

# Interim Report on the Ladder Dig Series, G.B. Cave, Charterhouse-on-Mendip, Somerset

By  
M. G. NORTON, B.Sc.

## INTRODUCTION

The following article is intended to be a purely descriptive account of the recent additions to G.B. Cave as a result of work in the Ladder Dig. These extensions are called collectively the "Ladder Dig Series". This account makes no attempt to describe or interpret the geomorphology of the Ladder Dig Series. This will be included as one of the sectional reports in a fuller account in a later issue of *Proceedings*.

## HISTORY

On January 4th, 1961, the Helictite Chamber in the Ladder Dig was discovered (Gilbert, 1963). The continuation of the passage was in the south-eastern end of the chamber, and it was here that digging first started later in that year. At this time the Bottom Dig was still being pushed in an effort to follow the stream till a passable streamway was reached. However, after having reached a depth of 430 ft. (157 m.), the way on was by digging through very unstable boulders and fill, and, after a few near misses, the dig was abandoned as too dangerous.

Hopes were then pinned on the Ladder Dig which, being some 45 ft. (16 m.) vertically above the Bottom Dig (see Gilbert, 1963, *Fig. 9*), offered a route over the boulders to come down, it was thought, to the streamway on the other side. Although digging started late in 1961 it was not until the Helictite Chamber had been greatly spoilt by visiting parties that it was decided to start full-scale excavations at the far end. This went on for some three years and 27 ft. (10 m.) of quite roomy passage was dug out. In the last few feet the rock roof was replaced by loose fill and boulders below a calcite bed, and it was through this fill that a draught developed after some chemical assistance to break up the calcite.

The breakthrough was made upwards, through this bed of calcite on May 9th, 1966. On the breakthrough trip the boulder choke was passed and Bat Passage discovered and explored. It was estimated that around 500 ft. had been discovered and this turned out to be a remarkably accurate estimate. Considerable additions have since been made to this length.

# G.B. CAVE LADDER DIG SERIES

Surveyed by U.B.S.S. 1966.  
C.R.G. grade 5.

