Comprehensive Inorganic Chemistry. vol. 6, *The Alkali Metals,* John F. Suttle; *Hydrogen and Its Isotopes,* Robert C. Brasted. Van Nostrand, Princeton, N.J., 1957. viii + 234 pp. Illus. $6.

Volume 6 of *Comprehensive Inorganic Chemistry* will not disappoint those readers whose familiarity with earlier volumes would lead them to expect a work distinguished by an orderly marshaling of well-chosen data, clearly and concisely interpreted.

These volumes are intended to appeal strongly to the industrial inorganic chemist; part 1, on the alkali metals, places emphasis on industrial processes used in the production of commercially important compounds and on phase diagrams of aqueous and nonaqueous alkali salt systems. Thermodynamics is represented by extensive heat data, although discussion of free energy and entropy is largely lacking. There is very little information on the crystallographic properties of the various salts, and the discussion of organic compounds of the alkalis is limited to two pages. On the other hand, there is a rather surprisingly complete treatment of the behavior of the metals and of various salts in liquid ammonia.

Part 2, devoted to hydrogen and its isotopes, presents an adequate summary of the known thermodynamic and nuclear properties of hydrogen, deuterium, and tritium, as well as a thorough discussion of hydrogen chemistry. Commercially important processes, especially those used for the large-scale preparation of the gas, receive special attention.

Although clearly limited in scope, this volume, like other volumes in the series, is a valuable reference work for anyone working in the field of inorganic chemistry.

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The Species Problem. A symposium presented at the Atlanta meeting of the American Association for the Advancement of Science, 28–29 Dec. 1955. Publication No. 50. Ernst Mayr, Ed. American Association for the Advancement of Science, Washington, D.C., 1957. ix + 395 pp. Illus. $8.75; AAAS members, $7.50.

Systematists have good reason to be bored with discussions of the species problem. Nevertheless the problem does exist; it is crucial for all of biological science; and the last word on it has not been and probably never will be said. This symposium achieves novelty by bringing together statements by authors who can discuss the problem with first-hand data but who have not previously generalized from those data in just this context. The authors and their fields are as follows: H. L. Carson, population genetics; V. Grant, botany; J. L. Brooks, limnology; J. Imbrie, paleontology; T. M. Sonneborn, protozoology; J. A. Moore, embryology; and C. L. Prosser, physiology. The editor, Ernst Mayr, has contributed introductory and concluding chapters.

All but one (Sonneborn) of the authors agree with the editor as to the preferred concept of a species. They generally call this the "biological concept," thus perpetuating semantic confusion that has long troubled such discussion. Of course all concepts of species of organisms are *ipso facto* biological. This particular concept is genetical, and indeed genetical in a restricted sense. It is the concept of a species as a population (or group of populations) within which interbreeding commonly occurs but which is well or completely isolated from interbreeding with other populations. The concept has been expressed in many formally different but conceptually identical ways, and it has been discussed for generations and at great length. Restating the concept or merely subscribing to it have long since lost interest. There remain, however, difficulties in its application and questions as to its appropriateness. This symposium demonstrates that discussion of those points still has some value.

When sufficient data are available, this particular genetical concept is usually clear-cut, but it may in numerous instances be vague. That is no argument against use of the concept, because any other runs into at least as many doubtful cases. Yet the lack of a sharply decisive criterion raises problems of practical application. Moreover, the *direct* application of the concept is rarely possible. Its bearing almost always has to be judged from indirect evidence. Those two classes of problems are the principal subjects of the symposium. They are treated by all the authors, perhaps most clearly and extensively by Grant and Imbrie. There are also instances in which use of this concept, directly or indirectly, is theoretically appropriate but may be judged impractical. The one dissident author, Sonneborn, insists that this impracticality is so widespread as to rob the concept of general usefulness. His case is weakened by the fact that his own materials give quite clear-cut results under the very concept that he tends to reject. Apart from that point, Sonneborn's contribution—almost half this volume and really a book in itself— is full of new data and is a major work on some aspects of protozoology.

Let us hope (although it may be too much to hope) that this symposium is the last word on the applicability and practicability of the interbreeding concept of species for organisms that do in fact interbreed. We must look to the future for a truly general solution of the species problem, one that also takes into account the multitude of organisms that do not interbreed.

G. G. SIMPSON
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Vertebrates of the United States. W. Frank Blair, Albert P. Blair, Pierce Brodkorb, Fred R. Cagle, and George A. Moore. McGraw-Hill, New York, 1957. ix + 819 pp. Illus. $12.

The problem of determining biological materials is often formidable and frustrating to the nonspecialist, and any tool that eases the burden is welcome. The present volume is designed to enable anyone to identify, down to species, any vertebrate (except marine fishes and marine turtles) occurring in the United States. It will be used by the nonspecialist, for the specialist on each of the vertebrate groups has at his finger tips the extensive literature of his field. The book is a lineal descendant of Pratt's long-useful *Manual of Land and Fresh Water Vertebrate Animals of the United States,* which has not been available for ten years. This parentage is acknowledged in the preface, and the new book is modeled on its predecessor. The most notable departures are the inclusion of the birds and the parceling out of the sections among several authors.

