

granites, but that most of them are of one kind—nonmagmatic. These are his words: "Of course a magmatic intrusion, formed either by differentiation of a basic magma or by ascent of a problematic granite magma would resolve the question for the most part. But we have seen how unlikely an intrusion is, in the immense majority of cases, and notably in all cases where the formation of granite in place, or nearly in place, is affirmed for the great part of its material or almost all of it" (p. 294).

Anyone who hopes to find a fresh approach to the "granite problem" will not find it here. It is surprising to read a book dealing with granite and find not a single chemical or modal analysis. No triangular diagrams depicting these data on the different types of granites are provided in the book. No use is made of the trace element distribution in granitic rocks. The min-

eralogy of the feldspars is treated superficially, with no attempt to distinguish various types on the basis of mineralogy. Experimental studies on systems related to granite are barely mentioned. No mention is made of Bowen's "petrogenesis residua system" or of its significance in the generation of granite magmas through differentiation of more basic lavas or in anatexis. Many geologists will be astonished to learn that the Sierra Nevada batholith is a product of granitization as are the Tertiary granites of the Alps (p. 204). The gabbro-granophyre association is not considered.

Despite the lack of quantitative chemical and modal information, the book offers a wealth of information on the field relations of granite and related rock types.

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Plant, Soil, and Microbial Interactions

Microbiology and Soil Fertility (Oregon State University Press, Corvallis, 1965. 164 pp., \$4.50), edited by C. M. Gilmour and O. N. Allen, contains seven chapters, each based on an address given at the 25th Annual Biology Colloquium held at the Oregon State University in April 1964. The chapters deal with various aspects of plant-soil-microbial interactions and are presumably directed towards the perplexing and enduring question concerning the role played by microorganisms in the phenomenon of soil fertility. Although specific organisms are known to carry out biochemical transformations resulting in products available to plants, and the population as a whole can be demonstrated to be an active fraction of the soil organic matter, the presence of which so greatly modifies soil properties, soil microbiologists have long been frustrated in their efforts to control fertility through manipulation of the soil population. Plants are but one of the organisms in the ecosystem, albeit the one that man considers most important. There is a tendency to regard the microbial population as being in some vague way subservient to the higher plant, whereas in fact a cropped soil is microbiologically greatly different from an uncropped soil because of the many effects produced by the presence of living roots.

It is somewhat invidious to select

particular chapters for special comment, because a high standard is maintained throughout, but perhaps it is a reviewer's prerogative to dwell on topics of especial interest to him. C. D. Moodie approaches in a thoughtful way the nature of the sites of nutrient exchange and absorption in soils, and the effects of moisture level on soil as a microbial medium. C. C. Delwiche takes a broad biogeochemical view of the distribution and cycling of carbon and nitrogen in the biosphere, pointing out that the latter contains only one part in 10^7 of the carbon on the surface of the earth. Full characterization of the major part of this, which is soil humus, still defies the organic chemist, but as F. E. Broadbent points out, recent findings do permit recognition of certain functional groups and the conclusion that it is not "entirely a disorganized collection of biological residues."

Ethel K. Allen and O. N. Allen discuss the evidence for symbiosis of soil organisms with nonleguminous plants that have roots on which nodules or other root hypertrophies are observed. In a few instances, isotopic nitrogen studies have established significant fixation of nitrogen, but they make it clear that many species have not yet been critically examined and that where organisms have been isolated from such root tissues, adequate proof of rein-

fectiveness and nodule production has not been given. The Rhizobium-legume association is not well understood, but according to J. C. Burton, there is still potential improvement to be realized by further physiological and genetic investigations of strain variation and host specificity.

These seven papers constitute a valuable report on the current state of our knowledge of seven topics in soil microbiology and microbial-plant relationships.

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Cultural Anthropology

Marquesan Sexual Behavior (Harcourt, Brace, and World, New York, 1966. 251 pp., \$5.95), by Robert C. Suggs, represents an attempt to obtain sufficient factual data to develop an adequate picture of present Marquesan sexuality, and to salvage enough of the vanishing information concerning aboriginal sexuality to permit comparison and a study of culture change. That his attempt was largely successful is a tribute to his and his wife's objectivity and understanding of Marquesan language and culture.

The islanders were not amenable to direct biographical interviewing on sexual matters—a curious reluctance in so permissive a culture—and one perhaps attributable to missionary influence and generalized distrust of Europeans. Therefore, the data collected by the Suggses was obtained by listening to (and sometime judiciously encouraging) conversations and by observation. Since Marquesans are much given to sexual talk and gossip, this monitoring of conversation proved an effective technique. Suggs cross-checked his male-derived data with that obtained from females by Mrs. Suggs.

Following an initial chapter devoted to physical environment, history of European contact, and a brief sketch of social organization, the author employs a life-cycle approach with consecutive chapters entitled "Reproduction," "Infancy and childhood," "Puberty and adolescence," and "Marriage and adulthood." In these chapters, which constitute the heart of the volume, the author first presents the modern and then the aboriginal data.

