generally wider attention to these problems. Although the author did not intend the book to be a general survey, the recent French and German literature remains underrepresented.

The first five chapters have been revised only to the extent of interpolating accounts of selected new literature. Chapter 6, "Plant communities," of the first edition, has been nearly doubled in length and divided into two chapters treating "description and comparison" and "classification and ordination," the latter built largely on work published since 1957. These two chapters will be especially useful for orienting students confronted by the variety of viewpoints taken by different groups of workers. The final summarizing chapter is little changed. Three new tables have been added to "Appendix B," and the list of references is nearly doubled.

The second edition is more suitable for use as a textbook, particularly as a result of the new treatment of the section on plant communities, but the book necessarily has a sharp focus on quantitative methods in community ecology and is suitable only for advanced instruction. A list of mathematical symbols in the front would have facilitated use of the book as a reference work and textbook. This book is the most critical evaluation of measurement and analysis problems in plant ecology available in one volume, and the second edition again brings it abreast of contemporary work. We are indebted to the author for the criticism and stimulation he applies to developing thought in this fundamental area within the realm of ecology.

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Science and Discovery Series

The Laws of Physics. Milton A. Rothman. Basic Books, New York, 1963. viii + 254 pp. Illus. $4.95.

There is a class of readers for whom I would think this book a boon indeed: those who are already well into the essential abstractions of physics and much excited about it, and who want to see the road ahead. Around this central group there are others who will respond positively, out to and including people who teach physics. The writing is very simple and straightforward, and in this style the author introduces a number of topics that are usually dodged at this level. For example, about 15 pages are devoted to mechanics after Newton—energy and potential, the Lagrangian and the Hamiltonian, and the relation between symmetries and conservation laws. The discussion goes in a fairly conventional pattern into forces and fields and thence into relativity. A sketch of quantum physics is preceded by a simple treatment of probability and of thermodynamics. A final chapter on elementary particles ends with the strong and weak interactions. There are three appendices: on momentum and energy in elastic collisions, on the relativistic transformations, and on the Mössbauer effect.

A critical reader will produce quite a few marginal questions and exclamations, but I think many of these comments will refer to matters that are essentially minor [for example, the "special theory deals only with systems moving at constant velocity" (p. 141)], if the intent of the book is kept clearly in mind. Rothman's brief treatment of the direction of time seems utterly misleading.

I have one much more general criticism. The historical and philosophical by-play is unhistorical and unphilosophical. There are the standard animadversions about the Greeks—Aristotle, but any Greek will do, even Democritus, *daimon* of physics. There is the standard contrasting of modern science with previous philosophers (rationalists all), followed (only two pages later) by the statement that "Newton was able to show by mathematical proof that the moon's travel around the earth must indeed be ruled by the force of gravity (p. 16)."

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Biospeleology

Biospéléologie: La Biologie des Animaux Cavernicoles. A. Vandel. Gauthier-Villars, Paris, 1964. xviii + 619 pp. Illus. F. 64.

Rich, endemic cave faunas are best developed in temperate regions near the margins of Pleistocene glaciation, regions like those found in southern and western Europe, the southeastern United States, Japan, and New Zealand. Systematic investigations of cave animals began about 1840 in both Europe and the United States. In this country, cave biology flourished between 1870 and 1910, with the work of Packard, Cope, Banta, and Eigenmann, but the foundations of modern biospeleology were laid in Europe by E. G. Racovitza, René Jeannel, and others in the period between 1907 and World War II. There has been no general treatise on cave biology since Jeannel's *Les Fossiles Vivants des Cavernes* (1943).

Owing to the rapid advances made during the last two decades in the study of this unique habitat, a fresh and more comprehensive approach is certainly indicated. It is especially appropriate that this should be attempted by Vandel, the director of the Laboratoire Souterrain du C.N.R.S. at the Grotte de Moulis (Ariège), France. The experimental investigations carried out by the author, his colleagues, and his students at the cave laboratory are reviewed and well integrated with the descriptive material that forms the core of his book.

After a short introduction, there is a detailed inventory (246 pages) of the cavernicolous animals of the world. This is by no means a checklist, which would more than fill a volume of this size, but a carefully balanced treatment of each of the known groups of cavernicoles at the ordinal, familial, or generic level, depending on their ecological significance and diversity. Part 3 deals with geographic distribution and ecology of cavernicoles. Parts 4 and 5 treat physiology and behavior, and Part 6 the evolution of cavernicoles.

The sources of food utilized by cave animals include not only organic debris washed underground by sinking streams, but also microorganisms that occur in cave silts and clays. Evidence is reviewed for the dependence of many cavernicoles on cave mud, either throughout their life cycle or in juvenile stages. Most troglobites (obligate cavernicoles) have undergone evolutionary changes that led to loss or reduction of eyes and pigment, reduction of the metabolic rate, and loss of the ability to adapt physiologically to temperature and humidity conditions other than those prevalent in caves. The few species that have been studied have a much longer life cycle than their close epigean relatives.

There is abundant evidence, well presented by Vandel, which suggests that preadaptation has been historically significant in determining which groups of animals could successfully colonize