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.

RICHARD W. COTTLE
Bell Telephone Laboratories, Inc., Holmdel, New Jersey

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.

NORMAN D. NEWELL
American Museum of Natural History and Columbia University, New York