

formation of the deeper layer. It is clearly illustrated in this section between Api and Raine Islands, that all the other conditions remaining the same or nearly so, the quantity of carbonate of lime found in a deposit is less the greater the depth. It is believed that this basin below 1300 fathoms is probably cut off from the colder water farther south, and, indeed, from general oceanic circulation, below that depth, in this respect approaching to the condition of enclosed seas. In all such basins the surface shells appear to be removed from the deposits at lesser depths than in areas where there is no interruption to free communication arising from the existence of submarine barriers.

The mineral particles in these deposits consisted chiefly of angular fragments of volcanic rocks and minerals, all of small size except the pieces of pumice which were numerous in all the dredgings. There were many manganese particles, and, at the sounding in 1400 fathoms, some of the Foraminifera shells were filled with the peroxide, so that a complete internal cast of the shell was left after treatment with dilute acid. The deposit in 130 fathoms, off Api Island, was a Volcanic Sand containing 13 per cent. of carbonate of lime.

*Off Raine Island.*—The soundings and dredgings in 135, 150, and 155 fathoms (see Chart 27) showed that the deposit was a Coral Sand, composed of white and brownish coloured fragments of Corals, Molluscs, and Foraminifera shells, with a considerable admixture of calcareous Algæ. Mr. H. B. Brady found in this deposit a larger number of species of Foraminifera than in any other taken during the cruise. Many of the shells were probably washed from the shallower water of the adjoining reefs. The deposit contained 87 per cent. of carbonate of lime, and it was estimated that more than one-half of this consisted of pelagic Molluscs and pelagic Foraminifera. The mineral particles in the deposit consisted of fragments of quartz, felspars, mica, augite, and olivine, and were estimated at 4 per cent.

By treating this deposit with dilute acid, casts of the Foraminifera shells are obtained, the majority of which are of a brick red colour, although a few are of a yellowish, or even greenish, tinge (see Pl. XXIV. fig. 3). They are not so compact or well marked in outline as the white and pale straw-coloured casts usually met with in glauconitic muds, and have very frequently a porous aspect, from the removal of the carbonate of lime which has, in many instances, been associated with the red material forming the casts. If some of the Foraminifera be treated with dilute acid, the action stopped after it has continued for some time, and the substance dried and examined by reflected light, a number of casts of the organisms are seen in carbonate of lime looking quite like milky quartz. If, however, the action be continued, it is seen that they are composed of carbonate of lime as they entirely disappear, leaving a small residue of a reddish colour, or very areolar casts of the shells in the same red substance. Examined in thin sections, it is observed that the shells are filled with a red, yellowish, or greenish matter, frequently extending into the foramina. The shell is at once distinguished from the cast by its structure, transparency, and optical properties.