The Geology of Rod's Pot, Burrington

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The situation of the cave has been described by Pearce (1946)* in these *Proceedings* (Vol. V, p. 191). The system has been formed in limestone of the Z_2 subzone of the Carboniferous Limestone, about 130 yds. north of the junction of the massive limestone with the Lower Limestone Shales (K zone), along which swallets commonly develop. The entrance to Rod's Pot is in one of a series of swallet depressions which lie along the southern side of the track from Read's Cavern to the Society's hut. While Read's Cavern is near the K–Z junction, the line of swallets does not coincide with the outcrop of this junction but swings away from it, to the north. The reason for the development of swallets along this line is not at present clear.

A dip of 72° was measured near the entrance, and 70° at the bottom of the 50-ft. vertical, but throughout the greater part of the cave the dip is about 64°, in a direction N. 30° E. Wide variations in dip, such as are conspicuous in G.B. Cave on the southern side of the Blackdown anticline, are here absent.

The cave may be considered in two sections. The first consists principally of narrow rifts, formed by the enlargement of several nearly vertical joints, which follow closely the direction of dip of the rocks. The second section, from the beginning of the Main Chamber onwards, has been primarily governed by bedding planes, and the passages are of considerable lateral, but small vertical, extent. (For plan and section see Vol. V of these *Proceedings*, *Plate* 5. *Fig.* 17, herewith, illustrates some of the geological points described below.)

The way in lies through enlarged joints, showing no special features, and the first small chamber, out of which lead the two main rifts, has a bedding plane roof. The two rifts are passable at their intersections with a bedding plane, and show on their walls grooves, parallel to the bedding, which are interpreted as a result of differential solution (*Plate* 11, *Fig. A*).

The floor of the rifts is mainly of debris, but in places solid rock can be seen, and here the floor has an approximately U-shaped cross-section. The two rifts are connected by a small window, just south of the 50-ft. vertical, and beyond this point the western rift only is penetrable.

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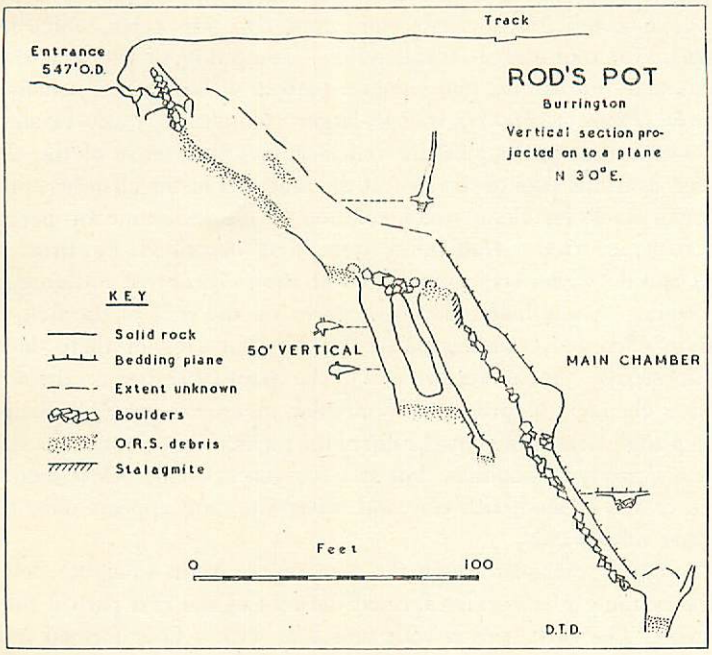
* For references, see p. 75.

PLATE II

Fig. A.—Western wall of western rift, showing grooving and Old Red Sandstone debris in minor fissure.

Fig. B.—Roof of the lower part of the Main Chamber, showing half-tubes. The lighting is from the top left of the picture, as printed. The section of ceiling shown is about 4 ft. by 3 ft.

The two ' verticals ' are enlargements of the same master joint as is the western rift; their lower ends are connected by a low chamber, the floor of which is of sand and pebbles derived from the Old Red Sandstone. At the northern end of this small chamber a low bedding plane cave can be penetrated downwards for about 15 ft., but is then choked.



