active audience of any given lecture. The number is, in general, small. This most amusing and occasionally enlightening book contains generally useful introductions to the subjects mentioned.

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Origin of the Angiosperms

The Spores and Pollen of the Potomac Group of Maryland. Gilbert J. Brenner. Department of Geology, Mines, and Water Resources, Baltimore, Md., 1963. ix + 215 pp. Illus. Paper, $2.50; cloth, $3.50.

This volume represents the first comprehensive work on Lower Cretaceous spores and pollen published in the United States. Brenner describes all the pollen, spores, and algae (130 forms) that he found in the Potomac Group; the work is based on a study of 43 rock samples from three stratigraphic sections, two of them from bore holes and one from surface exposures.

The most significant finding in Brenner's publication concerns the time when flowering plants first evolved. Rocks of the Potomac Group in Maryland compose the classic American Lower Cretaceous section, in which the entrance of angiosperms in the fossil record is documented. In 1911 E. W. Berry had reported that, of the three rocks units of the Potomac Group, only the uppermost (the Patapsco Formation) contained unequivocal angiosperm fossils, and these appeared at the base of that unit and above. From the middle and lowest formations (the Arundel and the Patuxent), Berry recorded a few "thoroughly questionable angiosperms" associated with a rich flora of lower plants. Brenner's pollen evidence corroborates, in a convincing way, Berry's conclusions from fossil leaves. He found that undoubted (tricolpate) angiosperm pollen is present throughout the Patapsco Formation in three sections and is absent from the middle and lowest formations of the Potomac Group. In addition, Brenner found a few monosulcate pollen grains throughout the Potomac Group; monosulcate pollen is known to occur in living Angiospermae as well as in Gymnospermae.

Brenner summarizes the known leaf and pollen record of angiosperm occurrences in the Lower Cretaceous, and he concludes that the earliest unequivocal angiosperm leaves and pollen occur in strata of Albian age (late Early Cretaceous) in Portugal, northern Europe, and in the New World. This conclusion is interesting in the light of current theories that angiosperms had their origin during the Paleozoic. Those arguments would be more convincing if they were based on undoubted fossil evidence.

Happily, this volume takes careful account of existing valid names for fossil pollen and spores and follows the International Code of Botanical Nomenclature. (Sadly, not as much can be said for every American work on fossil pollen.)

In my opinion, the stratigraphic and taxonomic work is well done. A minor objection is Brenner's usage of the term *microflora* to mean an assemblage of pollen and spores. The term refers to either a small flora or entire microscopic plants; it should not be applied to the microscopic parts of vascular plants.

In summary, the volume is a significant contribution to the literature on pollen and spores in this country.

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History of Science

The History of Sciences in India. Proceedings of the symposium held at Calcutta, August 1961. P. Maheshwari, Ed. National Institute of Sciences of India, New Delhi, 1963. viii + 343 pp. Illus. Paper, R. 13.75.

The essays in this symposium are subdivided into four main sections: (i) Social and International Relations in the Development of Sciences (teaching, methodology, and the like in the history of sciences), (ii) Agriculture and Chemistry, (iii) Biology, Health, and Medicine, and (iv) Astronomy, Mathematics, and Earth Sciences. Most of the papers in the first section are of a general nature, but this is the only factor that binds them together, for they vary considerably in particular focus. N. K. Bose, for example, has written articles on the classification of soils and on the classification of temples; S. N. Sen has chosen the study of the transmission of scientific ideas between India and foreign countries in ancient and medieval times; V. R. Shastry discusses science in the Vedas; and A. Rahman, in addition to collaborating on other articles, has written on the theoretical aspects of the history of science. There are 12 papers in the first section.

Of the four papers in the second section, three are devoted to the history of agriculture in ancient India and the fourth, by B. V. Subbarayappa, to Indian atomism. The third section contains 12 papers that range from the need for the creation of medico-historical museums to essays on the history of botany in early India and discussions of various phases of the growth of medicine and pharmacy. Of the half dozen papers in the fourth section, four are devoted to the history of mathematics, including S. Chakrabarti's interesting comparative essay on the origins of the ideas of mathematical analysis (a discussion of Archimedes and Bhaskara). The two remaining essays are devoted to geography and aeronautics in ancient India.

