eral position seems sound and exceedingly sensible. On the other hand, what he has to say about probability, induction, or the theory of measurement would not give an uninitiated reader any feeling for the fact that these areas of the philosophy of science are full of exact results and specific unsolved problems. There is also, it seems to me, a disproportionately detailed discussion throughout the book of the relevance for scientific method of recent results in mathematical logic in comparison with the discussion of corresponding results in mathematical statistics.

PATRICK SUPPES
Applied Mathematics and Statistics Laboratory, Stanford University

Principles of Field Biology and Ecology. Allen H. Benton and William E. Werner, Jr. McGraw-Hill, New York, 1958. vii + 341 pp. Illus. $6.50.

By approaching ecology from three directions—as a field study, as a taxonomic challenge, and as an economic problem because of man's biasing effects—Benton and Werner demonstrate a close relationship between the various principles described. A surprising amount of space is given to a clear account of the development of field biology in America, a topic usually neglected in any volume dealing with population dynamics and ethology. The concluding chapters, on the use of biological literature and on the choice and conduct of a field problem, will be helpful to advanced undergraduates and beginning graduate students.

The references following each chapter and a glossary of terms used in the book offer assistance and make the text matter itself more lively and interesting.

LORUS J. MILNE
MARGERY MILNE
Department of Zoology, University of New Hampshire

Morphology of Plants. Harold C. Bold. Harper, New York, 1957. xxiii + 669 pp. Illus. $8.

This textbook organizes in one volume a survey of the whole plant kingdom. To cover this great diversity the author has adopted the "type method"—that is, the use, for each major group, of illustrative types for detailed study. Wherever possible the types are genera that are readily obtainable. Bold admits that there will be inevitable disagreement about emphasis and choice of types, but on the whole he seems to have made an excellent selection.

In format the volume is neat and attractive. In general, each major group of plants is dealt with in one chapter, which comprises an introduction or description of the general features of the groups, followed by detailed coverage of representatives. Coordination of the diverse subjects is accomplished largely by recapitulations and summaries. The greater part of the book concerns living plants. The treatment of fossil plants is concentrated in a single chapter, "Plants of the past," which is presented after all the living forms have been discussed. Although this approach has the disadvantage of separating the fossils from their nearest living relatives, it has the advantage of serving as a review and synthesis of the plant groups. It can also serve mechanically to bring all the fossil forms together in the laboratory.

The author has relied more heavily than the writers of conventional texts on photographic illustrations. Many of those that are included are good, but unfortunately many are only fair—either not clear or out of focus. More labeling might improve some of the photographs and drawings and increase their effectiveness.

A very useful appendix (pages 621–652) describes procedures and devices for preparing laboratory materials and adds much to the value of the book. It is Bold's belief that living materials are indispensable for good teaching. I believe that many teachers have a need for instruction, however, if this high ideal is to be achieved. The author has met this need by providing numerous tips on techniques, many of them original. Another pedagogically desirable innovation, in my opinion, is the providing of derivations of scientific names from the Greek or Latin roots.

My major criticism is that the number of plant divisions (the phyla) has been increased to approximately double that taught by most teachers. Bold has made a radical (called "conservative") classification that treats vascular plants, for example, in nine separate divisions —Psilophyta, Microphyllophyta, Arthrophyta, Pterophyta, Cycadophyta, Ginkgophyta, Coniferophyta, Gnetophyta, and Anthophyta. He holds that evidence of ultimate interrelationships of these assemblages, especially among land plants, is so tenuous that they must be considered as polyphyletic.

One may argue that not enough attention has been given here to efforts of phylogenists and taxonomists to detect and correlate not only differences but resemblances as well, and to weigh them justly. I really wonder whether the beginner in morphology has the necessary equipment to evaluate, on so little evidence, the propriety of the various "phylogenetic speculations," or whether an elementary textbook such as this one is the appropriate arena for such discussion.

