THE VOLCANIC VENTS AND POCKET DEPOSITS OF DERBYSHIRE

Leader: Dr. F. Moseley — Sunday, 5th September, 1965

A Sunday excursion was held in the Buxton area, visiting three localities. Two of these, Hughes Bros. quarry at Waterswallows (080750) and Calton Hill Quarry (Derbyshire Stone Ltd.) (118715) were concerned with old volcanic vents; and the third, the Derbyshire Silica Firebrick Co. pit at Friden (179619), with one of the large Trias and drift filled solution holes in the limestone.

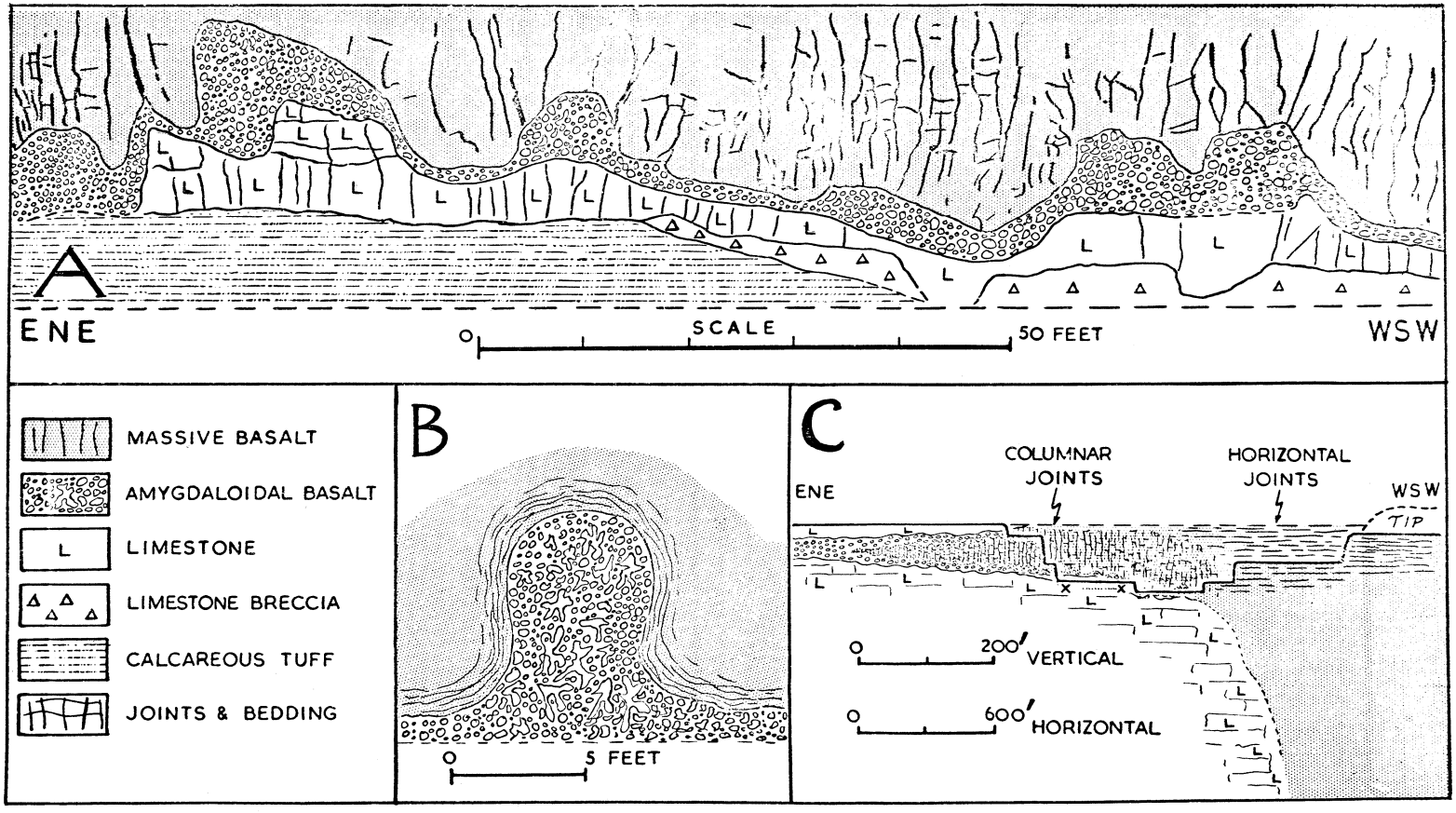
The party assembled at Waterswallows in the soft gentle rain which had been falling for eighteen hours, and waded through a few feet of mud into the large working roadmetal quarry. (Those members with gum boots had a distinct advantage.) The field relations between the basalt and limestone could be clearly seen. Over much of the southern part of the quarry basalt lava with some columnar jointing rests either on tuff or on limestone, whilst immediately to the north of this the basalt - limestone contact plunges steeply, as shown on Text-fig. 1 . The interpretation offered here is of a former volcanic vent with its associated lava and tuff.

