anatomical terms is given with the definition and derivation of each. This section on etymology should prove particularly valuable to the student.

As is usual with Prof. Romer, this book is most interestingly written. It is not merely a collection of anatomical facts, but rather tells the story of vertebrate history and structure in a clear and lively manner. The illustrations are good and profuse (363 figures), and many of them are original.

Many teachers are reported to have adopted this book sight unseen. It is the opinion of this reviewer that they will be well pleased with their choice.

WILLIAM O. PUCKETT

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Principles of Animal Ecology. W. C. Allee, Alfred E. Emerson, Thomas Park, Orlando Park, and Karl P. Schmidt. Philadelphia: W. B. Saunders, 1949. 837 pp. $14.00.

Since Haeckel's suggestion of the term *ecology* in 1870 no group of authors has done more than this illustrious quintet to establish the science on a firm basis.

Among the book's outstanding values are its documentation of many principles on which the evidence was previously widely scattered, its precise statement of the present status of these principles, so that lines of past and present accomplishment and profitable future advance are indicated, and its comprehensive organization of the widespread materials of ecology.

The five principal sections of the book are "The History of Ecology," "Analysis of the Environment," "Populations," "The Community," and "Ecology and Evolution." These are supplemented by an excellent subject index, meticulously prepared, a bibliography, and an author index of nearly 2,500 titles. Great care has been taken to correlate various parts of the book through cross references. A glossary would have been helpful.

The authors rightly make the point (p. 693) that ecology tends to be holistic in its approach. Where most adequate, the book considers its subject matter from the bio-ecological, i.e., the plant-animal, viewpoint. The authors reject the terms "animal formation" and "plant formation" in favor of biotic concepts (p. 582). Unfortunately, the authors felt that, for convenience and workability, they could not extend their work to include the whole scope of ecology (p. vii), the bio-ecology of some writers. But in fact most of their treatment is sympathetically bio-ecological.

The concept of the community as a complex organism, which many authors have discussed without coming to any very widely accepted conclusion, receives full recognition here. Table 30, p. 440, presents a highly convincing comparison of the doctrines of the cell, the multicellular organism, and the community. The reviewer would point out that the community as a functioning organism in many, probably most, instances, is the plant-animal community. This important point is not always made clear by our authors, although it is unmistakably implied or exemplified on many pages.

Note some of the practical implications of this concept of the plant-animal community as a complex organism. Ecology should never be divided, at least in philosophic thought, into plant ecology and animal ecology. The splitting up of the subject into abstracted aspects of restricted scope (one of my students reported taking five courses in ecology in a single institution—plant, animal, forest, insect, and wildlife ecology) is strictly for convenience and may lead to confusion.

The pervasive quality of the order of nature is suggested on page 464, where it is pointed out that there is a parallel between the zonation of a restricted community on granite rock and the major features of the suppositional dispersal pattern of the world biota (Matthew). In both, the primitive types are peripheral and the more highly evolved ones at or near the center.

Tables of stratal equivalents, such as those given on pages 470 and 473, may be of the highest theoretical and practical value, especially in such fields as horticulture, game management, fisheries administration, and agriculture generally.

Under "Natural Selection" (pp. 640 and following) there is a closely reasoned development of the thesis that the concept of competition has often been misapplied in recent years. "The importance of its implications and of its conscious misapplications in human affairs, both in economics and in interclass and international warfare, can hardly be overemphasized." On page 641 appears the significant statement: "Fitness involves cooperation, and adaptations leading to coordination of parts of organisms and of individuals in populations are the result of evolution through natural selection." The action of selection on a unitary population emphasizes the desirability of highly developed cooperation within communities. Indeed, the concept of community selection is probably one of the most important in the entire philosophy of evolution. It dispossesses the tooth and claw theory of survival, the philosophy of the Nietzsches and the Hitlers, and enforces instead the survival value of cooperation, as a controlling selection factor in some cases.

Instances of sacrificial individual or group action are often overlooked. Somatic cells sacrifice the capacity to reproduce new organisms and often die functioning for the benefit of the whole organism (pp. 691–692). Maternal instincts subject the mother to a higher mortality rate than would otherwise be the case. ". . . Survival may well be in relation to humanity as a whole, rather than for the benefit of the few at the expense of the many" (p. 694). "The evolution of greater interdependence between organisms is correlated with progressive evolution" (p. 696).

