THE BUCHAN CAVES RESERVE

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INTRODUCTION

The Buchan Caves Reserve covers a large part of an elongate block of limestone in the south–west corner of the Buchan synclinorium. This block is separated from the main outcrops of limestones by the Taravale Mudstones to the east, and the Buchan River to the north.

HISTORY

The name 'Buchan' probably derives from the aboriginal 'Bukkan' or running water. Aboriginal occupation of caves in this area was probably negligible, due mainly to the supposed presence of the Nargun, a mythical man–beast which inhabited the caves and devoured those who strayed into the dark.

Although Buchan was settled around 1836, it was not until 1889 that James Stirling described Dukes Cave (B–4), Spring Creek Cave (B–1) and some other caves in the district. In his report he recommended that the caves should be developed for tourism, but his report was not heeded.

In 1900 A.E. Kitson also reported on the caves, and recommended the reservation of various areas around the district. This report was heeded and the Buchan Caves Reserves were gazetted.

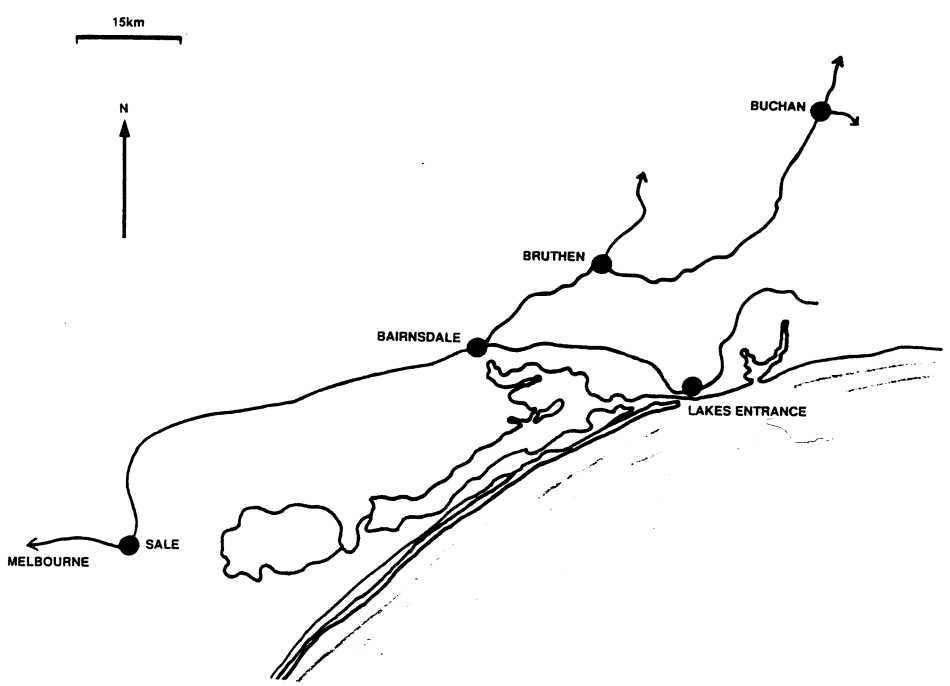

Figure 1: Locality plan

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One of the first explorers of the caves was Frank Moon, who in 1907 discovered the southern end of Fairy Cave (B–5, B–64). Moon, in his explorations, was accompanied by Dr. John Flynn, the pastor (who later founded the Flying Doctor Service) and the local policeman. They worked their way north, and a year later broke into Royal Cave (B–6, B–65) from Fairy Cave. This was soon followed by the discovery of Federal Cave (B–7).

At this time Moon had also explored Dukes Cave, but had been stopped by a rockpile. In January 1911 Moon dived a muddy pool in the far end of the lower level of Federal. Beyond this was an active stream passage, which led downstream to a rockpile — the other side of the Dukes Rockpile.

The next 50 years saw little active exploration. In the late 1950s the VCES and SASS started exploring the area, and discovered such caves as Whale (B–20). After a sympathetic change in management, exploration in the Reserve picked up in the mid 1970s. B–32, the upstream section of Moons, was discovered soon after. In 1974, a number of trips led by Lou Williams succeeded in digging through the Dukes Rockpile. For the first time since 1911 the main part of Dukes Cave was visited and soon the connection to Federal Cave was made through Connection Sump.

