

the upper surface of which there is a layer of ashes only one-eighth of an inch in depth, covered by a thin layer of manganese. The majority of the nodules at this station have a layer of this volcanic tufa or ash in the position represented by the figure. None of the nodules, however, in the position of those represented in Pl. IV. fig. 3, *i.e.*, along the line separating the tufa from the Red Clay, exhibit this layer of ash on the superior surface. Pl. IV. fig. 5 shows a nodule in which a *Carcharodon* tooth forms the nucleus. In addition to the nodules above referred to, there were numerous small nodules about the size of marbles, some of them having tufa in the centre and others with nuclei of sharks' teeth or their fragments. Some very irregular flat fragments had Red Clay in the centre. Sharks' teeth from this station are represented in Pl. V. figs. 1, 2, 3, 4, 5, and 13, and Pl. VI. figs. 9, 10, 13, 15, and 17.

The volcanic islands of Rurutu and Tubuai are each distant from this station between fifty and sixty miles, the former to the west and the latter to the south. One or other of these islands is probably the source of the volcanic ashes which have fallen upon this old sea-bed. The arrangement of the volcanic ashes, the coarser particles lying on the Red Clay and these being covered by finer and finer particles, seems to indicate that they have been derived from a terrestrial eruption, to have fallen upon the surface of the ocean, and, in falling through the water, to have been arranged in layers according to size and specific gravity. After this tufa had consolidated, the bottom would seem to have been broken up by some disturbance, and the manganese to have been subsequently deposited over the surface and down the cracks between the different fragments. The minerals in the Red Clay portion of the slabs are much more highly altered than in the portion composed of tufa.

Station 283, 2075 fathoms.—In the upper part of the sounding tube was a light-coloured Globigerina Ooze containing many pelagic Foraminifera; in the lower six inches of the tube was a very dark chocolate-coloured clay, containing much manganese in the form of round balls and many crystals of phillipsite.

Station 285, 2375 fathoms.—The trawl at this station contained several quarts of dark chocolate-coloured clay, and large numbers of manganese nodules, sharks' teeth, earbones and fragments of other bones of Cetaceans, pumice stones, and angular and rounded pebbles, apparently ice-borne. The specimen of the deposit procured in the sounding tube contained carbonate of lime in the form of pelagic Foraminifera in the upper layers, but that in the trawl did not show any effervescence when treated with dilute acid.

There were between two and three bushels¹ of manganese nodules. The great majority of these were of small size, from 1 to 2.5 cm. in diameter, resembling a lot of marbles. One large nodule, however, with a large white-coloured nucleus, appeared to have been broken to pieces in the trawl. The white nucleus had at one time been a

¹ About 80 litres.