EXPLANATION OF **Fig. 17.**

The section is projected on to a vertical plane, whose orientation corresponds to the predominant direction of the passages of the cave, and also to the direction of dip of the rocks. Certain passages therefore appear foreshortened (e.g., the lower part of the Main Chamber), and where there are several parallel rifts, as in the upper section, only one can be shown. This type of section shows the relation of the cave to the dip of the strata, and the true relative positions of its different parts in a vertical plane. The extent of the principal deposits of boulders and Old Red Sandstone debris has been shown to emphasize the important effect which these accumulations have on the present aspect of the cave.

Connecting the western rift with a third lying to the east is a small tunnel, about 18 in. high, with an almost circular cross-section which indicates formation by solution when filled with water, as there is no evidence for concentration of water action in the lower part of the channel. The tunnel on the left a few feet farther on has a rounded roof, but the rock floor is obscured by clay. Where this tunnel joins the Main Chamber it shows ceiling pockets and a choked rift in the floor.

In this upper section, therefore, we have a system of several rifts, of considerable vertical extent, running down the dip and intersected in several places by strike passages of very limited dimensions.

The Main Chamber consists of two parts : the first lies along the dip of the rocks, and has a correspondingly steep slope, while the second lies nearly horizontally along the strike. The roof of the first part is a bedding plane, once occupied by a calcite vein, from 1 to 3 in. thick, which may be seen where the roof meets the side walls. The ceiling of the second part is approximately horizontal, and shows a pattern of half-tubes, usually about 1 in. wide (*Plate* 11, *Fig. B*), though larger examples may also be seen. In most cases a thin ($\frac{1}{16}$ in.) calcite vein occupies the centre of the channel, and here, as in the case of the roof of the first part of the chamber, provided the line of weakness along which solution of the limestone by percolating water first occurred. Half-tubes were first described by Bretz (1942, p. 717), and the writer is in agreement with the views of that author regarding their origin. A few half-tubes are present on the roof of the first part of the Main Chamber, running down the dip, but are not there developed along the strike. At the western end of the Main Chamber, on the northern side, two channels, approximately circular in cross-section, lead upwards at a steep angle determined by the dip of the rocks. The floor of the chamber is almost entirely of boulders, but at a few places solid rock is seen. The western end is choked with clay and stalagmite, and appears once to have continued downwards.

The cave, reached through the floor of the Main Chamber, has as its roof the bedding plane which formed the roof of the first part of the Main Chamber. The cave here is wide and low, with a floor formed in places by a bedding plane, but elsewhere by boulders. The final rift is choked with debris.

The limestone boulders which abound, particularly in the lower part of the cave, cannot have travelled far, and must have originated within the cave. This could only have happened by the enlargement of joints and bedding planes until blocks of limestone were loosened, and fell. This stage of affairs is present in the Main Chamber and below. Such a phenomenon would not have occurred if the cave had been primarily excavated by running water, but is quite possible and, indeed, to be expected if solution by ground water was occurring along a number of joints and bedding planes.

The smaller debris, which is ubiquitous, consists almost entirely of sand and pebbles derived from the Old Red Sandstone, and has been brought in from outside the cave. This deposit probably once filled the cave more completely than it does now, as vertical sections have been cut through it in several places, and in the rifts of the first part of the cave masses of such

debris may be seen overhead. Even small cracks are in many places packed with this material (*Plate* 11, *Fig. A*).

Dripstone is not common in the cave, and the few examples, described and figured by Pearce (*Ibid.*, p. 192, *Plates* 6, 7), show no remarkable features. The stalagmite at the upper end of the Main Chamber is undergoing re-solution in the small pools on its surface.

There is no evidence of the action of a stream of any size, and on this account, and on the basis of more positive evidence advanced above, the formation of the cave is attributed principally to sub-water table solution. Since the lowering of the water table to somewhere near its present position, the cave has probably acted on one or more occasions as an active swallet, when a large amount of debris from outside accumulated within the system. The cave does not at present take a stream, and modification by vadose water has been negligible. Possibly of importance is the fact that the chamber at the bottom of the verticals, and the Main Chamber, are both choked to about the same level—435 ft. O.D. ; but the significance, if any, of this fact cannot be appreciated until a wider study of the district has been made.

REFERENCES

Bretz, J. H., " Vadose and Phreatic Features of Limestone Caverns ", *Jour. Geol.*, 1942, Vol. L, pp. 675–811, 55 figs.

Pearce, R. A. J., " Rod's Pot ", U.B.S.S. *Proc.*, 1946, Vol. V, No. 3, pp. 191–3, pls. 5–7.