

# Burrington Combe Survey

BY J. H. CRICKMAY

Most spelæologists have made use of maps and plans at some time or other, either as a guide to the cave they were exploring, or to help them find their way over strange country to some remote swallet or rising. Few, however, realize how a map is constructed, and fewer still have ever carried out an actual survey.

During 1947 I commenced a survey for the Society of the northern cave district of Mendip, centred on Burrington Combe, and I propose

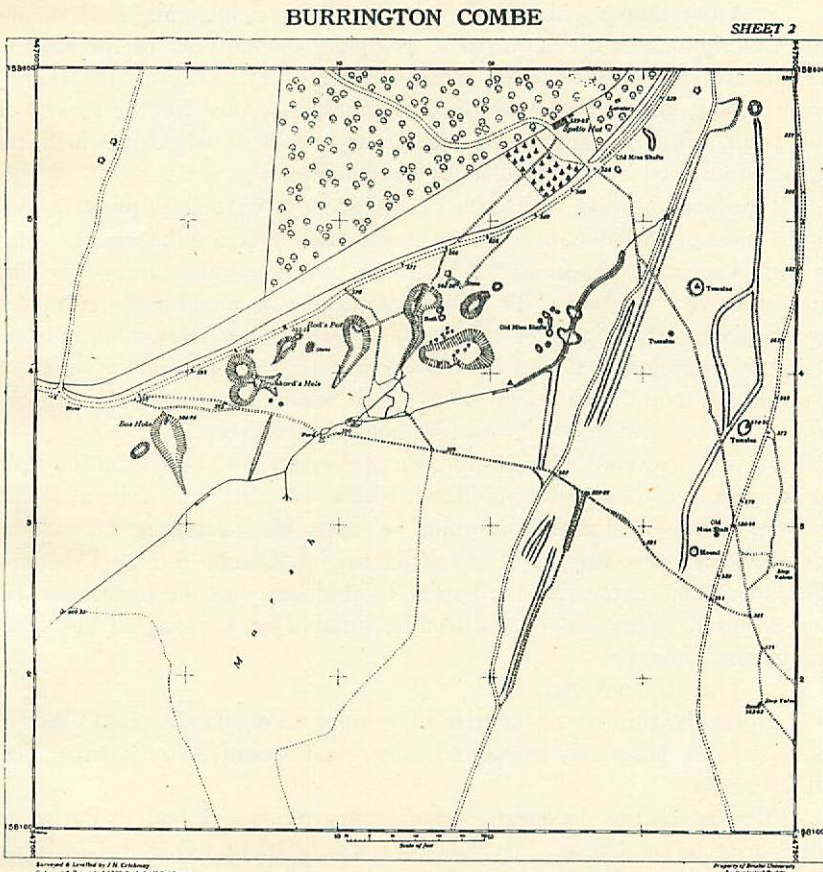


Fig. 9.

giving a brief description of the methods used, and of the results achieved, in the hope that it may be of interest, and perhaps of some use to my fellow cavers.

Four distinct operations are necessary for the construction of a map :—

1. A rigid framework of fixed points must be surveyed, preferably by theodolite observations. This framework must be correctly oriented, and its dimensions ascertained by direct measurements on the ground.

2. The framework must be plotted at a convenient scale, and the detail which it is required to show must be supplied by measurements or some other method.

3. A series of relative heights, covering as much of the map as is practicable, must be ascertained, preferably by observations with a surveyor's level.

4. A fair drawing of the whole must be made, including such names and descriptions as are required to complete the purpose of the survey.

These four operations are interdependent. The trigs in the framework should be sited to give the maximum assistance for the survey of the detail, and the detail should include any rocks or boulders which are likely to be used by the leveller for his bench-marks, etc.

I propose dealing with each of the above operations separately, but first I must point out an overriding consideration affecting the whole. This is embraced in the question, "What is the purpose of the survey?" The answer, in my case, is: "To show as accurately as possible the entrances of all caves, and the position of all dry swallets and collapses: to indicate such underground detail as is known to exist: to provide a series of co-ordinated points and bench-marks which can be used for accurate underground survey: to show all detail of archæological interest."

Having answered this question, the surveyor has to decide on the scale at which the map is to be published, which will affect the scale at which it is surveyed, the accuracy to which he makes his measurements, and the time taken on the survey. For the Burrington Combe Survey I decided that a scale of 1/2500 was the largest I could use with the instruments at my disposal. This scale would also be suitable for showing all the detail enumerated above.

#### 1. THE FRAMEWORK.

Normally this would consist of a rigid triangulation, controlled in scale by an accurately measured base, and oriented by astronomical observations.

Not having the necessarily accurate instruments, I had to devise an alternative to the above. My first idea was to superimpose the detail on to the published O.S. 1/2500 plan, but I was forced to abandon this,

owing to the marked scarcity of existing detail on which I could base my new work, particularly to the south, where the ground rises to the top of Mendip.

