

Previously all these fishes of the Norwegian Sea were generally believed to live only along the bottom, but, as mentioned in Chapter III., the "Michael Sars" in May 1911 obtained in a pelagic haul in the cold layers of the Norwegian Sea a specimen of *Paraliparis bathybi*. In the cold water layer there are thus fishes which at least occasionally occur in midwater.

On the coast banks off Greenland, Jan Mayen, and the most northerly coasts of Spitzbergen dwells a genuine Arctic fauna. Of these shallow cold-water species the following are most important: *Icelus hamatus*, *Triglops pingelii*, *Lumpenus maculatus*, *L. medius*, and *L. lampetrisformis*, besides *Gadus saida* (the polar cod). Arctic shallow-water fauna of the Norwegian Sea.

On the east and south side of the Norwegian Sea, from Spitzbergen along the coast of Norway and the North Sea banks, and also at Iceland, the cold water does not occur on the slopes in depths less than 600 or 700 metres, and the change from the cold water to "Atlantic water" is very marked. The deep-sea fauna and the fauna of the coast banks are for this reason much more sharply separated than in the Atlantic. At most seasons the limit is determined by the vertical distribution of the Atlantic water, and this limit may oscillate according to changes in the current, though this point has not yet been thoroughly examined.

The fishing experiments of the "Michael Sars" have sometimes in a very striking way shown how sharp the limit is between the two faunæ. In June 1902, for instance, a long line of 1200 fathoms was shot on the northern slope of the North Sea bank towards the deep water, one end of the line being in 217 fathoms, where the temperature was 6° C., and the other end in 300 fathoms, where the temperature was -0.2° C. In the cold water we obtained cold-water fish (*Raia hyperborea*), while near the upper end of the line (in warmer water) the fish belonged to the coast bank species (*Sebastes*, *Macrurus fabricii*). *Raia hyperborea* has been taken from North Spitzbergen down to the slope of the North Sea plateau; *Macrurus fabricii* is known from the Bay of Biscay, from the ocean off the east coast of North America, and from other localities.

#### THE FISHES OF THE COAST-BANKS

The "Michael Sars" has now had the opportunity of investigating the coast-banks from Spitsbergen to a little south