measurement of association between species and the description of a fauna. The final chapter, of especial value to this reviewer, is on productivity estimation and construction of an energy budget. Each chapter is heavily documented, with its own bibliography. A single comprehensive bibliography would have been of more value, in my opinion.

Where feasible, Southwood has drawn data from insect population studies, but studies on other invertebrates of aquatic and terrestrial habitats are included. The emphasis is on field techniques, but of necessity some laboratory experiments are cited. Throughout the text the ecological methodology is based on the biotic aspects of insect populations and relatively little is said concerning mensuration of physical factors or the important interplay between physical and biotic phenomena. This is a perfectly legitimate point of departure, but it would have been helpful to have it indicated in the book's title.

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Text in Plasma Physics

Introduction to Electrical Discharges in Gases. SANBORN C. BROWN. Wiley, New York, 1966. 296 pp., illus. $9.95.

The dramatic growth of plasma research and of the physics of ionized gases in recent years has generated new interest in the study of electrical discharges. The need for modernized textbooks covering this subject is therefore apparent. In this volume Sanborn C. Brown of M.I.T. has managed at least partially to fill this need. Being a direct descendant of Brown's earlier *Basic Data of Plasma Physics*, this new version is still classical, in the sense that it emphasizes the fundamental ingredients such as elastic and inelastic collisions, mobility, diffusion, ionization, and recombination coefficients as well as surface effects and breakdown criteria. This material is treated well and systematically, and purposely on a fairly elementary level. The description of actual types of discharges is rather fragmentary, however, and at times disappointingly sketchy. The author's own interest in high-frequency phenomena is apparent throughout the volume, and in view of their general importance this may be an asset rather than a disadvantage. Contact with several modern developments is established by inclusion of the effects of magnetic fields in the treatment of diffusion, ionization, and breakdown, as well as by brief remarks about hollow-cathode arcs and electrically driven shocks. Unfortunately, these remarks are so sketchy that they may be misleading. In fact, the discriminating reader may find fault with several passages in this book which are not altogether satisfying (such as an improper derivation of the Debye length in the discussion of ambipolar diffusion). Some readers may also be disappointed not to find discussions of recent advances in our understanding of striations, fluctuations, and instabilities, or of new developments in discharge types, as for instance brush-cathode glows, reflex discharges in magnetic fields, or high-power pulsed discharges such as theta pinches. All such material is to be considered beyond the scope of this text and is left to the student for supplemental reading in the original. It should be noted that the literature cited barely extends into 1963. The author's intentions are best summarized by his own opening statement in the preface: "This book is written as a text for a one-semester introductory course in gas discharge physics at the advanced undergraduate or early graduate level. It makes no attempt to be complete but rather attempts to survey the areas of physics involved and to illustrate the types of problems and techniques used in this branch of physics." The author certainly succeeds in keeping the book short by restricting his material mostly to the essentials of discharge physics.

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Permian Palynology

The Systematics and Distribution of Permian Miospores. GEORGE F. HART. Witwatersrand University Press, Johannesburg, South Africa, 1965. 260 pp., illus. $12.05.

The purpose of this book is to bring order out of nomenclatural chaos by presenting a uniform classification for Permian miospores. The book contains an introduction, a discussion of fundamentals of Permian palynology, 129 pages devoted to systematics, 6 pages concerned with distribution of Permian miospores, a bibliography of 199 entries, an index, and more than 400 line drawings, charts, and tables. Whether or not the author has resolved many of the nomenclatural problems is open to question. One hundred thirty-five new combinations are proposed, two new genera and two new species are described, and two genera are emended.

The classification used by Hart utilizes supergeneric categories advocated by Potonié, such as ante-turma, turma, sub-turma, and infra-turma. The major subdivisions are ante-turma Pollenites for pollen grains and ante-turma Sporites for spores.

