

composition. But our surprise will be still farther lessened, when we afterwards inquire into the action of tides and currents, in disseminating sediment.*

Formation of Conglomerates.—Along the base of the Maritime Alps, between Toulon and Genoa, the rivers, with few exceptions, are now forming strata of conglomerate and sand. Their channels are often several miles in breadth, some of them being dry, and the rest easily forded for nearly eight months in the year, whereas during the melting of the snow they are swollen, and a great transportation of mud and pebbles takes place. In order to keep open the main road from France to Italy, now carried along the sea-coast, it is necessary to remove annually great masses of shingle brought down during the flood season. A portion of the pebbles are seen in some localities, as near Nice, to form beds of shingle along the shore, but the greater part are swept into a deep sea. The small progress made by the deltas of minor rivers on this coast need not surprise us, when we recollect that there is sometimes a depth of two thousand feet at a few hundred yards from the beach, as near Nice. Similar observations might be made respecting a large proportion of the rivers in Sicily, and, among others, respecting that which, immediately north of the port of Messina, hurries annually vast masses of granitic pebbles into the sea.

Causes of Stratification in Deltas.—The stratified arrangement which is observed to prevail so generally in aqueous deposits, is most frequently due to variations in the velocity of running water, which cannot sweep along particles of more than a certain size and weight when moving at a given rate. Hence, as the force of the stream augments or decreases, the materials thrown down in successive layers at particular places are rudely sorted, according to their dimensions, forms, and specific gravity. Where this cause has not operated, as where sand, mud, and fragments of rock are conveyed by a glacier, a confused heap of rubbish devoid of all stratification is produced.

Natural divisions are also occasioned in deltas, by the interval of time which separates annually the deposition of matter during the periodical rains, or melting of the snow upon the mountains. The deposit of each year may acquire some degree of consistency before that of the succeeding year is superimposed. A variety of circumstances also give rise annually, or sometimes from day to day, to slight variations in colour, fineness of the particles, and other characters, by which alternations of strata distinct in texture, and mineral ingredients, must be produced. Thus, for example, at one period of the year, drift wood may be carried down, and at another, mud, as was before stated to be the case in the delta of the Mississippi; or at one time, when the volume and velocity of the stream are greatest, pebbles and sand may be spread over a certain area,

* See Chap. 22.