that makes no pretense to being an exhaustive treatise on electrolytes but is, rather, a critical, detailed account of some of the most important aspects of the subject presented with refreshing vigor. Although it is not, properly speaking, a textbook, graduate students and particularly those who have more than a cursory interest in the electrochemistry of solutions will welcome this book.

The subjects discussed from both an experimental and theoretical point of view are conductance, chemical potential, and diffusion. A considerable amount of critically selected experimental data is included covering a substantial range of concentration. The theoretical treatments are based on the Gibbs free energy, on the Debye-Hückel interionic attraction theory, and on the work of Onsager, Fuoss, and Falkenhagen. The authors have attempted to extend the theoretical limiting dilute solution equations to practical concentrations with some success. However, I cannot agree that these extensions are not empirical. Thus, although the manner in which they introduce the ion size factor for the electrophoretic term of the Onsager conductance equation is theoretically valid, it does not appear to be so for the ionic relaxation term. Fuoss and Onsager have recently pointed out that in the latter case a transcendental function appears which cannot be approximated in such a simple manner. But this new theoretical development appeared after the publication of the book and should not detract from its very substantial merits.

THEODORE SHEDLOVSKY
Rockefeller Institute for Medical Research

Papirova Chromatografie. I. M. Hais and K. Macek, Eds. Czechoslovakian Academy of Sciences, Prague, 1954. 720 pp. Illus.

Although this book is not easily available in this country and is written in Czechoslovakian, it seems desirable to review it here as a matter of scientific interest. I was fortunate in obtaining the services of H. Korbel, who carefully translated a chosen 15 percent of the text. On the basis of this translation, the copious illustrations, and a table of contents supplied by the editors, this review is written.

The book is the work of 23 collaborators, two of whom are the editors. The selection of material for the book was made partly on the basis of methods worked out and checked by the authors of the various chapters or else compiled from the literature. The literature cited in the text was as complete as possible up to early 1953, and references accumulated between March and September 1953 were included in the bibliography. There are 3795 literature references cited, with the titles given in the language of original publication. This makes it possible for the reader who is limited to English, German, and French to understand the majority of the references, for most are in these languages. There are 243 pictures and diagrams, including eight pages of black-and-white plates and two pages in color at the end of the book. There are 73 tables in the text and, at the end of the text, some 19 pages of detection agents (177 of them) and 11 pages of solvent systems (241 of them). The book is then, within the time limitations, the most complete work on this subject that has yet appeared.

The most important characteristic of the book is the approach that it takes to paper chromatography. The subject is treated as a science. The authors analyze logically the background material and the great diversity of observations on paper chromatography and draw what generalizations seem permissible, always giving examples to illustrate their meaning. The result is that, although there are many aspects of paper chromatography that are not well understood, so much is brought into an ordered form and so much else in addition is given a rational explanation that the reader is left with great confidence in the method, and with the feeling that its problems have solutions that he can arrive at following the precepts of others as described in this book. The authors describe applications of chromatography primarily in order to help the reader solve his own problems.

Of what value can a book like this be for a person who does not read Czechoslovakian? The greatest value, that described in the preceding paragraph, is largely lost to him. However, much value still remains. The book has the most complete bibliography available, which can be read since the majority of the titles are in English, French, or German. There are also references to publications in Czechoslovakian and to Soviet journals which indicate that much work in this area is going on in those countries. Most of the tables and lists of detection agents and solvents are useful to the reader, because international chemical nomenclature is used, and because references are given to literature in the more widely current languages. Also, with a dictionary, all the large number of figures and photographs become available. Hence, even though the text may be hard going, a tremendous amount of material that is not collected in this way elsewhere is available to the reader.

It is scientifically most unfortunate that the authors of this book, when they undertook such a monumental task, should have chosen to publish it in a language of only local interest scientifically. It is to be hoped that when a new edition is forthcoming it will be published in German, or better yet in English. One essential of scientific progress is communication.

HAROLD G. CASSIDY
Department of Chemistry, Yale University

The Method of Trigonometrical Sums in the Theory of Numbers. I. M. Vinogradov. Trans. by K. F. Roth and Anne Davenport. Interscience, New York–London, 1954. x + 180 pp. $5.

This book, so ably edited by K. F. Roth and Anne Davenport, is an account of the so-called "method of exponential sums" introduced by Vinogradov. It is well known that this method has helped to solve many outstanding problems of additive number theory and analytic number theory. To give an example, Goldbach conjectured in 1742 that every large odd number can be represented as a sum of three prime numbers. This is proved, with almost complete details, in Chapter 10 of the present book. Another problem of great interest is whether it is true, and the reader can check without difficulty the truth for small values of x, that there exists at least one prime between x^2 and $(x+1)^2$, where x denotes a natural number. While this is still unsettled, a somewhat weaker theorem—namely, that there exists at least one prime between x^3 and $(x+1)^3$ for all large values of x, has been proved by the British mathematician A. E. Ingham, using Vinogradov's estimates on trigonometric sums.