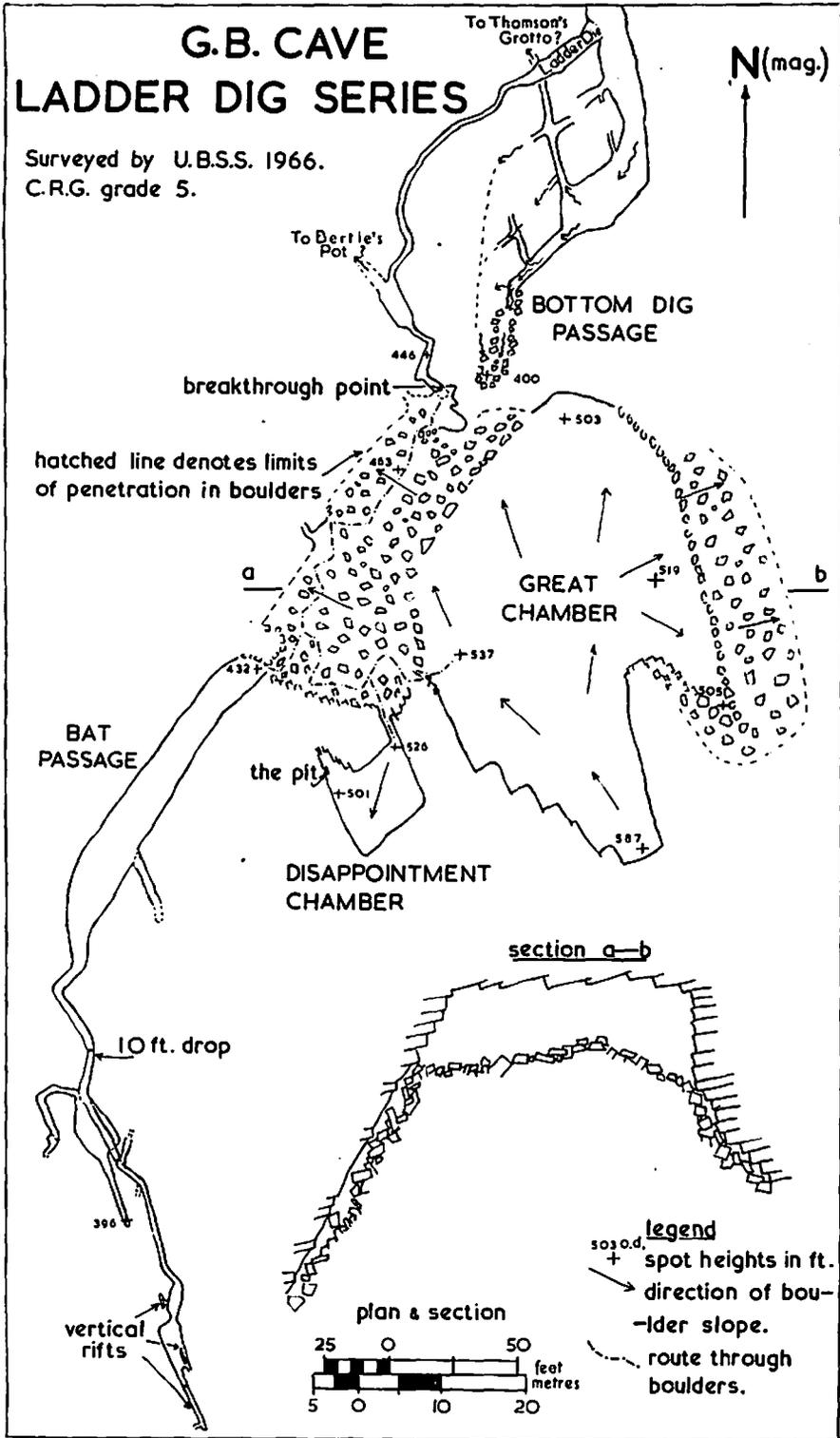
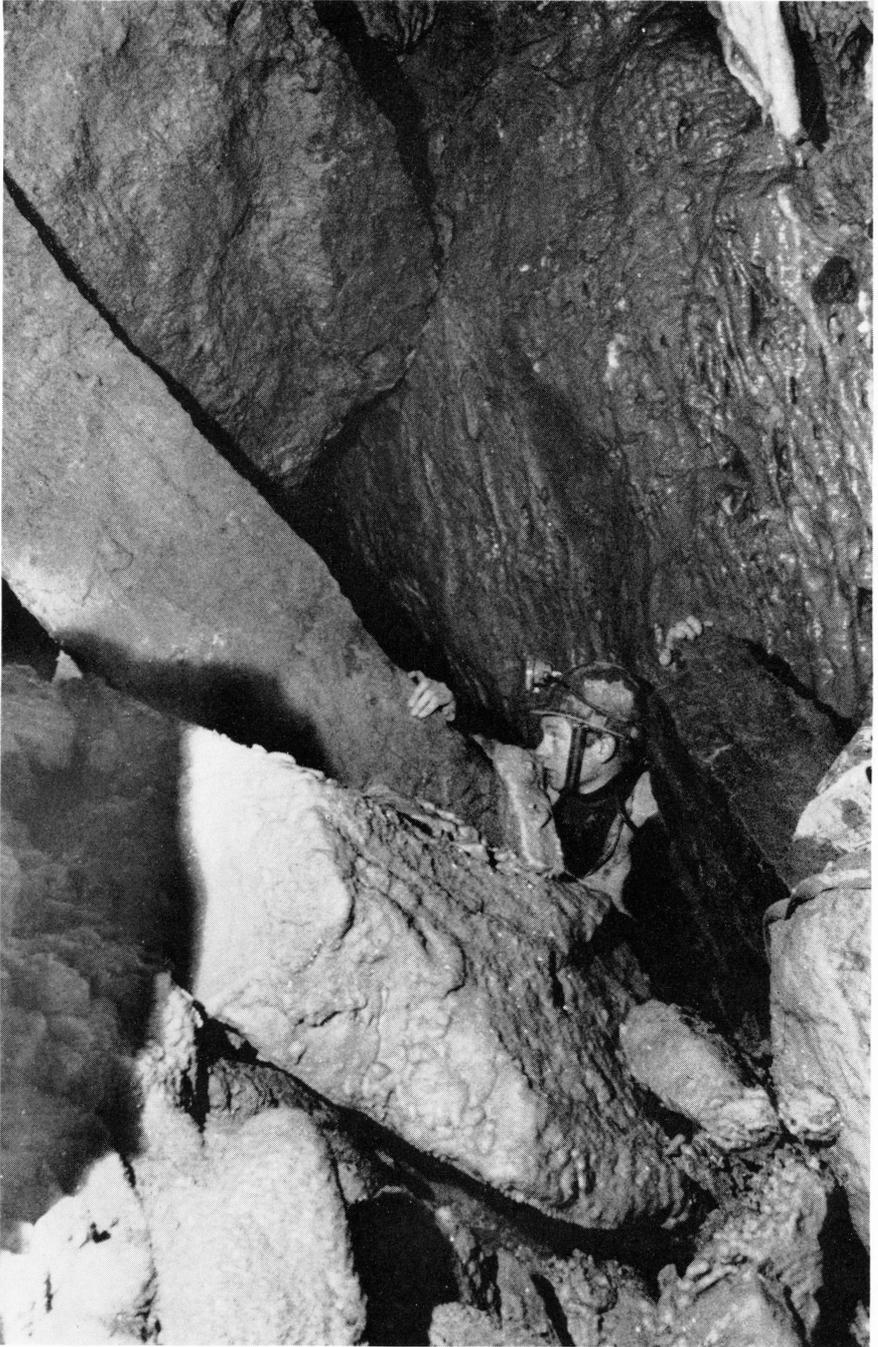


