

flourish in some localities in such immense quantities as to displace all others, a phenomenon that may certainly be seen also now and then in the boreal region, though not to such a marked extent. Even when several species occur together the specimens appear to be more numerous than is the case in the boreal region. On one occasion in the Barents Sea the "Michael Sars" brought up in a single trawling over a ton of big sponges (*Geodea*), and near Jan Mayen at another time more than a barrellful of *Pecten grönlandicus*. The prawns again are sometimes in myriads, and Sars relates that during the Norwegian North Atlantic Expedition the trawl came up positively full of the feather star, *Antedon eschrichti*. One reason for such enormous quantities of individuals is that many of the arctic animals produce their young fully developed, without any free pelagic stage, so that in all probability a large proportion continue to live where they were born.<sup>1</sup> Currents, the nature of the bottom, and conditions of nourishment must also be taken into account.<sup>2</sup>

Direct  
development.

Nowhere perhaps do we find such a marked contrast between the boreal and arctic faunas as when we pass from one of the boreal coast plateaus out into the cold area of the Norwegian Sea. If we trawl on the plateaus, where the temperature does not sink below 6° or 7° C., we find a boreal fauna consisting to a great extent of forms which have migrated into the Norwegian Sea from southern latitudes. As soon, however, as we come to the slope of the deep basin (the cold area), at a depth of say 600 to 800 metres,<sup>3</sup> where the temperature falls below 0° C., the exclusively arctic element begins to predominate, and we meet with species that are almost entirely foreign to the banks and coasts of the boreal region.

There is the remarkable *Umbellula encrinus* (see Fig. 358), a form belonging to the pennatulids, that may grow several metres high, with large rosette-like polyps at the upper end of the stalk. Of star-fishes we have the beautiful purple *Pontaster*

Arctic fauna  
in the upper  
part of the  
cold area of  
the Nor-  
wegian Sea.

<sup>1</sup> Römer and Schaudinn, *Fauna arctica*, Einleitung, p. 48; see also Murray, *Trans. Roy. Soc. Edin.*, vol. xxxviii. p. 492, 1896.

<sup>2</sup> At one locality in the North Sea we captured large numbers of snails (*Sipho gracilis* and *Neptunca antiqua*) and of a sea-mouse (*Spatangus purpureus*). The first named deposits its eggs in capsules, from which the young emerge fully developed, a circumstance sufficient to explain their plentifulness, but *Spatangus* has floating larvæ, so that other factors must have come into operation. There may be an aggregation of individuals in a limited area without direct development, provided the larvæ are not carried away by currents; thus our common ascidian (*Ciona intestinalis*) often forms large congregated masses owing, as far as I could make out, to the fact that the eggs sink in large quantities by the mother's side, and develop in a comparatively short space of time.

<sup>3</sup> The depth at which the temperature falls below 0° C. is liable to variation; north of Tampen the "Michael Sars" found such temperatures in 1902 at about 550 metres.