is a set function, but then what does $(\sin x)/x$ mean? In the second case are there two sine functions, and if not, what does one do about degrees and radians? The author defiantly states that "although purists make a great point of distinguishing between the function f and its value $f(x)$ at x . . . even purists retrogress occasionally and we shall make no excuse for suiting ourselves." This attitude is reasonable; the only question is where one draws the line. To the reviewer it appears that, in many places, students will find comprehension hindered by retrogression.

But these criticisms are small points. Hille's book, which for all its rigor is written in a breezy readable style, indicates that it is possible to teach calculus both rigorously and usably.

J. L. Doob
Department of Mathematics, University of Illinois

Neuroendocrine Mechanisms

Neuroendocrinology. Ernst Scharrer and Berta Scharrer. Columbia University Press, New York, 1963. xiv + 289 pp. Illus. $8.50.

Ernst Scharrer and Berta Scharrer are a remarkable if not unique scientific team, and one whose early collaborative efforts constitute pioneering contributions to the currently burgeoning field of neuroendocrinology. The direct or indirect participation of the central nervous system in endocrine function has become widely recognized during the past few years. Perhaps nowhere is the intimate relationship better seen than in the insect and crustacean, and Berta Scharrer's publications on the localization of neurosecretory cells in the *Limulus* first appeared more than 25 years ago. Ernst Scharrer's interests in the subject are of equal duration, but in recent years have leaned somewhat more to neurosecretion in the mammal. The paper read by the Scharrers at the Laurentian Hormone Conference in 1953 [*Recent Progress in Hormone Research*, vol. 10. Academic Press (1954), p. 183] stands as a classic in the field, perhaps most of all because it brought out the concept that the role of neuroendocrine systems may well be comparable in many species. In the mammal the phenomenon of the production of secretory material by neurons of the supraoptic and paraventricular nuclei, the transport of the secretory material down the neuron, and its release into the blood vessels of the neurohypophysis was (and remains) the best documented example. This concept, the formation of which came largely through the Scharrers' work, met with some scepticism when it was first presented, but is now well accepted.

The Scharrers were expected to write a book on the subject of their mutual interest, and their wide experience well fitted them for such authorship. *Neuroendocrinology* sums up many years of thought and study. There is a wide scope of coverage, with consideration of many species and a real effort to demonstrate the common pattern of neuroendocrine mechanisms as they occur across the animal kingdom. The clear-cut demonstrations of control of maturation, reproduction, and certain metabolic functions by neurosecretion in the simpler life-forms leads one to look for analogous mechanisms in the mammal, and the Scharrers have sought out and attempted to define such analogies. This is perhaps the greatest value of the volume. For example, the regulation of metamorphosis in the insect by a balance of stimulatory and inhibitory hormones under the control of the central nervous system may not be so different from the regulation of sexual maturation in the mammal. It is regrettable that some of the newer information on the synthesis and secretion by the pineal gland of methoxy indoles (apparently under the control of sympathetic fibers) which inhibit gonadal activity in the mammal [*Science* **141**, 277 (1963); **142**, 1071 (1963); **143**, 1328 (1964); **145**, 63 (1964)], strong evidence in support of such a notion, was not available at the time of publication. There is reason to believe that continued research along these lines will reveal other analogous situations and further support the kind of thinking that the Scharrers have been doing for so long.

The reader may find the early chapters—"Afferent pathways," "Integrative centers," "Efferent pathways," and "Target organs"—a little thin. It is only when the authors dig deeply into the experimental evidence, in the chapters on reproduction, growth and development, and metabolic processes, that the full import of their message becomes apparent.

It is not easy reading. There is much concentrated fact, though occasionally a bit of delightful humor appears. The illustrations come out well, but are disappointingly scanty considering the large amount of anatomical material available to the authors. The bibliography is excellent. The cost of the volume is not at all excessive. *Neuroendocrinology* is a worthwhile addition to the library of the biologist, the endocrinologist, and the physiologist, and, for that matter, to the library of anyone interested in the science and the mysteries of life.

Gordon Farrell
Department of Physiology, School of Medicine, Western Reserve University

Space Science

The Physics and Astronomy of Meteors, Comets, and Meteorites. Gerald S. Hawkins. McGraw-Hill, New York, 1964. x + 134 pp. Illus. $2.50.

This excellent paperback, which can almost be tucked in one's pocket, will interest both the layman and the student. Written primarily for a junior or senior undergraduate in the physical sciences, this book presents in clear concise sentences an account of the bodies that move in the regions between the planets. There is special emphasis on those bodies that have direct contact with the Earth—meteors, meteorites, and micrometeorites—because scientists have greater knowledge of these objects. Hence, comets are discussed in only two of the nine chapters, although, owing to the close relation between comets and meteors, and between comets and micrometeorites, reference is often made elsewhere to comets.

The distinguishing characteristics of meteors and meteorites, and the different origins of these two types of bodies, are clearly pictured in words, drawings, and photographs. The student will enjoy the equations and the theory offered as proof of most of the statements. Meteors, comets, meteorites, and micrometeorites are real objects. They exist today as well as in the past and are truly messengers of the evolution of the solar system, if we can interpret them correctly. The author has attempted to present a picture with the pertinent knowledge that scientists now have of these interplanetary bodies. It should stimulate further study and thereby increase our

knowledge of these objects. The study of cosmic dust, for instance, is attracting special attention in the present space age. Though not differentiated by Hawkins, cosmic dust consists of particles generally smaller than micrometeorites, as defined by the International Astronomical Union, and an understanding of the identification and analysis of cosmic dust demands some astronomical knowledge of the nature, composition, and motion of interplanetary bodies.