Fig. 15.



**PLATE II**  
Bat Passage.



**PLATE 12**

On the route to Bat Passage.



**PLATE 13**  
Surveying in Great Chamber.

## DESCRIPTION

The way up through the calcite bed leads to spaces between calcite-cemented boulders. A somewhat constricted crawl among formations for 12 ft. (4 m.) leads to a chamber some 20 × 10 ft. (7·0 × 3·5 m.) with a roof of boulders resting against the rock wall on the right side (north-west).

In this section the boulders are cemented together and stabilized by much mud-coloured flowstone which has completely covered some of them. Small curtains hang from the slabs in the roof and from the sides, while in the upper (north-east) parts are some larger formations before the chamber ends.

The way on follows the rock wall on the right and a crawl through a narrow opening between boulders leads to another chamber, somewhat larger than the first. One is now obviously in the beginning of a boulder ruckle of considerable size—many of the boulders being as long as 10 ft. (3·5 m.). The only bedrock here is the rock wall on one's right, dipping at an angle of approximately 70°, the boulders extend beneath, to the left (south-east) and above, resting against the wall in many places thus constricting the route on. This region is noticeably less stable than the first as is seen by recent bruise marks on the rock and shattered boulders of rather disturbing size. One may descend at this point for some 30–40 ft. (10–13 m.) into the choke, but the choke becomes steadily more unstable as one goes down and there is much loose finer filling between the boulders. The lowest point must be very near the final digging area of the Bottom Dig, and it is when one is in this region of the choke that one realizes that it was not an unreasonable decision to abandon digging there.

From this chamber there are two main routes through the ruckle to Bat Passage. One route descends following the rock wall (12 ft., 4 m.) and then follows a crawl among some formations; the other ascends the boulder slope and goes underneath a large slab to another chamber where a descent of 15 ft. (5 m.) to the lower route has to be made. The routes meet in a chamber containing a large pool and some fine formations. An aven enters here. It has been climbed for around 30 ft. (10 m.), but closes down into a stalagmite barrier. The route on follows the right wall over fallen slabs, past some very deep red formations and a very good curtain and boss. After another 15 ft. (5 m.) one reaches a more unstable zone of smaller boulders and more fill. The way spirals down here, and a little crawling brings one to the head of Bat Passage.

