reports of mentation and the nature and content of these reports. The book also includes detailed summaries of the recent experimental literature on the determinants of the REM sleep state and of dream content.

The presentation requires no technical background of the reader and is written in a style that should be attractive to beginning students or interested laymen. The book will no doubt also attract the attention of sleep researchers who wish to know more about the point of view of its author, who has already made important original contributions to the field. The book is not unbiased in its treatment of the subject matter. Although Foulkes is usually conscientious in his presentation of alternative interpretations of the data summarized, he leaves no doubt as to where he stands on most of the issues. However, he obviously pitched his work at an elementary level, and the sophisticated reader will find little in the way of useful original theory.

The major theoretical discussion concerns functions of mentation at various stages of sleep. Foulkes believes that the primary function of mentation at sleep onset is the management of disrupting sensory stimuli and disturbing inner thoughts and feelings so that sleep may be achieved more easily. The process of management involves incorporation of stimuli and representation of impulses in simple, wish-fulfilling form in the hypnagogic fantasies. In contrast, the role of wish fulfillment is minimized for REM-period dreams, which are regarded primarily as a kind of intense self-exploration dealing with the problems of waking life. Non-REM mentation serves the function of maintaining and consolidating the "transfer of relatively intact processes of mental synthesis from wakefulness to sleep" (p. 198) so as to protect the individual from "unpleasant consequences that might attend a total failure to exert an organizing influence on mental experience" (p. 198).

The examples of dream interpretation which Foulkes presents serve to illustrate his ideas and may make the text more readable for a general audience, but as he himself recognizes, they cannot be accepted as very convincing evidence in support of his views. The function of sleep mentation is an interesting question. Unfortunately, however, it does not seem possible at this time to subject issues of this sort to experimental test in the laboratory situation. Foulkes's theoretical discussion is therefore more likely to be controversial than productive of research.

The two books have only minor areas of overlapping subject matter. Taken together they provide a particularly useful and up-to-date introduction to the findings and issues in an area of growing importance to the understanding of man.

DONALD R. GOODENOUGH
*Department of Psychiatry,*
*State University of New York,*
*Downstate Medical Center, Brooklyn*

## Elementary Plant Physiology

**About Plants: Topics in Plant Biology** (Addison-Wesley, Reading, Mass., 1966. 184 pp., illus. $2.95), by F. C. Steward with A. D. Krikorian and R. D. Holsten, is a fine and successful attempt to overcome the lack of elementary books in plant physiology.

Although the plant physiologists of a century ago, men such as Sachs or Von Mohl, never thought of plant physiology as a subject divorced from the rest of botany, it did develop separately over the years. More unfortunately still, plant function was taught in many places as an entirely separate course at the intermediate or advanced level only after students were well grounded in morphology and anatomy. The modern tendency is to reverse this trend by bringing form and function together and to teach them in an interrelated and more organic way in beginning courses. However, sometimes in such attempts the pendulum swings over a little too much toward the side of physiology, and important aspects of morphology and anatomy are overlooked.

The book here reviewed is intended for such beginning courses. It tries to bring form and function together, but the weight is definitely on the side of function. The teacher who uses it in his elementary course will most certainly have to supplement it with a book on morphology and anatomy.

The book is a modification of Steward's *Plants at Work*, deemphasizing the more specialized aspects of biochemistry and cell physiology. These changes are intended to make the book more useful to students of general biology with little or no knowledge of chemistry. Steward and his collaborators succeed admirably well in this task. The book is very clearly written, with nothing taken for granted, and even the most difficult subjects are made easily understandable. The authors should be congratulated for succeeding in what is probably one of the most difficult tasks in writing.

As in every text there are some errors of detail, as well as some views with which one might want to take issue. For example, the Krebs cycle is referred to as a "now familiar series of intermediates," although it is obviously not familiar to the student. The illustrations are correct and useful. However the book could have profited from more illustrations of plant structures. Finally, I would like to have seen chapter 11, "Growth: Development: Reproduction," expanded. These very crucial topics are not treated, in my opinion, with the detail they deserve.

In brief, this is an excellent beginning textbook on plant physiology for students with little or no knowledge of biochemistry, and it manages to fill a gap in the rapidly saturating market of elementary biology books.

OTTO T. SOLBRIG
*Department of Botany,*
*University of Michigan,*
*Ann Arbor*

## Reaction to a Crisis

Throughout the 19th century, New Orleans maintained a sinister and in many ways well-deserved reputation for ill-health. Yet even in this generally unenviable record of sickness and death, the yellow fever of 1853 is uniquely prominent. In **Sword of Pestilence: The New Orleans Yellow Fever Epidemic of 1853** (Louisiana State University Press, Baton Rouge, 1966. 205 pp., illus. $5), John Duffy has written a well-balanced account of this epidemic, in all probability the most severe ever to strike an American city. Of an estimated 100,000 who remained in New Orleans through the summer of 1853, about 10,000 died of yellow fever; some 40,000 cases were reported.