One hundred seven of the 199 publications listed in the bibliography are Russian. A number of genera and species are described in these publications, and, to my knowledge, the illustrations in the publications are chiefly drawings. Drawings may or may not convey the proper concept of a taxon, although when used in conjunction with photomicrographs, they can serve a useful purpose, that of conveying the author's interpretation. Hart, in his acknowledgments, writes, "I have studied and photographed holotype and paratype material of Soviet permian species and examined the bulk of Soviet permian palynological literature." Thus he presumably could have illustrated the taxa proposed by Russian palynologists by means of photomicrographs. Not a single photomicrograph appears in the entire book, however. There are 410 drawings and diagrams representing pollen grains and spores. More than 30 of these drawings are duplicates serving no useful purpose. For example, figure 274 represents *Laricoidites*, whereas figure 275 is the same drawing turned upside down and represents *L. levis*. A photomicrograph of the holotype, *L. levis*, would have been of much greater value, since the original description of the species by Luber and Waltz in 1941 was illustrated only by means of a drawing.

Although some papers appearing in 1963 are cited in the bibliography, the significant contribution by Klaus, published in May 1963, is missing. Obviously Klaus's 130-page paper was not available to Hart. This is most unfortunate, for some important differences between the two authors remain unresolved. These include, for example, the acceptance of *Platysaccus*, *Striatites*, and *Strotersporites* by Klaus, with the last two genera emended, and the re-

jection of all these genera by Hart.

A number of illustrations show pollen grains of angiosperms that are irrelevant to a book concerned with Permian palynology. There are errors such as absence of authority and date, incorrect dates, and misspelled taxa; for instance, *Paraspora* should be *Parasporites*, *Hamiaepollenites* should be *Hamiapollenites*, and *Dulhuntyspora* should be *Dulhuntyispora*. Further, seven figures representing seven genera of monosaccate taxa are extracted from numerical sequence and appear on page 213. The generic names of subsequent species are not in the explanation of these figures, merely the first letter abbreviation of the genus, which could be confusing to anyone not already familiar with Permian spores and pollen grains.

This book provides an important bibliography of Russian literature and descriptions in English of taxa proposed by Russian palynologists. This information is of value to the specialist in Permian palynology. The degree to which the proposed nomenclatural changes are accepted must be based on their conformity with the rules of botanical nomenclature and will have to await the test of time.

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Liquid Ammonia

Anorganische und allgemeine Chemie in flüssigem Ammoniak. Vol. 1, part 1, of *Chemie in nichtwässrigen ionisierenden Lösungsmitteln.* JOCHEN JANDER. Vieweg, Braunschweig; Interscience (Wiley), New York, 1966. 585 pp., illus. $27.50.

Many of my contemporaries will be reminded by Jochen Jander's encyclopedic presentation of *Chemistry in Anhydrous Liquid Ammonia*—part of the (Gerhard) Jander-Spandau-Addison monograph series on Chemistry in Nonaqueous Solvents—of the outstanding scientific contributions made by three great American chemists, E. C. Franklin, C. A. Kraus, and H. P. Cady. The principle of research by analogy, tempered and modified by experiment, employed by these pioneers in establishing the chemistry of a "world" in which ammonia replaces water most certainly stimulated a tremendous amount of experimental and theoretical activity for many years.

There was a time in the '20's and early '30's when the followers of Franklin, Kraus, and Cady constituted a veritable "school" of liquid ammonia chemists. They liked to experiment with liquid ammonia as a solvent, much as the present nuclear magnetic resonance, electron spin resonance, infrared, chromatographic, polarographic, and what-not specialists attempt to use their instrumental devices to solve all manner of chemical problems. This group drew new disciples into its ranks. Many of them extended their research activities to explore chemical and physicochemical phenomena in other nonaqueous solvents. A school of nonaqueous solvent chemists developed in the '40's and early '50's. Yet today there are relatively few who devote themselves to the study of nonaqueous solvents per se. We have reached a stage where we can reasonably predict which of a number of nonaqueous solvents one might use to advantage in carrying out specific chemical reactions. Liquid ammonia has become a widely used reaction medium.

