

The nucleus of one nodule broke down into a floury material, which under the microscope seemed to be composed of a large number of prismatic crystals belonging to the monoclinic system. Besides the larger nodules to which we have referred, there was a considerable number of smaller ones varying from 0.5 to 2 cm. in diameter, almost all formed round minute fragments of pumice. Frequently numbers of these were cemented together by the manganese, and appeared to be in the process of formation into larger nodules.

Station 252, 2740 fathoms.—The trawl brought up many hundreds of manganese nodules along with some rounded fragments of pumice; there was no clay mixed with these nodules, having apparently been all washed away as the trawl was hauled up through the water. The largest nodules were about the size of cricket balls; they were more or less round or ellipsoidal, and when rolled on the deck they looked like a pile of dirty potatoes. Pl. III. fig. 5 represents (natural size and in section) the prevailing form, size, and structure of the nodules from this station. Three zones may be distinguished in the figure:—(a) The elongated yellowish white centre or nucleus penetrated by dendrites of manganese; it is hard and compact, and rather sharply separated from the dark layers which surround it. It may be observed that the elongated form of the nucleus appears to be the cause of the ellipsoidal form of the nodule, the nearly spherical nodules having a round nucleus. (b) The zone of manganese immediately surrounding the nucleus has a thickness of about 1 cm., and in it no concentric arrangement can be observed. This intermediate zone is generally terminated externally by a band of more compact manganese, separating it in a manner from the more external layers, and appears, for many reasons, to have formed part of the original nucleus, which may possibly have been a fragment of pumice. There is almost always an interruption of continuity between the intermediate and outer zones, accompanied by a layer of light brown clay or mud. (c) In the outer zone there is a distinct concentric structure, determined by small alternate layers of manganese and clayey matter; these layers have each a thickness of about 1 mm., and the depth of the whole zone is about 7 mm. The manganese in this zone is purer than in the others, and on a polished surface it has a semi-metallic lustre. Pl. IX. fig. 7 represents a section of one of the round nodules. The manganese has here been removed by placing the face of the section in strong cold hydrochloric acid; in this way a clayey skeleton is obtained showing distinctly the structure of the nodule. The three zones indicated above may again be observed; the nucleus, however, is small, having a diameter of only 2 mm. This is surrounded by an area showing no concentric arrangement, then follows the outer zone with concentric layers. Fig. 7a represents a portion of the outer zone (c) magnified 25 diameters. The manganese has been removed and the empty spaces indicate the positions occupied by the manganese, which had a dendritic arrangement throughout the earthy or clayey matter. This clayey skeleton is fine grained, and is with difficulty held together. It may be remarked that the outer