ested in maintaining living cells by freezing.

The last half of the book is devoted to specific microchemical and histochemical methods for locating and determining carbohydrates, proteins, nucleic acids, lipids, minerals, enzymes, and enzymatic activity. The excellent results that can usually be obtained by the complementary use of microchemistry and quantitative histochemistry are emphasized, but limitations, such as those found in the analysis of minerals, are also discussed. The two chapters on enzymes are particularly interesting and worthwhile, and the final chapter is an excellent account of autoradiographic methods. The book is well illustrated throughout.

Both the simplicity and the clarity of this work are to be lauded; but a danger does exist in that some morphologists may oversimplify the biochemical implications and physiologists may get the impression that all morphological problems can be solved by the procedures in this book. However, close cooperation between workers in the two disciplines should terminate in the resolution of such possible obstacles.

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Textbooks of Botany

The Science of Botany. Paul B. Weisz and Melvin S. Fuller. McGraw-Hill, New York, 1962. xi + 557 pp. Illus. $8.95.

Plants: An Introduction to Modern Botany. Victor A. Greulach and J. Edison Adams. Wiley, New York, 1962. xvi + 545 pp. Illus. $7.50.

An Introduction to Plant Biology. Dale C. Braungart and Ross H. Arnett, Jr. Mosby, St. Louis, Mo., 1962. 411 pp. Illus. $11.

A college teacher selecting a textbook of botany, or anyone interested in a volume from which they can learn about plants as subjects of scientific investigation, has a number of choices, among which are the three volumes reviewed here. One, *Plants: An Introduction to Modern Botany* by Greulach and Adams, is planned for use in a one-semester course, or for the semester devoted to botany in a biology course. It is pared to size by omitting the extended treatment of the plant kingdom, but it could be the text for a two-semester course, if supplementary material is used. The other two texts are for two-semester courses at the introductory college level.

Weisz and Fuller's book, *The Science of Botany*, and the one by Greulach and Adams, are new approaches to college botany, both successful and welcome. In both, the newer information, concepts, and insights that have been gained in biological and biochemical research are fully integrated, from the beginning, into the topics covered. In so many textbooks—for example in *An Introduction to Plant Biology* by Braungart and Arnett—DNA and the gibberellins and other "new" topics are discussed, but the conceptual implications of recent advances have not changed their descriptive approach to many topics. In fact, Braungart and Arnett's book is a traditional textbook with the occasional unfortunate twist that plants are made to fit pedagogical categories common to zoological thinking. One example is the paragraph on movement, in which movement is listed as a characteristic for distinguishing living things from nonliving. In an effort to make plants seem alive, movement is discussed without a clear distinction being made between turgor movements and changes in position which result from growth. Their description of plant life histories is printed on green paper, and bound together in a center section. If such a presentation makes it possible to reduce the emphasis on life histories, it may be a desirable innovation; that the histories, as they are usually presented, kill the interest of many students is well known. But an interesting treatment would be a more desirable solution. Unfortunately, the book contains far too many errors, in the text figures and their legends and in the written presentation. It is a harsh but inescapable conclusion, in my opinion, that there are better traditional botany texts.

A word more should be said about the two textbooks with the refreshing, new approach: *Plants: An Introduction to Modern Botany* by Greulach and Adams and *The Science of Botany* by Weisz and Fuller. Greulach and Adams provide (in an appendix) the chemistry that is needed to understand much of modern botany. They discuss the origin of life in the last chapter. Weisz and Fuller start with the origin of life and develop their presentation; they immediately introduce the chemical facts and concepts which they then use throughout the book. It will not be an easy textbook for students, but it should be an interesting one because it is challenging. The six parts of *The Science of Botany* are: The living world; The world of plants; Metabolism; Self-perpetuation: The steady state; Self-perpetuation: Reproduction; Self-perpetuation: Adaptation. The four sections of *Plants: An Introduction to Plant Biology* are: Man and the world of plants; Levels of plant organization; Plants in action; and From generation to generation.

All three texts are well illustrated. Photographs and diagrams are, with very few exceptions, well enough reproduced for a student to easily see what is described. The very excellent, and numerous, explanatory diagrams in Weisz and Fuller merit particular commendation. (Incidentally this is not the Fuller of Fuller and Tippo's well-known text.) Weisz and Fuller quickly make clear complicated botanical and chemical information. Students who have little or no chemistry should be able to understand not only what is known about the physiology of live plants, but also developmental morphology and the role of plants in the scientific world and in man's world. The same "feel" for the plants as biologically and humanistically important is achieved by the approach of Greulach and Adams. This cannot be said with equal force for the book by Braungart and Arnett.

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Marine Mollusks

Marine Molluscan Genera of Western North America. An illustrated key. A. Myra Keen. Stanford University Press, Stanford, Calif., 1963. x + 126 pp. Illus. $4.50.

