Book Reviews

The Enjoyment of Mathematics. Selections from mathematics for the amateur. Hans Rademacher and Otto Toeplitz. Princeton University Press, Princeton, N.J., 1957. 204 pp. Illus. $4.50.

This is an excellent and welcome translation of the well-known *Von Zahlen und Figuren,* the second edition of which was published in 1933. The English title is very appropriate, for the book is indeed a thoroughly enjoyable sampler of fascinating mathematical problems and their solutions. Moreover, the translator, Herbert Zuckerman, has added two new chapters which, as Hans Rademacher notes, "faithfully reflect the spirit in which this book was written."

The authors planned their volume with the hope of extending delight in mathematics beyond the limited circle of those who possess a marked talent for it. They aimed at acquainting their readers with typical methods of proposing and solving problems that are of inherent mathematical interest. They have therefore deliberately avoided mention of the uses of mathematics in science and technology, as well as discussion of the logical and philosophical foundations of the subject. The examples are taken from several branches of mathematics, including elementary number theory, geometry, topology, analysis, and set theory. Although some of the topics that are discussed will doubtless be familiar to many readers, a number of them (such as Waring's problem, periodic decimals, or the spanning circle for sets of points) are not easily available elsewhere in a form suitable for laymen. Each of the 28 chapters, with the exception of the last, is self-contained, assumes no previous knowledge of the subject, and develops solutions for the question discussed in a way that makes clear the essential simplicity of the reasoning and the strategy of the argument. The book certainly achieves what the authors sought to accomplish.

In one of the two chapters that were added by Zuckerman, Cauchy's proof that the geometric mean is never greater than the arithmetic mean is presented. The second of these chapters extends a proof given by Bonse (which was expounded in the original version of the book) for the Chebyshëv inequality that when $n \geqq 4$, the $(n+1)$th prime is less than the square root of the product of the first n primes. The stronger result is established that when n is sufficiently large, the $(n+1)$th prime is less than the seventh root of the product of the first n primes. As Zuckerman remarks, the proof uses only the simplest arithmetical ideas but nevertheless "shows clearly how ingenious and how difficult mathematics can be. . . . If this last chapter seems to require a difficult chain of thought, if it shows how mathematics can build a real and meaningful structure on such a small foundation, then it probably exhibits most clearly the real motive of this book." In my judgment, the qualification "probably" is unnecessary.

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Malaria. Eradication, insecticide resistance, entomological investigations, epidemiology, control, and prophylaxis. *Bulletin of the World Health Organization,* vol. 15 (No. 3–5), pp. 361–862. World Health Organization, Geneva, 1956. $6.

The successful eradication of malaria from large areas of the world in which it was previously the cause of great morbidity and mortality has led to a change in strategy in the control of this disease in recent years. The introduction of residual insecticides has been very largely responsible for success in the instances in which eradication has been effected. The rather widespread development of resistance to these sprays on the part of insects, particularly house flies, has, however, alerted malariologists to the possibility that *Anopheles* mosquitoes might also develop such resistance. There are now reports that two species of *Anopheles* in widely separated areas have developed resistance to DDT, that two other species have become resistant to dieldrin and related insecticides, and that still another species has been found to be resistant to both of these groups of insecticides. It is now apparent that if eradication of malaria is to be accomplished through reduction in the numbers of malaria-carrying mosquitoes, the race must be won before sufficient insecticide resistance has developed among these mosquitoes to nullify these efforts. The new policy that was adopted by the eighth World Health Assembly has shifted from that of control to one of eradication of the disease.

This bulletin is devoted in large part to this goal. It consists of 25 articles and 16 shorter notes, contributed by more than 40 authors. G. MacDonald discusses the theory of eradication of malaria in which natural disappearance of the disease is related to deliberate elimination, and an analysis is made of the factors that affect basic reproduction rates in epidemics arising from small origins, duration of infectivity of primary malarial cases, density of mosquitoes as related to man, and longevity of the vectors and their degree of anthropophilism. He gives a simplified method for expressing such an analysis mathematically.

Three articles are devoted to insecticide resistance among malarial vectors; these include descriptions of the actual measurement of resistance in the field and a discussion of the rationale of its prevention. In the first of these, Busvine discusses the manner in which resistance may be detected and measured and speculates on the way in which it arises, the possibility of preventing or overcoming it, and its importance in the past, the present, and the future. In his discussion of the possible advantage of using two insecticides simultaneously, he dismisses the possibility that this practice may be advantageous in cases where susceptibility to the two insecticides is positively correlated or quite independent but admits its advantage in cases where the susceptibility to one compound is the reverse of susceptibility to another. It appears unfortunate to me that no references are given to the work on which his conclusions are based.

In the second article that deals with insecticide resistance, Livadas and Thymakis report their investigations on the susceptibility to DDT of anophelines in different localities. Although they found considerable difference in susceptibility in the mosquitoes of the areas tested, they found, in general, that anophelines in Greece were increasing in their resistance to DDT.

Belios and Femeliaris, in the third paper on resistance, report the results of tests to determine the susceptibility of *Anopheles sacharovi* larvae to DDT, chlordane, and dieldrin on the coastal plain of Astros, Peloponnesos, where these insecticides had been used as residual sprays and for larviciding by air for

more than 10 years. They found that larvae had developed some degree of resistance to chlordane and dieldrin but not to DDT, although DDT had been more commonly used than the other two.

