sented in the latter (for example, the pores in the cell membrane in Fig. 2–7). The treatment of general sensory endings has been expanded to a full chapter, with many new photographs. None of these figures deals with the fine structure of receptors.

Limited space precludes a detailed review of this book. The author is to be commended for his attempt to reach the student in many ways, but particularly for his use of straightforward terminology in dealing with the cranial nuclear columns (somatic, branchial, visceral motor; somatic and visceral sensory) and for his interesting explanations of the meaning and derivation of the colorful but cumbersome words of neuroanatomy.

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Applied Botany

Vistas in Botany. vol. 2, *Applied Botany*. W. B. Turrill, Ed. Pergamon, London; Macmillan, New York, 1963. xiv + 380 pp. Illus. $15.

As Turrill points out, the articles in this volume do not cover all aspects of applied botany. There is, however, a wide range of subjects, including fruit, cereals, and grasses, with vistas in the plant disciplines of taxonomy, anatomy, pathology, and ecology. In all, the volume contains ten chapters written by different authors, and its diversity is illustrated by the opening chapter on botanical aspects of wood science and the closing one on uses of seaweeds.

The chapter on wood science is a succinct, accurate, and ably written digest of current studies in the field of wood anatomy. The author does not purport to cover the entire field, but he provides an excellent review of his specialized topic.

G. H. M. Lawrence's well-written essay on the taxonomy of cultivated plants contains an implicit plea that applied scientists recognize the need with respect to the nomenclature of plants and cultivars and begin recording their work not just in tables and graphs, but also in properly documented dried plant specimens or vouchers which provide more accurate and detailed information than the best written records.

In considering recent grassland research, the author briefly reviews the research without discussing many aspects of plant breeding in this broad field. Some phases of the nutritional problems of grassland are covered, including digestibility trials as a major nutritive value factor. On the whole, the subject is well treated, and the author's clear, concise style makes interesting and informative reading on grassland agriculture.

Recent research on fruit crops is discussed in two essays—"Some aspects of commercial fruit growing in Great Britain" and "Pests and diseases of fruits and their control." The first deals broadly with production of new varieties, cultural practices, propagation, and storage. The second is concerned with a brief description of the principal insect pests and diseases of fruits, and with their control.

The chapter on cereal breeding deals extensively with improvement in wheat, oats, and barley. In general, it is an excellent chapter which covers the most important points as circumscribed by well-proven chemical methods and techniques. There are notable omissions—for example, neither the importance of maintaining gene sources nor the value and use of male sterile genes for building large crosses and for maintaining back populations in a "crossable" state are discussed. No attempt was made to discuss the implications of more recent breakthroughs in genetics. Some techniques, such as those used in the United States, are not included. In general the examples are mainly tied to what has happened in Great Britain. But it would be difficult to review the world literature on cereal grains in one chapter.

There is an interesting treatment of the origins of horticultural plants. Gene mutations, the role of polyploidy, and cytological analysis are discussed in relation to horticultural crops. It is pointed out that the use of these tools in determining the origins of horticultural plants may be at odds with more classical interpretations.

A full discussion of economic plant products would probably require an entire book. The material selected for consideration here was obviously based on the recent literature, but more emphasis could have been placed on the fact that we have only begun to inventory the world's plant resources.

In the chapter on some aspects of applied plant ecology, the late W. B. Turrill, the editor of the volume, presents a concise summary of economic ecology, which is documented with specific examples.

The final chapter, a very interesting, well-illustrated one, gives a good historical account of the various species of algae, their geographical distribution, their use as human food and in commercial products, and their value in medicine.

In general, the editor's objective—that of providing a broader vista of applied botany for teachers and students—has been accomplished. Since the volume contains a number of articles on widely different aspects of botany, I have consulted specialists in the Crops Research Division (U.S. Department of Agriculture) and have incorporated their comments in this review.

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Uralic and Altaic Series

Peoples of Central Asia. Lawrence Krader. Indiana University Press, Bloomington; Mouton, The Hague, Netherlands, 1963. xiv + 319 pp.

This general survey of the geography, ecology, history, and ethnography of Central Asia is clearly the result of long and diligent labor. It can only be welcomed as a major contribution to the English-language literature on these subjects. An immense mass of material has been digested and presented in, on the whole, clear and excellently organized form.

Many of the specific issues of fact and interpretation raised by Krader are beyond my competence. Where this is not the case, we disagree only on relatively minor matters of emphasis or phrasing—for example, in the section on Central Asian shamanism (p. 130), where the concept itself seems rather too broadly defined.

