

cooling down the surface of the crust, which, being a bad conductor, does not transmit heat with sufficient rapidity to affect perceptibly the temperature of the cold indraught. It is probable that in winter, in those parts of the Polar seas which are not directly influenced by warm currents, the whole column of water from the surface to the bottom is reduced to the lowest temperature which it will bear without freezing, and is thus an ample source of the coldest water of the highest specific gravity.

From the fact that the water of the ocean is much more extensively cooled down in the southern than in the northern polar regions, and probably from other causes, it appears that at present the northward movement of the cold under-flow is much in excess of the movement to the southward, and the present development of the abyssal fauna has the general effect of being derived from a southern source.

It seems probable for several reasons, the most obvious of these being that no Classes nor Orders, and but few Families and Genera, are met with in the abyssal regions which do not likewise occur in shallower water, that the original direction of the migration of marine animals is from the shore seawards.

At present the temperature conditions of the shore belts meet those of the abyssal regions in the Polar seas only. A path is thus indicated by which a passage may more readily take place from shallower into deeper water. The causes which determine the under-flow of water from the poles northwards and southwards, although they may vary from time to time in energy, are not temporary; and it seems likely that, during the lapse of later geological time, new blood has been infused into the fauna of the abyssal regions by occasional drafts from the shallower water of the Polar zones.

All these questions are of the highest interest. They will be discussed more fully in the volume of this report which contains a general summary of the scientific results. In the meantime, I hazard these few remarks as an indication of the direction in which our researches would seem to lead.

*General Conclusions.*—I think that the data already in our hands warrant our provisional acceptance of the following general conclusions:—

I. There is no depth-limit to animal life in the ocean. All the classes of marine invertebrata which are found in shallower water, and some groups of fishes occur under otherwise favourable circumstances at the greatest depths. Judging from our present information, we should be inclined to believe that animals decrease in number, in variety, and usually also in size, at extreme depths.

II. Temperature is the supreme condition which determines the distribution of marine animals. Except in certain "enclosed seas," where the distribution of temperature is abnormal, an *abyssal fauna* occupies an *abyssal region*, extending from depths of 500 or 600 fathoms to the bottom. The normal temperature of this region ranges from 32° F. to 40° F. as an extreme upper limit which is rarely exceeded. Towards the