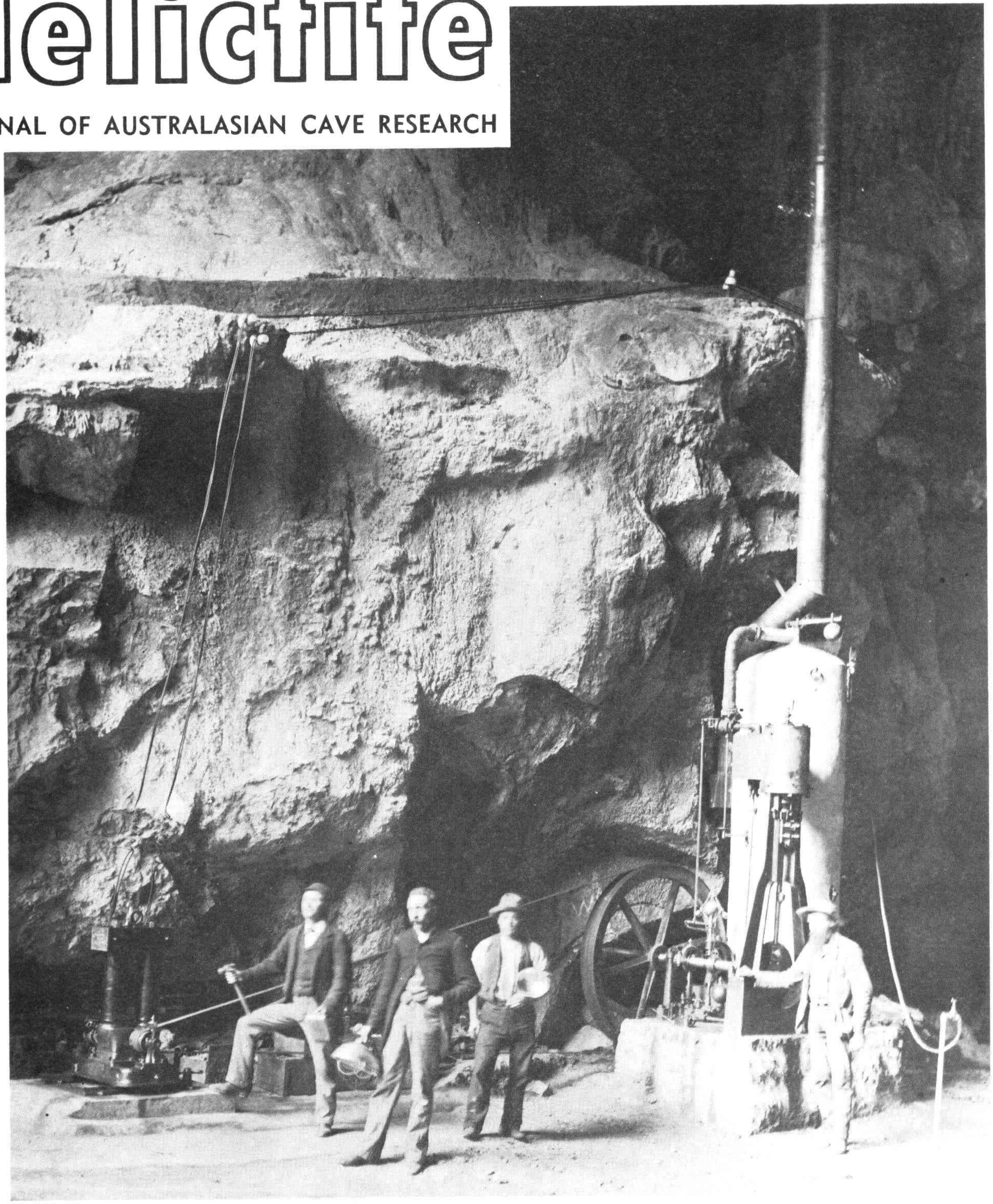
Vol. 9, No.4 OCTOBER, 1971

Helictite

JOURNAL OF AUSTRALASIAN CAVE RESEARCH



Electric power plant in Grand Arch, Jenolan Caves, N.S.W., used to light caves 1888.

See page 72.