It should, perhaps, be mentioned that the methods of Vinogradov are very heavy and complicated, and that the estimates he obtains for exponential sums are, at least sometimes, very far from the probable truth. To give an example, let $f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_0$ be a polynomial with integer coefficients, where a_n is not divisible by the prime p. Then A. Weil's recent proof of the Riemann hypothesis in function fields implies that

$$\left| \sum_{x=1}^{p} e^{2\pi i f(x)/p} \right| \leqq (n-1)\sqrt{p}$$

So far as is known, this deep result lies beyond the range of Vinogradov's method. However, Vinogradov's results still give the best information, to date, on the root-free regions of the classical zeta-function of Riemann in the critical strip!

The translators must be congratulated

on this important addition to literature in the analytic theory of numbers. One should not omit to remark that the annotations are extremely helpful to the reader.

S. CHOWLA
Department of Mathematics, University of Colorado

Preservation and Transplantation of Normal Tissues. G. E. W. Wolstenholme and Margaret P. Cameron, Eds. Little, Brown, Boston, 1954. xii + 236 pp. Illus. + plates. $6.

This book is comprised of papers presented at an international symposium held by the Ciba Foundation in March 1953. The ensuing discussions are also included. The coverage is broad and includes papers on the general problems of immunity and tissue culture and the problems connected with the storage, preservation, and grafting of such structures as gonads, parathyroids, skin, nerves, blood vessels, and cornea.

Books Reviewed in The Scientific Monthly

September

Advances in Virus Research, K. M. Smith and M. A. Lauffer (Academic). Reviewed by M. H. Adams.

From Classical to Modern Chemistry, A. J. Berry (Cambridge Univ. Press). Reviewed by L. W. Elder, Jr.

Animal Form and Function, W. R. Breneman (Ginn). Reviewed by D. R. Newth.

My Way of Becoming a Hunter, R. H. Rockwell and J. Rockwell (Norton). Reviewed by C. H. Rogers.

A Manual of the Dragonflies of North America (Anisoptera), J. G. Needham and M. J. Westfall, Jr. (Univ. of California Press). Reviewed by C. D. Michener.

Conserving Natural Resources, S. W. Allen (McGraw-Hill). Reviewed by P. B. Sears.

Mammals of California and Its Coastal Waters, L. G. Ingles (Stanford Univ. Press). Reviewed by K. R. Kelson.

The Material Culture of Pueblo Bonito, N. M. Judd (Smithsonian Institution). Reviewed by P. S. Martin.

Paracas Fabrics and Nazca Needlework, 3rd century B.C.*–3rd century* A.D., J. Bird and L. Bellinger (National Pub.). Reviewed by C. Evans.

An Introduction to Psychology, H. W. Karn and J. Weitz (Wiley). Reviewed by J. W. Gustad.

Cherries and Cherry Products, R. E. Marshall (Interscience). Reviewed by C. S. Waltman.

Development of the Guided Missile, K. W. Gatland (Iliffe; Philosophical Library). Reviewed by H. S. Seifert.

Charles Darwin and the Golden Rule, The late W. E. Ritter, E. W. Bailey, Ed. (Science Service; Storm). Reviewed by K. P. Schmidt.

Prehistoric Stone Implements of Northeastern Arizona, R. B. Woodbury (Peabody Museum of American Archaeology and Ethnology). Reviewed by E. K. Reed.

Relativity for the Layman, J. A. Coleman (William-Frederick). Reviewed by P. G. Bergmann.

Cancer: Race and Geography, P. E. Steiner (Williams & Wilkins). Reviewed by C. P. Rhoads.

Foreign Policy Analysis, F. Gross (Philosophical Library). Reviewed by R. Braibanti.

Excavations at Star Carr, J. G. D. Clark (Cambridge Univ. Press). Reviewed by M. J. Mellink.

Auxins and Plant Growth, A. C. Leopold (Univ. of California Press). Reviewed by W. P. Jacobs.

New Books

Dictionary of Legal Terms, Spanish-English and English-Spanish. Louis A. Robb. Wiley, New York; Chapman & Hall, London, 1955. 228 pp. $8.

Laplace Transforms for Electrical Engineers. B. J. Starkey. Iliffe, London, 1954; Philosophical Library, New York, 1955. 279 pp. $10.

