

then a new link can be added to the food chain; namely, crustaceans, which eat the worms and in turn are eaten by fishes." Dr. C. E. ZoBell, of the Scripps Institution of Oceanography, who accompanied the expedition for part of the time, was able to demonstrate the presence of large numbers of bacteria in the mud from the greatest depths, and to grow them in culture media under pressures of up to 1,000 atmospheres and at low temperatures—conditions approximating to those found in the abyss. He showed that they were truly barophilic because there was no growth in the cultures subjected to atmospheric pressure. "Although from 0.0002 to 0.02 grams of bacteria per square metre of ocean floor may be considered a small 'standing crop' as compared with the crops harvested from fertile garden soil, this amount compares favourably with the total weight of animals found by zoologists on the *Galathea* Expedition."

The main object of the expedition was to explore the greatest depths, and undoubtedly one of the most important biological results achieved was this elucidation of the ecology of the abyss, and the demonstration that the idea of a constant rain of food material from above is a misconception. The basic food material does come from above, but far from being a product of the sea derived from planktonic organisms, it is directly derived from the land in the form of the cellulose of higher plants.

This book gives an absorbing account of the progress of the expedition, and an excellent general view of the scientific results obtained. Specialists will look forward to the appearance of the detailed monographs reporting on the very large and important collections that were brought back, which will no doubt be presented in the form of a series of volumes to be published over a number of years.

L. HARRISON MATTHEWS

GLOBAL ATOMIC WAR

On the Beach

By Nevil Shute. Pp. vi+312. (London: William Heinemann, Ltd., 1957.) 15s. net.

THE theme of "On the Beach" is the extinction of the human race resulting from an atomic war. Everybody dies. Just that.

When the novel opens, in Melbourne, 1962, nobody is alive in the northern hemisphere. Movements of the atmosphere are steadily carrying lethal particles southwards. Mr. Shute has deployed his remarkable imagination as engineer, naval officer and storyteller—there is a fascinating account of an atomic-powered submarine's voyage along the coast of the 'hot' North American continent—in the service of an aim which would appear to be above all a moral one. On his immense popular following this book can only inflict a haunting distress: one takes off one's hat to him.

Mr. Shute has limited his canvas: he has taken only five main characters—five very ordinary people at that; and he has pitched the emotional and dramatic tone invariably low. Until the moment when the radiation sickness comes on, everybody sticks to the tamest of domestic preoccupations; and then quietly takes a suicide pill. The effect is hypnotic, and also odd. Mr. Shute's world ends not, as the epigraph warns, with a whimper, but with a stoical silence, movingly impressive—if one were not

nagged by the thought that Mr. Shute either could not or would not create someone with a wild uncontrollable reaction to catastrophe.

The moral, in so far as Mr. Shute states it explicitly, comes via his characters thus: "Maybe we've been too silly to deserve a world like this", and "The only possible hope would have been to educate them out of their silliness". Again something falls oddly, and flatly, something which tends to be characteristic of 'scientific' novels of the Wellsian kind. Like Wells, their authors, it seems to me, recognize readily in human nature "the white thread of intellect and the scarlet thread of passion"; they miss the black thread of ineradicable destructiveness. (On the other hand, 'literary' novelists of the past thirty years have tended to recognize the scarlet thread and the black, and notably to leave out intellect.) 'Silliness' would seem to mean to Mr. Shute something connected with weakness of intellect. To my mind the enemy hides deeper in us, and elsewhere; and Mr. Shute does not really get at him. But one takes off one's hat all the same.

WILLIAM COOPER

EELS

Eels

A Biological Study. By the late Prof. Léon Bertin. Pp. viii+192+8 plates. (London: Cleaver-Hume Press, Ltd., 1956.) 25s.

THE French title "Les Anguilles", freshwater eels, indicates that this book is a study of a single species, but this is not merely the only comprehensive account in English of the life-story and bionomics of the European eel. It aims at illustrating a number of aspects of biology and methods of research by reference to a single animal. The dramatic and once baffling life-history of the eel, as well as its economic importance, has focused attention upon it through the centuries, but it is only during the past half-century that the techniques have been developed for studying its osmotic relations during its migrations from salt to fresh water and back again, or for statistical analysis of the populations to test the homogeneity of the species, or for appreciating the role of the endocrine organs in controlling its migrations. Nor in other centuries could the problem of its sexuality and sex determination even have been defined.

A student with an elementary training in zoology to the Higher School Certificate or First Medical examination standard can read this book with profit, and come away with some understanding of the problems presented by the eel to human curiosity and of the methods of attacking them, often groping at first, but becoming more precise as understanding and technique developed. Prof. Bertin makes his study of eels also a study in the history of zoological science, presented in a literary style which enables the reader to share the excitement of discovery and emulation. Each chapter is followed by a list of references, among which we miss the complete reference to Schmidt's Royal Society paper of 1922 (although this is referred to in the text) and—an unfortunate omission for English readers—any notice of Dr. Frost's account in 1945 of the freshwater life of the eels of Windermere.

The translation runs well, but could be bettered here and there. 'Expérience', for example, should usually be translated 'experiment'. There are some serious misprints—'thiner' (*sic*) for 'plus épaisse' on