

approach of the dredge than bottom fishes, which are generally of a more sluggish nature, and which, seeking safety by burying themselves in the ooze, would be readily enclosed in the dredge.

So far as the observations go at present, no distinct bathymetrical zones, characterised by peculiar forms, can be defined. As the transition from the organisation of the typical surface fish to that of the most highly specialised deep-sea form is gradual, so the passage from the littoral to the abyssal fauna is continuous and not marked by a sudden change. The limits between the two faunæ are still more obscured by the remarkable manner in which they overlap each other owing to the wide bathymetrical range of certain species of either fauna. I need only mention such common littoral forms as *Lophius piscatorius*, *Merluccius vulgaris*, and *Pleuronectes cynoglossus*, which descend to depths of from 300 to 700 fathoms, thus living in the same areas which are inhabited by the most highly specialised abyssal forms like *Chiasmodon*, *Trachipterus*, and *Alepocephalus*. Also the temperature of the water clearly interferes with a uniform bathymetrical distribution of fishes, as many species, which in low latitudes are found at considerable depths, often ascend into the cold surface strata of high latitudes.<sup>1</sup> Further, nocturnal pelagic surface fishes seek, during the day-time, the darkness of greater depths. The instances of the wide bathymetrical range of deep-sea species are numerous: some may range from a depth of some 300 fathoms down to one of 2000 fathoms; or, in other words, a fish which has once attained in its organisation to that modification by which it is enabled to exist under the pressure of half a ton, can easily accommodate itself to one of two tons or more.

But if there are serious obstacles to a division of the deep-sea fish-fauna into vertical zones characterised by the presence of peculiar forms, there are less objections to an attempt to show to what limits the families of fishes descend which are represented in the deep-sea by surface-forms or their modifications. As far as our present knowledge goes, we find—

1. That at a depth of 400 fathoms the Gobiidæ, Trachinidæ (with the exception of *Bathhydraco*), Blenniidæ, Percidæ, Scorpenidæ, Trichiuridæ, Cyttidæ, Cataphracti, Bathyrhissidæ cease to exist.

2. At a depth of 500 fathoms two important types, viz., the Sharks and Rays, and the Flat-fishes cease to flourish, only one isolated example of each descending beyond that limit.

3. At 700 fathoms several other families, which are characteristic forms of the littoral fauna of the cold and temperate zones disappear, viz., the Cottidæ, Discoboli, and Lycodidæ (with one exception); there is also no evidence of the Trachipteridæ and Myxine extending beyond this depth.

4 The depth of 1200 fathoms seems to be the limit of the Holocephali.

<sup>1</sup> This fact was first expressed in Introduction to the Study of Fishes, p. 305.