The Josiah Macy, Jr. Foundation, 1930–1955. A review of activities. The Foundation, New York, 1955. 174 pp.

The Chemistry and Fertility of Sea Waters. H. W. Harvey. Cambridge Univ. Press, London, 1955. 224 pp. $5.50.

Experimental Psychology. A series of broadcast talks on recent research. B. A. Farrell, ed. Philosophical Library, New York, 1955. 66 pp. $2.75.

Soil Warming by Electricity. R. H. Coombes. Philosophical Library, New York, 1955. 116 pp. $4.75.

Forestry and Related Research in North America. Frank H. Kaufert and William H. Cummings. Soc. of American Foresters, Washington, D.C., 1955. viii + 280 pp. $5.

Plant Ecology. Reviews of Research. Arid Zone Research, VI. UNESCO, Paris, 1955. 377 pp. $7.

Chemical Engineering Cost Estimation. Robert S. Aries and Robert D. Newton. McGraw-Hill, New York, 1955. 263 pp. $6.

Climates in Miniature. A study of Micro-climate and environment. T. Bedford Franklin. Philosophical Library, New York, 1955. 137 pp. $3.75.

Midwest and Its Children. The psychological ecology of an American town. Roger G. Barker and Herbert F. Wright. Row, Peterson, Evanston, Ill., 1954. 532 pp. $7.50.

Proceedings of the UNESCO Symposium on Typhoons, 9–12 November, 1954, Tokyo. Japanese National Commission for UNESCO, Tokyo, 1955. 257 pp.

Cardiovascular-Renal Problems. vol. 1, *Clinical Pathologic Conferences of Cook County Hospital.* Hans Popper and Daniel S. Kushner, Eds. Blakiston-McGraw-Hill, New York, 1954. 325 pp. $5.

Miscellaneous Publicatons

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

Frogs of Southeastern Brazil. Bull. 206. Doris M. Cochran. Smithsonian Inst., Washington, 1955. 423 pp. $2.

Archives de l'Institut Pasteur de Madagascar. Rapport Annuel, 1954. The Inst., Madagascar, 1955. 78 pp.

Israel's Science Bibliography. vol. 1, No. 1, Jan.–June 1954. Miriam Balaban, Ed. Israel Scientific Press, Jerusalem. 37 pp. $1.25 (order from Interscience, New York–London).

Geochronology. With special reference to southwestern United States. Terah L. Smiley, Ed. Univ. of Arizona Press, Tucson, 1955. 200 pp. $1.50.

A Description of Two Species of Bonito Sarda orientalis *and* S. chiliensis *and a Consideration of Relationships within the Genus.* Fish Bull. No. 99. H. C. Godsil. California Dept. of Fish and Game, 1955. 43 pp.

Catch Localities for Pacific Albacore (Thunnus germo) *Landed in California, 1951 through 1953.* Fish Bull. No. 100. Harold B. Clemens. California, Dept. of Fish and Game, 1955. 28 pp. *Age Determination of the Northern Anchovy,* Engraulis mordax. Fish Bull. No. 101. California, Dept. of Fish and Game, 1955. 66 pp.

Control of DDT-Resistant Potato Flea Beetles. Circ. 193. James B. Kring. Connecticut Agricultural Expt. Sta., New Haven, 1955. 23 pp.

An Evaluation of the Red Fox. Biological Notes No. 35. Thomas G. Scott. Illinois National History Survey, Urbana, 1955. 16 pp.

Moderne Therapie der Anämien. Nach pathogenetischen Tesichtspunkten. Walter Tischendorf. S. Hirzel Verlag, Stuttgart, 1955. 114 pp. DM. 14.

Organization and Administration of the Military Research and Development Programs. House Rept. No. 2618, 83rd Congress 2nd session. Twenty-fourth Intermediate Report of the Committee on Government Operations. Supt. of Documents, GPO, Washington, D.C., 1954. 72 pp.

Index to Hearings before the Joint Committee on Atomic Energy, Congress of the United States, Eighty-fourth Congress, First Session, on Development, Growth, and State of the Atomic Energy Industry. The Committee, Washington, D.C., 1955. 17 pp.

Disposal of Government-Owned Community at Richland, Wash. pt. 2. Hearing before an ad hoc subcommittee on disposal of government-owned communities, Joint Committee on Atomic Energy, Congress of the United States, Eighty-fourth Congress, first session. The Committee, Washington, D.C., 1955. 241 pp.

Report on the Security Problem. By a subcommittee of the Committee on Government Operations, U.S. Senate, in support of Senate Joint Resolution 21 to establish a commission on government security. (Reprinted from the *Congressional Record*) Fund for the Republic, New York, 14 pp.