

striking predator/prey reaction between a starfish and a sand dollar urchin. In Great Britain the flight reaction initiated among groups of the small scallop (*Pecten opercularis*) by the physical and chemical presence of the common starfish is now fairly well known. Off the Californian coast the presence of another predatory starfish causes immediate burrowing of all the sand dollars in its vicinity.

The arrangement of the main subject-matter is systematic, enabling the reader to study the comparative ecology of a group rather than of a habitat. It is in these main sections that the authors have packed such a wealth of material on the general biology of the Pacific coast species. Much of this factual matter would appear to be derived from the writers' own observations, and it is perhaps unfortunate that the reader cannot readily distinguish the new from the old, owing to the lack of references.

The book contains excellent chapters on such general subjects as food, animal groupings and sense organs, and there is a stimulating discussion on growth-rate, a subject which is difficult to analyse in a population of marine animals, and upon which it is perhaps even more difficult to generalize. Records are given of some careful experiments on the growth of a colonial tunicate, from which the authors were able to calculate the frequency of division in a colony and the overall growth in unit time under varying conditions. The book ends with a chapter on the relation of higher vertebrates to shore conditions, and there are appendixes giving a short bibliography of general works, and an original analysis of animal phyla according to the types of habitat in which their representatives live.

The authors have written a stimulating book of value, packed with observations on the mode of life of marine animals, which shows that real natural history is still a very live subject.

H. G. VEVERS

SWEET ODOURS

Synthetic Perfumes

Their Chemistry and Preparation. By Dr. T. F. West, Dr. H. J. Strausz and Dr. D. H. R. Barton. Pp. viii+380. (London: Edward Arnold and Co., 1949.) 70s. net.

THE chemistry and preparative methods of the important perfumery synthetics are described systematically and factually in this book. It is one that should be a useful text-book for the manufacturer of perfumery chemicals, and a guide that will show the artist-perfumer what raw materials are available to him. It is a book in which the chemistry is uniformly sound and the nomenclature careful; in these respects it shows a considerable advance over some of its predecessors in the same field.

Some resolution is always needed to re-write material, but when an author is confronted with new information which disturbs what he has already written, he should not evade the task. Drs. T. F. West, H. J. Strausz and D. H. R. Barton have taken a rather different line in one or two instances. Their discussion of irone (pp. 178-185) was evidently written before October 1947, when both Ruzicka and Naves described its synthesis in *Helvetica Chimica Acta*. In fact, the "probable formula" of irone which is given on p. 178 of "Synthetic Perfumes" includes a 7-atom ring. The description of the synthesis and true con-

stitution of irone is given on p. 336 in an addendum, which also includes a discussion of recent work on muscone and civetone. One cannot help thinking that it would have been far better to have incorporated this important new material in the body of the book, even at the cost of re-writing a part of it.

Perhaps it is because of the plurality of authorship that occasional cases of repetition are to be found; for example, the superiority of ethylvanillin to vanillin itself for use in the presence of methyl anthranilate, which is adequately described on p. 133, is repeated on p. 289.

Finally, it is to be deplored that technical books tend increasingly to cost more than most individuals can afford to pay for them. R. W. MONCRIEFF

THERMODYNAMICS FOR THE ADVANCED ENGINEERING STUDENT

Thermodynamics

Principles and Applications to Engineering. By Prof. Dr. Ernst Schmidt. Authorized translation from the third German edition, by J. Kestin. (Oxford Engineering Science Series.) Pp. xx+532. (Oxford: Clarendon Press; London: Oxford University Press, 1949.) 35s. net.

AT a first glance, this appears to be a book to be warmly welcomed, including, as it does, subjects of topical interest such as supersonic flow, jet-propulsion and even a paragraph on heavy water. However, on reflexion, doubts arise as to the possibility of covering the whole ground to the same high standard in a not too unwieldy volume, starting with yet another re-statement of elementary points. Investigation reveals that there is some selective treatment and omission of points which possible purchasers of the book might reasonably expect to find dealt with.

If the subject of fluid mechanics is to be admitted to a book on thermodynamics—and it seems inevitable nowadays—surely there are numerous problems connected with internal combustion engines coming under this heading; admittedly these are dealt with at some length in other books of this series. In Great Britain, Callendar's equation might be considered worthy of more attention than a short paragraph (and that somewhat derogatory). In fact, the basis of the steam tables (Keenan and Keyes) given at the end of the book is scarcely explained adequately. Kinetic theory is not dealt with separately but is developed as required alongside the rest of the subject. This perhaps is as it should be, but the author just misses going far enough to throw light on certain phenomena: for example, the laws of expansion of steam under particular conditions remain an unresolved mystery to a reader of this book, the appropriate formulæ being merely referred to as empirical—an almost inevitable corollary to ignoring Callendar's work. Again, in turbine work, scant recognition is accorded to the contribution of workers in Great Britain, and, where practice here is at variance with or even in advance of that given, no hint as to the facts is indicated.

A brave attempt is made to cover the subject of heat-transfer in its higher flights in two chapters, with inevitable gaps. For example, the author's