The only serious criticism that might be made of this book relates to a possible conflict between the synchronic and diachronic methods. Krader defines his purpose as primarily that of describing "the indigenous peoples of the area and their traditional culture," and secondarily, that of describing "the changes brought about during the period of Tsarist and Soviet rule" (p. v). In view of this dual intention, it is not always clear to which period or set of circum-

stances a given statement applies. Furthermore, as I have pointed out elsewhere, the concept of a "pre-contact situation" or the "ethnographic present" is a tricky one to handle in dealing with Central Asia. This difficulty makes itself felt particularly in the section on social structure: the accounts by 19th-century Russian scholars to which Krader refers for data on the social organization of the nomadic tribes cannot, in the nature of things, reflect the precontact situation. On the other hand, if the intention was to bring the account of the social structure up to date, there is a great deal of current Soviet literature that could and should have been cited but was not. However, this is an arguable point, and hardly damages the overall value of the work.

The system of annotation, by the way, is unnecessarily clumsy, requiring as it does, two separate references—one to the footnotes at the end of each chapter and another to the bibliography at the back of the book.

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Dipole Moments

Tables of Experimental Dipole Moments. A. L. McClellan. Freeman, San Francisco, Calif., 1963. x + 713 pp. $14.

This is a compilation of all of the experimentally determined dipole moments reported through 1961. The data are recorded in three tables: Compounds Without Carbon, Compounds Containing Carbon, and Compounds of Unspecified Formula. The third table includes data on oils and on natural and synthetic polymers. The compounds in the first two tables are listed by formula following the arrangement used in *Chemical Abstracts*.

In addition to dipole moment values, the percentage of electronic polarization used for atomic polarization in the calculation of the dipole moment is listed for compounds whose dipole moments were calculated from dielectric constant measurements. For other determinations the method of determination is listed. For about 50 compounds for which sufficient data were available the author has calculated a recommended value of the dipole moment. The methods used for evaluating the data in these cases are given in an appendix.

A bibliography with 2178 entries, an author index, and a tabulation of organometallic compounds under the respective metals add to the usefulness of this book. Scientists who use dipole moments in their work will find this a valuable compilation.

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Theoretical Physics

Lectures in Theoretical Physics. vol. 5. Lectures delivered at the Summer Institute, University of Colorado, Boulder, 1962. Wesley E. Brittin, Ed. Interscience (Wiley), New York, 1963. viii + 585 pp. Illus. $12.

This volume represents the fifth installment of the Boulder lectures delivered at the Summer Institute for Theoretical Physics at the University of Colorado. The contents comprise the 1962 proceedings. There are nine lectures delivered by eight lecturers. The topics cover a wide and diverse spectrum: general quantum theory (Furry and Bloembergen), solid state and related topics (Barut, Phillips, Blount), general relativity (Wheeler, two lectures), group theory (Biedenharn), and particle physics (Barut).

The brief preface states that it is the hope of the editors that "the lectures will prove to be of value to students who wish an *introduction* to current research as well as to experts in one field who wish to familiarize themselves with other fields" (my italics). It is the first part of this statement that causes me some concern. Although it may be true that the lectures presented in previous volumes did fulfill this hope, it is doubtful that a similar claim can be made here. To be sure, some of the lectures in the present volume are admirable and are exempted from the criticisms hereby made.

Specifically, I find it difficult to escape the impression that a potential lecturer, invited to contribute to such institutes on a topic of his choice, is too often tempted, and succumbs to the temptation, to speak on the subject closest to his current interests—his own research. In many cases he has attained a degree of specialization from which it is difficult to descend. Too often he is carried away by his own enthusiasm and is unaware that he has failed to make the translation that is necessary to enable a student with little or no prior knowledge to profit from the lectures as much as he might. The net result is something in the nature of a review article for experts.

Approximately half of the lectures in the present volume suffer from the malady described. The others are to be highly commended. If 50 percent efficiency is acceptable, this book is recommended for all those with at least the training of an advanced graduate student.

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High Pressure Research

High Pressure Physics and Chemistry. vols. 1 and 2. R. S. Bradley, Ed. Academic Press, New York, 1963. vol. 1, xii + 444 pp., $15.50; vol. 2, xii + 361 pp., $12.50. Illus.

Since the publication in 1949 of Bridgman's classic, *The Physics of High Pressures*, at least six books published in English have recorded the dramatic progress that is being made in research at very high pressures. This two-volume treatise is the most comprehensive yet written, and extensive bibliographies at the end of each chapter cite most of the important studies up to early 1963. Although 20 authors have contributed essays based on their special knowledge, there is admirable unity of style and comparative freedom from the repetitions and omissions that so often mar collective works. In a field that depends so heavily on the strengths of materials and their maximum use in the design of apparatus, one might expect to find emphasis on experimental techniques to the exclusion of theory, but this is not the case. A fine balance has been achieved between theory and experiment.

Chapter 1 gives an historical overview of the progress that has been made during the 20th century and singles out those centers that have made principal contributions to various phases of high-pressure research. The principles that underlie the main experimental routes to the generation of high pressures and the present state of