Though more dramatic in scale, the history of this epidemic conformed to the classic pattern of community reaction to such crises. At first, business-minded citizens suppressed news of the fever, fearing the paralyzing effects of such news upon the city's commercial life. The "better sort," of course, fled in large numbers, tending

to reinforce the traditional belief that yellow fever was a disease associated peculiarly with poverty and immigration. Municipal efforts at medical care and prophylaxis, the city's attempts to care for the orphaned, the unemployed, and the convalescent—all proved totally inadequate; a voluntary society, the Howard Association, composed of earnest young merchants and professional men, stepped in to undertake these medical and philanthropic tasks. (Relief funds collected in other American cities were, for example, sent in many cases not to New Orleans' municipal government but directly to the Howard Association). The medical profession was in a peculiarly difficult position, its members unable to cure and incapable of agreeing upon either a cause or preventive of the disease—yet exhausted by the burden of work thrust upon them. Therapeutics were heroic, preventive measures pathetically traditional: streets were cleaned, cannon fired twice daily, and barrels of tar burnt to purify the presumably infected atmosphere.

The 20th-century reader of Duffy's study will be particularly shocked at the supine and formless behavior of New Orleans' municipal government. The city had no real board of health, and even when the epidemic was clearly gaining headway legislators resisted efforts to appropriate funds for fighting the epidemic and aiding its victims. Once the disease had established itself, moreover, the city's government largely evaporated; two-thirds of the board of aldermen and assistant aldermen slunk away from the infected city—despite the traditional assumption that such officials should remain and help personally during such periods of crisis. No northern city of comparable size was, in this period, quite so bereft of formal leadership and administrative mechanisms.

Duffy has told his story clearly and with an eye for interesting detail. He is somewhat handicapped, however, by a comparative paucity of personal documents describing the epidemic and a consequent dependence upon printed sources almost exclusively. These often lack the immediacy of less formal and self-conscious diaries and letters. And during epidemics, of course, journalists and physicians tended to be particularly tendentious or evasive.

CHARLES ROSENBERG
*Department of History,*
*University of Pennsylvania,*
*Philadelphia*

## Papers in Archeology

**New Roads to Yesterday: Essays in Archaeology** (Joseph R. Caldwell, Ed. Basic Books, New York, 1966. 556 pp., illus. $12.50) consists of 20 articles on archeology that have appeared in *Science*. They are grouped under the headings of Old World Beginnings, The New World, Cities and Civilization, and one under Science in Archaeology, and are followed by a comprehensive index. The lengthy introduction weaves together the diverse pieces and supplies some necessary background, so that the nonprofessional reader will emerge with considerable understanding of some of the goals of archeological research and some comprehension of the discipline. In addition to the last paper, several others could come under the heading of science in archeology to distinguish them from the more strictly archeological and culture-history items.

The range of the contributions is impressive, for, as the editor states,

> The excitement and ferment over the past decade, when archaeology's horizons were so rapidly expanding, found a ready-made historian in *Science*. . . . Many of these [essays] are landmarks that should excite the general reader as well as the professional archaeologist, for they are written by the innovators themselves [p. 1].

The editor's selections are of high quality, and it is good to have them easily available in this attractive and coherent form.

The book suffers from only one serious flaw; with a few exceptions, I could find no indication as to when the individual articles were published. Although some of the articles have been modified or revised, there is a continuing flood of new material in archeology and it is important to know exactly when a particular piece originally appeared and to what extent, if at all, it may have been revised. Here one can only estimate how up-to-date each article is by referring to the latest item in the accompanying bibliography. It is to be hoped that in a second printing this omission will be remedied.

In general this is a highly successful experiment which should justify the production of similar volumes made up of *Science* articles in other fields.

ROBERT W. EHRICH
*Department of Anthropology,*
*Brooklyn College of the*
*City University of New York,*
*Brooklyn*

## Chemistry of Seawater

**Chemical Oceanography**, volume 1 (Academic Press, New York, 1965. 732 pp., illus. $25), edited by J. P. Riley and G. Skirrow, aims to be a "comprehensive textbook on chemical oceanography to cover the chemistry of the sea, the interaction between the components of seawater and marine life, and the geochemistry of marine sediments." Volume 2 (reviewed in *Science*, 27 May 1966) covers marine sediments; volume 1 concerns itself with the chemistry of seawater. The subject is developed in 13 chapters by 11 authors, all experts in their fields. The problem with the work under discussion as a textbook results from the dilemma of chemical oceanography as a branch of science. There really is no science of chemical oceanography. Rather, the subjects usually covered under that heading form parts of a number of scientific specialties. We can study the physical chemistry of the complex, relatively concentrated solution of electrolytes that is seawater. We can study the physical processes that take place in the ocean and at the ocean-atmosphere interface by studying chemical data. We can consider seawater as the environment for marine life and so study the interchange of chemical constituents between the marine biosphere and hydrosphere. As geochemists, we can trace the pathways of elements from the weathering of rocks, down the rivers, into the sea, and back into sediments. Looking at this problem on a grander time scale, as paleoecologists, we can consider how the seawater, by interacting with the lithosphere-biosphere and atmosphere, has stabilized the chemical environment on the surface of our planet as a suitable stage for the evolution and persistence of life. We must orient our science to a specific problem and a point of view, rather than gather together all the bits and pieces of study that a chemist can do at sea.

In chapter 1, J. P. Riley reviews the history of chemical oceanography from the Greeks to the future prospects for exploiting the mineral resources in and under the sea. Next, K. F. Bowen briefly reviews the currents and mixing processes in the sea. This is followed by a discussion of the physical properties of seawater by R. A. Cox. These properties are summarized in 14 tables, and some of the techniques of measurement are presented. A review of the major constit-