The sections are not all equally successful. The section on fishes, by G. A. Moore, is excellent. The keys are presented in simple language, intelligible to a nonichthyologist, and characters likely to give trouble are usually illustrated. The sections on amphibians, by A. P. Blair, and on reptiles, by F. R. Cagle, are outstanding. Both are notable for skillful use of illustrations—often simple but effective diagrams—to supplement the wording of the keys. It is difficult for the specialist to appreciate the importance to the nonspecialist of such visual aids. The section on mammals, by W. F. Blair, is somewhat marred by emphasis on the penis bone as a character for many of the smaller rodents. This structure is difficult to prepare, and it is unrealistic to expect a nonspecialist to use it as a character successfully. Fortunately, no identifications depend wholly on characters of the penis bone. Much the weakest section is that on birds, by Pierce Brodkorb, who shows no appreciation of the obvious fact that his chapter will be used almost exclusively by nonornithologists. This section is written largely in the highly private jargon of the ornithol-

ogists, and consequently much is gibberish to anyone else. Illustrations are few and apparently capriciously chosen. Phrases such as "adult downs on apteria only," "secondaries aquintocubital," and "tarsus booted" convey no meaning whatever to me. It is revealing that the vast majority of the words defined in the glossary pertain to birds.

Despite any minor weaknesses, this book should have a long and useful life expectancy. It is a much-needed addition to the everyday working tools of the biologist.

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Modern Applied Photography. G. A. Jones. Philosophical Library, New York, 1957. vi + 162 pp. Plates. $4.75.

This little book provides a bird's-eye view of the whole field of photography as applied in science, industry, and the arts. Photography here means more than "drawing with light"; it means activating any photosensitive surface, with or without the use of conventional cameras, by means of the whole spectrum of energy. There is hardly a field of investigation, an industry, a business, or an art which does not use photography in some sense. Yet people who already use photography would profit from reading this book. Not only would it extend their horizons but it might stimulate the production of new ideas for new applications in their own fields.

The treatment is functional. Chapters deal with photography as an aid to memory, scientific recording, photography by dim and bright light, recording of color, infrared sensitivity, ultraviolet photography, radiography, atomic particles, recording and analysis of motion, photography in production, and photography as an instructor. The bibliography is skimpy; for example, one of the most significant of the new books, published in 1955, is *Research Films in Biology, Anthropology, Psychology, and Medicine,* (Academic Press, New York); it is not listed. The book might well have been enlarged by the inclusion of additional illustrative examples of the processes described. However, this would have increased its cost.

This is a book of principles to stimulate the imagination, not a book of techniques to follow. Anyone using photography professionally (today this includes everyone) can find a flaw in its coverage. I use time-lapse photomicrography in recording the behavior of animal cells in tissue culture. The book discusses time-lapse photography in the study of plant growth and of the movement of clouds, and in the teaching of patterns in ploughing a field, but, alas, does not discuss the cinephotomicrography of cells. Indeed, the author goes out of his way to say that the applications of time-lapse recording are very few; this is not in the spirit of the book, which admirably shows that the applications of photography are many.

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New Books

L'Automatique des Informations. Principes des machines (a calculer, en particulier). Opérant sur de l'information. F.-H. Raymond. Masson, Paris, 1957. 185 pp. Paper, F. 1600.

Human Relations and Power. Sociopolitical analysis and synthesis. Albert Mueller-Deham. Philosophical Library, New York, 1957. 441 pp. $3.75.

The Experimental Control of Plant Growth. With special reference to the Earhart Plant Research Laboratory at the California Institute of Technology. Frits W. Went. Chronica Botanics, Waltham, Mass., 1957 (order from Ronald, New York). 360 pp. $8.50.

Le Volume Sanquin des Poumons Chez l'Homme. Jacques Lammerant. Editions Arscia, Bruxelles, 1957. 192 pp.

Industrial Electronics Handbook. R. Kretzmann. Philips, Eindhoven, Holland; Philosophical Library, New York, 1957 (ed. 1 translated by Harley-Carter, ed. 2 revised by H. E. Kater and D. J. Mitchell). 305 pp. $12.

Industrial Electronics Circuits. R. Kretzmann. Philips, Eindhoven, Holland; Philosophical Library, New York, 1957. Translated by D. J. Mitchell. 202 pp. $10.

Water Waves. The mathematical theory with applications. J. J. Stoker. Interscience, New York, 1957. 595 pp. $12.

Steinsalz und Kalisalze, Franz Lotz. Borntraeger, Berlin, 1957. 477 pp.

