them cited in the book under review—for example (p. 287), a speech by Chou En-Lai in February 1963.

2. Editorial in *Renmin Ribao*, "Sweep away all monsters," reprinted in *Peking Review*, 3 June 1966. Concerning my assumption that our reviewer can ignore the oscillations of the party line, see note *6*.
3. Table C-38 in "Federal Funds for Research, Development, and other Scientific Activities," vol. 14, *National Science Foundation Publ. 65–19* (1965).
4. The others: L. A. Orleans, "Professional Manpower and Education in Communist China," *National Science Foundation Publ. 61–3* (1961); S. H. Gould, Ed., *Science in Communist China* (AAAS, Washington, D.C. 1961).
5. Mao Tse Tung, "Where do man's correct ideas come from?", *Current Background* (Hongkong), No. 740 (31 Aug. 1964).
6. The argument I have attributed to the imaginary reviewer concerning the relative priorities of social practice and theory, as well as my assumption that he is free to utter the argument, is based on actual events in China. A hard core of scientists and engineers engaged in some major basic and applied research projects in China has not, so far, been affected by the shifts in party line mentioned earlier; and during the last few years a number of them have carried on in the party's theoretical journal *Hung-ch'i* and elsewhere an intense debate on such issues as: which is primary in the natural sciences—the criterion of practice, the experiment, or the theory? How can one be at the same time "professionally expert and politically red"? For the best review of the debate on the first question, see Ho Tsu-hsiu (described on page 435 of the book under review as a member of the Institute of Atomic Energy and the Institute of Mathematics—both in the Chinese Academy of Sciences—and of the Laboratory of Theoretical Physics in the Joint Nuclear Research Institute at Dubna, U.S.S.R.); "More on the question of the criterion of practice in the study of natural sciences," *Hung-ch'i*, No. 10, 23 May, 1964. In this article, Ho Tsu-hsiu sharply attacks those who deny the relative truth of theories. His conclusion that "practice is the criterion for the testing of truth, and practice can accurately distinguish the correct and mistaken knowledge . . . Practice, knowledge and again practice. . . . This is precisely an important law in the development of truth," is the basis of my imaginary reviewer's argument.

   All of this debate is carried on in Marxist terminology by prominent scientists who are both red and expert. One startling Marxist conclusion is to be found in an article by the historian of science Yin Mei-ch'in headed "Can we defend the viewpoint of 'only professionally proficient but not politically red' by citing Newton's case?" (*Chun-Kuo Ch'ing-nien Pao*, 3 Apr. 1965). Yin debates there against two physicists who have suggested that Newton was, after all, a good scientist, though he was not politically red. To this Yin replies: "Newton indeed knew nothing about Marxism-Leninism because he died before Marx was born. It is precisely because it was improbable for Newton to learn thoroughly and master the Marxist theory of dialectical materialism that his contributions—however impressive and significant—had their serious limits."
7. C. M. Li, *The Statistical System of Communist China* (Univ. of California Press, Berkeley, 1962).

Food Crops in India

Introduction to Agricultural Botany in India (vol. 1. Asia Publishing House; Taplinger, New York, 1965. 480 pp., illus. $18), by G. V. Chalam and J. Venkateswarlu, was written as a textbook for use in Indian agricultural colleges, and as a supplementary reference work for graduate students and research workers who need information about crops grown in India. In the first of the two projected volumes, three chapters, encompassing 81 pages, are devoted to the basic principles of reproduction in plants, to genetics in relation to plant breeding, and to the plant-breeding procedures used in crop improvement. A glossary at the end sets out the meanings of over 530 terms.

The main body of the book is devoted to chapters on rice, wheat, barley, oats, maize, sorghum or great millet, and to other members of the family Gramineae (Bajra or pearl millet, ragi, Italian or foxtail millet, barnyard millet, little millet, proso or hog millet, and kodo millet). Each of these chapters contains a great fund of information on the history, origin, taxonomy, morphology, physiology, cytology, inheritance, breeding, and special aspects of the respective crops. In addition to treatment of the basic principles, much attention is given to summarizing and tabulating existing knowledge, and many literature citations are included. For example, the chapter on rice contains a 3-page tabulation of mutations and a 14-page listing of the early, medium, and late varieties grown in the various Indian states, which gives the parentage, sowing season, duration, yield, and quality of rice produced. The chapter on wheat contains a 9-page table setting out the main improved varieties of wheat grown in India, and their origins, regions and conditions of suitability, and main characters. The book is well illustrated with textual drawings and a useful series of halftone plates.

Volume 2, now in process of publication, will contain chapters on oilseeds, pulses, fibers, spices, and tubers. Thus in the two volumes there will be brought together a summary of much that is known of the major crops of India and of what has been done to improve their productivity. These volumes should be most useful to anyone preparing for or undertaking plant-breeding work in India or in any other country where similar crops are grown.

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The Nature and Functions of Sleep

During the past several years there has been a marked increase in research on the phenomena of sleep. The increase can be traced to the now widely known discovery by Aserinsky and Kleitman [*Science* **118**, 273 (1953)] of rapid conjugate eye movements (REM's) during sleep and to the subsequent series of studies by Dement and Kleitman [*Electroencephalog. Clin. Neurophysiol.* **9**, 673 (1957); *J. Exp. Psychol.* **53**, 339 (1957)] which led them to conclude that REM's reflect visual scanning activity in dreams and that REM periods might be used as an objective definition of the dream state.

One manifestation of the high level of interest which these proposals stimulated is the impressive list of relatively up-to-date books now available summarizing various aspects of research on sleep. **The Psychology of Sleep** (Scribner, New York, 1966. 281 pp., illus. $6.95), by David Foulkes, and **Sleep** (Coward-McCann, New York, 1966. 335 pp. $5.95), by Gay Gaer Luce and Julius Segal, are the most recent additions to the list.

The volume by Luce and Segal is a popular discussion of research on sleep. It is a much expanded version of an earlier monograph written by Luce for the National Institute of Mental Health and summarizes recent research findings in the area of sleep for the public and interested scientists. Its scope is broad, beginning with a discussion of biological clocks and including useful, up-to-date summaries of material on the biological, psychological, and medical aspects of sleep. It emphasizes the future—the kinds of practical applications which may one day develop from the basic research now in progress. There is some degree of oversimplification and overgeneralization present, but remarkably little for a book of its type. The book is obviously the product of skilled science writers who are as devoted to educational objectives as they are to the interests of their general public.

Foulkes's book is concerned primarily with "sleep mentation"—reports of dreams, thoughts, and images described by subjects after being awakened in the laboratory. Great emphasis is placed on comparisons among sleep onset, REM sleep, and non-REM sleep in terms of the relative frequency with which awakenings elicit

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.

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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.

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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