drawn (p. 108) regarding the amitotic division of endothelium, the subsequent differentiation of these cells into mesenchymelike tissue, and later redifferentiation into fibroblast, smooth muscle and cartilage cells.

The author is to be congratulated for his broad approach to an important subject. The integration of cytology, cell physiology, and cell chemistry is prerequisite to a better understanding of the endothelial cells and to the many diseases that result from their derangement. This small monograph will be of value to both the research worker and the clinician interested in vascular disease.

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Antibiotics Annual 1954–1955. Henry Welch and Felix Marti-Ibanez, Eds. Medical Encyclopedia, New York, 1955. ix + 1154 pp. Illus.

It is incredible that so much information about antibiotics could be brought together in such a short period of time and published for the benefit of the interested reader. This annual contains 1154 pages of reading material on a wide range of subjects dealing with old, new, and untried antibiotics. The publication of this volume followed the second Annual Symposium on Antibiotics sponsored by the Food and Drug Administration of the Department of Health, Education, and Welfare which was held in October 1954. The President addressed a letter of good wishes to all those participating in the symposium.

For all those interested in antibiotics and for all physicians who use them, this annual will serve as a work of reference as well as a group of papers that will stimulate thought and new ideas.

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The Chemistry of Synthetic Dyes and Pigments. H. A. Lubs, Ed. Reinhold, New York, 1955. xiv + 734 pp. Illus. $18.50.

Although this book was not intended as a single-company production, all of the 19 contributors to this extensive volume have been associated with the Jackson Laboratory of the Organic Chemicals Department of E. I. duPont de Nemours & Co. It is obviously a well-knit group of collaborators, for in many chapters four or five workers are credited with segments of the chapter, and the same collaborator appears in different chapters. The separate collaborators are not indicated in the table of contents but are identified in the sections that they prepared.

This compilation represents a very readable collection and assimilation of the many American and British intelligence team reports on the progress of dye synthesis in Germany prior to World War II, to which has been added much of the known technology in this and other countries in this same field.

The general discussion on colored chemical constitution and organic pigments and the extensive bibliography add much to the value of this book as a general reference to workers in other fields who desire knowledge of dyestuffs. Combination with such standard works as the forthcoming new edition of the *Color Index* or the *Yearbook of the American Association of Textile Chemists and Colorists* will permit easy "translation" into available commercial types.

In the organization of this extensive treatise, there is first presented a general discussion on aromatic intermediates. There follow separate discussions on the important dye classes, including azo, azoic, sulfur, anthraquinones, indigoid, and phthalocyanine and the general bibliographic and discussion sections mentioned in the preceding paragraph. In general the discussion concerns the indicated methods of production of known classes of dyes and modifications to give important variants to the basic type.

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Organic Reactions. vol. VIII. Roger Adams, Ed. Wiley, New York: Chapman and Hall, London, 1954. viii + 437 pp. $12.

The latest volume of what has become a series of standard reference works for the organic chemist comprises eight chapters: "Catalytic hydrogenation of esters to alcohols" by the late Homer Adkins; "The synthesis of ketones from acid halides and organometallic compounds of magnesium, zinc, and cadmium" by David A. Shirley; "The acylation of ketones to form β-diketones or β-keto aldehydes" by Charles R. Hauser, Frederic W. Swamer, and Joe T. Adams; "The Sommelet reaction" by S. J. Angyal; "The synthesis of aldehydes from carboxylic acids" by Erich Mosettig; "The metalation reaction with organolithium compounds" by Henry Gilman; "β-Lactones" by Harold E. Zaugg; "The reaction of diazomethane and its derivatives with aldehydes and ketones" by C. David Gutsche.

The general format of each chapter follows closely the style that has become standard for the series. The book is definitely of interest and, indeed, is wellnigh indispensable to the practical organic chemist. With but few exceptions, mechanistic treatment of the reactions has been held to a minimum. Where a mechanistic discussion is given in some detail, it is necessary for proper interpretations and application of the reaction involved.

The long and exhaustive chapter on acylation of carbonyl compounds by Hauser and his associates provides a welcome survey of the host of applications of this important reaction. It supplements the earlier chapter on the Claisen condensation that appeared in volume II of the series.

The chapter on synthesis of aldehydes from carboxylic acids likewise supplements the earlier chapter on the Rosenmund reduction of acid chlorides that appeared in volume IV. With the discussion of indirect methods of reduction of a carboxyl group to an aldehyde, this important transformation has now been completely covered.

The chapter on β-lactones provides information not only on the modes of synthesis of these interesting compounds but, what is perhaps more important, on the uses to which they can be put in further syntheses.

The volume maintains the high standard of its predecessors. About the only criticism that can be made is that in a few of the chapters, the literature survey has not been brought forward as far as could have been possible and desirable. This is particularly noticeable in Chapter 1; the shortcoming is undoubtedly due to the untimely death of Professor Adkins. Likewise, in Chapter 2, complete literature coverage is claimed only up to mid-1950.

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Electrolyte Solutions. The measurement and interpretation of conductance, chemical potential and diffusion. R. A. Robinson and R. H. Stokes. Academic Press, New York, 1955. xiii + 512 pp. Illus. $9.50.

This volume is the American edition of the book published by Butterworths Scientific Publications of London. The authors, R. A. Robinson, professor of chemistry at the University of Malaya, and R. H. Stokes, reader in physical chemistry at the University of Western Australia, are active workers in the field of electrolytic solutions. They have written a lively, stimulating book: a book

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
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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.

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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