"HELICTITE"

Journal of Australasian Cave Research

Edited by Edward A. Lane and Aola M. Richards

VOLUME 9 NUMBER 4 Published Quarterly OCTOBER, 1971

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MOUNT ETNA CAVES. Edit. J.K. Sprent. 1970, 116 pp. Published by the University of Queensland Speleological Society ($2.75). A Collection of Papers Covering Several Aspects of the Mt. Etna and Limestone Ridge Caves Area of Central Queensland.

A well-produced, well-illustrated and comprehensive study devoted to the caves of a single area, the Mt. Etna-Limestone Ridge cavernous limestone outcrops a few miles north of Rockhampton in Central Queensland. A wide range of interests is involved ranging from mapping to geology and biology. Such a project, by gathering together summary papers on most facets of speleological interest, produces a reference text of real value now and for future use. The publication has papers on geology, cave descriptions, fossils, meteorology, surface and underground surveys, surface and underground fauna, flora, an historical outline of mining, recreation and conservation activities, and concludes with a case for conservation of the Mt. Etna and Limestone Ridge caving area.

An appendix ("The Present Situation") emphasises the need for urgent governmental action to preserve the caves of the area in the face of extensive and expanding quarrying activities. It is noted that little effective action had been taken by the Queensland Government to the date of the report to protect the caves and that despoilation or destruction remained imminent. It is understood that since the Appendix was written, another quarry face has been opened and several caves intercepted by operations. An assurance has been given to conservationists that the northern cavernous flank of the mountain has a two-year stay of operations still while the Department of Mines investigates alternative economic limestone reserves. It is unlikely that the problem will be resolved until the investigation is completed. - E.A.L.

COVER PHOTOGRAPH. This 1886 photograph from the E.A. Lane Historical Collection is the first known showing electricity generating plant associated with an Australian cave. The first, successful experiments in lighting a cave with electricity were carried out at Jenolan, New South Wales, in 1880. The steam-driven dynamo shown here was installed in the Grand Arch in 1886, and in January 1887, the first permanent lighting was installed in the Imperial Cave - passage lights arranged in circuits of 25 incandescent lamps. Later the plant was replaced by a dynamo driven by a water-wheel downstream of the Grand Arch. At the time the road from Mt. Victoria had not been completed so no traffic, other than foot, passed through the Arch.

Although some experiments in electricity generation were carried out in Sydney as early as 1860, it was first used commercially in 1878. Municipal enterprise, especially in country towns, was considerable. Tamworth and Young generated and sold electricity in 1888, Penrith and Moss Vale in 1889, and Broken Hill in 1890. So Jenolan holds the proud record of being one of the first places in Australia to apply incandescent lighting. - E.A.L.

A PRELIMINARY NOTE ON A CAVE IN BASALT, BUNYA MOUNTAINS NATIONAL PARK, QUEENSLAND

A. GRAHAM*

Abstract

The existence of a small cave in Tertiary basalt in the Bunya Mountains, Queensland, has been known for some time, but has only recently come to the attention of speleologists. The origin of the cave is uncertain, although multiprocess formation or modification of an original lava tube is suggested. The cave contains a small colony of Miniopterus schreibersii.

Location and History

The cave is situated on the western side of the Bunya Mountains National Park, 90 miles northwest of Brisbane, in a small cliff face in the upper valley of Cattle Creek. Details of access are available from the Park Ranger.

Originally the cave was included in the property of Mr. C.J. Stirling, who subsequently donated 40 acres of land including the cave to the National Park. In 1965, a vague report (author unknown) of a limestone cave on Cattle Creek was printed in the "Darling Downs Naturalist". Confusion resulting from the occurrence of calcite formation in the cave obviously led to this incorrect identification. The cave is now visited fairly regularly by adventurous tourists.

Geology

The basalt of Lower Miocene age (Stevens, 1967) crops out over the whole of the National Park. The total thickness of basalt in the vicinity of the cave is about 1,750 feet, and maximum elevation about 3,622 feet above sea level at Mt. Mowbullan. The cave, 30 feet above the floor of the valley, is about 2,250 feet above sea level.

