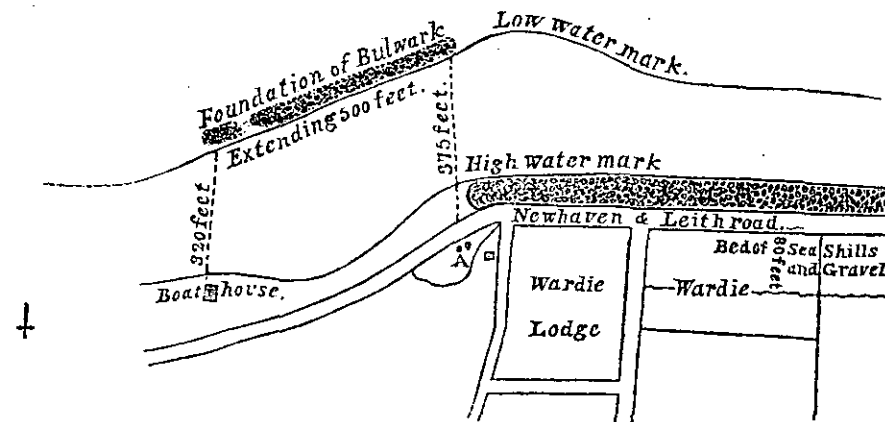


XXII.—Notice of an Ancient Bulwark discovered on the Sea-shore of the Lands of Wardie, near Edinburgh.

Communicated by Captain D. BOSWALL, R. N., F. S. A. Scot.

[Read to the Society 23d January 1832.]



Wardie, December 23, 1831.

IN the month of July last, some men were employed in levelling and clearing a part of the sea-shore at Wardie, during a very low spring-tide, for the accommodation of bathing machines, when they struck upon the foundation of a building appearing to them the ruins of an old dyke. They had great difficulty in cutting through this obstruction, the mass being so strongly united. Although under water, this circumstance arrested their attention, owing to the difference between the slate-clay they were removing, and the substance opposed to their labours.

The sea covering the whole of the outer and northern part of these foundations to the depth of three or four inches, little of them could be seen at that time, only that the workmen, by wading in the water, ascertained that there was a body of stones and lime, very difficult to separate, of a considerable breadth, and beyond the usual thickness of a wall. A part, however, was detached from the inner or land side, for inspection, which proved to be small whin-stones bedded in lime mortar.

Since the above period, no opportunity occurred to enable me to examine at low water, the length, breadth, and materials of this ancient sea wall or bulwark (for it has no doubt been a work of that description, from the appearance

of the shore within it, as having been once covered by the land), until Monday and Tuesday last, the 19th and 20th, at a very low spring-tide, when, with the assistance of Messrs Dall and Leslie, superintendent and engineer on the establishment of the Leith Harbour and Dock Commission, it was ascertained that these foundations extended to the eastward 500 feet, broader in some parts and narrower in others, but giving an average breadth of eighteen feet. They lie off shore or seaward from high water-mark, at the western extremity 220 feet, and the eastern end is 375 feet from the same tide-mark on that part of the shore.

This ancient work can only be seen and inspected at the first three neap-tides after full and change of the moon, from half past eight to a quarter before ten o'clock in the morning, or at the same time in the evening.

This interesting building has been constructed with the round and various shaped stones so common along this coast, in size from a hundredweight to a ton, many of these having lime attached to them, although removed to a considerable distance within the foundations, by the force of the sea in stormy weather. The spaces between the larger, on which the action of the sea appears to have made no impression, are closely packed with smaller stones, bedded in lime mortar of a light blue colour, in which, as a substitute for the usual admixture of sand, gravel and burnt clay are added. This composition is so very hard, that the pick cannot penetrate it without two or three attempts on the part of the workman, and when separated it fractures, taking a part of the stone away which it is either attached to or embodied in. From these facts we have a most valuable piece of information as to the construction of works of this description, as it is evident that this ancient piece of marine architecture was raised with a view to great strength and durability, and appears, although subjected to the sea and tides for ages past, to have had equal solidity as a foundation, with buildings in more favourable situations on land.

It is to be regretted that so little remains of this old sea boundary to give an opinion of its original formation, height, or thickness, from its base; but enough of that part of the structure is left to show that the preparation of the lime as a cement or mortar, by mixing it with gravel and burnt brick or clay, was the same as that of the Romans in the erection and construction of public works in particular situations, for instance the bulwarks at the salt-water baths, Point Peusilippo, bay of Naples, the naval arsenal near Cape Mecænum, the two remaining arches of Nero's Bridge at Puzzouti, and what is now left of the artificial port of Æstia, at the mouth of the Tiber, formed by the Emperor Claudius. I have been informed, that in many of the castles and houses of

our ancestors in Scotland, some of them in ruins, others entire, this mode of preparing the cement or mortar, similar to that of the Romans, for building, is common; but there has been no discovery as yet made of works so constructed by them as to resist the encroachments of the sea on our coasts, or to form embankments in rivers. It may then fairly be presumed that the discovery made at Wardie has been the work of the Romans, who were long established at Cra-mond, in the vicinity, if not occasionally stationed there; and in 1822, in opening up some ground under the old Wardie farm-house, on the north side, two earthen urns, which I suppose to be Roman, were discovered, one of which had bones in it, calcined: it was inclosed by large pieces of sandstone, but on exposure fell to pieces. The other is now in my possession. The distance between the spot they were found and sea boundary, the subject of this notice, is 800 feet.

That the waters within the Frith of Forth, which was once confined by this ancient boundary, have at a very early period been higher upon the alluvial land, is ascertained by a stratum of shells from five to six feet thick, eighty feet within the present high-water mark, and six feet in height above it, commencing at Wardie and extending eastward to Newhaven; and that it must have overflowed a public work of great importance at Newhaven, of which there is now only a traditional record, appears from the following extract, taken from Lyell's *Principles of Geology*, page 265, and which confirms many practical observations made of late on the effects of the sea and tides in the Frith of Forth.

“Estuaries have a tendency to become silted up in parts; but the same tracts, after remaining dry, perhaps for thousands of years, are again liable to be overflowed, for they are always low, and, if inhabited, must generally be secured by artificial embankments. Meanwhile the sea devours, as it advances, the high as well as the low parts of the coast, breaking down, one after another, the rocky bulwarks which protect the mouths of estuaries. The changes of territory, therefore, within the general line of coast, are all of a subordinate nature, in no way tending to arrest the march of the great ocean, nor to avert the destiny eventually awaiting the whole region; they are like the petty wars and conquests of the independent states and republics of Greece, while the power of Macedon was steadily pressing on, and preparing to swallow up the whole. On the coast of Fife, at St Andrews, a tract of land which intervened between the castle of Cardinal Beaton and the sea has been entirely swept away, as were the last remains of the Priory of Crail, in the same county, in 1803. On both sides of the Frith of Forth land has been consumed; at North Berwick in particular, and at Newhaven, where an arsenal and dock, built in the reign of James IV., in the fifteenth century, has been overflowed.”