In general, this volume represents the growing concern in India for an understanding of the history of science as part of its own national history. While the diversity of the collection testifies to the awareness of the problems involved in this undertaking, the irregular quality of the contributions highlights the limited nature of the solutions offered. The task is enormous, but it is under way, at least for the ancient and medieval periods. It can only be warmly encouraged.

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Conference Report

Advance in Mass Spectrometry. Proceedings of a conference held at Oxford in September 1961. R. M. Elliott, Ed. Pergamon, London; Macmillan, New York, 1963. xviii + 628 pp. Illus. $20.

This volume contains the proceedings (44 papers) of a conference on mass spectroscopy and some of its applications. Although the conference, which was attended by many authorities in the field, was sponsored by British and American mass spectroscopists, it can properly be called international, for authorities from other countries contributed many papers. The papers are distributed among five general sections:

Mass Spectroscopy in Research; Mass Spectroscopy of Inorganic Compounds; New Instruments and Techniques; Mass Spectroscopy of Organic Compounds (pt. 1, Theory and correlation of spectra; pt. 2, Mass spectra and analysis); and Ionization and Dissociation. The individual papers are followed by comments and discussion. The volume also contains a rather complete bibliography on work in mass spectroscopy during the period 1958 through 1960.

A substantial portion of the volume is devoted to problems of chemistry, reflecting in part the interests of the sponsors of earlier similar conferences and in part the fact that the mass spectrometer is a powerful tool for conducting studies in physical chemistry or making chemical analyses. Nevertheless, there are interesting papers on new instruments and on applications to fields other than chemistry. Those interested in chemical kinetics, ion-molecule reactions, and other fields where mass spectroscopy can be used as a tool will find the volume quite valuable. Others will find it valuable as a means of keeping abreast of some of the latest developments in instrumentation and in the application of techniques to a variety of fields. Interesting points are brought out in the discussion that follows the papers.

Since the book consists of both invited and contributed papers, with the authors having liberty to choose their own topics, it lacks the cohesion and organization one would find in a book written by one person. On the other hand, the papers and discussions by so many outstanding authorities give the reader an opportunity to gain a feeling for some of the latest work and thinking in parts of the field. The production of the book is well done, and the numerous figures and photographs are excellent.

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Note

Mathematics

Twenty-one papers published between 1953 and 1961 are reprinted in this volume, **The Mathematical Works of J. H. C. Whitehead**: vol. 4, *Algebraic and Classical Topology* (Pergamon, London; Macmillan, New York, 1963. 361 pp. $12.50), edited by I. M. James. Although a wide variety of subjects is covered, one can distinguish several connected "blocks." One such block (consisting of papers Nos. 64, 79, 74, 78, 87, and 82 of the general list) deals with work (carried out in collaboration with E. H. Spanier) concerned with S-theory and duality. This theory is an attempt to achieve greater regularity and more algebraic structure in homotopy theory by passing to direct limits under suspensions. Another block of papers (Nos. 69, 70, 71, and 72), mainly in collaboration with I. M. James, is devoted to fiber spaces and fiber bundles.

In 1958, Whitehead, stimulated by the successes of Bing and Papakyriakopoulos, regained his interest in classical topology of Euclidean spaces and combinatorial manifolds. The results are presented in another block of papers (Nos. 81, 83, 84, 86, 88, and 90). Of these papers, No. 84 (with Arnold Shapiro) is a priceless gem. Of the remaining five papers, special mention should be given to No. 89. It is a substantial paper in differential topology, a subject exceptionally dear to Henry's heart. There is not much doubt that, had his life not been so suddenly interrupted, this is the direction in which his energies would have been applied.

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New Books

General

Ancient and Medieval Science. From the beginnings to 1450. René Taton, Ed. Translated from the French edition (Paris, 1957) by A. J. Pomerans. Basic Books, New York, 1964. 572 pp. Illus. $17.50.