Tire Dynamics. Tire marks and their relationship to vehicle velocity prior to brake application. Andrew J. White. Motor Vehicle Research, Inc., South Lee, N.H., 1956. 282 pp.

Chemistry of the Rare Radioelements. Polonium-actinium. K. W. Bagnall. Academic Press, New York; Butterworths, London, 1957. 189 pp. $5.

The Fundamental Constants of Physics. E. Richard Cohen, Kenneth M. Crowe, Jesse W. M. Dumond. Interscience, New York, 1957. 299 pp. $7.50.

Science in Progress. Tenth series. Hugh Taylor, Ed. Yale University Press, New Haven, 1957. 268 pp. $6.50.

Thermodynamics of One-Component Systems. William N. Lacey and Bruce H. Sage. Academic Press, New York, 1957. 387 pp. $8.

Progress Report in Chemical Literature Retrieval. Gilbert L. Peakes, Allen Kent, James W. Perry. Interscience, New York, 1957. 229 pp. $4.75.

Progress in Nuclear Physics. vol. 6. O. R. Frisch, Ed. Pergamon Press, New York and London, 1957. 304 pp. $14.

Nouveau Traité de Chimie Minérale. vol. III. Group 1a, *Rubidium, Césium, Francium*; Group 1b, *Généralités, Cuivre, Argent, Or.* Paul Pascal, Ed. Masson, Paris, 1957. 850 pp. Paper, F. 6000; cloth, F. 6900.

Functional Analysis and Semi-Groups. Colloquium Publ., vol. XXXI. Einar Hille and Ralph S. Phillips. American Mathematical Society, Providence, R.I., rev. ed., 1957. 820 pp. $13.80.

Progress in the Chemistry of Organic Natural Products. vol. XIV. L. Zechmeister, Ed. Springer, Vienna, 1957. 385 pp. $17.85.

Morphology of Plants. Harold C. Bold. Harper, New York, 1957. 692 pp. $8.

Tratado de Doenças das Aves. vol. 1, *Doenças Produzidas por virus;* vol. II, *Doenças Produzidas por Bactérias e Fungos;* vol. III, *Doneças Produzidas por Protozoários e Artropódes Parasitas;* vol. IV, *Doenças Produzidas por Helmintos, Doneças da Nutriçao, Donenças dos Orgãos e Aparelhos Vícios, Envenenamentos Patologia do Desenvolvimento Higiene, Terapêutica Geral e Cirúrgica.* J. Reis and P. Nóbrega. Edições Melhoramentos, São Paulo, Brasil, ed. 2, 1957. 1553 pp. (4 vols. bound in two).

The Eye Goddess. O. G. S. Crawford. Macmillan, New York, 1957. 168 pp. $10.

Gazéfication et Oxydation des Combustibles. Bases théoriques et réalisations industrielles de la conversion oxydante. Jacques Meunier. Masson, Paris, 1958. 550 pp. Paper, F. 4500; cloth, F. 5200.

Electron Impact Phenomena. And the properties of gaseous ions. F. H. Field and J. L. Franklin. Academic Press, New York, 1957. 358 pp. $8.50.

The Lipids. Their chemistry and biochemistry. vol. III, *Biochemistry.* Biosynthesis, oxidation, metabolism, and nutritional value. Harry J. Deuel, Jr. Interscience, New York, 1957. 1101 pp. $25.

Encyclopedia of Chemical Technology. First supplement volume. Raymond E. Kirk and Donald F. Othmer, Eds. Interscience, New York, 1957. 992 pp. $25.

Liver: Structure and Function. Hans Popper and Fenton Schaffner. Blakiston Div., McGraw-Hill, New York, 1957. 792 pp. $20.

Van Nostrand's Scientific Encyclopedia. Aeronautics, astronomy, botany, chemical engineering, chemistry, civil engineering, electrical engineering, electronics, geology, guided missiles, mathematics, mechanical engineering, medicine, metallurgy, meteorology, mineralogy, navigation, nuclear science and engineering, photography, physics, radio and television, statistics, zoology. Van Nostrand, Princeton, N.J., ed. 3, 1958. 1846 pp. $30.

Drying Farm Crops. Carl W. Hall. Agricultural Consulting Associates, Reynoldsburg, Ohio, 1957 (order from Edwards, Ann Arbor, Mich.). 359 pp. $7.

Nuclear Radiation in Food and Agriculture. W. Ralph Singleton. Van Nostrand, Princeton, N.J., 1958. 391 pp. $8.50.

The Ashanti. A proud people. Robert A. Lystad. Rutgers University Press, New Brunswick, N.J., 1958. 219 pp. $5.

Does Man Survive Death? A symposium. Eileen J. Garrett, Ed. Helix Press, New York, 1957. 208 pp. $3.75.

An Introduction to the Study of Stellar Structure. S. Chandrasekhar. Dover, New York, 1957. 513 pp. $2.75.