Examination of the cliff face revealed a layer of altered vesicular basalt, mottled black, red and purple, with abundant zeolites, overlain by fresh unaltered basalt. Clear definition of there being two flows is obscured by encrusting calcareous deposits on the cliff face. However, such a sequence is generally considered to be typical of successive flows.

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Description

A plan of the cave and longitudinal and cross sections are shown in Figure 1. The entrance chamber, about 25 feet by 30 feet, is in close-jointed unaltered basalt. A deep crack extending upwards into the roof of this chamber provides a roost for bats. The most notable feature is the abundance of usually dry formation - small flowstones, straws, stalactites and stalagmites - the white colour contrasting with the dark basalt. The cliff face is also covered in places with poor flowstone. Weathering products of the basalt, zeolites, and aragonite in vesicles, dissolved in groundwater is the most probable origin of the calcite. This calcareous formation is obviously responsible for the confusion about limestone caves in the area.

The small crawl passages from the main chamber occur in altered basalt and, in places, the original appearance of the rock has completely changed through secondary mineralisation. In parts the rock is probably more than 60% zeolite. There are smooth-surfaced wall sections, but these do not appear to be of primary origin as zeolite veins were noted exposed in and flush with these smooth surfaces. Decoration is absent from the inner passages.

While the floor of the entrance chamber consists of a guano deposit over three feet deep with roof talus included, the inner floors are mostly rock, covered by weathered material and minor guano. The near-horizontal floor of the inner passages is actively eroding downwards internally in some places by water action, and the cave is generally damp. A small free water surface occurs beyond the limit of access and old tree roots penetrate deep into the cave.

The dendritic nature of the side passages is of interest. Other minor caves are exposed in the cliff face, two being of similar appearance but neither exceeds 20 feet in length.

Air flow out towards the entrance has been observed on one occasion by tracing smoky air resulting from a bush fire in the vicinity, thus indicating the existence of another opening to the surface beyond the limit of exploration.

Biology

A colony of *Miniopterus schreibersii* (Kuhl) inhabits the cave, and bats have been noted roosting in the crack in the roof of the entrance chamber and in the chamber west of the crawl passage.

R.A. Young (personal communication) notes that the main chamber has probably been used by bats for a considerable period of time. The deep layer of guano on the floor of the entrance chamber indicates that most of the ceiling is covered with bats during times of peak activity. No information is

