picture of the variety of results on crystal and magnetic structures which have been obtained with this new research tool, which is so definitely "a product of the so-called atomic age."

The remaining two articles cover various aspects of nuclear magnetic resonance. The application of this other relatively new technique to the investi-

gation of electron paramagnetism in metals is ably presented by Knight, who has contributed so much to these developments. Pake's article is a lucid introduction to nuclear magnetic resonance and is long on discussions of relaxation times but short on other types of applications to solid-state problems (for example, one looks in vain for mention of the interesting results on the sublattice magnetization obtained by Poulis in his work on the proton resonance in an antiferromagnetic crystal).

A book like this, however, can be all things to all men. If, by chance, the particular volume contains a good article of special interest to the reader, he will be very pleased; otherwise, the tendency is to ignore entirely a given volume with its heterogeneous collection of articles and return to the less exhaustive but more coherent discussion to be found in a single-volume presentation. One can hope, though, that coherence will appear when the series as a whole is available, although the student will still require a good guide through the maze.

The book appears to have an adequate name and subject index; it is nicely composed and printed, but it has an unimaginative binding which, in my copy, quickly tore loose from the main bulk of the pages.

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Chemistry and Uses of Pesticides. E. R. de Ong. Reinhold, New York; Chapman and Hall, London, ed. 2, 1956. 334 pp. Illus. $8.75.

As stated in the preface, this book has been rewritten and brought up to date. Numerous references to the literature of 1955 are included. Citations to the literature, rather than the author's knowledge and experience, are the source of authority. The book is a compendium rather than a textbook or treatise, for it considers individual pesticidal active principles as single or pure substances, giving for each something of the chemical and physical properties, the uses for which it has been recommended, and its toxicology and pharmacology.

No important omissions have been noted, and a number of substances that are still considered experimental are mentioned. References to crops and pests are therefore incidental but can be traced through the index. Inorganic compounds are treated in 81 pages; petroleum products in 26; fumigants in 38; derivatives of plants in 30; synthetics in 96; heat, cold, dehydration and radiation in 15; and tolerances and exemptions from the requirements of tolerances of residues in two. Citations grouped at the end of each section are relied on for details of directions not to be expected in a book of this size.

There is no section on the pesticide laws and the requirements of lawful labeling, nor is there one on fertilizer-pesticide mixtures. Since the book relies so much on publications, its reliability can hardly be questioned. It should be more valuable to workers and students with a chemical background than to growers and farmers.

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Handbuch der Physik. Band XXXVI. Atome II. S. Flügge, Ed. Springer-Verlag, Berlin, 1956. 424 pp. Illus. DM. 88.

This volume of the famed *Handbuch*'s new edition contains four articles: "Quantum mechanics of the atom" by Friedrich Hund and "Statistical treatment of the atom" by Paul Gombas, both in German, and "Theory of atomic collisions," and "Excitation and ionization of atoms," both in English, by Harrie Stewart Wilson Massey. The authors write from great authority and with careful attention to the latest advances in their fields, but the vast amount of material covered in such review articles makes for a condensed style that demands much study as a prelude to understanding.

In Massey's beautiful article on atomic collisions, enough illustrative detail is provided for the simpler cases of *s*-wave scattering to make clear the essential ideas. It might nevertheless have been more helpful to the student if a few more steps had been provided at the risk of boring the experts. The article is much more general than the title indicates, and the enrichment of the calculational techniques by contributions from workers in nuclear scattering problems is evident throughout.

Massey's second article interweaves in a skillful manner a historical discussion of experimental techniques and results and a comparison with theoretical predictions. The article concludes with a description of applications of excitation and ionization to electric discharges in gases, the aurora, and so forth, thus relating the discussion to other fields.

Hund's article proceeds through a brief historical introduction, leaning heavily on the correspondence principle, to a treatment of the one-dimensional model and the approximations of perturbation theory and the method of Jeffreys (WBK). It is my impression that the emphasis on the correspondence principle is rather heavy despite its historical importance. A description of the periodic system is given; it lists the various quantum state specifications in spectroscopic notation without much discussion of how these things came to be known. However, these criticisms are of minor importance when the article is viewed as a whole, for the article provides a comprehensive summary of the symmetry characteristics of atomic systems from the point of view of group theory, the effect of electron spin, the basis for the vector model, and a discussion of approximation methods, stressing the self-consistent treatment due to Hartree.

The article by Gombas introduces the necessity for a statistical point of view which results from the complexity of the many-body problem. The basis for the treatment of atomic problems in the Fermi-Dirac statistics is noted as applying to electrons, and the simple Thomas-Fermi model is treated. Various corrections to the model such as exchange and relativistic effects are described, as well as the application of the model to the equations of state for extreme pressures and temperatures. Comparisons are made between the results given by the Hartree-Fock method and those of Fermi-Thomas statistical theory, and it is made clear that remarkable agreement between the two points of view is often possible. The general usefulness of the statistical method to questions of molecular structure and of the interaction of gamma radiation with atoms is also indicated. In addition to copious references throughout the Gombas article, an extensive bibliography with references through 1955 is given at the end.

Infrequent typographical errors and failures of the printing to register made for a small amount of confusion.

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Ninth Annual Report of the Advisory Council on Scientific Policy 1955–1956. Her Majesty's Stationery Office, London, 1956 (order from British Information Services, 30 Rockefeller Plaza, New York 20). 12 pp. $0.14.

In the United Kingdom, the member of the cabinet who is responsible for the formulation and execution of government scientific policy is the Lord President of the Council. On general questions relating to the whole field of civilian science, the Lord President is advised by an Advisory Council on Scientific Policy, which was established in 1947 and is composed of eminent men from the universities, industry, and government. The type of information contained in the annual reports of the council parallels in many instances that to be found in the reports of the U.S. National Science