

stages of growth without coming into the vicinity of land. These truly pelagic fishes are represented in the Challenger collection by numerous genera: (species of) *Carcharias*,¹ *Xiphias* and *Histiophorus*, *Coryphæna*, *Lirus*, *Cubiceps*, *Psenes*, *Nomeus*, *Platystethus*, *Thynnus*, *Lepidothynnus*, *Echeneis*, *Seriolichthys*, *Antennarius*, *Centriscus*, *Scombrosox*, *Exocoetus*, *Scopelus* (sp.), *Diplophos*, *Astronesthes*, *Halaphya*, (*Leptocephalus*).

The number of these surface fishes is considerably increased by others which for the greater part of their life inhabit the depth of the ocean, from 100 fathoms downwards. The causes which make these fishes ascend to the surface are not known; but as some of them have been observed to make their appearance at the surface periodically, we may surmise that this change of habitat is in connexion with their propagation. Indeed, most of them are found at the surface only during the early stages of their growth, and it would seem that their ova and fry require for development and growth the higher temperature and the light of the surface water. These fishes connect the surface pelagic fauna with the deep-sea fauna, and are represented in the Challenger collection by the following genera:—*Scorpæna* (*dactyloptera*, young), *Nealotus* (young), *Lepidopus* (adult and young), *Thyrstites* (young), *Schedophilus* (young), *Centrolophus* (young), *Trachypterus* (young), *Lophotes* (young), *Onus* sp. (young), *Bregmaceros* (adult and young), undetermined genera of *Pleuronectidæ*, *Scopelus* sp. (adult and young), *Prymnothonus*.

The pelagic fauna receives likewise a very considerable contingent from the littoral fauna. A great number of young and undeveloped fishes, which are the offspring of species rarely found in the adult state at any distance from land, occur at the surface in the open sea. Their presence under conditions so widely different from those under which they live when mature, can be explained by the fact that spawn or fry floating on the surface may be driven by currents to great distances from the place where the spawn was originally deposited; this must frequently happen, especially on oceanic banks which are covered by a small depth of water, and which, therefore, are suitable localities for littoral species. The wide distribution of the same littoral species over large oceanic areas, like that of the Tropical Indo-Pacific, finds thus an easy explanation. The Challenger obtained many immature specimens of such littoral forms in the open sea, as *Pimelepterus*, *Holocentrum*, *Lichia*, *Platystethus huttonii*, *Trigla*, *Brosmius* (?), *Onus* sp. *Fierasfer*, *Solea* (?), *Synaptura* (?), *Hemirhamphus*, *Belone*, *Balistes*, *Tetrodon*.²

Finally, fully developed specimens of littoral species may also stray or be accidentally driven into the open sea. But these fishes must be considered to be occasional stragglers

¹ Very little is known about the propagation of the pelagic species of *Carcharias*; all seem to be viviparous, bringing forth their young in the open sea, like other viviparous Plagiostomes, or on oceanic banks.

² Whether *Branchiostoma* should be included in this list is uncertain at present.