the Coahuiltecans, had been virtually wiped out; others, such as the coastal Karankawas and the inland Tonkawas, were much weakened shadows of what they once had been. On the other hand, the originally distant Comanches had benefited from the unintended gift of Spanish horses and had invaded Texas, driving before them the Plains Apaches. In the first quarter of the 19th century the Comanches were at the peak of their power, and, not surprisingly, a preponderant part of Berlandier's account deals with them. Ewers does not place Berlandier's journal within such historic perspective either in the introduction or in his generally splendid footnotes. The result is that readers who are unacquainted with the Indian history of Texas are apt to receive a distorted impression. The Comanches loom too large, other tribes pale to insignificance, and such distortion is not helped, for example, when such people as the remnant Tonkawas are referred to as "notorious" (p. 8).

Specialists will want to return to Berlandier's original manuscript, since the translation leaves something to be desired ("indios bravos," for example, is translated as "Indian braves," p. 55, whereas "wild Indians," in contrast to mission or other "tame" Indians, was intended, and other inaccuracies might be cited). But in general, the publication of such an obscure manuscript is to be greeted with applause and with the hope that other such materials also will now find their way into print.

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Thermally Stable Substances

High Temperature Resistant Polymers. A. H. FRAZER. Interscience (Wiley), New York, 1968. xiv + 338 pp., illus. $17.50. Polymer Reviews, vol. 17.

This book is a well-written, invaluable but not critical summary of much recent literature directed toward the development of high-temperature-resistant polymers. However, a more accurate title for the book would have been "Aromatic and Miscellaneous Polymers, Some Having Inorganic Structures," since it reviews some of the least stable as well as some of the most stable materials, while essentially omitting some older polymers of comparable thermal stability. Most of the materials reviewed have not been characterized appreciably, or indeed sufficiently to establish that they are polymers. Often the depicted structures are not entirely accurate and represent only part of the actual structures. Incomplete condensations are highly probable in many of the synthetic situations described. This is not the author's fault, since the field tends to foster the pot-boiling approach and most of the substances tend to be nonsoluble and intractable.

One difficulty in discussing the field is the lack of consensus on the definition of "thermal stability" and the mercurial usage of the term in the literature. The author makes a valiant and reasonable attempt at clarification, pointing out the distinction between deterioration of physical properties and deterioration of chemical structure. The reviewer prefers to measure thermal stability by the rate of disappearance of the original chemical structure. Thus in my opinion "rearrangement to more stable structures" is a decomposition and not a factor contributing to thermal stability.

A chapter is devoted to so-called ladder polymers, an ill-conceived though imaginative name for multibonded structures often aromatic and often essentially char. The author does not clearly elucidate that there are two extreme situations for the decomposition of ladder polymers, one trivial and one of substantial importance. If one doubles the number of bonds that must be broken to achieve a given conversion in a given process, will the preexponential factor be halved, or will the activation energy be doubled? For sequential bond rupture the former would occur, and for simultaneous rupture of two bonds the latter.

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Chemoreceptors and Behavior

Olfaction in Fishes. HERMAN KLEEREKOPER. Indiana University Press. Bloomington, 1969. viii + 224 pp., illus. $12.50.

Increasing exploration and utilization of aquatic environments, particularly the recent emphasis upon the world's fisheries for the alleviation of human nutritional deficits, have pointed up many serious gaps in our understanding of the biology of fishes. The operation of their chemical senses is an outstanding example. Specialized chemoreceptors play an important role in feeding and predatory behavior, sexual and social behavior, and the orientation and migration patterns of fishes. The range of pertinent research problems is correspondingly wide, and for obvious practical reasons summaries generally deal with only a few of them. In this case, attention is concentrated strictly upon olfactory organs and behavioral patterns demonstrably related to their functions.

Approximately two-thirds of the book is devoted to the morphology of the olfactory organ in fishes. The remainder is divided, about equally, between electrophysiological and behavioral studies. In making many of the older anatomical findings more conveniently available, the book renders a valuable service. Modern electron-microscopical studies of the olfactory receptor cells are also well represented and illustrated, although for lack of many appropriate data on these receptors in fish there is considerable reliance upon findings in amphibia and mammals.

Kleerekoper's attempt to relate structure and function inevitably suffers from the shortcomings of physiological data and theory. Application of electrophysiological techniques, which dominate the recent physiological approaches to olfaction, is hampered by the smallness of these receptor cells and by the difficulty of obtaining stable recordings from single units in the olfactory epithelium. Again, many of the data cited are from studies on amphibia and mammals, but the controversial aspects of their interpretation are sketched only briefly. Concerning such questions as the exact interpretation of electroolfactograms or the role of pigments in the olfactory epithelium, readers will have to seek other, more extensive treatments in the literature.

The discussion of olfaction and behavior is more detailed, including a review of the studies made by Kleerekoper and his collaborators on the localization of prey by the lamprey. An appendix describing a method of monitoring the locomotor patterns of fishes should be useful to anyone planning such experiments. All in all, this volume will probably be most valuable to specialists, for whom its anatomical and behavioral coverages will be particularly useful.

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