Since then the main exploratory thrust has been by the Sady brothers. Their main discovery, Scrooges Vault (B–56), is at the southern end of the limestone. In the main limestone area recent work has been mainly one of consolidating and relocating and surveying old caves.

TOPOGRAPHY

The main topographical features of the area are aligned generally north–south, parallel to the strike of the rocks. To the west are a series of moderate slopes coming off the volcanics. A number of intermittent streams flow off these slopes into the valley of Fairy Creek, to the east. East of this is a ridge which contains most of the caves. This ridge is cut by a steep valley leading out to the main Buchan River valley to the east of the ridge. To the south of the limestone is a wide, flat, high–level abandoned valley, which heads south towards Molleys Plains.

GEOLOGY

The oldest rock units in the area are the Snowy River Volcanics. These are a thick sequence of impermeable Devonian acid volcanics. They outcrop as the high country to the west, and dip at about 30° towards the east under the sediments. Above this is the Spring Creek Member, a thin, transitional unit, consisting of interbedded volcanics and sediments. The Buchan Caves limestone overlies this. At its base it is dolomitic and thick–bedded, grading up to a thin–bedded pure limestone. Notable features are the strong jointing and thick (approx. 3 cm) shale bands in some of the bedding planes. These two exert important influences on the development of the caves.

On top of the limestone is the Taravale Mudstone, which ranges from a muddy limestone to a limey mudstone. No fresh exposures occur on the surface, and it can only be seen

in road cuttings. It is very prone to landslips and is fairly permeable.
To the south of the area, and probably covering the southern extension of the limestone, is a large area of Tertiary river sands and gravel, which occupies the valley area mentioned above.
Structurally the rocks in the area all dip at a fairly uniform 30° to the east with an occasional small N–S fold. A prominent fault runs north–south along the ridge from the south. Towards the north it splits into two. There are a number of small cross faults which show up as collapses in the main caves.

