

another that an hour's sail may be sufficient to pass from the extreme of heat to the extreme of cold.

"Finally, it had been shown that a large proportion of the forms living at great depths in the sea belong to species hitherto unknown, and that thus a new field of boundless extent and great interest is open to the naturalist. It had been further shown that many of these deep-sea animals are specifically identical with tertiary fossils hitherto believed to be extinct, while others associate themselves with and illustrate extinct groups of the fauna of more remote periods; as, for example, the vitreous sponges illustrate and unriddle the ventriculites of the chalk."¹

"PORCUPINE"
EXPEDITIONS.

In consideration of the value and novelty of these results, the Royal Society urged the Admiralty to provide means of extending the observations. In 1869 the surveying ship "Porcupine," Captain Calver, was appointed for this service. In addition to the temperature observations, which had turned out so interesting in the cruise of the "Lightning," it was decided to make a number of chemical observations on the water. For this purpose, the chartroom was fitted up as a laboratory, and a chemist was invited to join the biologists on the cruise. A number of arrangements were also made for facilitating dredging and the subsequent observations. The "Porcupine" was well adapted for the purpose, and between May and September 1869 she made three distinct trips. The first of these was under the scientific direction of Mr. Gwyn Jeffreys, and it was chiefly devoted to dredging off the west coast of Ireland and in the channel between Scotland and Rockall. The deepest dredging was in 1470 fathoms, and no lack of life was found at that depth. It was accordingly resolved that, during the second trip, under the direction of Professor Wyville Thomson, an attempt should be made to dredge in the deepest water within reach, so that a definite answer to the general question of the existence of life at great depths could be arrived at. The "Porcupine" was steered for the Bay of Biscay, and at a point about 250 miles west of Ushant two highly successful hauls of the dredge were taken in water over 2000 fathoms deep, and in both animal forms from the Protozoa to the Mollusca were abundant.² It was on this cruise that Captain Calver suggested the employment of hempen tangles attached to the dredge frame, which resulted in the capture of many new animals. The third cruise of 1869, during which Dr. Carpenter was the naturalist in charge, was intended to be a repetition of that of the "Lightning" in the previous autumn. The observations of the earlier expedition were confirmed and extended in various directions.

THE "SHEAR-
WATER'S"
OBSERVATIONS.

In 1870 Mr. Gwyn Jeffreys and Dr. Carpenter continued the work in the "Porcupine" by a highly interesting series of soundings and dredgings in the Mediterranean and current observations in the Strait of Gibraltar. Dr. Carpenter resumed the study of this region in the following year in the "Shearwater," commanded

¹ Thomson, *op. cit.*, pp. 79, 80.

² *Ibid.*, pp. 96, 97.