The next two chapters are devoted to art and religion. Although explicit

sexuality was an integral part of aboriginal religion, it is singularly rare in the art of either the past or the present. The next chapter compares the Marquesans with Polynesia in general, showing basic similarities, and the final chapter is an often provocative and interesting treatment of the probable causes of cultural change. Five appendices on special topics and a bibliography conclude the volume.

The book is replete with information which, when compared to other cross-cultural data, is of substantial theoretical import. For example, it is clear that female sexual responsiveness

is extremely subject to cultural conditioning; that permissiveness does not preclude strong jealousy nor prevent preoccupation with sex; and that a major cultural interest need not be expressed in the graphic art. In view of the value of Suggs's contribution, one joins him in his hope that anthropology will develop more precise measurements and techniques to categorize behavior into meaningful units so as to facilitate studies of change and causation.

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Introductory Textbook on Ecology

This second edition of **Field Biology and Ecology** (McGraw-Hill, New York, ed. 2, 1966. 509 pp., \$9.50), by Allen H. Benton and William E. Werner, Jr., has been largely rewritten with additional chapters on energy exchange and marine ecology. The appendix has also been enlarged to include bibliographic reference sources, ecological instrumentation, and a very brief discussion of statistical terms. The book is composed of 13 chapters, one of the earliest being a brief but excellent history of the development of natural history and ecology in the United States. In addition to lucid chapters on taxonomy, communities, and succession, the authors also present the basic principles of animal behavior and, in a later chapter, review and stress the increasing importance of ecologically orientated research on man's deteriorating environment. However, although the authors claim that their book "is designed to meet the needs of a beginning ecology or field biology course," it only partially reflects the orientation and important research developments that characterize the growth of ecology during the past decade. For example, of the 13 chapters, one is devoted to energy flow in ecological systems and one to population ecology, but together these chapters comprise less than half of the material describing ecological succession. In the chapter on natural populations the significant concepts and current problems relating to growth and regulation are only briefly touched on, and the emerging relationships between genetics and ecology are omitted. In addition no mention is made of the Morris 15-year budworm study, which is prob-

ably one of the most significant studies of a natural population ever attempted, nor of the work of MacArthur on species diversity and community stability which has stimulated so much recent research and discussion.

The authors' interests and competence in the description of natural ecological systems is evident throughout the book, particularly in the chapters on plant communities and succession which comprise almost half the book. Avoided in the discussion of communities, however, is the biocoenological approach that has resulted in research into the reality of the plant community and the emergence of the concept of the vegetational continuum. In addition, even though many students today are equipped with the elements of calculus before enrolling in a beginning ecology course, an introduction to the use of mathematics and statistics has been avoided throughout the book, despite the fact that these are indispensable tools for the ecologist today.

Most chapters are profusely illustrated with excellent photographic material, much of it from the authors' own files. Graphical content is low and reflects the descriptive rather than the analytical and experimental approach of the authors. The book will continue to serve very adequately as a text for use in an elementary ecology course at the sophomore level, where emphasis is on vegetation, but it does not provide sufficiently the balance of content and the depth necessary for the more prevalent introductory course in general ecology at the junior-senior level.

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Meteorology

Climates of the U.S.S.R. (Aldine, Chicago, 1966. 279 pp., \$10), by A. A. Borisov, is written as a manual for high school teachers and students of geography. It presents a considerably reworked version of the first edition (1948) which was received very unfavorably in the U.S.S.R. [*Meteorol. i Gidrol.* No. 1, pp. 79-81, and No. 4, pp. 51-52 (1950)]. This English-language edition was translated from the second Russian edition (1959) by R. A. Ledward; Cyril A. Halstead edited the translation.

In the introduction Borisov presents a quite interesting outline of the development of climatology in the U.S.S.R., he then discusses, in the first chapter, the climate-forming factors, such as radiation regime, circulation conditions, and moisture cycle. The tables showing the frequencies of different air masses, and of lows and highs, are compiled for the interval 1930 to 1939 rather than for a later or a longer period. Under the heading "Moisture Cycle" the author discusses the attempts to calculate the moisture transport in the period prior to World War II (Kasatkin, Kaminskii), but the investigations of contemporary meteorologists are only briefly mentioned.

The second chapter deals with the general characteristics of climatic elements in the U.S.S.R.: air and soil temperatures, humidity (here it is difficult to understand why the author presents a map showing the distribution of relative humidity at 1 p.m. in May), cloudiness and sunshine, precipitation, evaporation, and snow cover. This chapter concludes with a treatment of the general characteristics of the climate of the U.S.S.R. and with a table comparing the extreme values of climatic elements in the U.S.S.R. with those recorded world-wide. In the brief discussion of continentality it is rather odd for the author to use Zenker's formula (not "Tsenker"—one should be careful in re-transliterating *non-Russian* names; the same holds for "Fikker" = Ficker).

The last, the most valuable, and also the most interesting chapter, chapter 3, deals with regional climates of the U.S.S.R. The author divides the area into eight regions according to the circulation types and dominant air masses. He also describes the climatic regions in relation to their geomorphological features: climates of seas and lakes, of plains, and of mountainous