

e represents the head of *Ipnoops murrayi*, Gthr., taken by the "Challenger" in about 3000 metres.

a shows a "normal" eye like the eyes of bottom-fishes on the slopes of the coast banks; *b* and *c* exhibit very small eyes; finally, *d* and *e* are perfectly blind. In *Bathymicrops* the whole head is covered with scales, including the eyes, which are only faintly visible through the covering as minute black dots. In *Ipnoops* the head is covered with filmy bony plates, and eyes are entirely absent. A peculiar organ, which has been regarded as a light-organ, is situated below the plates, and supposing this interpretation to be correct it is the only light-organ known in these forms.¹

How is this series of remarkable forms to be arranged conformably to the biological classification of the fishes according to their light-organs attempted above? They have all been taken only in the trawl, but are they really bottom fish? Why then (if we may be allowed the expression) do they not all possess large eyes, like other bottom fish living at similar depths? On the other hand, we must admit that they all differ from pelagic fishes in appearance. Most bathypelagic fishes are black, and their scale covering is but poorly developed.

As a "working hypothesis" I would suggest that these fishes belong to the deepest water-layers near the ocean-floor, and for this reason they unite qualities characteristic of both bottom fishes and pelagic fishes. The fact that they belong to the family Scopelidæ seems to strengthen this view, as this family comprises such a wealth of pelagic forms. Several of these fishes, as for instance *Benthosaurus grallator* (Fig. 502), are also provided with long filaments or whip-like appendages indicating pelagic habits; to the south of the Azores we took some splendid specimens, in which these appendages, really transformed fin-rays, were intact, as seen in the figure.

Another problem attaches to the remarkable fact, previously mentioned, that light-organs are lacking in all pelagic fishes of the coast waters and also of the boreal area. Neither are they found in the fishes of tropical coast waters, where the temperature cannot be supposed to prevent their development, nor do they occur in those of the Norwegian Sea, where the depth is sufficient

Pelagic fishes
of coast
waters and
of the
boreal area.

¹ Sir John Murray and Professor Moseley at first described these organs as modified eyes,—without lens or vitreous humour, and with only rods arranged in hexagonal bundles in the retina. Later Moseley stated they were certainly not eyes, but phosphorescent organs (see Manchester Science Lectures, Dec. 18, 1877, p. 132; Narr. Chall. Exp., vol. i. p. 239, 1885; Zool. Chall. Exp., Part LVII. Appendix A, 1887).