Book Reviews

Silicones and Their Uses. Rob Roy McGregor. McGraw-Hill, New York, 1954. 302 pp. Illus. $6.

This volume, the third to appear in this country on the general subject of silicones, is a practical treatise about what silicones are, how they are made, and in what ways they are useful. The author has enjoyed a close connection with the science and technology of silicone materials for 15 years, principally as administrative head of the multiple fellowship at Mellon Institute sponsored by the Corning Glass Works and The Dow Corning Corporation. He has put this experience to good use in the present task, coming up with an authoritative discussion of all the practical aspects of silicone polymers.

After a brief introduction, the author devotes a chapter to each of the five major aspects of the subject. Chapter 1, on the history of silicones, is short, interesting, and at times fanciful. Chapter 2, on the general types of commercial silicones, constitutes half of the book—silicone "fluids," "compounds" (in the sense that the rubber compounder uses the term), lubricants, resins, rubber, and bouncing putty are treated in separate sections, each complete with tables of properties of the representative Dow Corning materials appropriate to that section. Past and present uses for each type of polymer are described, and some projected uses are discussed. Chapter 3, on the physiological response to silicones, devotes 11 pages to the investigations of effects on experimental animals, proving mostly that there is no physiological response. This conclusion opens the way to a variety of interesting proposed uses in medicine and in the cosmetics industry. Chapter 4 takes up the applications of silicones in specific industries, in the form of a well-organized list of such applications according to type of industry. Several pages on cost considerations follow, showing that the price of silicone materials has been falling since 1942, while everything else has been going up. Chapter 5 reviews the preparation of silicone intermediates and then takes up the various methods of polymerization. A bibliography of 152 listings and an index of eight pages complete the volume.

McGregor plainly states that he is writing for the general reader, and especially for engineers, designers, and practical scientists who may want to use silicones to solve a particular problem. He makes it equally plain that he is not writing for the research chemist or chemical specialist in the field of silicones. This is not to say that the book contains little about the chemistry of silicones; it contains a great deal of chemical information, some of it in unexpected places. However, the chapter expressly devoted to the chemistry of silicone preparation takes up matters from an elementary level, and anyone with at least freshman training in chemistry should be able to follow the narrative and the reactions. If he does, the reader will have a reasonably good understanding of what goes on in the manufacture and use of silicones. He may then want to proceed further in other sources.

There is no doubt in my mind that this book has accomplished the author's purpose and that many people in applied science and the practical arts will find it exceedingly useful. Another author might have defined and described things quite differently, but none could have achieved in the final result any greater practical utility.

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Methods of Theoretical Physics, pts. I and II. Philip M. Morse and Herman Feshbach. McGraw-Hill, New York–London, 1953. xxx + 1978 pp. Illus. $30 the set, $15 each volume.

This is a monumental work. At first glance, one wonders at the enormous effort involved in collecting, organizing, systematizing, and presenting such a mass of material. Further study evokes a steadily growing admiration and gratitude that the tremendous work has been done and that an amazing amount of useful material has been made available to physicists. This is not to say that it can be read in a hurry. It must be studied. But one who needs to know the subject matter can find it.

The title is an accurate description of the contents. The unity, the organization, and the material of the book are based on the methods rather than on the subject matter of theoretical physics, which means that the book is on mathematics but mathematics in the physicist's sense. Little attention is paid to rigor as a mathematician understands it, but much attention is given to the applicability to physical problems. Classical mechanics, optics, electromagnetic theory, and quantum mechanics are frequently dealt with together, as in the sections on field theory.

Some of the chapters would make, in themselves, good courses in mathematics for physicists. One hundred forty pages on functions of a complex variable and 180 pages on ordinary differential equations provide, in a concise form, most of the techniques needed in these fields and provide them with minimum emphasis on analytic rigor and maximum emphasis on intuitive (geometric) understanding.

Extensive discussions of approximate methods prepare the reader for the "facts of life" in theoretical physics, as opposed to classroom situations where most problems can be treated in closed form.

As is to be expected from the activities and interests of the senior author, the solutions of Laplace's and Poisson's equations and of the wave equation are given full attention. In these chapters, as in most other chapters, a valuable tabulation of solutions, functions, and other material is appended. In fact, the tabulations at the ends of the various chapters

would provide, in themselves, a valuable reference book.

