lished recently. Instead, this book should serve as a splendid reference volume. The usefulness of the present version is severely impaired by the lack of an index. Otherwise, the rendition into English is quite readable, although the typography must be characterized as only fair. It is to be hoped that a fully indexed translation of the complete 1959 edition will be published shortly.

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A Review for Specialists

The Theory and Practice of Scintillation Counting. J. B. Birks. Pergamon, London; Macmillan, New York, 1964. xx + 662 pp. Illus. $17.50.

The use of scintillation counters has come to be of enormous importance in many fields, including nuclear physics, medicine, space physics, chemistry, biology, geophysics, and geology. Therefore, a comprehensive treatise like this one will find many potential readers. The present volume, which is separated by an 11-year interval from Birk's first book, *Scintillation Counters*, consists of a documentation and discussion of the very large literature from papers, conference proceedings, review articles, and similar sources. The author's field of specialty is organic scintillators, and much of the text deals with research results on the fundamental process of scintillation in organic materials, both liquid and solid. The book is organized in 16 chapters, each of which includes a reference bibliography aimed at being extremely comprehensive. The introductory chapter includes a general bibliography, as well.

Various types of nuclear detectors and the early history and principles of scintillation counting are covered in the introduction. This is followed by a useful chapter on the interaction of radiation with matter, including range-energy curves for various particles and a discussion of the photoelectric and Compton processes with applications to scintillation materials. Chapters 3 and 4 outline the theory of the scintillation process in organic and inorganic crystals. In the chapter on the detection of scintillations (chapter 5), phototubes, light pipes, and the reflectivity of surfaces used for light gathering are treated, and there is an interesting discussion of the meaning of line width as seen in the usual way on the output of a photomultiplier, a discussion of the pulse shape and time resolution of photomultipliers, and a lengthy table (14 pp.) on the characteristics of commercial photomultipliers, including some of Soviet manufacture. In chapters 6 through 10 additional details of organic scintillators, both crystalline and plastic, and their applications are considered. This section of the book comprises 246 pages. Birks then devotes further discussion to the scintillation process in inorganic crystals, and this is followed by chapters on alkali halides and other inorganic solids, such as zinc sulfide and cadmium sulfide. Scintillations in gases and the applications of gas scintillators are discussed in chapter 14. The book has a short concluding chapter, and an extensive postscript which describes important work that came to the author's attention after the completion of the original manuscript. This postscript with its reference list of 103 papers, almost all of which were published in 1962 and 1963, testifies to the enormous current activity in the field of scintillation counting.

Because the book is in the nature of a greatly enlarged review article, it will be of most use to specialists in the field of scintillation counting. It will be of particular use to research workers who are encountering new problems in the development of scintillation materials and for them will be an important sourcebook.

However, the book is not organized for use as a reference handbook by those who are interested in the quick solution of a practical problem in scintillation counting. This is because the author covers such a large amount of material but has not digested and presented the material so that it is easy to find specific information on a particular topic. For example, while I was examining the book, a current application problem arose in the laboratory —we needed to find the relative merits of sodium iodide and anthracene for detecting charged particles. The many curves showing the efficiency of anthracene and the separate curves for the inorganic materials were not presented on the same basis, and we could not find a single figure or table in the book which compared the relative efficiencies of these scintillation materials for different kinds of radiation. The answer was finally obtained from curves given in a manufacturer's brochure. The book lacks a subject index, and despite the author's statement that he could not compile one, a subject index, even an incomplete one, would add greatly to the book's usefulness. The working physicist might wish for a chapter which would serve as a "handbook of scintillation counting" and which would represent the author's digestion and condensation of the vast amount of research material documented in *The Theory and Practice of Scintillation Counting.*

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Analytical Chemistry

The Geochemistry of Oil and Oil Deposits. L. A. Gulyaeva, Ed. Translated from the Russian edition (Moscow, 1962) by S. Caspari. Israel Program for Scientific Translations, Jerusalem; Davey, New York, 1964. iv + 220 pp. Illus. $7.50.

Works translated into the English from the Russian language are frequently difficult to read and comprehend, and whether reading *The Geochemistry of Oil and Oil Deposits* is worth the effort depends on the validity of the conclusions reached by the investigators. The book is divided into two sections: (i) discussion of the compositions of the organic materials in petroleum and sedimentary rocks and the behavior of petroleum-like components in rocks under the action of compressed gases; and (ii) presentation and interpretation of analyses of rocks and waters from oil fields.

Although the investigators purportedly used modern methods of investigation, they did not fully exploit the capabilities of modern instruments and techniques, and their analyses of organic materials are usually reported in percentages of poorly defined substances such as bitumens, benzene-alcohol extracts, oily components, asphaltenes, or humic acids. Many of the conclusions that are presented by the various authors appear to be more strongly supported by presumptions than by analytical data. Nevertheless, some of these conclusions deserve further attention. The analyses of halogen compounds in bitumens and crude oils and of organic solutes in formation waters, which are described in the book, are novel and are potentially of theoret-

ical or economic interest. Gas-liquid chromatography and electron-capture detectors probably could provide accurate qualitative and quantitative assays of the volatile halogen compounds in oils, and variations in the organic solutes of formation waters, which may define the proximities of oil deposits, could most likely be determined chromatographically and spectroscopically. Such reliable and effective analytical methods, however, were not employed by the Russian investigators who report their work in this volume, and the findings generally lack the sound experimental foundations that characterize constructive scientific endeavors.