Bat Passage is entered just below the roof at the top of a steeply descending boulder slope, which drops some 25 ft. (8 m.) in a horizontal distance of 30 ft. (10 m.). The roof of the passage descends only a few feet so the open passage rapidly attains a height of 25 ft. (8 m.) with its width a fairly constant 20 ft. (6 m.).

Just inside the passage an aven enters from the right-hand roof and a river of calcite flows from it and continues down the boulder slope right to the bottom in a series of stalagmite flows, and pools. Towards the left-hand wall are many mud pinnacles which are, on June 8, 1966, still intact.

Throughout Bat Passage the formations are taped off, and the route to be taken is to the left of the tape when only one is laid or between the tapes when there are two.

From the aven onwards the walls and roof of the passage are of solutional origin, while above the aven the features are all due to collapse. The floor reaches its lowest level at the bottom of the boulder pile and then rises 15 ft. (5 m.) over some mud-covered boulders. The right half of the floor is undisturbed mud with many mud stalagmites and "poached eggs" (deposits of calcite with reddish centres, which spread outwards). Here were two bat skulls and associated bones cemented in the mud; more bat skeletons were found further on and removed for examination.

On the left a passage leaves and ends in a small grotto after 15 ft. (5 m.). The entrance to this resembles the entrance to the Ladder Dig from the Gorge, though scaled down by a factor of four perhaps. Further along one has to walk in a narrow path in order to avoid a large expanse of dried-up calcite terraces on the left and mud formations on the right. Beyond which, the passage closes down to a 3 × 2 ft. solutional passage.

Before this, however, there is a most impressive array of roof formations, with corresponding white flowstone on the floor; here is a pair of beautiful red stalactites called the Carrots, and one must be careful not to touch these when entering the narrow section. After a few feet of crawling the passage opens out a little and a magnificent stalagmite boss, 4 ft. (1.5 m.) high stands in the centre surrounded by a calcite floor and pools. It is connected to the roof by a curtain and a stalactite. To the right is a recess in the wall in which there are more formations and pools. Unfortunately, the way on is past this boss, and it has resultingly got a little muddied, but care here should ensure that the formation is not spoilt any more.

After another 15 ft. of crawling on a calcite floor, the passage opens into a chamber via a 10 ft. (3.5 m.) drop. This chamber is about 30 ft. (11 m.) long by 20 ft. (6 m.) wide, and closes down to a low passage with a false floor, which is followed for 20 ft. (6 m.), and a side-passage which also closes down. In the roof, however, are a number of rifts with a large phreatic window in the rock between two of them.

An upper level passage continues at the same level as the head of the 10-ft. drop, and by climbing into this one may proceed for some 170 ft. (52 m.). The passage is at first 5 ft. (2 m.) high with solutional cavities connecting it with the chamber below. After 30 ft. (11 m.) a passage, Crystal Crawl, comes in from the left and from this point the extension continues up

to 20 ft. (6 m.) high and 2 ft. (0.8 m.) wide. Crystal Crawl is undoubtedly one of the most beautiful passages in the cave, and goes back for some 80 ft. (26 m.) towards the exit passage on the south-east side of Bat Passage.

Continuing along the Upper Level Extension of Bat Passage, the route is all but blocked by formations after another 30 ft. (9 m.). A squeeze past the obstruction gives access to a continuation of the passage, which is bedecked with numerous stalactites with pools containing large crystals of calcite in the floor. It ends in two rifts, either side of a stalagmite barrier. The one on the right descends down a 45° stalagmite slope for 20 ft. (6 m.), but is then blocked completely by stalagmite. The other descends vertically for around 10 ft. (3.5 m.), but is too tight to follow. There is no draught from either of these rifts. Above them one may climb an aven for 20 ft. (6 m.) or so, but one is again stopped by the inevitable calcite barrier. This point of the cave is approximately 650 ft. (230 m.) from the breakthrough hole at a depth of 435 ft. (14 m.) below the entrance.