Other papers are devoted to cytogenetics, behavior, and control of *Anopheles,* to malariometry, to epidemiology, to suppression and prophylaxis by drugs, and to a wide variety of topics related either directly or indirectly to the chief goal, the eradication of malaria. They represent, for the most part, papers that were prepared for the second African Malaria Conference, held in Lagos in November 1955, for the Inter-regional Conference on Malaria for Eastern Mediterranean and European Regions, and for the sixth session of the World Health Organization Expert Committee on Malaria.

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A Guide to the Literature of Chemistry. E. J. Crane, Austin M. Patterson, and Eleanor B. Marr. Wiley, New York; Chapman & Hall, London, ed. 2, 1957. xv + 397 pp. $9.50.

Eleanor B. Marr, the principal author of this edition, states in her preface, "The first edition of *A Guide to the Literature of Chemistry* was the first comprehensive book to appear in its field." This was in 1927, and, 30 years later, by virtue of this second edition and of the absence of any comparable guidebook in this discipline, the *Guide* is still the most comprehensive book in its field. The vital role played by the literature in the development of chemistry and the dire need for signposts to guide the research worker through the ever-expanding maze of chemical literature make this *Guide* a "must" for the science reference collections of library, laboratory, and home. It is also intended to be used as a textbook, and as such it should find wide acclaim in those universities that offer courses not only in chemical literature but also in documentation and library science. The textbook features include discussions of basic principles and topics, emphasis on how to use each form of chemical literature, and an introduction to the art of literature searching (chapter 10 rather than chapter 8, as is indicated in the preface).

The organization of the first edition has been retained for the most part, but the entire book was rewritten, material was updated, and two chapters were added, one on trade literature and the other on Government publications. The principal chapters are entitled "Books," "Periodicals," "Patents," "Government publications," "Trade literature," "Other sources" (biographies, bibliographies, lectures, motion pictures, reviews, scientific meetings, theses, unpublished materials), and "Indexes." In each of these chapters the chief sources are described, analyzed, and classified. Books and current journals are classified by subjects or fields (in accordance with the *Chemical Abstracts* classification of abstracts), and the journals, secondarily, by country. Abstract journals are classified separately. An 11-page chapter entitled "Libraries" furnishes a glimpse into the nature of the collections and services of the various types of libraries and outlines the principal classification systems used.

The seven appendixes contain listings of literature related to chemical literature; symbols, abbreviations, and standards used in chemical literature; libraries (U.S. and Canadian with notations indicating the extent of chemical collections and of the services provided); periodical bibliographies; scientific and technical organizations; periodicals of chemical interest (although the list contains only periodicals that were discontinued before 1910); dealers and publishers. One might suggest that some of these appendixes, especially 1, 3, and 5, could serve a better purpose by being integrated within the text under their related topics.

One may hope that publication of the third edition of the *Guide* will not await the passage of another 30 years, for the saturation point in chemical literature output is not yet in sight. E. J. Crane, in anticipation of a third edition, states in his foreword to the *Guide* that this "will be completely Miss Marr's. . . . The book is moving into good hands."

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An Introduction to Electrostatic Precipitation in Theory and Practice. H. E. Rose and A. J. Wood. Constable, London, 1956 (order from Essential Books, Fair Lawn, N.J.). 166 pp. Illus. $2.80.

In this monograph H. E. Rose and A. J. Wood have covered the present state of the precipitation "art," both from a theoretical and practical point of view. Equipment is described, electrical theory is developed, practice and theory are compared, and the many problems of design calculation are reviewed. The authors have generally discussed and correlated the important literature in the field and have evaluated it in an unbiased manner. Where opinions could be expressed, they have added their own, with the careful judgment of those who write in a field with which they are well acquainted.

This work fills a gap that has long existed. Anyone who is working in this or in a related field will find the book easy to read, well prepared, and stimulating.

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Precision Electrical Measurements. Proceedings of an international symposium on precision electrical measurements, National Physical Laboratory, 17–20 November 1954. Philosophical Library, New York, 1956. 26 papers. $12.

This volume contains the proceedings of the international symposium on Precision Electrical Measurements, which was held at the National Physical Laboratory, Teddington, England, in November 1954. The majority of the 26 papers presented are the work of staff members of the National Physical Laboratory, the National Bureau of Standards, and their counterparts in other countries. These laboratories were created largely to undertake precision measurements and to develop techniques for such measurements. This symposium testifies to the vigor with which these objectives are being pursued. But progress is necessarily uneven, and so we have the curious spectacle of a paper on the use of nuclear magnetic resonance—a very precise tool—in the measurement of magnetic fields side by side with a discussion of the use of sphere gaps—not very precise tools—in the measurement of high voltages.

The papers are divided into five sections. A summarized version of the discussion ends each section. Five papers in the section on "Capacitance and dielectrics" cover measurements of solids, liquids, and gases over a wide frequency range. "Inductance and magnetics" includes six papers on the measurement of magnetic properties at both low and high frequencies. "Electrotechnics" is concerned largely with the measurement of power. "High-voltage measurements" includes papers on measurement of direct, alternating, and impulse voltages. The last section, "High-voltage impulse testing techniques," devotes three of its six papers to the problem of breakdown in transformers.

The subject matter of the symposium is of direct interest to the electrical industry. Those members of the industry who are concerned with making electrical measurements will find here a clear exposition of techniques employed at the national laboratories and at industrial laboratories throughout the world. The authors make full use of circuit diagrams, graphs, and photographs in de-