

VERTICAL AND HORIZONTAL DISTRIBUTION OF DEEP-SEA FISHES.

Before the voyage of the Challenger scarcely thirty deep-sea fishes were known; this number is now increased to about 370, if we include a few species which are, in fact, surface fishes, but descend occasionally or regularly to or even beyond the 100-fathoms limit. In a table appended to these introductory remarks, I have endeavoured to show in a graphic manner the bathymetrical range of each species, so far as it has been ascertained at present. Unfortunately, some uncertainty prevails as regards the depth at which certain specimens were obtained. I formerly assumed that the fishes of the open sea were living either near to the surface or at the bottom, but I think now that Mr. Murray is right in supposing that certain fishes live habitually in intermediate strata, without ever coming to the surface or descending to the bottom.¹ The function of the pneumatic apparatus with which many deep-sea fishes are provided is to regulate their specific gravity, so that a fish is able to maintain its position at a certain depth, which would vary only within certain limits, comparable to those which we observe in surface fishes. As the mouth of the dredges or trawls used by the Challenger was open during their descent or ascent, it is within the limits of probability that sometimes fishes were accidentally enclosed whilst the apparatus was traversing the strata intermediate between the surface and bottom. And this has actually happened more than once; for it is quite certain that common surface fishes, like *Sternoptyx* and *Astronesthes*, never ranged to the depth of 2500 fathoms, the depth to which the dredge had descended on the occasion of the capture of these specimens. On the other hand, many of the fishes obtained by the Challenger offer sufficient evidence, from their own organisation, that they live at the bottom, and are unable to maintain themselves suspended in the water; and, consequently, that they actually were obtained at the depth to which the dredge descended. Besides, the statements of the depths of the Challenger fishes have been confirmed in many instances by the observations made during the more recent deep-sea explorations.

However, it may be assumed that of those *mid-water fishes*, as the forms may be called which inhabit intermediate strata, comparatively much fewer specimens are captured than of the bottom fishes. It must be of rare occurrence that fishes accidentally enter the narrow mouth of the dredge whilst it is passing to the bottom or to the surface, and it is more likely to happen when the larger trawl is used. But such free-swimming fishes are much more agile in their movements, and escape more easily on perceiving the

¹ The habit of some fishes of living at a distance from the surface and bottom is a fact which has been known for a long time among fresh-water fishes. *Salmo lacustris*, of the Lake of Constance, has received its vernacular name from this habit; it is called "Schwebe-forelle," that is, the trout which is suspended in mid-water.