

Britain. The quality of printing and of the illustrations is first-class.

The question does arise as to whom this book is directed. It will probably be disappointing to specialists in other fields who seek from the title an introduction to rubber technology within the framework of chemistry and physics. The policy appears deliberate of keeping the scientific matter on a 'popular' level. For example, in the chapter on polymer chemistry, one jumps within a page from atoms and valency to monomers and polymers. Again, in the chapter on vulcanization, the concept of cross-linking is dismissed with reference to the analogy of a fish net of varying size of mesh, and no concept is given of the number of cross-links to monomer units or dependence of properties on the nature of the cross-links, to take only two relevant subjects which should surely be dealt with. The popular approach is also sometimes misleading, as in the equations put forward to describe rubber oxidation.

Rather than an 'Introduction', the various chapters of this book are really self-contained reviews. As such, they include much of interest to practising rubber technologists. The readers of this book will, in general, be already qualified and could with ease have swallowed stiffer doses of the science of their subject from the eminent contributors to this volume. A chemistry and physics of rubber technology still requires to be written.

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MARINE BIOLOGICAL REPORTS FROM DENMARK

Meddelelser frå Danmarks Fiskeri- og Havundersøgelser

Ny Serie, Bind 2, Nr. 23-26. Nr. 23: Investigations on the Quantitative and Qualitative Distribution of Zooplankton in the Southern Part of the Norwegian Sea. By V. K. Hansen. Nr. 24: A Quantitative Investigation of the Echinoderm Fauna of the Central North Sea. By Erik Ursin. Nr. 25: Conditioning *Ostrea edulis* L. from the Limfjord for Reproduction out of Season. By I. A. Aboul-Ela. Nr. 26: The Oligochaete Fauna of Three Danish Brackish Water Areas. By I. Dahl. Pp. 292+5 plates. (København: C. A. Reitzels Forlag, 1960.) 47 Danske kr.

THE final part of the second volume of the new series of biological reports published by the Danish Institute for Fisheries and Marine Research contains four interesting contributions which carry on the high standards established by the earlier series. The first paper, by V. K. Hansen, "Investigations on the quantitative and qualitative distribution of zooplankton in the southern part of the Norwegian Sea", describes the results of cruises made during several seasons in the area of the off-shore herring fisheries just north of the Iceland-Faeroes-Shetland ridge. Samples were taken with the vertical Hansen net, supplemented by horizontal hauls with small high-speed samplers of the Hardy Indicator type. The catches are described and discussed in relation to movements of Arctic and Atlantic water masses, but conclusions are apparently being kept until the remainder of the plankton community has been described.

Of two shorter papers, one by I. A. Aboul-Ela, on "Conditioning *Ostrea edulis* L., from the Limfjord for reproduction out of season", shows that successful

spawning can be induced by higher temperatures. The other paper, by Mrs. Ingerlise Dahl, on "The Oligochaete fauna of three Danish brackish water areas", deals with the systematics and biology of these little-studied animals, which form a surprisingly important component of the bottom fauna in the Danish Fjords.

Most of the volume is taken up by Dr. E. Ursin's comprehensive study, "A quantitative investigation of the Echinoderm fauna of the central North Sea". The author has based his work on most of the Danish material collected since 1922, as well as on a large number of quantitative grab-samples taken from R.V. *Dana* during 1950-55. Full tables are given showing the occurrence of the commoner species at all stations since 1932, and the distribution of both common and rare forms is described in some detail. Reference is made to the accepted bottom fauna communities, but in the main the distributions are considered from the zoogeographical point of view in comparison with other localities, notably Iceland and the Adriatic. Apparently the echinoderms of the southern North Sea have decidedly southern affinities, and the total numbers per unit bottom area are considerably greater than in the northern part. However, the author regards the latter area as the rich area for echinoderms because a larger number of (rarer) species occur there. Many of the species found only in the northern (or north-western) part of the North Sea are distributed to the north of the area (for example, *Leptasterias mülleri*, *Strongylocentrotus droebachiensis*), and would thus be expected to be limited to the northern region because of the generally cooler conditions there during the summer months and the somewhat deeper water which allows the establishment of a thermocline. Other, much fewer, species of southern distribution outside the North Sea (for example, *Antedon bifida*, *Palmipes membranaceus*) are also limited to the same area as the cold-water forms, possibly, it would be expected, because they can better survive the colder months of the year there than farther to the south and east where there are greater extremes of climate. However, the author, after considering such hypotheses, tends to reject most temperature correlations, and instead compares the distributions of the rarer species with the distribution of water masses characterized by the plankton community represented by the chaetognath *Sagitta elegans*.

As one reads the accounts of individual species one gains the impression that the author considers that the presence of "Sagitta elegans water" is the predominant environmental factor governing the distribution of echinoderms. Even if the experiments on biological factors in such water are considered conclusive, it is difficult to believe that they can have much influence on non-pelagic larvæ or on the adults themselves. Many inconsistencies in distribution in the North Sea would be more intelligible if other environmental factors were considered. Not only temperature but also depth of water, type of deposit and continuity of faunas must be of more direct importance to most species of echinoderms than hypothetical factors associated with water masses. In conclusion, the possibly subjective interpretation must not be allowed to detract from the general importance of this paper, which will form the basis for much future discussion, and zoogeographers will be grateful to Dr. Ursin for his careful compilation of the distributional records.

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