

at *b b*, similar unrounded nodules of flint, still preserving their irregular form and white coating, are found at various depths in the midst of the loose materials filling the pipe. These have evidently been detached from regular layers of flints occurring above. It is also to be remarked that the course of the same sand-pipe, *b b*, is traceable above the level of the chalk for some distance upwards, through the incumbent gravel and sand, by the obliteration of all signs of stratification. Occasionally, also, as in the pipe *d*, the overlying beds of gravel bend downwards into the mouth of the pipe, so as to become in part vertical, as would happen if horizontal layers had sunk gradually in consequence of a failure of support. All these phenomena may be accounted for by attributing the enlargement and deepening of the sand-pipes to the chemical action of water charged with carbonic acid, derived from the vegetable soil and the decaying roots of trees. Such acid might corrode the chalk, and deepen indefinitely any previously existing hollow, but could not dissolve the flints. The water, after it had become saturated with carbonate of lime, might freely percolate the surrounding porous walls of chalk, and escape through them and from the bottom of the tube, so as to carry away in the course of time large masses of dissolved calcareous rock,* and leave behind it on the edges of each tubular hollow a coating of fine clay, which the white chalk contains.

I have seen tubes precisely similar and from 1 to 5 feet in diameter traversing vertically the upper half of the soft calcareous building-stone, or chalk without flints, constituting St. Peter's Mount, Maestricht. These hollows are filled with pebbles and clay, derived from overlying beds of gravel, and all terminate downwards like those of Norfolk. I was informed that, 6 miles from Maestricht, one of these pipes, 2 feet in diameter, was traced downwards to a bed of flattened flints, forming an almost continuous layer in the chalk. Here it terminated abruptly, but a few small root-like prolongations of it were detected immediately below, probably where the dissolving substance had penetrated at some points through openings in the siliceous mass.

It is not so easy as may at first appear to draw a clear line of distinction between the *fixed* rocks, or regular strata (rocks *in situ* or *in place*), and alluvium. If the bed of a torrent or river be dried up, we call the gravel, sand, and mud left in their channels, or whatever, during floods, they may have scattered over the neighboring plains, *alluvium*. The very same materials carried into a lake, where they become sorted by water and arranged in more distinct layers, especially if they inclose the remains of plants, shells, or other fossils, are termed regular strata.

In like manner we may sometimes compare the gravel, sand, and broken shells, strewed along the path of a rapid marine current, with a deposit formed contemporaneously by the discharge of similar materials, year after year, into a deeper and more tranquil part of the sea. In such cases, when we detect marine shells or other organic remains en-

* See Lyell on Sand-pipes, &c. Phil. Mag. third series, vol. xv. p. 257, Oct. 1839.