

enclose. Many of the shells found imbedded in one of these strata are quite entire; whence it is argued that, considering their thinness and extreme liability to injury, they must have lived in the very place now occupied by the strata which enclose them. These strata it will be recollected do not lie in a hollow, but a hill; it is nevertheless concluded that this hill must have been the bottom of a fresh-water lake.

But as in this hill there are two strata containing fresh-water shells, separated by that which has already been described as belonging to the Upper marine formation, it may be concluded that this hill must twice have been within the bosom of a fresh-water lake, and between the periods been covered by salt water. Hence there are two formations by fresh water, which by their discoverer have been designated, in reference to their

present condition, with the occasional occurrence of fresh-water shells in alluvial tracts—belonging possibly to a very recent date, and certainly to one less ancient than the above. Near Kew in Surrey, land and river shells were found in sand and gravel overlying the remains of elephants, &c. and therefore certainly posterior to the catastrophe which inhumed these animals.

Traces of fresh-water shells have been supposed to be observable even in some of the strata of an antiquity greater, and in one instance considerably so, than that of the chalk itself; but the observations are of a doubtful character; they may be stated as follows:

1. The clay stratum separating the green and iron sand in the weald of Kent, and containing concretions of a compact argillaceous limestone known under the name of Petworth marble, abounds in a univalve supposed to be *Helix vivipara*, and a fluviatile shell; but the identity does not seem to be fully ascertained.

2. The strata immediately below the iron sand, known by the name of Purbeck marble, present a smaller species also referred to the *Helix vivipara*. Mr. Webster has given the following observations on these beds.

In the Isle of Purbeck a series of strata of shelly limestone, known by the name of the Purbeck stone, alternates with shale and marble. Some of the fossils of these strata strongly resemble fresh-water shells; they appear to be *cyclostoma*, *planorbis*, &c. (G. T. vol. ii. p. 166.) It was long ago observed by Woodward, in his history of fossils, that the shells in the Purbeck marble consist chiefly of the *Helix vivipara*; and it is rather surprising that this very ancient fresh-water formation should not have excited more attention. Beautiful impressions of fish are frequently met with by the quarry-men between the laminæ of the limestone; and I saw abundance of fragments of bones, some of which belonged to the turtle. Complete fossil turtles have been found, and lately one extremely perfect. (W. p. 192.)

3. Even among some almost of the oldest strata exhibiting organic remains, a similar occurrence of fresh-water shells has been supposed to be observable; for the only species of shells yet discovered in association with the coal measures is a kind of unio, much approaching that of fresh water, and the absence of marine remains seems to favour the supposition, nothing else but vegetables (certainly those of the land) being discoverable in the coal strata. It seemed necessary, although involving an anticipation of points to be examined hereafter, to make some allusion to these facts at present, in order to bring the whole subject of fresh-water formations under the reader's eye at once.