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No. XVI.—THE ORIGIN OF THE AULD WIVES' LIFTS AND THE
WHANGIE. By JAMES STARK.

THE interest aroused by recent papers (Gregory, 1916; Neilson, 1917) on the Auld Wives' Lifts may well excuse further discussion of the problem of their origin. From their imposing appearance it was altogether natural that legends should have gathered round them, and that they should have been regarded as a monument of the burial or religious customs of a long past age. But to say the least of it, it is unlikely that the primitive inhabitants of Scotland could, for any purpose, have brought together three such huge rock-masses, and lifted the heaviest of the three, an unwieldy block of 20 tons weight, on top of the other two. If a cromlech, there is nothing else in Scotland to compare with it, the nearest approach being probably the menhir or standing stone, of which the greatest example may weigh as much as 10 or 12 tons. To transport and erect such a stone would be comparatively an easy task. It is scarcely relevant to cite instances of megalithic monuments of great size in more highly favoured and further advanced countries than Neolithic Scotland, whose ungenial climate and barren hills constituted a barrier in the way of primitive civilisation, and denied to her sparse population the mechanical skill and the leisure for tasks of such magnitude.

The accounts of prehistoric structures in other countries are often exaggerated. In his recent paper on the Auld Wives' Lifts Mr. Neilson (1917) gives the dimensions and weights of the capstones of four Irish cromlechs, on the authority of Borlase, and in all four cases, if the dimensions are correct, the weights are grossly exaggerated. The largest one is said to be about 100 tons, whereas, even if it were a square-hewn block, it would only be 69 tons. The cubical content of the capstone of the Auld Wives' Lifts is only 58 per cent. of a square-hewn block of the same dimensions. In the same proportion the weight of the Irish block would only be 40 tons, and who shall say that the dimensions are correct when there has been such a gross misstatement about the weight? From the figures given by Borlase, it would therefore appear that the capstone of the Lifts is very much heavier than that of any cromlech in the United Kingdom, so that, if the lifts are artificial, by far the greatest feat in cromlech building has been accomplished by the least advanced people of these islands. Furthermore, the supporting stones of a cromlech are usually pillar-stones of quite moderate dimensions, leaving room for a burial chamber under the capstone, whereas, in the Lifts, the two lower stones together probably weigh at least as much as the capstone, and are close together, if not overlapping, at the base, which indeed cannot be seen, being buried under about 2 feet of moss, which has grown up around them.

We are all agreed that the three stones comprising the Lifts have been derived from the coarse-grained sandstone which forms the natural amphitheatre to the N.W., and that other masses of this rock have been detached from the escarpment along joints, by the ordinary processes of denudation, though, for the most part, remaining close to their original positions; indeed it is by this means that the escarpment itself has been formed. This action would be greatly intensified during the Glacial Period, and the detached fragments mostly ground up and carried away by the ice, the main stream of which, as indicated by the glaciated surface of the rock where exposed on the moor above, flowed from the north-west, across the edge of the escarpment. During the amelioration of the climate, at the end of the Glacial Period, there must have been frequent partial melting and regelation of the ice, which would not only open

a pre-existing joint, but would force the detached mass further and further from its parent rock, until it became enveloped in the general ice stream. It would then be carried along for just such a distance that, through the continued improvement of the climate, the ice would never again be powerful enough to transport it further.

Applying this to the problem of the Lifts, the two lower stones are roughly triangular in section, and are inclined towards each other, the west one at an angle of about 45 degs., and the east one considerably less. Mr. Neilson says, "The two bottom stones seem to have come from the same stratum, and are very much false bedded. I think the west stone is in its natural position, while the upper surface of the east stone requires to be lifted up so that it is horizontal in order to bring it to a corresponding position. They contain bands of conglomerate which can be traced through both stones." In this I agree with him. If the east stone were lifted over the west one the conglomerate shown in both stones would form a continuous band. More than that, the upper surface of the east stone would then just about fit into the lower surface of the capstone, which is strong evidence that the three stones of the Lifts were torn from the escarpment as a single block 15 to 16 feet high, with a parting of soft shale about 7 feet from its upper surface, and a diagonal joint, or small fault, crossing the block at an angle of about 45 degs.

