

and the American *Tuscarora*, all of which were carried out almost simultaneously in the years 1872-77. These were followed by a series of similar undertakings.¹

The seas were investigated in all latitudes and in all zones by means of plumb-line soundings and deep-sea thermometer readings; and the ocean sediments were brought from different horizons of depth by dredging-nets. In the year 1843, Humboldt had known no greater depth than 2000 metres. From the large number of observations taken by the *Challenger* and *Tuscarora* expeditions, Samuel Haughton was able in 1876 to calculate the mean depth of the Pacific, Atlantic, and Indian Oceans at 3000 to 3,650 metres. Krümmel in 1878 made a most careful and accurate calculation from all known data, and gave the mean depth for all oceans at 3,438 metres.

The old hypotheses of Athanasius Kircher, Kant, Ritter, and others, about submerged mountain-systems and submarine prolongations of continents had to give place to the newly obtained data. It was found that the greatest ocean depths were not in the middle of the oceans, but as a rule along the edge of mountainous coast-lines. The floor of the ocean has its different horizons of level: smooth ridges, extensive plateaux with gentle slopes, narrow canal-like depressions, connected series of deep hollows extending to depths of 6000 metres, and even 8,500 metres below sea-level, and undulating crust-forms occur in all the great oceans; but under the water there are no toothed mountain summits, no steep arêtes, no valleys and ravines such as we are familiar with amongst the surface forms of the land produced by subaerial erosion.

The material brought up by dredging-nets shows the nature of the sediments that are in course of deposition on the ocean-floor. "On the continental shelf, within the 100-fathom line, sands and gravels predominate, while on the continental slopes beyond the 100-fathom line, blue muds, green muds, and red muds, together with volcanic muds and coral muds, prevail, the two latter kinds of deposits being, however, more characteristic of the shallow water around oceanic islands. The composition of all these terrigenous deposits depends on the structure of the adjoining land.

¹ A complete account of the expeditions which have contributed to our scientific knowledge of oceanography has been given up to the year 1883 in Boguslawsky's *Handbuch der Oceanographie*, vol. i., pp. 390-400.