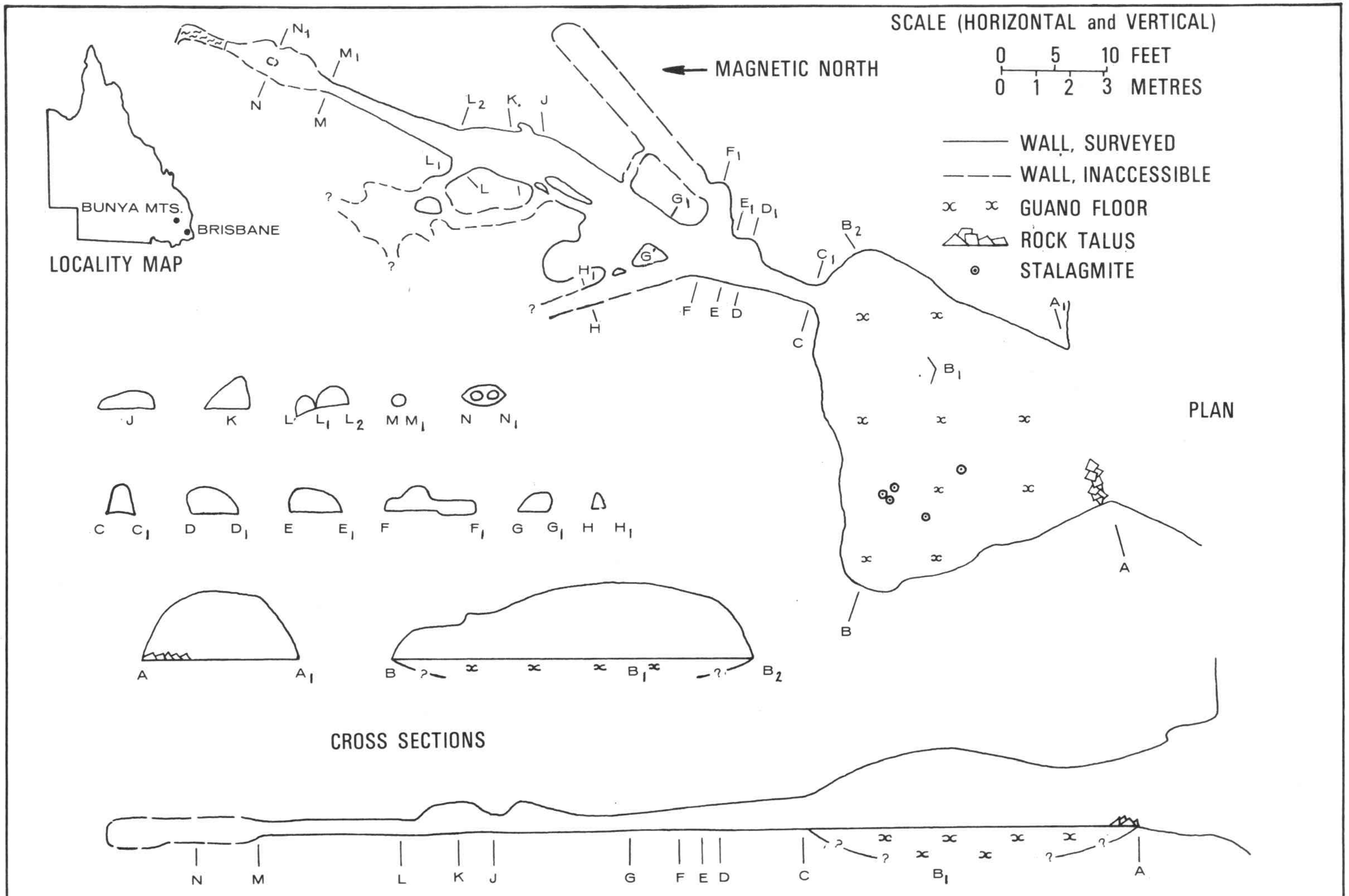

Figure 1. **CATTLE CREEK CAVE, BUNYA MOUNTAINS, QUEENSLAND**

UQSS survey led by A. W. GRAHAM, using tape-compass-clinometer, October, 1970.

available as to the functional status of the cave or to the seasonal fluctuations in numbers of *M. schreibersii* except that the following numbers are recorded:

23 January 1970	15	R.A. Young
9 August 1970	500	A.W. Graham
11 October 1970	2	A.W. Graham.

Origin of Cave

The following is a summary of cave features relevant to determining the origin of the cave:

(1) Absence of lava solidification features.
(2) Cave located close to interface of two lava flows.
(3) Majority of length of cave in weathered, altered basalt.
(4) Cross sections typical of lava cave proportions.
(5) Cave is known to be 100 feet long. At limit of exploration, at which point an air flow was observed, the cave is at least 60 feet below the surface.
(6) The tunnels are anastomosing as shown in plan.
(7) Probable small "steam bubble" type cavities are exposed in the adjacent cliff face.

Consideration of these features suggests that if the cave is a true lava cave, weathering has removed all the conventional features. Smooth-walled sections, as described earlier, are probable erosion features developed in clay-rich sections of the weathered, altered basalt.

The alternative possibility of a complex steam bubble origin, with enlargement by in-cave erosion, seems less acceptable in view of the known length and extension shown by air current. The anastomosing nature of the cave could result from erosion of rock between smaller cavities. This complex origin, however, could explain the formation of the entrance chamber by collapse into a cavity below, but the scale of such a process seems out of place with the remainder of the known features.

Acknowledgments

The author wishes to thank M.A. Randal and Miss B.R. Houston for their comments and R.A. Young for his observations on the bats at the cave.

Reference

STEVENS, N.C. 1967 : Isotopic Age Determinations on Tertiary Volcanic Rocks and Intrusives of South-Eastern Queensland. Proc. Roy. Soc. Qld., 79 (7) : 79 - 92.

