a very heterogeneous arrangement of the superficial portions of the earth's crust. In some regions sandstones and highly siliceous rocks prevail, in others limestones and clays with much iron and manganese. During the Challenger Expedition, particles of quartz were found to be almost wholly absent from the deposits towards the central portions of the ocean basins, but small quartz particles were found abundantly in all the terrigenous deposits laid down near the shore. As continental rocks are largely made up of free quartz particles, and all contain particles of quartz, it follows that they must have been formed from the deposits laid down near to pre-existing land. Rocks, made up in this way of terrigenous deposits, appear to have been again and again pushed up to form new land in the gradual evolution of the surface features of the planet, and to have been again and again torn down by atmospheric agencies, the various strata becoming more simple in composition, while the land masses, on the whole, have become more complex in structure at each revolution. Among the strata of the continents there are numerous examples of rocks which were apparently laid down in a deep sea, but a deep sea which must have been in more or less close proximity to some then-existing continental land. It is, on the other hand, extremely doubtful whether any continental rock has been laid down under physical conditions similar to those under which pelagic deposits are now being formed on the sea-bed beyond 300 miles from continental land. A broad distinction is to be drawn between *pelagic* and *terrigenous* deep-sea deposits. Quartz particles are almost wholly absent from the former, while they may make up 80 per cent. of the latter.

TERRIGENOUS DEPOSITS.

In the central parts of the Pacific and Indian Oceans there are in very deep water dark chocolate coloured deposits containing large quantities of iron and manganese, together with immense numbers of zeolitic crystals, small black spherules with metallic nuclei and other spherules of cosmic origin, great numbers of sharks' teeth and bones of whales, some of these latter belonging to extinct species. All these objects may be present as the nuclei of large manganese-iron nodules. At first I was inclined to regard the peculiarities of these deposits as being in some way due to hypogene action, but all these peculiarities may be better explained by regarding them as the results brought about by chemical changes on areas of the sea-bed where there has been an extremely slow rate of accumulation, and where all the materials of the deposit have for a long time been exposed to the action of sea-water. We now know that manganese can by successive deoxidations and reoxidations in, and at the surface of, marine deposits be transported on the floor of the ocean from coast regions to the central and deeper areas of the Ocean Basins.[1] Lime, iron, manganese, magnesia, and the alkalies seem to have accumulated in the ocean and in the abysmal deposits at the expense of

PELAGIC DEPOSITS.

[1] Murray and Irvine, On Manganese Oxides and Manganese Nodules in Marine Deposits, *Trans. Roy. Soc. Edin.*, vol. xxxvii., p. 740, 1894.