The author, obviously, has not tried to avoid controversy in his presentation. This is evident again, for example, in his dealings with the interesting idea that seed plants are homosporous. There is no question in my mind that the text will stimulate both the teacher and the student. The style of writing is good, the book is interesting, and the text, in general, seems to me to be superior. Teachers will undoubtedly find the book a most valuable text, and it is probable that biologists in other fields will find it a useful and handy reference to general plant morphology.

WARREN H. WAGNER, JR.
Department of Botany, University of Michigan

De l'actinie à l'homme. vol. 1, *Anticipation et mémoire.* Bases de l'évolution psychique. Henri Pieron. Presses Universitaires de France, Paris, 1958. viii + 306 pp. F. 1600.

Henri Pieron (1881—), who began his psychological writing just after the turn of the century, has been the leader in experimental psychology in France for the past 40 years. He inherited Binet's laboratory at the Sorbonne and Ribot's chair in the College of France and has been editor of *l'Année* since the 1920's. These important positions have enabled him to experiment, to lecture, and to publish extensively. This latest book, *De l'actinie à l'homme,* volume I, is a collection of 33 of his articles taken from 17 different journals, all French except one—a 1938 Russian journal of physiology. The dates of the articles range from 1907 to 1946, only four having appeared after 1916.

The collection is arranged in four parts: the first pertains to methodological problems of an objective psychology; the second, to studies of rhythms of behavior in sea anemones, certain Crustacea, and man; the third, to studies of mnemonics or cues for homing and direction orientation in mollusks and ants; and the fourth, to studies of memory in mollusks and to some general observations on animal memory. Each part begins with a brief introduction that has as its goal the tying together of the different parts in such manner as to show that anticipation (revealed by rhythms of behavior) and memory are the evolutional bases of mind. I am not enthusiastic about this aspect of the volume, for while the book thus provides in one place many facts about animal behavior, it does not make clear which of the connections that Pieron sees are his own

inferences and which pertain to characteristics of the animals involved.

Neither is it clear for whom the book is specifically designed. The American graduate student in physiological psychology might find it useful. It could serve to acquaint him with the work of France's greatest psychologist in the physiological tradition—an acquaintance that is seldom made. In the psychological literature that is widely regarded as basic in graduate training, one finds slight reference to Pieron. Thus, this selection of writings from one of the world's most prolific psychologists could have an effect in an unanticipated direction.

JOHN B. WOLFE
Department of Psychology, University of Mississippi

A History of Public Health. George Rosen. MD Publications, New York, 1958. 551 pp. $5.75.

This book is a "comprehensive international account of community health action." History's importance is indicated by the statement, "Every situation that man has faced and every problem that he has had to solve have been the product of historical developments." A paragraph from the volume's jacket defines public health. "From the earliest civilizations to the present, communities have endeavored to cope with health problems that arise as a result of human beings living in groups. Such problems include the control of infectious diseases, the provision of water and food, maintaining a sanitary environment, supplying medical care and providing for the disabled and destitute. When a group is involved, these problems cannot be handled individually, they require action by the community, and as a result there has developed what we know as *public health.*"

Rosen quotes the late Herman Biggs as follows: "Disease is largely a removable evil, it continues to afflict humanity, not only because of incomplete knowledge of its causes and lack of individual and public hygiene, but also because it is extensively fostered by harsh economic and industrial conditions and by wretched housing in congested communities. These conditions, and consequently the diseases that spring from them, can be removed by better social organization. No duty of society, acting through its governmental agencies, is paramount to this obligation to attack the removable causes of disease . . ." The author himself says: "These developments must be seen, however, not alone as events peculiar to the United States but in perspective of a world wide historical evolution that has brought into being the modern state with its concern for individual, family and community needs for organized social security and service. . . . Today, the principle of state intervention and control in health matters is admitted. . . . Its emergence has resulted from the interaction of important economic and social trends." It is the business of a history of public health to tell the story of this development, and since many nations have contributed, of necessity that narrative must be international.