The Atlas of Britain and Northern Ireland. Planned and directed by D. P. Bickmore and M. A. Shaw. Oxford Univ. Press, New York, 1963. 234 pp. Plates. $100.

Atomic Energy Encyclopedia in the Life Sciences. Charles Wesley Shilling, Ed. Saunders, Philadelphia, 1964. 500 pp. Illus. $10.50.

Biology of Birds. Wesley E. Lanyon. Doubleday, New York, 1964. 187 pp. Illus. $3.95. A popularization published for the American Museum of Natural History.

The Brain as a Computer. F. H. George. Pergamon, London; Addison-Wesley, Reading, Mass., 1962. 421 pp. Illus. $9.

Cereal Crops. Warren H. Leonard and John H. Martin. Macmillan, New York, 1963. 832 pp. Illus.

Chemistry of Life. Katherine B. Hoffman. Natl. Science Teachers Assoc., Washington, D.C., 1963. 128 pp. Illus. Paper, 50¢.

Coffee Processing Technology. vols. 1 and 2. vol. 1, *Fruit, Green, Roast, and Soluble Coffee*. Michael Sivetz and H. Elliott Foote (614 pp., $17.25); vol. 2, *Aromatization, Properties, Brewing, Decaffeination, Plant Design*. Michael Sivetz (391 pp., $12.50). Avi Publishing Co., Westport, Conn., 1963. Illus.

Dairy Cattle Management. Principles and applications. James M. Wing. Reinhold, New York; Chapman and Hall, London, 1963. 367 pp. Illus. $9.75.

Elsevier's Lexicon of International and National Units. English-American, German, Spanish, French, Italian, Japanese, Dutch, Portuguese, Polish, Swedish, and Russian. Compiled and arranged by W. E. Clason. Elsevier, New York, 1964. 84 pp. $4.95.

The Encyclopedia of Management. Carl Heyel. Reinhold, New York; Chapman and Hall, London, 1964. 1111 pp. Illus. $25.

Error and Eccentricity in Human Belief. Joseph Jastrow. Dover, New York [reprint of *Wish and Wisdom, Episodes in the Vagaries of Belief* (1935)] 1963. 410 pp. Illus. Paper, $1.85.

Essays on Creativity in the Sciences. By Associates of the Creative Science Seminar, Division of General Education, New York University. Myron A. Coler, Ed. New York Univ. Press, New York, 1963. 255 pp. $6.50. Essays by Ellis Blade, Mary-Frances Blade, M. A. Coler, H. Herbert Fox, Nicholas E. Golovin, Harold K. Hughes, Harold W. Mohrman, Anne Roe, Sidney G. Roth, Russell F. W. Smith, and Morton I. Teicher.

Exploration of the Moon. Franklyn M. Branley. Doubleday, New York, 1964. 139 pp. Illus. $3.50. A popularization published for the American Museum of Natural History.

Families of Flowering Plants of Southern Africa. Herbert Parkes Riley. Univ. of Kentucky Press, Lexington, 1963. 287 pp. Illus. $14.

Field Archery and Bowhunting. Arnold O. Haugen and Harlan G. Metcalf. Ronald, New York, 1963. 221 pp. Illus. $6.

Fifty Years of Science in India. Progress of botany. P. Maheshwari and R. N. Kapil. Indian Science Congress Assoc., Calcutta, 1963. 186 pp. Illus. Paper.

The First New Nation. The United States in historical and comparative perspective. Seymour Martin Lipset. Basic Books, New York, 1963. 384 pp. $5.95.

The Foundation Directory. Prepared by the Foundation Library Center. Ann D. Walton and Marianna O. Lewis, Eds. Russell Sage Foundation, New York, ed. 2, 1964. 1000 pp. $10. Provides information on 6007 foundations. For each foundation the information included covers (insofar as available) the corporate name and address; the name of donor or donors; the general purpose and activities, together with any special limitations; the assets, gifts received, and grants (the most recent available information); and names of officers and trustees.

A History of Chemistry. Charles-Albert Reichen. Hawthorn, New York, 1963. 112 pp. Illus. $5.95.