One feature would have increased the value of this little book enormously —a bibliography to help the student who wants to investigate further many of the original discoveries and theories. However, the 27 problems, with some answers, will satisfy many students.

The layman will probably be satisfied by the book in its present compact form. Meteors, comets, meteorites, and micrometeorites will soon be of even more intense interest to all, since these interplanetary bodies, in one form or another, visit the Earth from the realm into which man himself will soon venture.

FRANCES W. WRIGHT
Smithsonian Astrophysical Observatory, Harvard College Observatory, Cambridge, Massachusetts

Mineral Resources

Les Péridotites Serpentinisées en France. Groupe 1, *Péridotites Intracristallines.* pt. 4, *Massif Central Médian: Bassin du Haut-Allier.* F. H. Forestier. Bureau de Recherches Géologiques et Minières, Paris, 1964. 291 pp. Illus. Map.

As part of its broad mineral program in France, the Bureau de Recherches Géologiques et Minières is publishing three series ("suites"), on mineral resources, hydrogeology, and serpentinized peridotites, respectively. Reports on fluorspar and barite have been published. The present paper is one of a series of 12 loose-leaf reports that supplement the author's general review *Les Péridotites Serpentinisées en France* (1962). Ten of the reports are concerned with pre-Hercynian peridotites by districts; one is concerned with Hercynian peridotites of the Massif Central, and one with the "alpine" (Mesozoic and Tertiary) peridotites. Forestier believes, despite recognized objections, that the ultramafites were emplaced as fluid magma, possibly as submarine (ophiolite) flows, before the principal regional metamorphism of their country rocks, and that they were serpentinized at various times.

Fascicule 4, "Massif Central Médian: Bassin du Haut-Allier," is the first of the series on pre-Hercynian peridotites to be published. It describes 83 peridotite occurrences which are indexed by number on a geologic map at 1:300,000 scale and which appear to be closely associated with pyroxenites and amphibolites. Each occurrence is systematically treated under 16 headings that range from name, location, form, and size to nature of the original peridotite, degree of serpentinization and kind of serpentine (antigorite or chrysotile), atmospheric alteration, contact relations with country rocks, acid dikes and features related to them, previous descriptions, and dates of the author's visits. In essence the descriptions are detailed field notes that are illustrated by numerous sketches and sketch maps, and laboratory notes that include thin-section descriptions and a few chemical analyses. Many of the descriptions of mineralogy and rock relations are excellent and would apply equally well to ultramafites in the gneissic terrain of our southern Appalachian region.

The format and scope of the series evoke a mixed response. The loose-leaf format must be expensive; it has the usual drawbacks of large bulk and pages that tear loose, although good paper is used; and it is designed primarily for someone working in the field in France. The method of presentation, although effective for scattered small bodies, is not suitable for complex masses more than a few tens or hundreds of feet across. The descriptions are quite repetitious because most of the masses are small and very similar, and they do not seem to have the economic purpose that justifies the descriptions of individual deposits in the barite and fluorspar series. The publication of several hundred more similar descriptions will have limited scientific value; I hope that the series will also include modern large-scale maps which show the detailed structure and lithology of some larger and less fragmented Hercynian and "alpine" peridotites.

T. P. THAYER
U.S. Geological Survey, Washington, D.C.

Mathematics

A Textbook on Analytical Geometry. Joseph S. Mamelak. Pergamon, London; Macmillan, New York, 1964. viii + 247 pp. Illus. $6.

At a time when combined analytic geometry and calculus courses are much in vogue and when much effort has been turned toward producing elementary mathematics books that are reasonably sound, a book such as this is something of a novelty. It covers the usual topics associated with older books of similar titles, in much the same way, although there is some attempt to introduce significant geometric exercises with physical and engineering overtones.

In general there is no attempt to be rigorous despite the publisher's claim that "new concepts are developed in a rigorous manner." A typical beginning is "choose a straight line which extends indefinitely in both directions." Such words as infinite, direction, and extension are carelessly used. The popular phrases "draw a line" and "a point which moves" are used extensively. One exercise begins as follows: "A basic assumption of synthetic geometry is: figures can be moved in the plane without changing their form."

It is doubtful that the intended users, students of engineering and science, will profit much mathematically from exposure to a geometry course based on this book.

EDWIN HALFAR
Department of Mathematics, University of Nebraska

Laboratory Procedures

Theory and Practice in Experimental Bacteriology. G. G. Meynell and Elinor Meynell. Cambridge University Press, New York, 1965. xii + 274 pp. Illus.

This book of laboratory procedures is divided into seven chapters. The first, "Measurement of bacterial mass and number," includes plating, turbidometric, and chemical methods, with a rather detailed discussion of growth rates. The second chapter, on media, contains a discussion of the inhibitory factors sometimes found in media, as well as consideration of the usual topics. Methods of oxygenation, meth-