The range of subjects treated is remarkably complete, reminiscent of the "German handbook" tradition. In addition to the subjects already mentioned, others of particular interest are the treatments of integral equations, the diffusion equations, and the equations for vector fields. The only obvious omission is a lack of emphasis on algebraic methods. The correspondence of matrices with operators is mentioned, but there is no discussion of the group theoretical methods that have found extensive applications in problems related to crystals, molecules, and atoms.

The authors indicate in the preface that the book is an outgrowth of a course given at the Massachusetts Institute of Technology, and numerous problems are included whose solution by the reader would aid materially in his understanding of the subject matter. It seems improbable, however, that these two thick volumes can serve as a textbook in a graduate course of the usual extent. One could imagine that a first-class student, by devoting his full time to it, might work through the material in the course of an academic year but probably in not much less. Although its use as a textbook in the usual way seems doubtful, there is no doubt that this book will occupy a prominent position on the desks of almost all working theoretical physicists and will soon come to be the standard reference work for the mathematical techniques in physics.

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Les Groupes Sanguins Chez les Animaux. Individualités sanguine et tissulaire. R. Dujarric de la Rivière and A. Eyquem. Editions Médicales Flammarion, Paris, 1953. 407 pp. Illus. F. 3275.

The predominant tone of this ninth member of the *Collection de l'Institut Pasteur* is that of an encyclopedia of observations on animal blood groups and tissue individuality. As such, the book provides a useful set of summaries and references. If one wishes to know what conclusions have been drawn from blood-group studies of ducks, chickens, pigeons, horses, asses, cattle, sheep, goats, swine, cats, ferrets, dogs, rabbits, guinea pigs, rats, or monkeys, he will find almost all of them here. If one is curious about the existence or nature of maternal-fetal incompatibility in animals, he will find an exhaustive abstract of the literature. If one seeks a strong historical presentation of tissue specificity, particularly from the viewpoints of "cytotoxic antibodies" or of grafts, he will find many references and conclusions in this survey. About two-thirds of the text pages and most of the more than 850 references deal with these subjects. The authors rarely attempt more than the presentation of conclusions drawn in the papers to which they refer.

The references are marred by frequent typographical errors. To cite only a few examples, T. H. Morgan is credited with work done by W. T. J. Morgan; W. H. McGibbon is Mac Gibbon in much but not all the text, and Gibbon (Mac) in the bibliography; Beadle becomes "Beadie," and sex chromosomes "sex hormosomes"; Wiener's *Blood Groups and Transfusion* was published in 1945 or 1948 depending on where it is found in the references.

Broader aims for the book are expressed in the first 122 pages, which offer general treatments of serology and genetics and a detailed presentation of serological techniques, with primary reference to work on human cellular antigens. The general fields are covered in a fashion that seems likely to irritate the expert and either confuse the novice or mislead him into an opinion that he has achieved an easy mastery of these subjects. After a 16-page presentation of genetics, there are more than two cautious pages on the "Théorie de Mitchourine." The authors choose not to discount the interest provoked by the Russian theory, especially in its application to arboriculture, but to affirm the value of the "chromosome theory of heredity."

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Automatic Digital Calculators. A. D. Booth and K. H. V. Booth. Academic Press, New York, 1953. vii + 230 pp. Illus. + plates. $6.

It has been predicted that we are now entering a new phase of the Industrial Revolution wherein machines will relieve men of tedious and difficult mental labor, just as they relieved men of tedious and difficult physical labor during the first phase of the Revolution. Whether or not such a prediction is accurate, it certainly is true that there is today a great need for scientists with some knowledge of the design and use of automatic digital calculators. There is a corresponding need for a good textbook to be used as an introduction to the subject, and the authors state in the preface that they intend their book to be such a guide.

The general organization is excellent. The first three chapters review the history of digital calculators and examine many of the machines now in existence. The following chapters, which comprise more than half of the book, list the basic electronic and mechanical components from which a computer is built and describe how the components are put together in a computing system. In the last five chapters, the authors explain how problems are prepared for solution by a computer, and mention some unusual computer applications.

However, it is difficult to recommend as a textbook one that omits so many important points and differs in so many respects from current practice. The chapters on circuit design do not even mention the importance of reliability or the steps that must be taken to insure circuit stability. The use of mathematical techniques in logical design is ignored. To this partial list of omissions must be added incorrect statements and some dubious and controversial arguments. It is