

(b) *Rocks and Minerals derived directly from the Continental Masses.*

The widespread mineralogical products in marine deposits, derived from the ejections of submarine and subaerial volcanoes, have been dealt with in considerable detail in the preceding section, and it is now necessary to consider the products of the second category, with a more restricted distribution, referred to at the beginning of this chapter, viz., those derived immediately from continental masses and emerged lands. In the first instance, we may direct our attention to the fragments of continental rocks, and their distribution in marine deposits, and afterwards consider the mineral particles derived from the disintegration of continental rocks.

*Fragments of Continental Rocks.*—It is unnecessary to treat in detail the fragments of rocks and minerals met with in the littoral and shallow-water zones. It is evident that these are, for the most part, derived from the adjoining coasts, by the action of tides, waves, currents, and winds upon the submerged and emerged rocks which crop out in the shallow-water and littoral zones, or they have been transported from the far interior of the continents by the action of rivers and the ice with which rivers may sometimes be covered. In this work we have especially to deal with the deposits formed in the deep sea, that is beyond the 100-fathom line, or beyond what we have called the mud-line, where currents, waves, and other mechanical agents, play but an insignificant role. From *à priori* considerations we would not expect large fragments of the continental rocks to be carried seaward beyond the mud-line, except in what might be called abnormal conditions. The larger fragments met with in such abundance in the shallow-water and littoral zones are, by the mechanical and chemical actions of the region, continually subject to disintegration and decomposition; the minute products of their destruction are transported by currents into the stiller waters of the deep-sea region, where they slowly settle to the bottom, forming muds and oozes. The minute fragments thus transported seawards are rarely fragments of rocks, being principally made up of the more resistant crystalline particles, together with clayey and other amorphous matters. Indeed, under all normal conditions, it is rare to find fragments of rocks among the mineral constituents of a deposit, even in depths of a few hundred fathoms, and thirty or forty miles seaward, even although the shallow-water zone towards the land be of great extent, and covered with continental blocks of all dimensions and of varied lithological constitution.

It is well known, however, that continental blocks are in exceptional circumstances carried to great distances fixed in the roots of trees, or entangled among the other materials that are borne as natural rafts into the ocean from great rivers. Rivers affected with ice during some part of the year are also the means of distributing