I decided that before I could deal with the area, it would be absolutely necessary to establish one or two instrumentally fixed trig points.

Two points were chosen, sufficiently far south to cover the boundary of the area to be surveyed. At these points resections were observed with an artillery director, and two additional points were fixed by fully observed triangles.

The points fixed instrumentally are :—

*Ridge Resection.*—To the west of Hunter's Brook.

*Bomb Crater Resection.*—Due south of the U.B.S.S. Field Headquarters.

*Tumulus T.6.*—Between the Field H.Q. and Burrington Combe.

*Burrington Combe.*—On the opposite side of the Combe to Tumulus T.6.

*Bungalow.*—An additional observing-point fixed by producing the straight of the wall to the south of Ranger's Cottage.

Each of the above points is marked by a peg, with a stake alongside, driven well into the ground, and surmounted by a cairn of stones. Their co-ordinates, and full description can be obtained from the Secretary of the Society.

A diagram of the scheme is shown below :—

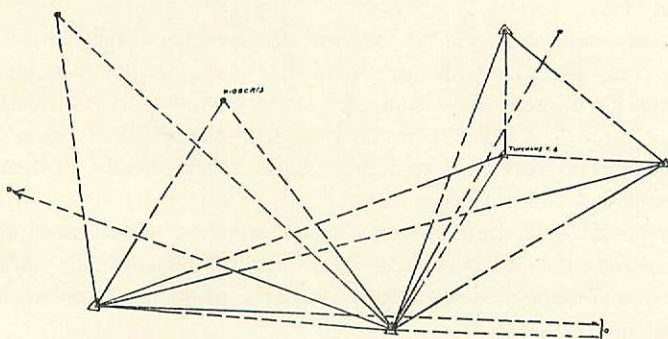


Fig. 10.

There being no triangulation points visible from which I could resect, it was necessary for me to use the detail on the Ordnance Survey 6 in. and 25 in. plans. The points chosen were : a junction at the south end of Mendip Lodge Lane ; a junction four chains east of Read's Cavern ; a junction six chains north-east of the U.B.S.S. Field H.Q. ; Burrington Church F.S. ; and the south-west corner of Lower Ellick Farm. The

co-ordinates of these points were scaled off the 6 in. gridded  $\frac{1}{4}$  sheet to an approximate accuracy of one metre. The only points that were chosen were those clearly defined on the plan and on the ground.

*Computation.*—The computation of the trig values presented no particular difficulty, except that Rowberrow Church Tower had to be omitted owing to difficulty in identifying the corner of the tower on the 6 in. sheet.

Trial points for the two resections were found by the Collins Point computation. Semigraphic resections based on these trial points proved the high standard of accuracy of the sheets in this area. In the Ridge Resection, it was possible to choose a final point within half a metre of all the resecting rays, and at Bomb Crater, a point within a metre of all the rays. The value of this point was strengthened by an intersecting ray from Ridge.

The values of the other two points were obtained by semigraphic resection, with the intersecting rays superimposed.

### 2. SUPPLYING THE DETAIL.

Two methods are available for the supply of the detail: (a) By detail survey; (b) By plane table.

I decided to use the plane table, and to use detail survey lines wherever necessary. A piece of stout paper was attached to the plane table, gridded, and the position of the trigs and other points, obtained direct from the O.S. plans, were plotted. (The only trig which appears on Sheet 2 is Tumulus T.6).

My first operation was to increase the density of the control, which had not been possible with the theodolite owing to bad weather. This was done by intersection from the instrumentally fixed trigs. These secondary control points are marked on the ground by a stake, and are indicated on the plan by a triangle. Their values can be obtained from the Secretary of the Society.

The detail was supplied by a series of plane table resections, from which in-direction measurements were made. Occasionally long detail lines were taped between fixed points, and the detail was supplied by offset measurements.

### 3. LEVELLING.

The heights were supplied by a line of levels run between Mendip Lodge Lane and Burrington Church via Goatchurch Cavern. Two additional loops were run to establish heights near the U.B.S.S. Field H.Q. and at Read's Cavern. The main line of levelling closed to  $\cdot 181$  ft. and the loops to  $\cdot 021$  and  $\cdot 053$ . The bench-marks are all indicated on the ground by arrows cut in the rock. Spot heights have been inserted on the plan at various points to indicate the rise and fall of the ground.

The heights of the bench-marks and spot heights can be obtained from the Secretary of the Society.

4. DRAWING.

The plan, which was originally surveyed on the scale of  $1/2500$ , has been enlarged to  $1/1250$ , and drawn at that scale.

The whole survey took eighteen days to execute : Four days for the trig work ; seven days for the supply of the detail ; and seven days for the levelling.

The archæological details were kindly located for me on the ground by Professor E. K. Tratman. I would also like to thank the various members of the Society whose timely assistance made the survey possible, particularly Mr. R. D. Stride ; also Mr. H. D. Wiseman, who has kindly drawn the plan for reproduction.

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