Although this book is only 126 pages long, it contains diagnostic characters for all the genera of shell-bearing marine mollusks found along the west coast of North America from the Mexican boundary to the Arctic Ocean. The following classes are included—Gastropoda, Pelecypoda, Amphineura, Scaphopoda, and Cephalopoda. Each genus is illustrated with one or more very acceptable line drawings, and the illustrations appear on the same page on

which the characters of the genus are noted. Other drawings give the technical terms that are used in the diagnosis of shells. The keys and the explanatory notes of their use take up 81 pages. Following this there is a systematic list which gives a classification of the groups down to genera. Under a section entitled "Ecology," the genera are arranged alphabetically, and the approximate number of species in each genus, its range, and its habitat is briefly noted. The glossary contains most of the technical terms used in discussing molluscan shells but not anatomy. There is a short bibliography and an excellent index of scientific names.

The difficulties encountered in constructing a key to so large a group as the Gastropoda are almost insuperable; only the brave would attempt it, and only the most tenacious would complete the task. This is especially true with respect to those genera that have a multiplicity of subdivisions which are based upon more or less trivial characters. The author undoubtedly encountered many cases where a choice of diagnostic characters of the shells was difficult. By bringing the nomenclature up to date and furnishing adequate illustrations, together with distinguishing characters of each genus, Myra Keen has provided a unique handbook that will long remain the standard reference for the area. Professional conchologists, individuals engaged in commercial shell fish investigations, and amateurs alike will find it indispensable.

It is the first book of its kind for the area concerned, and it covers all of the shell-bearing mollusks. It may well serve as a model for handbooks covering other areas.

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Range Lands

Range Ecology. Robert R. Humphrey. Ronald, New York, 1962. v + 234 pp. Illus. $6.50.

Range Ecology, a welcome addition to the literature, is the first book devoted to this subject. However, its title belies its contents; if the treatment of physiological effects was more complete, "Factors Affecting Plant Growth" would be a more appropriate title. The book is divided into 11 chapters, of which the first nine are on factors that affect plant growth—climate, atmosphere, temperature, light, soil, soil water, physiography, biotic influences, and fire. The remaining chapters are on range condition and the "range unit as an ecosystem." The book, which developed as a result of Humphrey's teaching experience, is somewhat contradictory in that it is written largely in nontechnical language but presupposes a background of plant ecology. For example, the terms *autecology, synecology, primary succession*, and *secondary succession* are presented without definition.

The chapters on soil, soil moisture, and fire are especially well done. The author concisely appraises the current status of our knowledge about these subjects, including the worth of range fertilization and prescribed burning. But his treatment of light is somewhat inadequate, for he implies that light is important only in forested areas used for rangeland. In the chapter on biotic influences, the response of range plants and plant communities to livestock grazing is given particularly inadequate treatment, but the effects of game are carefully reviewed.

In the chapter on range condition the various approaches used by federal agencies in classifying range conditions are objectively analyzed. Humphrey is critical of the climax approach used by the Soil Conservation Service, but he fails to recognize that the guides are closely coordinated with the potential of the site. He is also critical, perhaps overly so, of the three-step method used by the Forest Service and the two-phase method used by the Bureau of Land Management for determining range condition and trend. Some of his criticism is valid—the standards now used for classifying condition are inadequate and the natural differences in the vegetation on northern and southern exposures should be recognized. But he unfairly belabors the lack of randomization of transects and plots in the usual application of the method and fails to recognize that these selected sites are intended merely as bench marks for use in judging similar areas of vegetation and conditions. The method specifically provides, in cases where a high level of sample accuracy is required, that transect locations must be randomized. Few can argue with the requirements that Humphrey outlines for a usable approach to classifying range condition.

The final chapter, "The range unit as an ecosystem," is pitifully short (4 pages). It should have preceded the one on range condition, and in that case, the chapter would have served as essential background for that subject as well as a vehicle for intensive consideration of plant communities, plant succession, and range indicators. Despite the author's statement that "the exclusion of certain contributions does not reflect on their value," it seems strange that he has excluded reference to outstanding works such as those of A. W. Sampson (other than his text), M. W. Talbot, Lincoln Ellison, David F. Costello, and H. C. Hanson. One standard text on range management—by Stoddart and Smith—is entirely overlooked.

Despite these and other shortcomings, the book is a good addition to the literature and should be of value to beginning students, ranchers, and those responsible for administration of the range. Perhaps, too, it will inspire others to write in this somewhat neglected field.

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Ecology

Advances in Ecological Research. vol. 1. J. B. Cragg, Ed. Academic Press, New York, 1962. xii + 203 pp. Illus. $7.50.

Ecology deals with the many relations of organisms to their physical and biotic environments, and, as it has developed, it has separated into many more or less distinct fields of research. This new series, *Advances in Ecological Research*, recognizes the need for some form of integration of the rapidly diverging disciplines by presenting comprehensive articles on selected topics so that both the general reader and the specialist may obtain a balanced interpretation of current research and concepts in animal and plant ecology.

The first volume contains four contributions, each dealing with a different aspect of ecological research. The first, "Soil arthropod sampling," by A. Macfadyen, presents a practical summary of methods used for sampling soil arthropod populations; some topics considered are the methods used in three main types of work—exploratory, community, and trophic studies, the problems