Some of our "modern" younger chemists will look down their sophisticated scientific noses at Jander's adherence to the "solvent system concept," a conceptual picture first promulgated by Franklin; but for systematizing the chemistry of nitrogen compounds in their relationship to ammonia as a parent substance and for elucidating the behavior of substances dissolved in liquid ammonia, it has withstood the onslaught of time. Furthermore, it places the emphasis on good, sound, experimentally demonstrable, *useful* chemistry.

Errors are bound to creep into a compilation which attempts to cover the entire literature of inorganic liquid ammonia chemistry, but these are minor. Jander uses a year/number reference system in his bibliographical citations which does not conform with the two previously published monographs in the series. English versions of the editor's and author's prefaces are included. That of the author's preface is at best a poor literal translation and in some places does not even convey the real meaning of the author's German *Vorwort*.

This monograph, the companion monograph (volume 1, part 2, in the series) by Herchel Smith on *Organic Reactions in Liquid Ammonia* (in English), and volume 4, *Chemistry in the Lower Fatty Acids and Derivatives*, are the only volumes to have appeared thus far. We can only hope that the remaining monographs projected for the ambitious eight-volume compilation, initiated by the present author's father in 1956, will appear more promptly.

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New Books

Abstract Algebra. Chih-Hah Sah. Academic Press, New York, 1966. 358 pp. Illus. $9.75. Academic Press Textbooks in Mathematics Series.

Advances in Alicyclic Chemistry. vol. 1. Harold Hart and G. J. Karabastsos, Eds. Academic Press, New York, 1966. 405 pp. Illus. $16.50. Five papers.

Advances in Applied Microbiology. vol. 8. Wayne W. Umbreit, Ed. Academic Press, New York, 1966. 395 pp. Illus. $14. Ten papers.

Advances in Atomic and Molecular Physics. vol. 2. D. R. Bates and Immanuel Estermann, Eds. Academic Press, New York, 1966. 496 pp. Illus. $16.50. Seven papers.

Advances in Chemical Engineering. vol. 6. Thomas B. Drew, John W. Hoopes, Jr., Theodore Vermeulen, and Giles R. Cokelet, Eds. Academic Press, New York, 1966. 469 pp. Illus. $17.50. Five papers.

Advances in Communication Systems: Theory and Applications. vol. 2. A. V. Balakrishnan, Ed. Academic Press, New York, 1966. 342 pp. Illus. $13.50. Seven papers.

Advances in Computers. vol. 7. Franz L. Alt and Morris Rubinoff, Eds. Academic Press, New York, 1966. 319 pp. Illus. $14. Six papers.

Advances in Inorganic Chemistry and Radiochemistry. vol. 9. H. J. Emeléus and A. G. Sharpe, Eds. Academic Press, New York, 1966. 400 pp. Illus. $15.50. Six papers.

Advances in Oral Biology. vol. 2. Peter H. Staple, Ed. Academic Press, New York, 1966. 237 pp. Illus. $12. Six papers.

Alchemy, Medicine, Religion in the China of A.D. 320: The Nei P'ien of Ko Hung (Pao-p'u tzu). Translated from the Chinese by James R. Ware. M.I.T. Press, Cambridge, Mass., 1966. 404 pp. $15.

Algebraic Linguistics: Analytical Models. Solomon Marcus. Academic Press, New York, 1967. 266 pp. Illus. $12.

Applied Ore Microscopy: Theory and Technique. Hugo Freund, Ed. Translated from the German by Carlo G. I. Friedlaender and George Aletan, Macmillan, New York, 1966. 648 pp. Illus. $37.50. Eight papers extracted from *Handbuch der Mikroskopie in der Technik* (1954 and 1960).

Archeological Chemistry. A symposium (Atlantic City, N.J.), September 1962. Sponsored by the Division of History of Chemistry, American Chemical Society.

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