FURTHER CAVES OF KIRIWINA, TROBRIAND ISLANDS, PAPUA

C.D. OLLIER* and D.K. HOLDSWORTH**

Most of the caves of Kiriwina have been described in an earlier paper (Ollier and Holdsworth, 1968). This paper records some newly reported caves in the south of the island, and provides a more complete description of Tumwalau, a large cave only briefly described in the earlier paper.

Kiriwina (Figure 1) is the largest island in the group of coral islands known as the Trobriand Islands. It is situated about 100 miles off the north-east coast of Papua and north of the D'Entrecasteaux Islands, and can be reached by air from Port Moresby.

Sikau (Figure 2)

This cave is near Kumilabwaga village. It is a typical collapse cave, fairly large, with the form of an irregular tunnel, and contains several lakes of fresh water. Many bats live in the cave, which is largely floored by guano. Speleothem decoration is extensive, some being white and active. No archaeological material such as bone, shell or pottery was found.

Neguya (Figure 3)

This cave is also near Kumilabwaga village. The cave descends steeply, is much modified by collapse, and contains abundant stalagmite formation. A rift at the base of the main chamber leads to a second pool in an uncollapsed chamber. The entrance to the cave is an oval sink hole with an incomplete rim, the missing side facing the sea.

No bats or other living things were noted. A few sea shells and pottery fragments were found, but no bones, although a longer search could probably turn up a few. There is one "crypt" consisting of a chamber under a large fallen block, partly barricaded by a wall built of chunks of coral. This is very like the crypts we have found elsewhere, and was used to conceal or protect burials (see, for instance, p. 45 in Ollier, Holdsworth and Heers, 1971a). These features clearly indicate that the cave was formerly used as a place for interring the bones of the dead, a custom described in our earlier papers.

Our native guides explained that the crypt was the house of Doknikani, a legendary giant reputed to eat people. The guides could not be persuaded

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to go inside by any means, and tried hard to stop us going in. However, C.D.O. climbed into the small chamber without ill effect. Inside were a few pottery fragments and also a broken bottle! Evidently this was not the first time the crypt had been entered.

Bobu

This is a small waterhole at Kumilabwaga village.

Lupwaneta

This is a group of overhangs and small caves in what appears to be a fossil cliff above a raised beach about one mile south of Wawela. It contains many bones.

Kalopa (Figure 4)

This cave is about two miles north of Wawela and is reached by walking along the shore (and through the sea) from Wawela village. The cave is about 12 feet above the beach and consists of a small chamber about ten feet square, absolutely littered with bones. It is the greatest accumulation of bones encountered in any of the many bone caves we have investigated. The bones are in a complete jumble, and we could find no indications of orderly burial. No shells or pottery were discovered.

Bwaga and Kaulausi

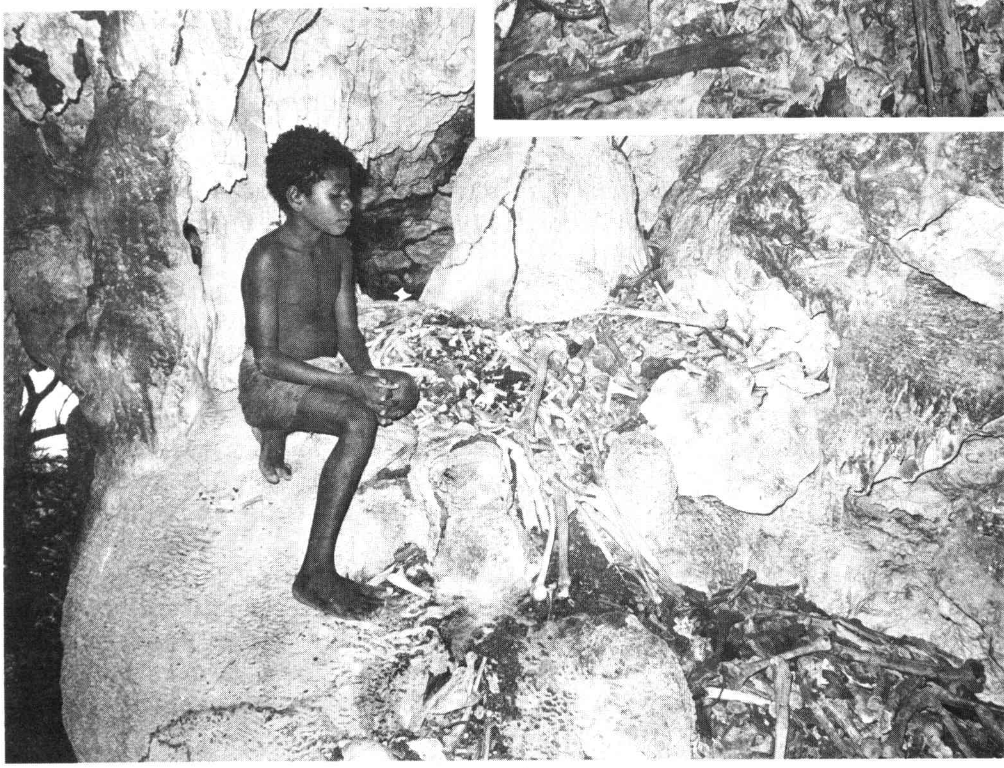
For the benefit of future explorers, we record that a cave is reputed to be near the village of Bwaga, and one or two caves near Kaulausi village. We were unable to persuade local people to show us these caves.

