

to be much more limited, and have chiefly been found in more or less close proximity to volcanic islands. There are, however, indications of an approach to the condition of the chocolate-coloured clays of the Pacific in the deep water about 20° N. and 50° W. in the Atlantic.

If now we attempt to summarise the foregoing descriptions, it may be said that these concretionary masses of manganese assume a great variety of forms in modern deep-sea deposits. Sometimes the oxides cover consolidated masses of tufa, fragments of rocks, portions of the deposit, branches of Coral, and remains of other calcareous organisms. At other times fragments broken off from what must have been huge concretionary masses were obtained in the trawl and dredge; this was especially the case in the shallower waters near to, or on the slopes of, volcanic islands. The prevailing concretions, however, were more or less rounded nodular masses, from 1 to 10 or 15 cm. in diameter, and hence resembling all concretionary bodies formed in a plastic or liquid medium. As will have been noticed in the descriptions of the nodules at each station, they may present great variations in the dredging, but as a rule the nodules at any one station have a family resemblance, and differ, in size, form, and internal structure, from those at another station; so much so that now, after a detailed study of the collections, it is usually possible for us and our assistants to state at sight from which Challenger station any particular nodule had been procured.

In a great many cases the external form depends on the shape of the nucleus, but there are a number of minor peculiarities which afford indications of the station to which the samples belong. The great irregularity of some nodules depends on the fact that the nucleus is not simple. The concretionary depositions have commenced around several adjacent foreign bodies; by the increase of the successive layers around the several nuclei, the little nodules have come in contact with each other, have become united, and finally have developed into a large single nodule with several protuberances, assuming the aspect of double, triple, or quadruple nodules. In the case of very large nodules the multiple origin becomes for the most part obliterated at the external surface. The surfaces of the nodules are covered by all sorts of asperities and mammillæ, these being generally more pronounced on the under surface which had been immersed in the deposit.

Sometimes there is no apparent nucleus, and nodules of this character usually contain more manganese, being dark brown or black to the very centre, and take on a bright metallic lustre when polished with chamois leather or a piece of cloth. Almost always, however, there are one or more recognisable nuclei, around which the manganese and iron have concreted. It may be remarked that there is no chemical relation between the manganese and the nucleus to initiate the depositions, for the nuclei may be indifferently carbonates, phosphates, silicates, or silica. Any solid body suffices for the support of the original and subsequent concretionary deposits. Basic and acid silicates