

considers this interpretation much more probable, supported as it is by the fact that many Radiolarians and Diatoms live at the surface. M'Donald of H.M.S. "Herald" had recently found some of these forms in the stomachs of pelagic Mollusca, but Huxley doubts very much whether these heavy *Globigerinæ* could maintain themselves in the surface water. The third hypothesis supposes these organisms to live in deep water, and, while not expressing a decided opinion on the matter, Huxley seems to prefer the last hypothesis, concluding by saying: "I abstain at present from drawing any positive conclusion, preferring rather to await the result of more extended observations."

During the years 1857 to 1859 the Austrian ship "Novara," under the command "NOVARA." of B. von Wüllerstorff-Urbair, completed a circumnavigation of the world. The expedition was accompanied by Hochstetter as geologist, and by zoologists and botanists, who made large collections and many important observations. Although the expedition engaged in no special deep-sea investigations, the meteorological and physical observations were most important. The results of the expedition have been published in a splendid series of volumes by the Austrian Government.¹

In 1860, H.M.S. "Bulldog" was despatched by the British Government for the preparatory survey of the route for the telegraph cable between England and America; Dr. G. C. Wallich, who accompanied the expedition, gives an interesting account of his observations.² He shows how little foundation there is for the objections urged against deep water being habitable; after weighing the facts connected with the chemical composition of sea-water, he devotes some space to the study of carbonic acid in the ocean, its origin, use, and distribution. He deduces from his various observations on Radiolarians, Diatoms, and Foraminifera, that carbonate of lime and silica are always present in sea-water, that the quantity of carbonic acid increases with the depth, and that the solvent power of water on these two bodies is due to the presence of carbonic acid. He is of opinion that, while the carbonate of lime is present in such minute quantity on the surface or on the bed of the deep sea as to be inappreciable by chemical analysis, extensive calcareous deposits are nevertheless formed in a continuous manner. He believes that pressure, far from restricting the development of animal life to the upper zones of the sea, may be considered as one of the essential conditions of life in great depths. Wallich examines the influence of light on the distribution of marine species, remarking that the want of light in very deep water produces the inverse phenomenon to that which fixes carbon in the plant and separates oxygen from carbonic acid. He concludes from his observations that organised beings living in the abysses of the ocean are descended from species living originally in shallow water; he believes that the Starfishes, &c., brought up from the greatest depths were caught alive in their natural

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¹ Reise der Oesterreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859, sixteen volumes, 4to. Wien, 1861 to 1875; see also R. v. Scherzer, Reise der Oesterreichischen Fregatte Novara um die Erde, Wien, 1866.

² Wallich, North Atlantic Sea-Bed, London, 1862.