Ecological indicators or indices, as the authors call them, are given rather sketchy treatment. No mention is made of the important work of Shantz and others in this field, although its theoretical and practical importance has been widely demonstrated. Also there might well have been somewhat more generous explicit reference to the concept of emergence, although it must be conceded that the whole cell-organismal-community concept is a philosophical elaboration in terms of emergence, implicit if not definitely expressed.

It must be confessed that, even with the outstanding and impressive job performed by the authors, the organization of the total body of ecological principles leaves something to be desired. As in reading the dictionary, one tends to lose the thread of the story in the mass of detail. Perhaps the method of composition, by a board of five outstanding and able authors, each with a lifetime of facts, experiences, and observations to place at the disposal of the group, makes inevitable some roughness in spite of the obvious and laborious effort to assure coherence and literary excellence. In this connection the method of work followed is of interest. First the different authors prepared the separate chapters. Eventually all parts of the manuscript were read aloud to the other authors and there was much discussion of questioned points. The result is an extraordinary accumulation of detailed facts, generalizations, and documentations. If the text lacks somewhat in smoothness or in literary felicity, it is quite understandable. Perhaps if one of the distinguished authors would now take the book and rewrite it from a synoptic view, shortening it somewhat, we could count on more rapid appreciation of it by the scientific and general public. But this reviewer does not want to leave the impression that anyone should undervalue the book. Its publication marks a great advance.

WALTER P. TAYLOR

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Webs in the Wind: The Habits of Web-weaving Spiders. Winifred Duncan. New York: Ronald Press, 1949. 387 pp. $4.50.

American Spiders: A Guide to the Life and Habits of the Spider World. Willis J. Gertsch. New York: D. Van Nostrand, 1949. 285 pp. $6.95.

Here are two books on spiders, so completely different that there is no question of comparison. Miss Duncan is primarily interested in the work of spiders and not in the spiders themselves. Dr. Gertsch is interested in the spiders themselves and looks upon a knowledge of their works and ways as necessary for their complete understanding.

Miss Duncan admits, in the foreword of *Webs in the Wind,* that she knew nothing about spiders when she started to observe them and their daily life. She chose spiders because "they are the only creatures which are full of activity and variety, and yet sedentary. Also ubiquitous." For two years, part of which was spent in New England and California and part in Mexico, she has watched and sometimes sketched those spiders and webs which have come to her notice. The inevitable result of such a program is a little here and a little there but no picture even approximately complete. This is not intended as criticism, for Miss Duncan makes no pretense that she has written an exhaustive treatise for arachnologists; it is rather a story that has been fun to write and will be fun for others to read. As such, her book is a success though some readers will regret that the identities of many of her pets are unknown.

Dr. Gertsch, who has charge of the spider collection of the American Museum of Natural History, chose to write about spiders because he knows about spiders. He is most interested in their classification and so his book is somewhat weighted in that direction. And since a proper classification of any group of animals must take into account not only the physical forms of the members of the group but also the habits and modes of life of the different species, he has included chapters dealing with the life of the spider, spinning, dispersal, courtship and mating, evolution and economic and medical importance. Other chapters deal with the major groups of the spiders themselves. The average reader will probably find the chapters on courtship and mating and economic and medical importance the most interesting. The fantastic nuptial dances of the male jumping spiders seem reasonable when one realizes that until the male has fully identified himself to the female, he is in constant danger of being killed and eaten by his mate. As to the medical importance of spiders in this country, Gertsch comes to the conclusion that only the black widows (*Latrodectus* spp.) are dangerous, and even these not as dangerous as the public in general considers them.

The 64 plates, half of them in full color, add very greatly to the pleasure of the reader. The author is indeed to be congratulated on getting together such a wealth of excellent pictures. The reviewer thinks that it would have been better if the plates had been numbered consecutively instead of in two series, but that is really a minor point. More important, it would seem that more should have been written about the enemies of spiders.

EDWARD A. CHAPIN

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Irrigated Soils: Their Fertility and Management. D. W. Thorne and H. B. Peterson. Philadelphia: Blakiston, 1949. 288 pp. $5.00.

The objective of these two Utah State Agricultural College authors was to write a textbook which would provide a source of information on those soils upon which more than one-half of the world's population is dependent, the irrigated soils. They assume that the reader has an elementary knowledge of botany, chemistry, mathematics, and physics and is familiar with concepts of pH, basic exchange, and physical properties of soil.

Some of the topics treated in the 25 chapters are: his-