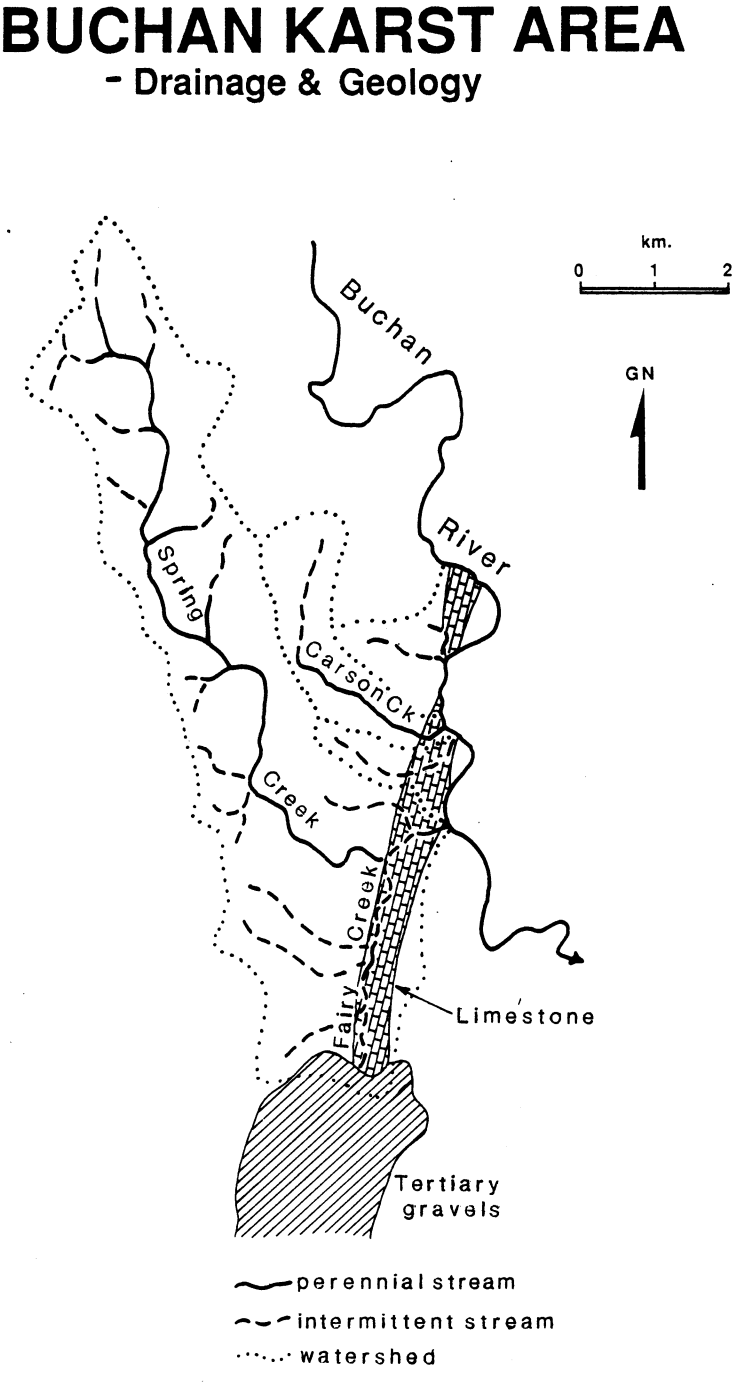

Figure 2: Buchan karst area

THE CAVES

The caves in this area can be classified into four groups which appear to reflect four different methods of development. The four groups are: stream caves, down dips, flat mazes and vertical pots.

Stream Caves

These caves appear to have been formed by the progressive downcutting of cave streams. The main examples are firstly the Dukes–Federal–Royal–Fairy system (B–4, B–5E, B–6E, B–7E, B–64, B–65) and the Moons (B–2 – B–32) system (Fig. 3). The former is,