It is well known that a glacier or ice stream flows with a differential motion, being faster on the surface than at the bottom, where it is retarded by friction, and also, in this case, by the lower part of the block being under the lee of the escarpment. The tendency would thus be to shear off the upper portion of a tall block embedded in the ice, and the block destined to form the Lifts accordingly seems to have given way along the soft shale parting, which would have but little cohesion with the sandstone. The weight of the upper portion of the block would then rest mainly on the east side of the lower portion, and would force it to slip downward along the diagonal joint, until the face which had been next to the joint became the base of the block, as shown in the accompanying figure. As the upper portion of the block, now the capstone, thus forced the divided sections of the lower portion further and

further apart, it settled down between them, so that its lower surface is now only about 4 feet above the surface of the moss, or about 3 feet below its original level. In doing so it appears to have slid down the inclined surfaces of the two sections fairly equally, so that it still retains its original horizontal position.

It has been objected to the ice theory that there are no glacial marks on the stones of the Lifts, but if these were simply enveloped in the ice stream they could not be glaciated, except on the bottom where they were dragged over the underlying rock—the top was probably glaciated before the block was moved from its parent bed. Another objection has been made that there is no glacial *débris* in the neighbourhood of the Lifts. This could accumulate only in the immediate lee of the escarpment, where there would be an ice-fall due to the sudden drop of some 16 feet. As a matter of fact, there are several boulders protruding through the moss in that direction, and there are probably many others entirely covered.

In this way I submit that the Auld Wives' Lifts may be accounted for without attributing their erection to human agency, which to the rude and barbarous aborigines of Scotland in the Stone Age would be next to impossible.

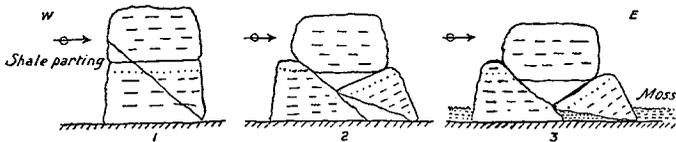
The origin of the Whangie has also been the subject of recent discussion. Mr. Tyrrell (1916) has questioned the previously held view that it was due to a slice or whang of one of the old lava beds of Calciferous Age slipping downwards along the weathered and crumbling surface of the underlying sedimentary beds; and he conducted an excursion last summer to settle the point.

It is only where the rock has been sufficiently compact to resist weathering that the projections on one side of the gorge fit the hollows on the other. For the most part, masses of the rock have fallen from both sides, and fill up the bottom of the gorge, but where the original surfaces of the fracture still remain the detached portion, that is, the Whangie itself, appears, in some places, to be somewhat lower and in others somewhat higher than its original position, while it must be admitted that, owing to the talus of *débris* outside, and fallen portions of the rock inside the gorge, the condition of the subjacent strata cannot be ascertained.

It seems at least possible, then, that the detachment of the Whangie may be due to the same causes that detached the Auld

Wives' Lifts, viz., the alternate partial melting and freezing of ice in an original joint or fissure, only in this case, as the rock face looks towards the west, the direction of the ice flow would prevent the mass of detached rock being carried any further.

The present width of the chasm at the bottom varies from about 4 feet to about 10 or 12 feet, while it is everywhere much wider at the top. Its average depth may be 35 to 40 feet. The Whangie itself is fissured and fractured at various places along its length of about 350 feet, so that it now consists rather of a series of separate bosses and pinnacles than a continuous wall. So great a mass of rock could hardly have been detached by any agency without such fractures taking place, and subsequent weathering has been so great as to suggest a very remote date for its original detachment, probably as far back as the Glacial Period.



Stages in the Evolution of the Auld Wives' Lifts.

1. Block detached from escarpment. 2. Intermediate position with east portion of lower part of block sliding down diagonal joint. 3. Final position. Arrow indicates direction of ice-stream.

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