

## EVIDENCES OF THE SHELL DEPOSITS

SEEN AROUND THIS CITY, NOT BEING PRODUCED BY THE ABORIGINES, AND THE PERIOD OF THEIR ORIGIN BEING POST TERTIARY.

[Read by H. S. Wintle, 12th April, 1864.]

A PAPER which I read before this Society, in November last, on what I was then pleased to consider, and still believe to be, post tertiary marine deposits, having called forth expressions of strong doubt with regard to the position I assigned to them in geological scale, and also to the mode of their origin, I here beg to furnish the *data* on which I base the conclusions therein set forth, and which I think will show that such conclusions are not so rash or premature as may have been imagined.

In a vertical section of these shell-beds exposed in the face of a cliff forming part of the river-bank at Sandy Bay, and which was referred to at some length in the paper just mentioned, the following order of strata is met with:—

First.—A bed of rich vegetable soil, possessing an average depth of 18 inches, in which no shells are seen, but containing fragments of charcoal, &c.

Secondly.—A stratum of comminuted shells, all of recent species, imbedded in a coarse black sandy soil. Average depth, 2 feet; and containing small quartz, and greenstone pebbles. No charcoal.

Thirdly.—A stratum of large rounded pebbles derived from the adjacent felspathic trap, and greenstone, with occasionally pebbles of sandstone—thinly interspersed with very small fragments of the over-lying shells.

Fourthly.—A stratum of comminuted shells of recent species, same as above. Average depth, 1 foot.

Fifthly.—A thin stratum of marl reposing upon what I believe to be the equivalent of the English New Red Sandstone.

Now let us enquire under what circumstances the formation of these several beds took place, and examine one by one in the ascending order, commencing with the marl, which forms the lowest stratum of the series. Whether this marl is of marine, or fresh water origin, there is no direct evidence to show; but there is sufficient evidence to prove it was formed in still water at some considerable depth. This is not the case with the shell bed reposing on it, for that unmistakably proves that the shells originally occupied a zone not far from the shore, and where the water was more or less agitated, as seen by the water-worn fragments of contiguous rocks associated with them. Here, then, is a change seen in the relative position of land and sea. That portion of the sea bed—assuming the marl to be of marine origin—is found at a later period to be close to the shore. Or if of fresh water-origin, gives evidence of the land having subsided beneath the sea-level. The bed of pebbles, some of them being actual boulders, argues a still more disturbed state of the water. These pebbles may have been deposited either by tidal action, or by an ancient rivulet having great force at certain periods. But they speak in favor of the former action as being the most probable cause, owing to the order of their arrangement. Immediately resting on this bed we have the first stratum of shells, showing that if the pebbles were strewn over a beach, of which there is very little doubt, another sinking of the land took place in order that they might be covered by another generation of testacea. Then a final elevation to be covered by eighteen inches of vegetable mould.

Assuming that the foregoing hypothesis is inadmissible, and that these shell-beds are the work of the aborigines, let us ask what could have induced them to spread the shells so uniformly over any given area?—and what possible motive could they have had in collecting such minute specimens as these I lay before you? The first-formed bed, it will be remembered, rests upon marl. Allowing this to be as hard and dry, as we find it now, at the time when the blacks were supposed to camp there, we have no evidence to show that it was an easy distance from the water. Facts go to prove that, on the contrary, it was under water at the time of the shell deposit.

My reason for assigning to these deposits a post tertiary origin is, that in no instance have I found the uppermost bed covered by strata of probable tertiary age, and further, that apart from the recent character of the shells, their condition favors the inference of their being the equivalent of the post tertiary beds of Europe.