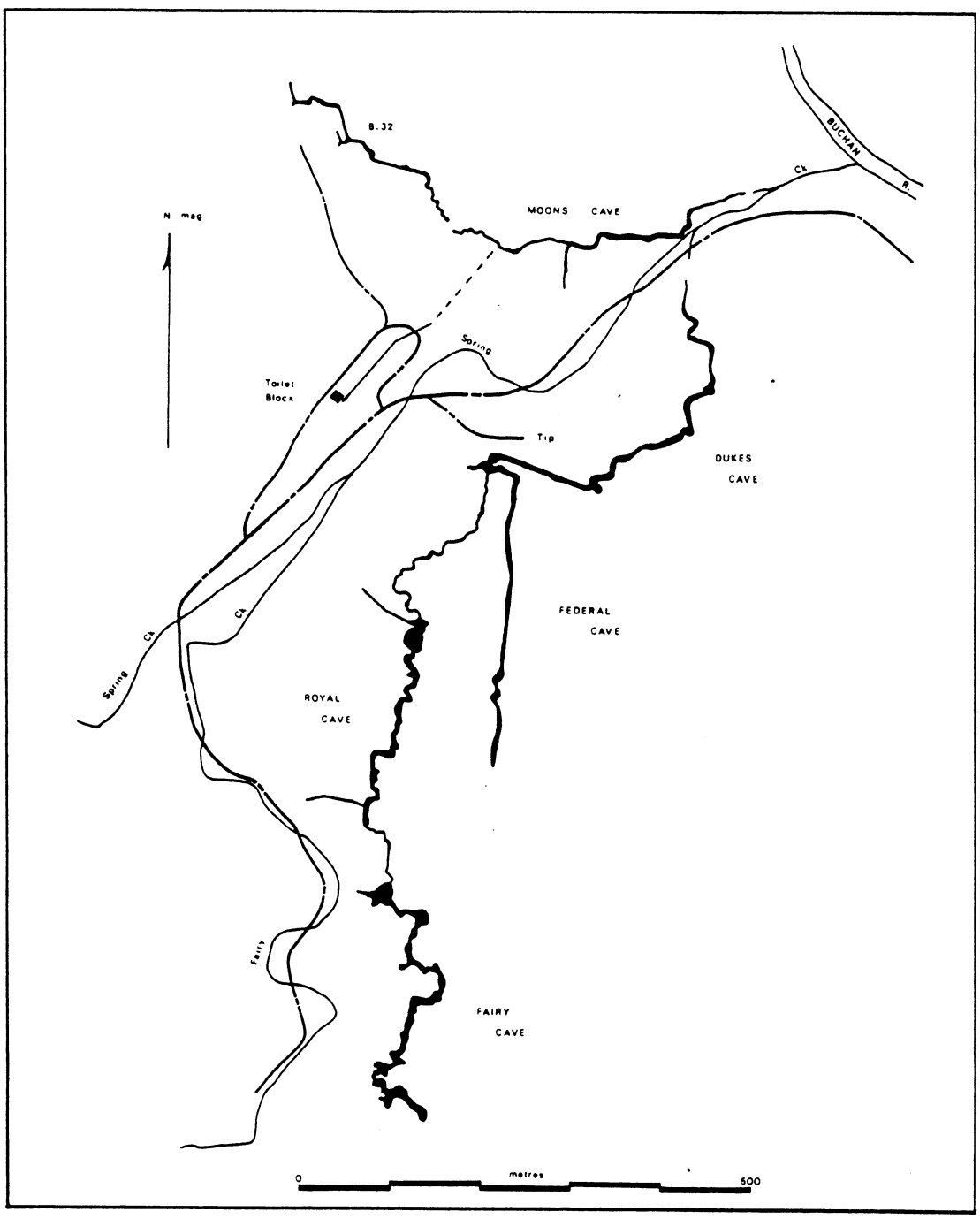

Figure 3: Buchan tourist cave systems

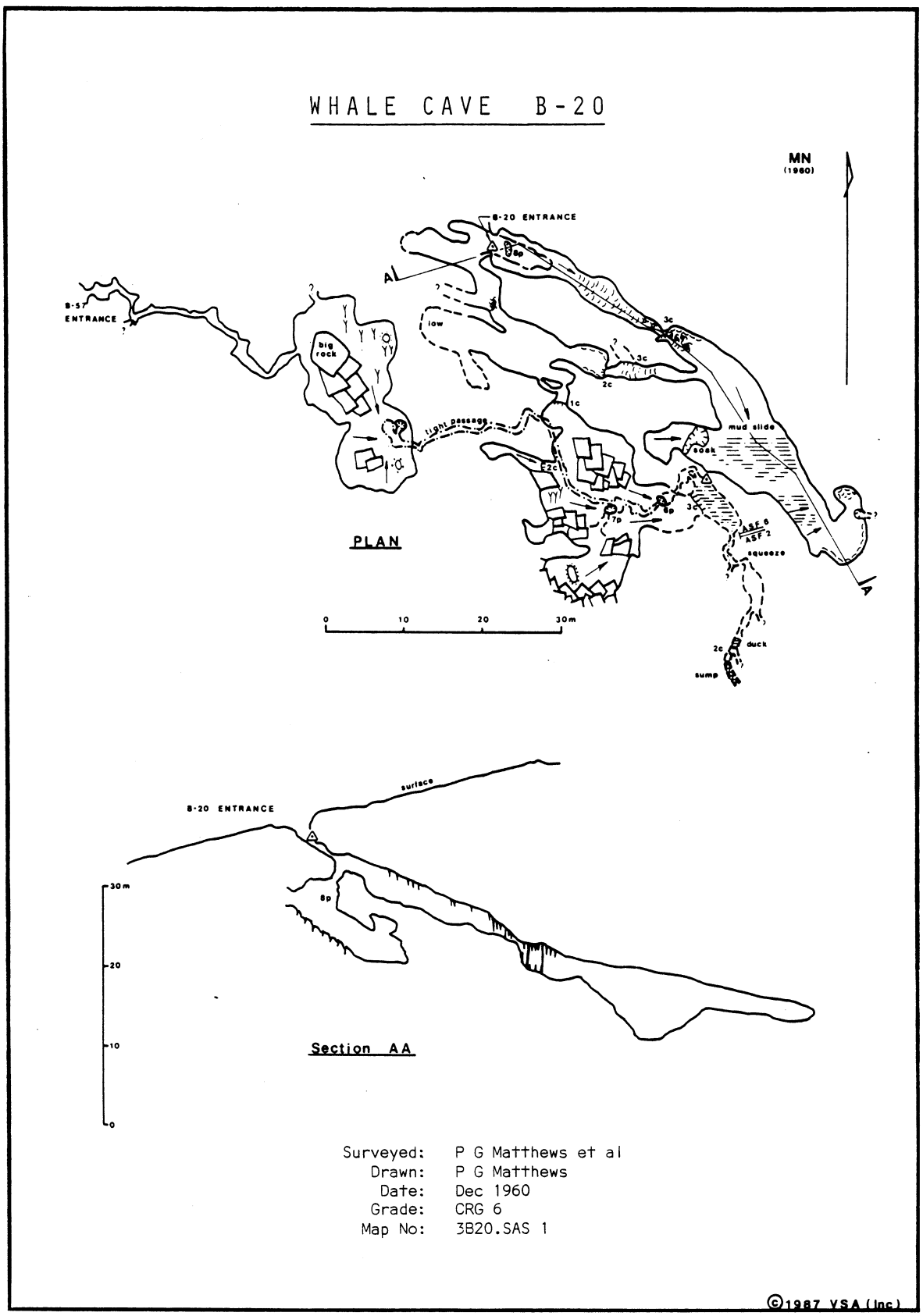

Figure 4: Whale Cave (B–20)

at present, being surveyed by VSA members, and is probably the best example of this type. It appears to have at least three main levels of development; however, a detailed survey could reveal more. The estimated length of the cave is 4 to 5 km, but this could be extended if:

(a) missing segments of upper levels are found

(b) the sumps in Dukes (the source of the stream) are pushed.

(c) the south end of Fairy Cave is pushed into all the legendary extensions.

Down Dips

The development of these caves is largely down the dip of the rock strata. Examples include Whale Cave (B–20) (Fig. 4), Kitsons Cave (B–8) and Archivault (unnumbered). These caves have down–dip and vertical development, but very little development along the strike of the rock. They were probably formed as phreatic feeders to the main stream, which were abandoned as the surface streams cut down below them. Similar caves could be developing now where the streams coming off the volcanics sink into the limestone.

Flat Mazes

These caves are mainly horizontally developed in all directions without any really distinct pattern. Examples include Spring Creek Cave (B–1) and Scrooges Vault (B–56). These caves were probably formed by slow–moving phreatic water. They have been modified by later collapse. Scrooges Vault still has many deep pools in its lower levels, and appears to act as a reservoir, taking water from the river gravel to the south, and slowly feeding it towards the Reserve to the north. This cave, and Spring Creek Cave at a much earlier stage, probably acted as giant sponges, helping to maintain a constant baseflow into the main stream system.

Pots

Caves of this type are predominantly vertical and were probably formed by rain water inflow, especially down the main fault. Examples are Foul Air Pot (B–27) and B–37. These caves are not common, and don't appear to have had much influence on the development of the main system, nor do they have much influence on the present–day hydrology, contributing only with water from a limited catchment area.

CURRENT RESEARCH

At present two major, interrelated projects are underway in the area. The first is an accurate survey of all the surface and underground karst features of the area. So far we are half way through the tourist cave system, and have completed most of the minor caves. At present we are concentrating on establishing a network of accurately positioned surface stations.

The second project is a hydrological investigation being carried out by the author through the Geography Department, University of Melbourne.

The aims of the project are:

(i) to improve our understanding of where the underground water is going,

(ii) to find out how long the water is taking to move through the aquifer and its behaviour.

At present the following work is planned:

(i) dye tracing, using fluorescent dyes, from various potential sources to the two main risings, Dukes and Moons. So far we we have put dye into Spring Creek where it sinks and B–67 near Scrooges Vault. We are still waiting for it to reappear, which indicates that flow through the aquifer during drought conditions is very slow and either requires more dye than originally thought or increased flow through the aquifer.

(ii) A water sample collection programme, where samples from five sites are collected fortnightly for two years. These samples are analysed for temperature, conductivity (on site), calcium and magnesium. The variation in these quantities will then be compared with rainfall and time of year to establish whether any relationships exist between the data. pH is also being measured seasonally to determine alkalinity.

(iii) If circumstances permit, a study of the flood pulses through the system will be undertaken.

CONCLUSIONS

This paper is merely an introduction to the area as these investigations are still in their early stages. The following questions (and possible answers) seem to pose themselves. What is the source of the permanent baseflow rising at Dukes? The most probable area is the extensive area of Tertiary river sands and gravel to the south. These gravels probably overlie a southern extension of the limestone which collects, and feed the water towards Dukes.

What is the source of the permanent baseflow water emerging from Moons? There is no area of gravels, nor is there any large surface stream to account for this flow. The only other possibility is leakage from the Buchan River when it enters the limestone. Tracing this will be difficult, as it would involve polluting the town water supply. The caves themselves appear to derive from the 2 cave streams cutting down through the limestone, with each type fulfilling a specific hydrologic function in the past or present.

ACKNOWLEDGEMENTS

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Since this was originally written a successful dye trace has been carried out. Rhodamine WT was placed into the small stream in B–67, a cave at the southern end of the limestone. Approximately three weeks later the dye appeared, in visible quantities, in Dukes Cave (B–4).