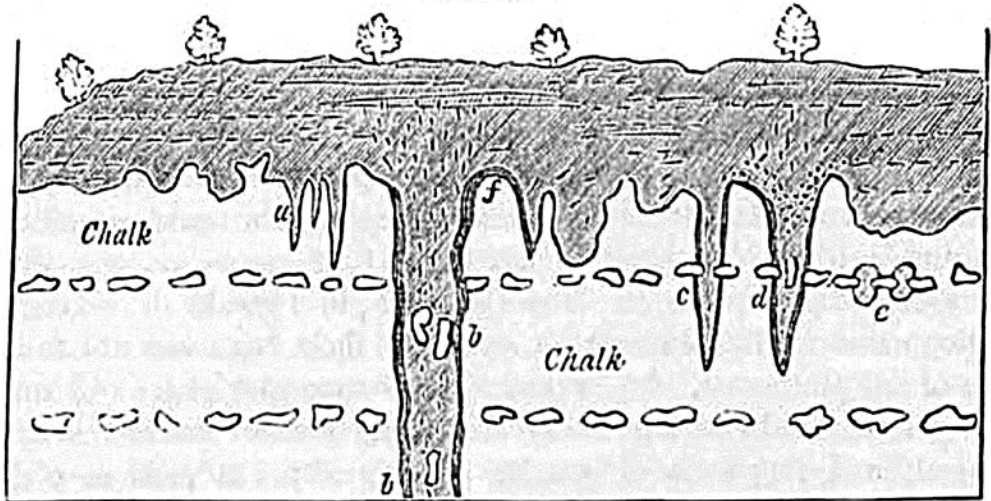


But there are other deep hollows of a cylindrical form found in England, France, and elsewhere, penetrating the white chalk, and filled with sand and gravel, which are not so readily explained. They are sometimes called "sand-pipes," or "sand-galls," and "puits naturels," in France. Those represented in the annexed cut were observed by me in

Fig. 101.



Sand-pipes in the chalk at Eaton, near Norwich.

1839, laid open in a large chalk-pit near Norwich. They were of very symmetrical form, the largest more than 12 feet in diameter, and some of them had been traced, by boring, to the depth of more than 60 feet. The smaller ones varied from a few inches to a foot in diameter, and seldom descended more than 12 feet below the surface. Even where three of them occurred, as at *a*, fig. 101, very close together, the parting walls of soft white chalk were not broken through. They all taper downwards and end in a point. As a general rule, sand and pebbles occupy the central parts of each pipe, while the sides and bottom are lined with clay.

Mr. Trimmer, in speaking of appearances of the same kind in the Kentish chalk, attributes the origin of such "sand-galls" to the action of the sea on a beach or shoal, where the waves, charged with shingle and sand, not only wear out longitudinal furrows, such as may be observed on the surface of the above-mentioned chalk near Norwich when the incumbent gravel is removed, but also drill deep circular hollows by the rotatory motion imparted to sand and pebbles. Such furrows, as well as vertical cavities, are now formed, he observes, on the coast where the shores are composed of chalk.*

That the commencement of many of the tubular cavities now under consideration has been due to the cause here assigned, I have little doubt. But such mechanical action could not have hollowed out the whole of the sand-pipes *c* and *d*, fig. 101, because several large chalk-flints seen protruding from the walls of the pipes have not been eroded, while sand and gravel have penetrated many feet below them. In other cases, as

* Trimmer, Proceedings of Geol. Soc. vol. iv. p. 7, 1842.