

few silly footnotes in praise of discussions around a coffee table—set-out with dignity, precision and completeness. My only comment of an unfavourable kind concerns the distinction between crystal-field theory and ligand-field theory. Here Orgel seems to be more explicit and helpful. It is true that the distinction (without which one cannot adequately deal with the successes and failures of Pauling's early theory of hybrids) is implicit in Chapter 7. But it would have helped very much to have had it developed more explicitly. Then the role of the linear combination of atomic orbitals approximation would have become more apparent, and it would not have been relegated to an appendix. It would also have been easier to relate nuclear hyperfine and electron-spin measurements to the degree of delocalization of the various molecular orbitals. I could also have wished that the author had distinguished more clearly between what chemists call orbitals and spin-orbitals.

But these are small points. This is a really important book, and will at once take its pride of place as the most definitive full-scale study of this field.

Inorganic chemistry has moved a long way from the situation in which the poor unhappy chemist had to learn long lists of formulae and reactions by heart. It now has a shape and a coherence. Wave mechanics has provided much of this understanding: and in so far as these books—particularly those by the Cambridge School—are able to show this pattern, they are to be welcomed most warmly.

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## TERPENE CHEMISTRY

The Chemistry of the Terpenes

By Dr. A. R. Pinder. Pp. vii+223. (London: Chapman and Hall, Ltd., 1960.) 50s. net.

THIS book is intended to provide honours undergraduates with a source of information on terpenes which is intermediate between the general text-books and the comprehensive monographs. There is no obvious reason why terpenes should be singled out for special treatment in this way, and it would be impracticable to require undergraduates to delve into a large number of works of this type each dealing at considerable length with one particular aspect of chemistry. It is, of course, impossible to cover everything in lectures to undergraduates, and there is no denying that it is desirable each year to deal with a few subjects in some detail. The topics selected for such treatment should, if possible, serve to illustrate important general principles or general methods of degradation and synthesis, and there can be no doubt that the terpenes are among those which are ideally suited to this purpose. However, it is questionable whether the students should be provided with an extra text-book to accompany all lectures giving special attention to a particular topic. That such a book might provide a hard-pressed lecturer with considerable assistance in planning a series of lectures is another matter. The present book is intended for students, and it must therefore be considered primarily in this light.

All the main classes of terpenes are covered, including the carotenoids, which, strangely, are omitted in the otherwise admirable reference works by Simonsen and his co-authors and in the excellent two volumes provided recently by de Mayo. Following a short chapter devoted to the determination of structure by both chemical and physical methods,

the various classes of terpenes are discussed in a conventional way giving rather greater attention to the mono-, sesqui-, and di-terpenes than to the more complex compounds. More examples of each class are often given than are necessary to illustrate many general points, and details on occurrence, isolation, and physical properties are included which can be of little use to the undergraduate. The text itself is always clear, but at times could with advantage be more critical, particularly when reproducing claims from the earlier literature and for which the evidence would not now be considered conclusive. I should also have liked to see more attention given to the mechanisms of the various reactions described. No explanation is offered for such simple processes as the cyclization of geraniol and the hydrolysis of citral; the direction of additions to carbon-carbon double bonds is explained in terms of Markownikow's rule; and the opportunity of introducing such concepts as non-classical ions and concerted processes is missed. At the end of each chapter references are given, though none was noticed that was later than 1957. Some sections are inevitably a little out of date; thus mevalonic acid receives very little mention in the chapter on biogenesis. However, those who require a brief survey of the terpene field will find it in this book.

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## ALGOLOGICAL STUDY ON THE EASTERN COASTS OF THE AMERICAS

Marine Algae of the Eastern Tropical and Subtropical Coasts of the Americas

By Prof. William Randolph Taylor. (University of Michigan Studies—Scientific Series, Vol. 21.) Pp. ix+870. (Ann Arbor: University of Michigan Press, 1960. Distributed in the United Kingdom by the Cresset Press, Ltd.) 19.50 dollars; 140s.

W. R. TAYLOR'S major work is the first complete account of the algae of the eastern coasts of the Americas, from Bermuda and from North Carolina (respecting the more southern species) to southern Brazil.

A historical survey, with bibliography later in the book, is of particular importance because such early records as exist are mainly scattered through general works or hidden in rare volumes. Brief reference is made to geographical distribution, though seasonal changes are much reduced in such warm waters where major currents tend to spread tropical conditions beyond their normal limits.

Preliminary discussion of algal habitats outlines the effect of fluctuating conditions in the aquatic environment. The author stresses the suitability of the region for algal study because of the possibility of a continuous working season with minimal tidal amplitude, although species are restricted by relatively stable water-temperature and insolation. Ecological habitats, intertidal and at greater depth, appear to be comparable in some cases with those in sub-tropical waters off parts of the Australian coasts, especially where terraces clothed with coralline and other algae extend into the sea and the roots of *Avicennia* and *Rhizophora* provide a habitat around the sun-lit margins of the groves. In the sub-littoral, Chlorophyceae, particularly members of the Siphonales, together with members of the Rhodophyceae,