number of genera listed increases from 341 to 568 [*sic*], nearly one-sixth of the increase being Delesseriaceae, favorite subjects of study with Kylin. One hears all too often of major pieces of work abandoned on the death of the author because they were too incomplete to be published or because loyal friends were lacking. This book is a fine memorial to Kylin and to his widow's unflagging devotion.

WM. RANDOLPH TAYLOR
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Physics and Chemistry of the Earth. vol. 1. L. H. Ahrens, Kalervo Rankama, and S. K. Runcorn, Eds. McGraw-Hill, New York; Pergamon, London, 1956. 317 pp. Illus. $8.

The continuing flood of scientific and technical papers requires the condensing of data and interpretations into manageable units so that the individual can maintain a broad acquaintance with science while keeping abreast of the advances in his own field of specialization. One device is the article that reviews the significant contributions whenever work in a particular field has progressed to the point that a retrospective evaluation is useful to the specialist and informative to scientists generally.

Pergamon Press and McGraw-Hill Book Company have embarked on producing annually as part of the "Progress Series" a volume on *Physics and Chemistry of the Earth.* The intent is to interest physicists and chemists in problems of our planet as well as to inform geologists of the state of knowledge in geophysics and geochemistry. The first volume is certain to succeed because of the emphasis on well-formulated statements backed by quantitative data, rigorous logic, and critical estimates of the probable validity. By the same token, the mathematics may repel a few who find the terms *very rare* to *abundant* sufficiently quantitative for all purposes.

The contents at first glance may give the reader the fleeting impression that six or seven out of the eight reviews deal with topics that have been bandied about at numerous conferences, symposia, and special sessions during the last 5 years: origin of the solar system, temperatures within the earth, radioactive methods for determining geologic age, seismology and the broad structure of the earth's interior, hydrodynamics of the earth's core, investigations under hydrothermal conditions, geochemistry of the halogens, and geochemistry in the U.S.S.R. Closer inspection immediately shows that the articles contain the basic information that a nonspecialist needs in order to profit from the papers and discussions at the various meetings. The specialist may disagree with the picture drawn, but he may well benefit from the critical appraisal made by a colleague of acknowledged competence.

Spencer-Jones traces the development of thought on the origin of the solar system by concise statement of the basis of each idea, the physical or chemical problem it is designed to meet, and the specific shortcomings that lead to its modification or abandonment. He suggests that theories premised on the cataclysmic interaction between the sun and another celestial body are less likely to succeed than theories premised on evolution from a solar nebula.

Verhoogen examines the methods used for deducing temperatures within the earth and inferring the sources of heat. He concludes that estimates based on assumptions about convection are preferable to those based on assumptions about conduction, but that it remains to be proved that convection does occur in the mantle. Studies of electric conductivity show promise for determining temperatures.

Ahrens gives the principal methods for determining geologic ages, with considerable emphasis on the problems and uncertainties, and points out potential methods that have not yet been exploited. Brief statements on meteorites and tektites are included, and the article concludes with references on methods not discussed: He, Ra, Io, photographic emulsions, cube edge, and radiation damage.

Bullen introduces seismology and then considers the broad structure of the earth's interior. Seven zones make up an earth idealized as a perfectly elastic, isotropic body; two earth models are presented. Bullen postulates that density distribution favors model B, the outer core is a high-pressure modification of the lower mantle, and the inner core is chemically distinct from the outer core.

Hide shows that the earth's magnetic field is due to circulating electric currents probably generated by hydrodynamical motion of the liquid conducting core; hence, a theory on magnetism is dependent on a theory of core hydrodynamics. Driving energy for the dynamo may come from precession, Urey's "sedimentation," and radioactive heating.

Roy and Tuttle review the post-1913 history of investigations under hydrothermal conditions, the most effective apparatus devised, and the results of mineral synthesis, phase equilibria, and liquidus studies. The data permit broader concepts of mineral and rock stability, of the development of very high pressures during crystallization in systems containing volatiles, and of the importance of alkalies to the solubility of water in a granite liquid.

Correns brings together a great mass of information on the geochemistry of the halogens, but the myriad gaps underscore his contention that geochemical preoccupation with cations has been matched by neglect of anions. The data are arranged in geologic order, ranging from cosmos and meteorites, through various rock groups, to hydrosphere and atmosphere, and concludes with a brief balance: fluorine originates principally from magmatic rocks, while iodine, bromine, and chlorine must come from the volatile phase of magma—unless the primitive ocean and/or atmosphere were rich in halogens. Of particular interest are the indications of worthy lines for future study.

Tomkieff summarizes the literature in Russian on geochemistry for the period 1948–53. The article as a whole is not easy reading but constitutes a compact guide to subjects and authors in six fields: geochemistry, geospheres, elements; minerals; mineral deposits; igneous rocks; sedimentary rocks; natural waters and evaporates. Each section carries its own references in addition to general author and subject indexes; the latter should not be confused with the name and subject indexes for the entire volume.

WILLIAM R. THURSTON
National Research Council

Chemistry of Chromium and Its Compounds. vol. I of *Chromium.* Marvin J. Udy, Ed. Reinhold, New York; Chapman & Hall, London, 1956. 433 pp. Illus. $11.

The value of a book such as this is immediately apparent when one considers that this volume, along with its companion volume II, covers all phases of the manufacture and uses of chromium metal, chromium alloys, and chromium chemicals as well as the chemical and physical properties. As the editor points out in the preface, no one person in this day could be expected to be sufficiently conversant with all phases of the science and technology of chromium to write such a book. This one is the work of 36 different and distinguished authors. It follows that no one reviewer could be sufficiently conversant with all phases of the subject covered to be able to give a really critical review of the book. Therefore, we must be content with the general impressions as they appear to me.