George Rosen writes from a rich personal background and from a broad point of view, drawing on the experiences of Classical Greece, Imperial Rome, the Medieval World, Italy, Spain, France, Germany, England, and the United States, chiefly, with references to China, India, the Near East, Eastern Europe, and such other parts of the world as contribute to the complete picture.

Following the customary foreword, preface, and acknowledgments, the subject is discussed in seven divisions: "The Origins of Public Health"; "Health and the Community in the Greco-Roman World"; "Public Health in the Middle Ages"; "Mercantilism, Absolutism and the Health of the People"; "Health in a Period of Enlightenment and Revolution"; "Industrialism and the Sanitary Movement"; and "The Bacteriological Era and its Aftermath" (in two sections). Public health is treated from its earliest history to 1950. There are nearly 140 headings of the subject matter under these seven divisions, among them: "Airs, waters and places"; "Baths as well as bread and circuses"; "Leprosy—the great blight"; "Toward a national health policy"; "The bookkeeping of life and death"; "Lunacy and conscience"; "Enter Mr. Chadwick"; "First steps toward international health organization"; "The vanishing diseases"; "The rise of scientific nutrition"; "The responsibility of government for the advancement of health"; and "The health and welfare of the industrial worker."

When it is recalled that the book is limited to 551 pages, the author may be forgiven if some aspects of public health history are not covered to the satisfaction of the reader. The discussion on vaccines should have mentioned smallpox vaccine again, should have included the work of F. F. Russell on typhoid vaccine, and should have included whooping cough (pertussis) vaccine; moreover, Rosen tells only part of the story when he makes no mention of the toxoids—diphtheria and, particularly, tetanus. Within the space available, industrial problems are well covered, but one feels a lack of coverage of the accomplishments of military medicine in public health and of the geography of disease. Perhaps more could be said about the Crusades, and about the discovery of new lands and the movements of peoples. Nevertheless, the book is a remarkably complete collection of data, and the story is admirably told.

The author makes few references to the future. Past may be prologue, and no doubt we can better understand the present and cope with the future because of our knowledge of history, but it would be unwise to attempt to reveal the future—a fact no one knows better than the historian. Too many factors impinge on the firm base of the past for us to be sure just what the future will be, although certain general trends may be clear.

The book contains no charts, diagrams, maps, plates, or illustrations but does include eight simple tables. I have two comments to make regarding them. Table III was not intended by the author to do more than illustrate his statement: "Then with the 1880's the golden age of bacteriological discovery was ushered in . . . causative organisms of various diseases were demonstrated in rapid succession, often several in one year. The explosive character of this process is clearly seen from Table III." This table is headed "Discovery of pathogenic organisms," and the title is misleading. A better one would be "Early discoveries of pathogenic organisms," or "Discovery of some important pathogenic organisms." The table also contains minor errors. Thus, the pneumococcus, the discovery of which is attributed to Fraenkel, 1886, was described by Pasteur as a septicemic microbe of saliva in 1881 and, in the same year, by Sternberg as a micrococcus of rabbit septicemia. The organism of leprosy, not even yet cultivated in the laboratory, was seen and described by Hansen in 1874, significantly earlier than the date 1880 given in the table. Soft chancre should be dated 1889 instead of 1887. I do not see why the anthrax bacillus (1876, Koch) was not included, since it was in a way the fuse that touched off the era, and for that matter the gonococcus, the meningococcus, and the organisms that cause whooping cough, tularemia, relapsing fever, and syphilis might well have been included because of their importance. Since the table includes the animal parasite that causes malaria and is not therefore restricted to bacteria, it would be logical to include also representative virus and rickettsial diseases, such as rabies, smallpox, typhus, and yellow fever, although to do so could be confusing, since the emphasis is on the last two decades of the 19th century as the golden era of bacteriological discovery.

My criticism here arises from the fact that a book as interesting, comprehensive, and authoritative as this one will be read by many people, some of whom