

salt as many regions of the present ocean, that they had a relatively high temperature and were probably frequently laden with fine clayey matter derived from the land and shallow reaches of the sea-bed, a condition of matters that now to some extent obtains in the western Pacific Ocean.¹ The great abundance of Protistan life in the open waters of the early ocean of which we have here some evidence, produced, in all likelihood, by death and decay a most abundant supply of food at the bottom of the ocean, especially just beyond the mud-line. In this position, again, the abundant food supply would bring about the most favourable conditions for the evolution of the Metazoa. Some species would eventually be able to spread upwards and establish themselves in the shallower portions of the sea-bed swept clear of mud by tides and currents. Even in these early ages species with pelagic larvæ, from being able to disperse more rapidly and to occupy all points of vantage, would ultimately be the successful competitors in these shallow reaches of the ocean.²

In the tropical and sub-tropical regions of the present ocean we find many large overgrown larval forms,—*Plagusia*, *Leptocephalus*, *Cephalacanthus*, *Phyllosoma*, *Alima*, *Erichthus*, *Arachnactis*, &c.—derived from the shore and shallow-water Benthos. These, having been carried by currents into the open ocean, and, not finding there the bottom conditions favourable for their further development, have grown to an enormous size. In some cases larvæ of this kind may have acquired the power of reproduction in their new habitat, somewhat after the manner of the Axolotl. Again, it is not difficult to imagine the pelagic Cœlenterates to have been derived from some such form as a Medusoid gonophore which, on being carried into pelagic waters, could not find the conditions necessary for the development of the fixed generation.³ My late colleague, Professor Moseley, used to regard the pelagic animals as the original stock from which other marine faunas had sprung,⁴ but evidence from embryology and other departments of research shows that there are better reasons for holding that all the highly organised pelagic animals are descended from ancestors which lived in the shallow waters surrounding the land, while the very ancient pelagic Protophyta and Protozoa were probably derived at a much earlier date from the simplest forms of life that originally appeared at the mud-line of Pre-Cambrian seas. The mass of individuals in the pelagic fauna and flora probably greatly exceeds that of other marine faunas, still the species are few when compared with the organisms of the shore and shallow water. Whales, seals, pelagic Fishes, *Halobates*, pelagic Cephalopods, *Ianthina*, *Scyllæa*, Pteropods, Heteropods, pelagic Crustaceans, Worms, and Cœlenterates, all appear to bear distinct traces of a

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¹ See Buchan, Report on Oceanic Circulation, *Phys. Chem. Chall. Exp.*, pt. viii., pp. 3, 13, 1895.

² See W. K. Brooks, The Genus *Salpa*, Johns Hopkins Press, Baltimore, 1893, p. 123; also The Origin of the Oldest Fossils and the Discovery of the Bottom of the Ocean, *Journal of Geology*, vol. ii. p. 455, Chicago, 1894.

³ See Agassiz, Three Cruises of the *Blake*, vol. i. p. 208.

⁴ See *Brit. Ass. Report* for 1884, pp. 751-753.