amount of such material is annually borne to the ocean by rivers from the dry land or washed from the coast line into deep water. The Challenger dredgings near land furnished abundant proof of this in the presence of leaves, fruits, and branches of trees, with occasional fragments of land shells and other organic substances. Alexander Agassiz dredged a great abundance of decaying vegetable matter from deep water in the tropics, off the Pacific coast of America.[1]

b. Albuminoid and other Organic Matters in Deep-Sea Deposits.

In nearly all deep-sea deposits traces of albuminoid organic matters can be detected by chemical analysis. Organic material can be observed after fragments of bones or shells have been removed by dilute acid, when there often remain small flocculent masses —sometimes taking the form of the calcareous shells—which, heated on a platinum plate, burn, leaving a black cinder. In shallower water, for instance in some Green Muds, there is a greenish matter which likewise burns and appears to be of vegetable origin. The presence of sulphides and sulphuretted hydrogen in all harbour muds, muddy bays near land, and, indeed, in nearly all the terrigenous deposits, such as the Blue Muds, is a sure indication that soluble and insoluble albuminoid and other organic matters are distributed throughout these muds and are in process of decomposition. Probably sulphides are present in all deep-sea deposits, but they are most abundant in muds near land where there is rapid accumulation, and where a large quantity of organic matter is borne down from the continents. In the Red Clays and the other truly pelagic deposits, the quantity of organic matter is much less, and, owing to the slow accumulation, the sulphides are probably oxidised as soon as formed, and never make up any considerable portion of the deposit.

The food of the deep-sea animals living on the floor of the ocean consists of the dead bodies of oceanic plants and animals that have fallen to the bottom from the surface and intermediate waters. The stomachs of Echinoderms, Annelids, and other organisms were always found to be completely filled with the surface layers of the ooze, mud, or clay of the region from which they were dredged, and there can be no doubt that the nutriment contained therein was sufficient for the necessities of life.[2] Even the Crustaceans dredged from areas where fine mud commences to settle on the bottom, about or beyond the 100-fathom line, appear to live largely on the minute particles of organic origin which there settle on the bottom along with the argillaceous matters. A very large proportion of marine deposits must in this way be passed through the intestines of marine animals, and in this sense, though not in the sense suggested by Thomson and

[1] *Bull. Mus. Comp. Zoöl.*, vol. xxi. p. 197.

[2] Murray, "Marine Deposits of the Indian, Southern, and Antarctic Oceans," *Scot. Geogr. Mag.*, vol. v. p. 425, 1889.