ual cycles, rhythms in dormancy of plants, hibernation of mammals, and seasonal migrations), and, finally, specifically with circadian rhythms in man. These latter, most conspicuous and extensively studied rhythms in man are treated in a separate chapter, with special attention to the sleep-wakefulness rhythm. Circadian variations of interest to the clinician, such as those in body temperature, blood pressure, pulse, and basal metabolic rate, are noted. The reader may wish for more specific reference to some of the studies mentioned, but perhaps the indications given in the bibliography of the books and articles where such specific reference can be found will be sufficient.

The recurring biologic phenomena discussed by the authors are those with a more or less similar time interval separating two comparable states. Terminology has been modernized according to current usage. Because a clear understanding of the reason for the use of certain terms—for example, *circadian* to designate rhythms with periods of about 24 hours—is basic to the ensuing discussion, the reader should give particular attention to the preface.

The text is further brought up to date by a succinct discussion of rhythms in their relationship to work hygiene as well as to intercontinental and extraterrestrial flights. Extensive work on rhythms done at the University of Minnesota is well summarized in the new edition.

By recent cave studies Michel Siffre, who lived for 2 months without known time cues, has produced substantial evidence that the sleep-wakefulness rhythm is to a large extent endogenously free-running rather than merely "learned"; thus, the discussion of Pavlov's hypothesis concerning the nature of this rhythm no longer occupies a prominent place in the second edition or in this translation.

An elementary but sound and lucid discussion of biological rhythms is not easy to come by in this rapidly developing field of study. In this respect, Reinberg and Ghata have made a positive contribution. Their book is not intended for, nor is it recommended to, the specialist, but it will be useful to students and to researchers starting work on rhythmic functions. And it will be of interest also to clinicians and investigators in other fields.

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Organic Chemistry: Instrumental Techniques

Physical Methods in Organic Chemistry. J. C. P. Schwarz, Ed. Holden-Day, San Francisco, Calif.; Oliver and Boyd, Edinburgh, Scotland, 1964. xii + 350 pp. Illus. $9.75.

This attractive and well-produced little book is the most recent addition to a quite numerous family of treatises, surveys, and reviews in which modern techniques for determining physical constants are related to applications where they are particularly useful. The editor and contributors (all teachers of chemistry in the United Kingdom and Australia) are aware that, on the one hand, they are competing with more detailed compendia which cover similar ground (and even have almost identical titles) and, on the other, that there is no lack of monographs in which individual methods are treated in great detail.

Wisely, a decision was made to fit this collection of essays primarily to the needs of students who are exposed to instrumental techniques for the first time and who are not yet expected to select one for a particular purpose or to familiarize themselves with details of the state of the art. Application to structural problems in organic chemistry are stressed. From this point of view, the book is successful. The introductory section and nine chapters ("Ultraviolet, visible and infrared spectroscopy" by P. Bladon and G. Elington; "Infrared and raman spectroscopy" by G. Elington; "Ultraviolet and visible spectroscopy" by P. Bladon; "Magnetic resonance spectroscopy" by L. M. Jackman; "Optical rotation" by J. C. P. Schwarz; "The determination of molecular weight" by C. T. Greenwood; "Diffraction methods" by G. A. Sim; "Mass spectrometry" by R. I. Reed; and "Dipole moments" by B. L. Shaw) are clearly written. Examples of applications are up to date; the references lead on to more detailed treatments. Commendably, the book does not contain a single meaningless photograph of the outside of a "black box."

The level of sophistication varies among the various chapters. For instance, the chapter on magnetic resonance spectroscopy assumes a far greater appreciation of physical principles than the brief introduction to mass spectroscopy. Separation techniques, without which many of the physical methods are unusable, are omitted all together. But, no matter. The book is a good introduction to an important field. It will stimulate the imagination of a perceptive student, and as he progresses toward more involved problems, he can find more detailed assistance elsewhere.

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Decision Making and Its Application

Operations Research: Process and Strategy. David S. Stoller. University of California Press, Berkeley, 1964. viii + 159 pp. Illus. $5.

Operations research is concerned with the science of decision making and its application. In this small volume, David S. Stoller, a senior research scientist at the RAND Corporation, does not attempt to provide a comprehensive survey of the techniques adopted by operations research; rather, he focuses briefly on its history, characteristics, and two types of operational problems: servicing and strategy. These are handled by queueing theory and game theory, respectively.

It appears that this book, which is divided into 23 chapters that average about six pages each, stems from the author's numerous lecture series on selected topics in operations research. In keeping with the typical mathematical background of the audiences for such lectures, only an introductory knowledge of calculus, statistics, probability, and the theory of equations is required for reading this work. Although he verifies many mathematical assertions, Stoller makes the material more palatable to the nontechnical reader by avoiding the Satz-Beweis style of exposition so frequently encountered in the mathematical sciences. In short, this is a book intended for the reader who seeks a "feeling" for operations research instead of an overall training in its techniques.