The 15 chapters in this volume are arranged in logical order and seem to cover the chemistry of chromium and its compounds. The book starts with a brief account of the history of chromium and continues, through the mineralogy and geology of chromium, to the analytic chemistry and the physical and chemical

properties. Finally, it discusses the industrial uses of chromium compounds. The volume also includes a chapter on the health hazards, which is certainly of primary importance in the protection of the workers in the chromium industries.

The book is excellent and satisfies the need for a comprehensive compilation of the data on the chemical and physical properties of chromium compounds. While it will probably not answer all the questions about the chemistry of chromium, it will, together with the books listed in the excellent bibliography, be a welcome addition on the desks of those scientists and engineers who are interested in the chemistry of chromium and its compounds.

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Books Reviewed in The Scientific Monthly, May

Freshwater Fishery Biology, K. F. Lagler (Brown). Reviewed by K. D. Carlander.

Die Flechtbinse (Scirpus lacustris L.), K. Seidel (Schweizerbart'sche Verlagsbuchhandlung). Reviewed by H. H. Iltis.

The Future of Arid Lands, G. F. White, Ed. (AAAS). Reviewed by A. W. Zingg.

Ceramics for the Archaeologist, A. O. Shepard (Carnegie Institution of Washington). Reviewed by P. V. Gardner.

Child Development, E. B. Hurlock (McGraw-Hill). Reviewed by P. H. Schoggen.

Microscopium, M. Rooseboom (National Museum for the History of Science, Leiden). Reviewed by R. P. Multhauf.

The Fighting Cheyennes, G. B. Grinnell (Univ. of Oklahoma Press). Reviewed by I. E. Wallen.

Disposal of Sewage and Other Water-Borne Wastes, K. Imhoff, W. J. Müller, D. K. B. Thistlethwayte (Butterworths). Reviewed by J. M. Dalla Valle.

The Individual Psychology of Alfred Adler, H. L. Ansbacher and R. R. Ansbacher, Eds. (Basic Books). Reviewed by E. L. Hartley.

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Working with Children in Science. Clark Hubler. Houghton Mifflin, Boston, 1957. 425 pp. $5.50.

America's Natural Resources. Edited for the Natural Resources Council of America by Charles H. Callison. Ronald Press, New York, 1957. 211 pp. $3.75.

The Doctor, His Patient and the Illness. Michael Balint. International Universities Press, New York, 1957. 355 pp. $7.50.

The Economic Factors in the Growth of Russia. An economic-historical analysis. Nicholas L. Fr.-Chirovsky. Philosophical Library, New York, 1957. 178 pp. $3.75.

The Growth of Leaves. Proceedings of the Third Easter School in Agricultural Science, University of Nottingham, 1956. F. L. Milthorpe. Butterworths, London, 1956. 223 pp. $6.80.

Beginning Statistics. Lester Guest. Crowell, New York, 1957. 255 pp. $4.

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An Introduction to Astronomy. Robert H. Baker. Van Nostrand, Princeton, N.J., ed. 5, 1957. 333 pp. $4.85.

Automation in Business and Industry. Eugene M. Grabbe. Wiley, New York; Chapman & Hall, London, 1957. 611 pp. $10.

The Neurohypophysis. H. Heller, Ed. Proceedings of the eighth symposium of the Colston Research Society held in the University of Bristol, 9–12 April 1956. H. Heller, Ed. Academic Press, New York; Butterworths, London, 1957. 275 pp. $9.50.

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Encyclopedia of Instrumentation for Industrial Hygiene. Prepared and issued cooperatively by the University of Michigan Institute of Industrial Health and School of Public Health and the Occupational Health Program of the Public Health Service, U.S. Department of Health, Education, and Welfare. Charles D. Yaffe, Dohrman H. Byers, Andrew D. Hosey, Eds. University of Michigan, Industrial Health Program, Ann Arbor, 1956. 1243 pp. $35.

Thermodynamic Properties of the Elements. No. 18 of the Advances in Chemistry Series. Edited by the staff of *Industrial and Engineering Chemistry.* American Chemical Society, 1155 16 St., NW, Washington 6, 1957. 234 pp. $5.

Nuclear Reactor Physics. Raymond L. Murray. Prentice-Hall, Englewood Cliffs, N.J., 1957. 317 pp. $10.

From the Closed World to the Infinite Universe. Alexandre Koyre. Johns Hopkins Press, Baltimore, Md., 1957. 313 pp. $5.

High-Speed Flight. E. Ower and J. L. Nayler. Philosophical Library, New York, 1957. 227 pp. $10.

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A Contribution to the Heritage of Every American. The conservation activities of John D. Rockefeller, Jr. Text by Nancy Newhall. Prolog by Fairfield Osborn. Epilog by Horace M. Albright. Knopf, New York, 1957. 179 pp.

Miscellaneous Publications

(Inquiries concerning these publications should be addressed, not to Science, *but to the publisher or agency sponsoring the publication.)*

Dissection Guides. I, *The Frog,* 63 pp.; II, *The Dogfish,* Rowett. 61 pp.; III, *The Rat with Notes on the Mouse,* 64 pp.; IV, *The Rabbit,* 32 pp.; V, *Invertebrates: Earthworm, Crayfish, Cockroach, Lancelet, Swan Mussel, Snail,* 56 pp. Rinehart, New York, 1957. $0.95 each.

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