### THE BOULDER RUCKLE

A little before Bat Passage one may climb up through boulders by a number of routes; and, with luck and following the most obvious of the routes, Disappointment Chamber will be reached. It is a muddy chamber on top of the boulders about 30×40 ft. (10×13 m.) and up to 20 ft. (6 m.) high, with a bedrock roof. All ways are blocked by boulders, with the exception of a narrow vertical passage, (the Pit), in the western corner of the chamber. It was hoped that this might lead to more discoveries, and after the removal of an obstructing boulder, the passage was entered, but it closed down in small spaces between boulders. There must be some direct connexion with the end chamber in Bat Passage, however, since within 15 minutes of blasting fumes could be smelt in the end of Bat Passage.

The route to the Great Chamber from Disappointment Chamber is difficult to describe, but by climbing and crawling through boulders in a northerly direction, one will probably reach the chamber eventually. The chamber is vast, and even with a good NiFe cell it is difficult to see across its 120 ft. (40 m.) width and 200 ft. (66 m.) length. The point of entry lies in the south-west corner of the chamber; to the south is an ascending pile of large blocks, leading up to the highest point of the chamber, 140 ft. (51 m.) above the breakthrough hole. From the roof at the southernmost extremity hangs a forest of straws 2 to 3 ft. long with some peculiarly shaped stalagmites on the floor beneath.

Just above the entrance hole, a passage enters and from here there is a section of wall showing solutional features; the rest of the chamber, however, is due almost entirely to collapse. From the highest point the chamber runs approximately north for 200 ft. (66 m.) and descends some 50–60 ft.

(18-20 m.), the roof being anything up to 50 ft. (18 m.) above the floor. On the eastern side the roof meets a steep slope of boulders, while on the western side there are many formations from the rock wall and some grottoes of outstanding beauty. These formations vary from a muddy brown to pure white, the outstanding one being an expanse of white stalagmite and a column 15 ft. (5 m.) tall, where a large three-pronged stalactite has joined with a mound of calcite on the floor. It is easy to see that the boulders underneath have settled in the recent past, since there is a crack of around 0.5 cm. where the column has parted.

The floor of the entire chamber is dotted with stalagmites, mud stalagmites and flowstone, some white, brown and red, and one must be careful when crossing the chamber to avoid these.

In the northern corner of the chamber (the lowest part at 78 ft. (26 m.) above the breakthrough hole) a descent has been made for 40 ft. (18 m.), but the choke becomes unstable at this depth. There are no obvious ways through or into the choke towards any open passage beyond, but the area to be searched is so large that a way through could go undiscovered for a long time.

Although the chamber is considerably more stable than the choke beneath it, there are many loose boulders, and evidence of rock falls in its recent history in the form of bruise marks and shattered slabs. One colossal boulder sits in the chamber beneath a hole of the same shape and size, serving to remind one that if a boulder does decide to drop there is not really much one can do about it!

### PROSPECTS FOR FURTHER EXTENSION

The Boulder Ruckle has not been fully explored, and it is not known what lies on the eastern side of the ruckle. It may be that there are open passages to be found, as the only draught encountered in the Ladder Dig Series is in the ruckle, where one would probably expect a draught anyway.

The most obvious place to look for an extension is in the terminal rifts at the end of the Series. The left (north-east) one of these can be seen to go down for 10 ft. (3 m.) and a stone dropped will fall for an estimated 20 ft. (6 m.). The discouraging feature of this part of the series is the absence of any draught so that if the rift is descended it is unlikely to lead to any immediate breakthrough. There is still no obvious place at which to dig with a view to regaining the streamway and the parts beyond.

The first exploratory party took great care to avoid contaminating the pools. The main exploratory party two days later took extensive samples of water from the pools and also collected some of the bat bones and skulls found in different parts of the series. Close examination of the pools failed

to reveal any macroscopical forms of life. A similar lack was noted in the Helictite Chamber (Gilbert, 1963, p. 62).