The sequence of the lava and tuff is well displayed, especially in a cutting now used for draining the quarry (Text-fig. 1). Limestones overlying the basalt (horizon of Cyrtina septosa) can be seen at the top of the quarry. Below it there is amygdaloidal basalt and then massive basalt with crude columnar jointing. The section in the cutting exposes the lower part of this massive basalt and the rocks underlying it. The massive basalt, which becomes finer grained towards the base, overlies amygdaloidal basalt with a sharp contact. There is no transition; the amygdaloid varies from a hard white rock, where it is impregnated by calcite (presumably from the underlying limestone), to a green crumbly chloritic rock and to a dark amygdaloid with irregular calcite geodes. The highly irregular junction between the massive and the amygdaloidal basalt exhibits a number of interesting features. There is for example a series of upward bulges or domes of the latter into the former, whilst within the lower two feet of the massive basalt there is a belt of narrow calcite veins which closely parallel the contact, even where there are sharp upbulges. The lower part of the amygdaloid is frequently decomposed yellow brown, and rests sharply on slightly marmorized limestone. It should be noted that in the lowest level of the quarry 100 yards south west of the cutting, the basalt is underlain by a rather coarse volcanic breccia made up of ash and lava fragments. The limestone in the cutting is only about 5 feet thick and is in turn underlain by calcareous tuff and limestone breccia, the limestone fragments in the breccia being quite strongly altered.

The limestone-basalt junction can be observed to drop quite steeply beneath the lowest levels of the quarry to the west and south-west of the cutting, and at the same time the basalt assumes different characteristics. The columnar joints are replaced by horizontal joints and along these joints there are thin calcite veins. This suggests that there has been vertical extension, and it is likely that this state of affairs could exist in the region of a volcanic pipe.

The exposures to the south of the quarry were not visited but it is worth observing that the massive central part of the basalt eventually thins out, leaving only a vesicular lava, and about 1 mile to the south this also thins out. A similar situation exists to the north of the quarry.

The conclusion therefore is that Waterswallows represents the site of a former volcanic vent with



Text-Fig. 1. Sections at Waterswallows

A. Cutting on the E. N. E. side of the quarry.

B. Upbulge of black amygdaloidal basalt into massive basalt. Amygdaloid with calcite geodes, massive basalt with calcite veins (black lines) parallel to junction. Centre of quarry.

C. Interpretation of the structure of the Waterswallows volcano. X....X is the position of the cutting of section A. E. N. E. end of the section at Hardybarn (089752).

the basalt (accompanied by some tuff) rising up a central pipe and spreading out sideways as a lava flow (the "lower lava" of this part of Derbyshire).

After lunch the party visited Calton Hill Quarry, with the rain still keeping the dust down. The mud here, in fact, was a little deeper than at Waterswallows, but nowhere, in my recollection, was it waist deep. This quarry has changed considerably in character since Tomkeieff described it in 1928, and could well be redescribed, although this would require a detailed resurvey. Little time was spent examining details but alternations of lava and bedded tuff were observed, the latter present in far greater amount than at Waterswallows; and the "olivine nodules" were also in evidence. The exact position of the "true" vent does not seem to be too clear since limestone underlying the volcanic rock has apparently been encountered at a number of points. We did not observe this on the day, perhaps because of the large number of temporary lakes.

The third locality to be visited was the silica sand pit at Friden (the Greater Friden Pit). For some unaccountable reason, and much to everyone's sorrow, the rain had stopped. It thus became impossible to claim that it had poured with rain all day.

There is an excellent private publication describing the "Pocket deposits of Derbyshire" by Dr. Courtenay Yorke, of which many geologists must be unaware (there are only a few copies in existence). The Greater Friden Pit (along with many others) is described in this publication and has also been recently investigated by F.W. Shotton (not yet published; see also Kent 1957).

An upper boulder clay at the top of the pit rests unconformably on early Pleistocene grey clay with wood fragments (spruce and probably larch, see Yorke p. 80) and on sands of various colours; unfortunately the section is not so well exposed now as it was a few years ago. Yorke regards the pit as part of an infilled channel exceeding half a mile in length.

Thus the day's proceedings came to an end and the party departed for home, getting drier every minute, with one hardy member who survived in gym shoes and pullover positively steaming. Gratitude was expressed to the managements of the three quarries visited.

F.M.

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