The treatments of both queueing theory and game theory are thus rather limited in scope. The servicing systems studied deal mainly with Poisson arrivals having negative exponential serv-

ice times, although some attention is given to gamma servicing models. The theory is illustrated (indeed motivated) by examples drawn from the realm of traffic and production engineering. Strategy problems are exemplified by finite, zero-sum, two-person (that is, matrix) games for which a modest amount of theory is included. The last three chapters are devoted to linear programming and its application to the solution of matrix games. In the final chapter, a very simple linear programming problem is solved by what Stoller calls "the simplex-gradient method." This heterodox approach to the problem is disappointing for want of motivation.

Also regrettable are the absence of exercises and the ineffectual use of references. Specifically, the references are scanty, mixed in level, and poorly keyed to the text. These defects tend to diminish the usefulness of this book to the reader who desires more than "flavor." Nonetheless, *Operations Research: Process and Strategy* is clearly written and offers a painless introduction to an exciting and expanding field of activity.

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Geologic Evolution of Japan

Geology of Japan. Fuyuji Takai, Tatsuro Matsumoto, and Ryuzo Toriyama, Eds. University of Tokyo Press, Tokyo, 1963. 279 pp. Illus. $12.50.

The Geologic Development of the Japanese Islands. Masao Minato, Masao Gorai, and Mitsuo Hunahasi, Eds. Tsukiji Shokan, Tokyo, 1965. 442 pp. Illus. $65.

The festoon of Japanese Islands along the border of East Asia has long fascinated geologists for the light that it sheds on the geologic meaning of island arcs, geosynclines, and the sharp demarcation between continents and ocean basins. Few general reviews of the geologic history of Japan have been published, and none of those published are comparable in scope and depth to two new books—*Geology of Japan* and *The Geologic Development of the Japanese Islands*.

The former is a *Festschrift* dedicated to Teiichi Kobayashi, who (still in his prime) has trained and inspired whole generations of Japan's leading geologists. The second is an outgrowth of a series of symposia organized by the Association of Geological Collaboration of Japan. The listing of contributors (18 in the first, 84 in the second) is a veritable "Who's Who" of contemporary Japanese geologists. The effective integration, and the excellent rendition in English, of the results drawn from so many sources attests to the outstanding competence of the editors, who are also principal authors, and their assistants.

These volumes, which are being published just at the inception of the formalized program of cooperation in scientific research between the American and Japanese communities, will be of inestimable value in providing Japanese and Americans with convenient and authoritative summaries of the present state of our knowledge with respect to the geology of Japan.

The whole of the Japanese archipelago, ranging from about the latitude of Montreal to that of Savannah and covering an area slightly greater than Italy, receives moderate to heavy precipitation. Enlightened land management has insured a universal protective blanket of vegetation. Quaternary volcanics and sediments cover older rocks over much of the islands. Consequently, natural outcrops of the pre-Quaternary rocks are quite limited, and there are many unresolved controversies about stratigraphic and structural relationships in the most complex areas.

The basement complex of metamorphic and igneous rocks, of continental type and uncertain age, underlies marine middle-Silurian rocks. It is clear that the Asian continent has not expanded here at the expense of the Pacific Ocean, probably the opposite. After formation of these Precambrian or early Paleozoic rocks, the area was more or less continuously occupied by geosynclines, sites of marine sedimentation, repeated volcanism, and crustal movements until late in its history. The Silurian limestones and shales are regarded as shelf deposits, and they contain only minor amounts of pyroclastics.

Evidently, Japan and the areas to the north and south were geologically, if not geographically, parts of the Asian continent until development of the island arcs during the Miocene. After that time, the area was characterized by much faulting and volcanism.

In a book review it is not possible to touch on the great wealth of subjects covered in these books. Suffice it to say that the treatment shows that Japanese geologic research is keeping abreast of modern developments elsewhere.

In *Geology of Japan*, the first chapter covers generalities and includes a good historical review of geologic research. Other chapters are devoted to the stratigraphy and paleontology of each of the geologic systems, and one chapter covers pre-Tertiary igneous and metamorphic geology and metallogenesis. Appendices include a glossary of geotectonic terms for Japan and a list of fossil names proposed in Japanese publications. This book is a concise introduction to Japanese geology: well written, compact, and suitable for use as a textbook for university students or as a reference book for professional geologists.

The Geologic Development of the Japanese Islands is a more ambitious compendium and analysis which sets as its goal the placement of Japanese geology in a great framework that covers much of eastern Asia. It even incorporates paleogeographic maps of all Eurasia. This book, with 30 full-page, two-color paleogeographic maps of Japan and immediately surrounding areas, is beautifully designed and printed. It is copiously illustrated, a good example of the present high level of the publisher's art in Japan. Unfortunately, it is priced too high for university students, but it will be essential to geologists interested in East Asia and problems of the western Pacific.

Major parts, with many chapters, cover the pre-Silurian, the geosynclinal and Honshu tectogenetic movements (Silurian–early Mesozoic), subcontinental and outer geosynclinal belts (Triassic-Paleogene), island arc stage (Neogene-Quaternary, with much material on the Pleistocene and human paleontology), and physical geology (volcanism, seismology, paleomagnetism, and submarine topography). Unfortunately, the China Sea, presumably a modern miogeosyncline, remains an enigma.

Both of these books are indispensable primary sources of information on many aspects of the geology of Japan and adjacent areas.

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