APPENDIX II

NOTES ON GRANITE

WEATHERING

THERE is no evidence either documentary or physical that quarries were worked in the Dartmoor granite prior to the early days of the nineteenth century. Shallow working on the Roborough Down elvan was certainly earlier, but even as to this Marshall, writing in 1796, speaks of "Rooborough stone" as then being found scattered in detached blocks. He refers also to "Moorstone or Quartzose Granite" as being found plentifully.

This old name 'moorstone' was applied to the surface blocks and boulders which were the sole source of granite for building purposes. All such blocks must have been exposed to weathering through long ages, and yet many of them were found to yield building material of good quality. Even in these days of quarries the surface stone is still resorted to, and much of it is excellent.

It is obvious that the Dartmoor granite does not yield readily to the weather. The hut-circles, stone rows, kistvaens and other works of the early bronze age were constructed with unwrought surface blocks; and in the three to four thousand years which have elapsed since they were erected there is no evidence that any appreciable deterioration has been caused by the weather.

Siwards Cross is referred to in a document of the thirteenth century, and, beyond its wanton breakage in the nineteenth, it stands to-day much as it must have left the mason's hands.

Fice's Well by the Blackabrook near Princetown bears on its lintel the inscription, in raised letters, "I F 1568", and the conduit which stood outside Old Town Gate in Plymouth, and which is now incorporated in part in a drinking fountain at Drake's Place, is dated 1598, also in raised letters. In each instance the inscription is still clear, so that over three centuries on the moorland heights or in a town atmosphere have had little effect upon the granite surface. It is true that the Plymouth City Council has caused the letters at Drake's Place to be chased around their outline with a point, and has thus exercised its best endeavours to shorten their being.

On the other hand some of the inscriptions on old altar tombs in moorland churchyards are badly worn, as far as the raised letters on the flat slab are concerned. The majority of these date from the seventeenth century. Since the water lodges between the letters on the horizontal slab, the conditions are not favourable to the preservation of the inscriptions. Even so, many are in good condition, as for example the grave of John Gray, who died at North Bovey on the 21 December 1643.

Incised inscriptions, still quite legible, may be found on memorials which date from the seventh century or thereabout, as in the Vicarage Garden at Tavistock.

With these evidences of the enduring quality of Dartmoor granite we may contrast the certainty of its ultimate yield to the elements. On many a Dartmoor Tor it is quite possible in the darkest of foggy nights to determine the points of the compass; and this by noting the face on which the rock has been most deeply incised by the weather. That face will be approximately towards the S.S.W., the direction of the prevailing and wettest wind. The joints which mark out the pseudo-bedding and the more or less vertical joints which cross these give access to the drifting rain, and thus form planes of weakness. On the whole the coarse-grained granites, with the larger felspar crystals, yield more readily; the finer grained rocks are less affected.

At solid angles between two planes the moisture can penetrate from two directions simultaneously. Thus all edges are liable to more intense attack than are plane surfaces. At solid angles formed by three planes the moisture can penetrate from three directions simultaneously, and thus corners are liable to even more intense weathering. From the suppression of angles by weathering rounded forms arise. The extent of such rounding depends on the nature of the rock. It may be very marked, as at Higher Whiten Tor on the West Dart, or a mere dulling of the angles, as at Hen Tor in the Plym Valley. At times this action results in the formation of a poised block, a good example of which is to be seen on Great Mis Tor, near the rock basin (Pl. 11A). And the poised block may be so balanced as to be capable of movement, when it is known as a 'logan'.

This suppression of angular form is not confined to sub-aerial rocks; it occurs also below ground level. Here, too, the primary agent is moisture. At the shallower depths it may in the past have been aided by frost; but, since the action has been traced at depths greater than 100 feet, frost can hardly have been an essential auxiliary, even during the Ice Age. Large areas of Dartmoor are underlain, not by solid granite, but by a decomposed granite, locally known as growan. In this growan will be found boulder-shaped cores of undecomposed granite, material better calculated to resist decomposition, either from difference in composition or mineral form, or because originally a large mass marked out by pseudo-bedding and joints, alongside smaller masses so marked out. The disease known as growanization spreads along the joints, whether horizontal or vertical, and if it proceeds inward from every joint with equal speed, will obviously have affected all parts of a small block long before the heart of a large block has been attacked. Like subaerial weathering it tends to suppress edges and angles, and thus the cores of the larger blocks may be left in boulder form as hard masses in the body of the growan. The roadside near Sheepstor Dam at Burrator shows some such boulders; others may be seen at Inga Tor, in the quarry, and yet others near Lustleigh Station, in the railway cutting.

