Book Reviews

Electroacoustics. The analysis of transduction, and its historical background, Frederick V. Hunt. Wiley, New York; Chapman & Hall, London, 1954. viii + 260 pp. Illus. $6.

This fifth number of the Harvard Monographs in Applied Science combines an interesting, well-documented history of the evolution of electroacoustics with the theory of electroacoustic transduction as extended by the author and his coworkers at the Harvard Underwater Sound Laboratory from 1941 to 1946. Special attention is given to the author's recently modified formulation of the electromagnetic relationships, which permits a unified analytic and equivalent circuit presentation of all transducer types. The power and utility of this new approach are illustrated by applying it to the analysis of several transducer types.

The 91-page introductory chapter covers electroacoustic transduction and its relation to the electric communication art very thoroughly but in a lively narrative style. An interesting account of the beginnings of sonar is included. The author draws heavily on and makes a strong case for the use of patent literature as source material. He points out that many discoveries, inventions, and developments were first reported and others exclusively reported in patents. Although patents are primarily concerned with technologic improvements, the earlier patents in any art not infrequently contain disclosures of importance to science. Of interest to applied physicists is the case of the application of negative feedback by Maxfield and Harrison around the electromechanical transduction link as a method of increasing electrically the damping in a mechanical system. This was published in a 1925 patent—long before the broader principles of negative feedback were enunciated by others.

Some general aspects of electromechanical coupling are treated in a short chapter with that title. The third chapter is largely devoted to the antireciprocal aspects of the coupling coefficient in electromechanical transducers and an introduction to the author's space operator which allows all transducer types to be represented by the same form of equivalent circuit. The utility of this approach is illustrated in a chapter on "Electric-impedance analysis of transducer performance."

The last three chapters are devoted to the application of the new approach to the analysis of moving conductor, electrostatic, and moving-armature transducers. The treatment of electrostatic transducers is highlighted by the author's reported discovery that the force-displacement relationship in a push-pull unit approaches a linear one as the resistance of the bias supply circuit approaches infinity. The chapter on "Moving armature (magnetic) transducer systems" gives special attention to the fact that the coupling coefficient must be treated as a complex quantity. In most instances the usual approximation involving the assumption that the coefficient is a positive real is very unsatisfactory.

The author has gone to unusual lengths to ferret out and verify original sources. This is a conspicuous and laudable exception to the recent trend toward publishing books and papers of a survey nature with inaccurate and inadequate bibliographies which lead the reader to impute the historical material to the author or to an incorrect source. The detailed history, new historical material and mathematical treatment should interest many workers in the communication, audio, acoustic, and transducer fields.

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A Million Random Digits with 100,000 Normal Deviates. The Rand Corporation. Free Press, Glencoe, Ill., 1955. xxv + 200 pp. $10.

The publication of these tables should meet at least two requirements that one frequently encounters in the scientific field: the need for an extensive set of random numbers, and the need for some assurance that the numbers used are random. Up to this time, a person has felt that he could at best satisfy only one of these requirements from existing tables.

The publication is in itself a very fine technical job. The size of the type used and the arrangement of the columns and digits should facilitate their use. The addition of 100,000 random normal deviates should prove particularly useful to individuals working in the field of statistics and needing random samples from a normal population to study empirically the distribution of some statistic.

The introduction not only provides interesting information on the method used to generate the random numbers but also describes the numerous tests made of the final results in testing for randomness. For those who are unfamiliar with the problem, I should mention that, although it sounds easy, one of the hardest tasks in this world is to evolve a random process. The satisfactory manner in which the Rand tables meet the numerous tests that they applied to the tables speaks well regarding their scientific worth. Some attention is given in the introduction to the problem of how to use the tables, especially those of the normal deviates. Users of the tables should note these sections carefully, since care is necessary in how one actually uses tables of this type.

As a final comment, one cannot help but be amused by the problem of proofreading the final tables to see whether the printing and reproduction mechanism has introduced "random" errors.

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Endothelium. Its development, morphology, function and pathology. Rudolf Altschul. Macmillan, New York, 1954. xi + 157 pp. Illus. $3.50.

This monograph developed as an outgrowth of the author's interest in arteriosclerosis, and it brings together much of the widely scattered literature on endothelium. This important tissue is discussed under the following chapter headings: "Historical notes and nomenclature," "Morphology," "Development," "Tissue culture," "Metaplasia," "Function," "Pathology," "Summary and conclusions." The chapter on the pathology of endothelium includes a discussion of tumors, inflammation, shock, hypertension, renal diseases, radiation effects, blood clotting, changes or abolition of circulation and arteriosclerosis. The book is well documented, although occasional references were advisedly omitted in order to keep the bibliography within 400 titles.

In my opinion, additional experimental data should have been presented in support of some of the statements quoted or conclusions drawn. Although these data would have lengthened the monograph, they would have made the text more valuable. For example, without additional supporting data, I would be unwilling to agree with the conclusions

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