

and this may, by the same causes, be forced up to the surface, where, by exposure to the air, it becomes inspissated, and forms the different varieties of pure and earthy pitch, or asphaltum, so abundant in the island.\*

It may be stated generally, that a large portion of the finer particles and the more crystalline substances, found in sedimentary rocks of different ages, are composed of the same elements as are now held in solution by springs, while the coarser materials bear an equally strong resemblance to the pebbles and sedimentary matter carried down by torrents and rivers.

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## CHAPTER XVIII.

### REPRODUCTIVE EFFECTS OF RIVERS.

Lake deltas — Growth of the delta of the Upper Rhine in the Lake of Geneva — Computation of the age of deltas — Recent deposits in Lake Superior — Deltas of inland seas — Rapid shallowing of the Baltic — Marine delta of the Rhone — Various proofs of its increase — Stony nature of its deposits — Delta of the Po, Adige, Isonzo, and other rivers entering the Adriatic — Rapid conversion of that gulf into land — Mineral characters of the new deposits — Delta of the Nile.

### DELTAS IN LAKES.

I HAVE already, when treating in the 15th chapter of the action of running water, and of the transporting and denuding power of rivers, given some account of the deltas of the Po and Mississippi. We can only form a just conception of the excavating and removing force exerted by such bodies of water, when we have the advantage of examining the reproductive effects of the same cause; in other words, of beholding in a palpable form the aggregate amount of matter, which they have thrown down at certain points in the basins of lakes and seas. It will appear, however, when we consider the action of currents, that the growth of deltas affords a very inadequate standard by which to measure the energy of the carrying power of running waters, since a considerable portion of fluvial sediment is swept far out to sea.

Deltas may be divided into, first, those which are formed in lakes; secondly, those in inland seas, like that of the Po already mentioned; and, thirdly, those on the borders of the ocean. The most characteristic distinction between the lacustrine and marine deltas, consists in the nature of the organic remains which become imbedded in their deposits; for, in the case of a lake, it is obvious that these must consist exclusively of such genera of animals as inhabit the land or the waters of a river or lake; whereas

\* Dr. Nugent, Geol. Trans. vol. i. p. 67.