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A Comprehensive Résumé

Ferromagnetic-Relaxation Theory. Marshall Sparks. McGraw-Hill, New York, 1964. xii + 227 pp. Illus. $12.50.

It is now almost 20 years since J. H. E. Griffiths discovered ferromagnetic resonance, and nearly 10 years since the appearance of yttrium iron garnet. The discovery of that admirable material made it possible to do a variety of experiments whose interpretation was for the first time reasonably clear-cut. The subject entered on its liveliest phase, and many of the main insights into relaxation processes, instability phenomena, and the resonant spectrum date from that period. During the intervening years, great activity has centered on refining experiments and the working out of the theory in detail (the present work provides a selective bibliography of approximately 250 references).

The stage has now been reached at which it is reasonable to produce a survey of the entire field. Sparks, who has contributed extensively to the theory, has written an admirably lucid and comprehensive account of these developments, which appears to include work done up to mid-1964. It contains a good account of all the assortment of relaxation mechanisms that have been suggested and carefully relates them to the experiments.

One of the author's objectives was to provide an account of the subject which can be read by a newcomer to the field. Thus, the first four sections describe ferromagnetic resonance, relaxation, and spin waves in relatively simple language, with emphasis on the acquisition of a set of operating concepts. In particular, the picture of relaxation as a series of processes involving the splitting and fusion of various quasi-particles (magnons and phonons) is emphasized. Methods of measuring relaxation times are also treated.

In the next section two-magnon and three-magnon processes are discussed in general, with a full exposition of surface scattering by pits. Some specific relaxation mechanisms operative in insulators are considered in sections 6 and 7. The valence exchange process operative in spinels is discussed in terms of Clogston's theory, which probably has a wider validity. The effects of impurities, such as the rare earths, are treated under the somewhat controversial headings of "slow" and "fast" relaxers. (The dust has not yet settled on this part of the subject.) The effects of atomic disorder, the dipole narrowing of inhomogeneously broadened lines, the Kasuya-Le Craw process, and eddy current broadening are also considered. The present experimental evidence in yttrium iron garnet is interpreted in terms of the various available mechanisms. High power instabilities and parallel pumping are considered in the final section.

The book is well produced, and the only errors that I noted were one or two liberties (in the bibliography) with the initials of some authors.

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Cytogenetics and Radiobiology

Mammalian Cytogenetics and Related Problems in Radiobiology. C. Pavan, C. Chagas, O. Frota-Pessoa, and L. R. Caldas, Eds. Pergamon, London; Macmillan, New York, 1964. xviii + 427 pp. Illus. $15.

This volume contains the proceedings of two symposia held in Brazil—one at São Paulo and the other at Rio de Janeiro—in October 1962. Of the 27 chapters, 19 are devoted to cytology and cytogenetics, and 8 deal with diverse topics in radiobiology. A few of the articles are short useful reviews of the status of particular areas—for example, Eagle's brief discussion of mammalian cell nutrition in vitro and Gartler's evaluation of the utilization of mammalian cell culture for somatic cell genetics. This type of article forms the main strength of the book. Many of the contributions are research reports which, for the most part, are too brief, narrow in focus, and fragmentary to be of much help to a reader who is trying to gain a general picture of the field. Papers of this type should be published in a regular journal rather than in a book.

The subject matter of the papers is even more diverse than one usually encounters in a symposium volume (varying from "The chromosomes of the Brazilian opossum" to the "Action of streptomycin on phage development in *Staphylococcus albus*," and to the "Modification of radiation effects in Ehrlich ascites tumors by oxygen or sodium azide"); a central theme is at best only vaguely developed. Although the symposia most likely succeeded in stimulating communication and were useful to the participants, the justification for publishing the papers is certainly less clear. Much of the information and many of the ideas are available in other reviews; there is in fact very little that is new in the volume. Moreover, in a field that is progressing as rapidly as mammalian cytogenetics, a long delay between the preparation of a manuscript and its publication is a serious fault. The meetings were held in late 1962, and the volume was published late in 1964. There are almost no references to work published after 1962. Although 25 percent of the references cite 1962 publications, virtually no 1963 references are cited, all of which suggests that the book was much out of date at the time of its appearance. The volume is, in addition, cluttered by discussions of papers (which were made from the floor) and by the proceedings of a round-table session.

The delay in publication will seriously decrease the usefulness of the volume to the specialists in the various areas, and the diverse, fragmentary nature of the subject matter will probably discourage the nonspecialist from reading more than a few of the chapters.

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