The principal feature of the Ladder Dig Series is the immensity of the boulder pile, which dwarfs anything else so far found in G.B. Cave. Its exact size cannot be determined as the limiting rock walls can only be seen in places, as the survey shows. Most of the length of the Bottom Dig is roofed and, in part at least, walled with part of this same boulder pile and the stream is washing out the finer fill and so undermining the upper levels. The top of the boulder pile is 140 ft. (42 m.) above the breakthrough point and this in turn is at least 35 ft. (11 m.) above the Bottom Dig and the floor there is still boulders.

### NOTES ON THE SURVEY

The instruments used were a metallic tape read to the nearest inch, a hand-bearing liquid-filled prismatic compass read to 1° and an Abney level. The degree of accuracy claimed for the survey is C.R.G. grade 5.

In drawing out the survey symbols for speleothems have been purposely omitted as well as details of the floor of Bat Passage. These are described above. The whole is an interim survey to go with the preliminary account so as to make as much information as possible available as soon as possible.

It will be noted that, where the boulder mass reaches the roof at the south end of the Great Chamber, the height is 587 ft. O.D., which is the same as the spot level at the "Bridge". This height should also be compared with the height of 400 ft. O.D. for the bottom of the Bottom Dig. The top of the boulders at the north end of the chamber is 503 ft. O.D. and as this is vertically over the end of the Bottom Dig the boulder mass is at least 103 ft. in height here.

The slope of the boulders in Disappointment Chamber is north to south, the reverse of that in the Great Chamber.

The survey was drawn out at a scale of 25 ft. to 1 in. It has been reduced photographically for reproduction at the same scale as the survey of the whole cave published in *Proceedings*, Vol. 6, No. 2, 1951.

## THE BACTERIOLOGY OF THE LADDER DIG SERIES OF G.B. CAVE: PRELIMINARY REPORT

By  
G. B. WOOD

Samples of static water and mud from the floor and walls were taken in Bat Passage on the second trip down the new Ladder Dig Series and a comparison of their bacterial content has been started. Bacterial and fungal contamination by the first entrants was presumed to be minimal, and considering the positions of the sampling sites in relation to the pathway taken through the passage by the original explorers it was probably nil.

The first stage of the investigation has been the plating out of the samples in the laboratory on to both minimal and fully nutrient agar media and their incubation at cave temperature (10° C.) and at room temperature (c. 18° C.). It is hoped to compare the total number, which is already known to be large, of species present with those which actively grow at cave temperature by this method and also to find which species have the least complex nutritional requirements, and which may thus be the best adapted to the cave habitat. Calcium carbonate-based media have also been used to simulate the high concentrations occurring in the normal cave environment and again comparison with media lacking carbonate is to be made.

The second and more difficult stage is the identification of the species present and also the isolation of autotrophic bacteria. This will be by far the longest part

of the project, and if it progresses rapidly phage type of any typable species present will be undertaken to compare results with those for typical surface-living strains. This could yield some very interesting information.

Results so far have been very encouraging, but it would be rather premature to draw any firm conclusions from them as yet and so the full report must be deferred to a future issue of *Proceedings*.

No living macro-fauna was found (c.f. Gilbert, 1963, p. 62). Worm casts were observed on the mud.

#### NOTE ON THE BAT REMAINS

The following species have been identified by Dr. R. J. G. Savage (Dept. of Geology):

*Plecotus austriacus* (Fischer);

*Plecotus* sp. Intermediate in size range which overlaps *P. auritus* and *P. austriacus*;

*Myotis bechsteini* (Kuhl).

Dr. Savage adds that these at present are commoner further south than Britain and would seem to indicate a slightly warmer climate than at present.

These species are the same as those found in the Helictite Chamber (Gilbert, 1963, p. 64).

#### REFERENCE

*Proc.* = *Proceedings, University of Bristol Speleological Society*

GILBERT, E. V., 1963, "An Account of Recent Developments in G.B. Cave, Charterhouse-on-Mendip, Somerset", *Proc.*, Vol. 10, 58-64.