It is not every fine-grained granitic rock that can resist either weathering or growanization. By the same roadside near Sheepstor Dam may be seen a vein of pink felsite in the granite, as thoroughly reduced to growan as the granite itself. And at Riders Rings, in the Avon Valley, a similar felsite has been in part weathered to a material so soft that it has been denuded, leaving in the surface soil very numerous spheres of quartz-and-schorl, which were formerly distributed through the felsite like figs in a pudding.

Sometimes the chief effect of weathering is to open up the joints of the granite, and reduce it to a collection of scattered blocks. From these the 'clitters' of the tors are derived. Such clitters are well developed at Hen Tor, and on Mis

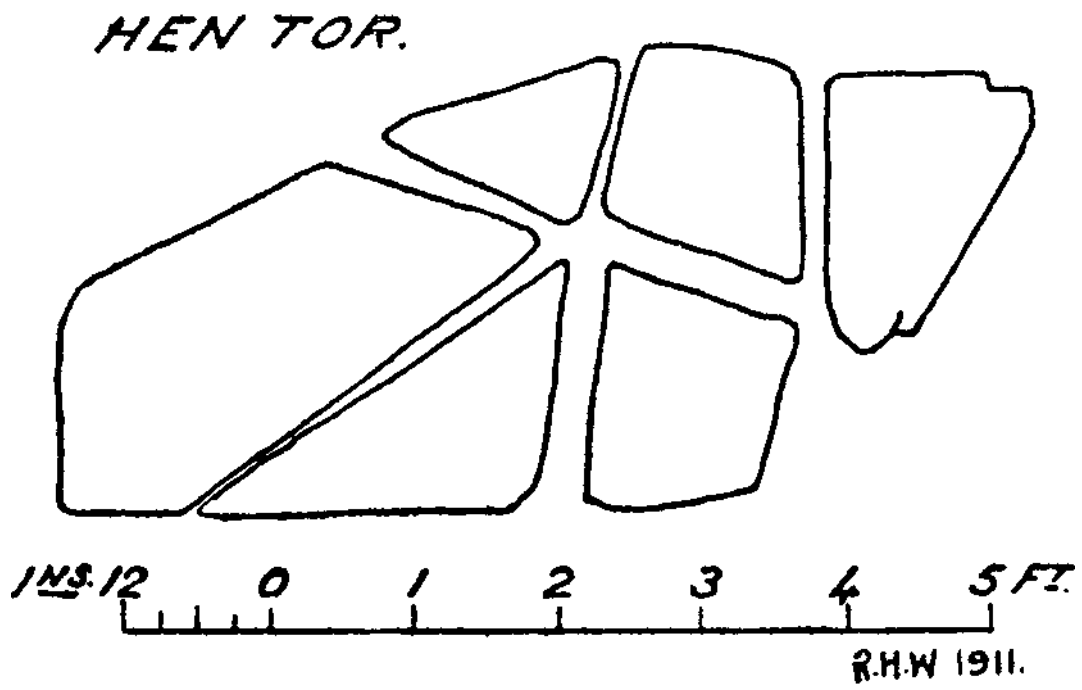

FIG. 129. Parted block of granite, Hen Tor.

Tor. Wistmans Wood owes its existence to three such clitters, and so deep is the mass of rocks that all the time which has elapsed since its formation has not sufficed for the infilling of the cavities between the blocks by vegetable soil.

Even after a block has been removed from its parent living rock it is still liable to subdivision by the weather. There lies near the summit of Hen Tor a slab of which a measured sketch is given in Fig. 129. It is now in six parts, but if any reader has a mind to treat the drawing as a jig-saw puzzle it will be found easy to restore the original form. A view of a less elaborate parting, from Huntingdon Warren, is given in Pl. 89B.

Rock basins are another effect of weather action (see pp. 28–32).

The following references should be added to the list at the end of the chapter on Dartmoor granite (p. 63) (ED.).

Brammall, A., 1926*a*. The Dartmoor Granite. *Proc. Geol. Assn.:* Vol. 37, pp. 251–77.

Brammall, A., 1926*b*. Excursion to Dartmoor. *Proc. Geol. Assn.*, Vol. 37, pp. 278–82.

Brammall, A. & Harwood, H. F., 1932. The Dartmoor granites: their genetic relationships. *Quart. Journ. Geol. Soc.:* Vol. 88,pp. 171–237.

Fitch, A. A., 1932. Contact metamorphism in South-Eastern Dartmoor. *Quart. Journ. Geol. Soc.*, Vol. 88, pp. 576–606.

B. Parted block of granite, Huntingdon Warren.