Tumwalau (Figure 5)

The nearest village to this cave is Moligilagi. The entrance chamber is large and high, floored by collapsed blocks covered with flowstone, clay and guano. This part of the cave was described in our earlier paper. Beyond this is a pool about 70 feet across which must be swum to gain access to the cave beyond. The further parts of the cave consist of long and relatively narrow passages and rifts, sometimes with several interconnecting "roads" running roughly parallel to each other.

There is a dominant horizontal structure in the limestone, reflected in the form of the cave. Some chambers are "platy" with thin sheets or plates of limestone projecting into the cave. Phreatic spongework is well developed, but pockets and pressure tubes have elliptical cross section with horizontal long axes. Instead of the common pendants between solution pockets, there are near-horizontal projections of rock which we called "salients". Vertical joints are well exposed in many of the rifts and clearly dominant the plan.

TWO PHOTOGRAPHS
OF HUMAN BONES
IN KALOPA CAVE.



There is quite a lot of life in this cave, including cave crabs. Some large ones are red, but others are small, white and almost transparent. There are white fish in the pool. Long legged insects are said to be fairly common, but we did not see any. Both flying foxes and small bats live in the cave. Native names for these animals are: red crabs = lakum; white crabs = pwaku; small bats = sigunoguna; flying foxes = migiaweda. No archaeological remains have been found in this cave.

Discussion

The caves described here are similar in most respects to those previously described, for which discussion can be read in earlier papers (see references). We will mention here only two particular points.

(1) The absolute litter of bones in Kalopa is something we have not encountered previously. Could this be something different from the usual accumulation of bones made over a long period from separate and distinct interments?

The great jumble could suggest a mass burial following a massacre or some other exceptional circumstance. Our own untrained observations seemed to indicate the usual deficiency in the number of small bones present, suggesting the common two-stage interment, but the deposit requires examination by somebody more expert on bones.

The local people could tell us nothing about the origin of the bones and seemed to think they were remains of the victims of Doknikani, the legendary man-eating giant. No stories of cave burials were volunteered. This is somewhat surprising in view of the stories we obtained in Kitava (Ollier, Holdsworth and Heers, 1971b) of cave burials of people from Wawela who had raided Kitava. On our expedition in southern Kiriwina we did not have the services of a good interpreter, which could account for our failure to obtain more information.

(2) The geomorphology of Tumwalau poses special problems. Coral islands may be uplifted by earth movements in several distinct stages, and at each stage a new reef grows at the new sea level. With successive uplifts, the island comes to have a series of steps or terraces (Figure 6). This is most obvious on Kitava Island, which has at least five terraces, clearly visible from the sea. The situation on Kiriwina is not so obvious, but there is a bench at about 90 feet above sea level, clearly indicating at least two periods of uplift of the island.

The entrance to Tumwalau is at the junction of this bench and the hill inland from it, and Tumwalau appears to be an old cave largely associated with the old sea level at the time of the 90 foot terrace formation. Other caves on Kiriwina are more likely to be associated with presentday level.

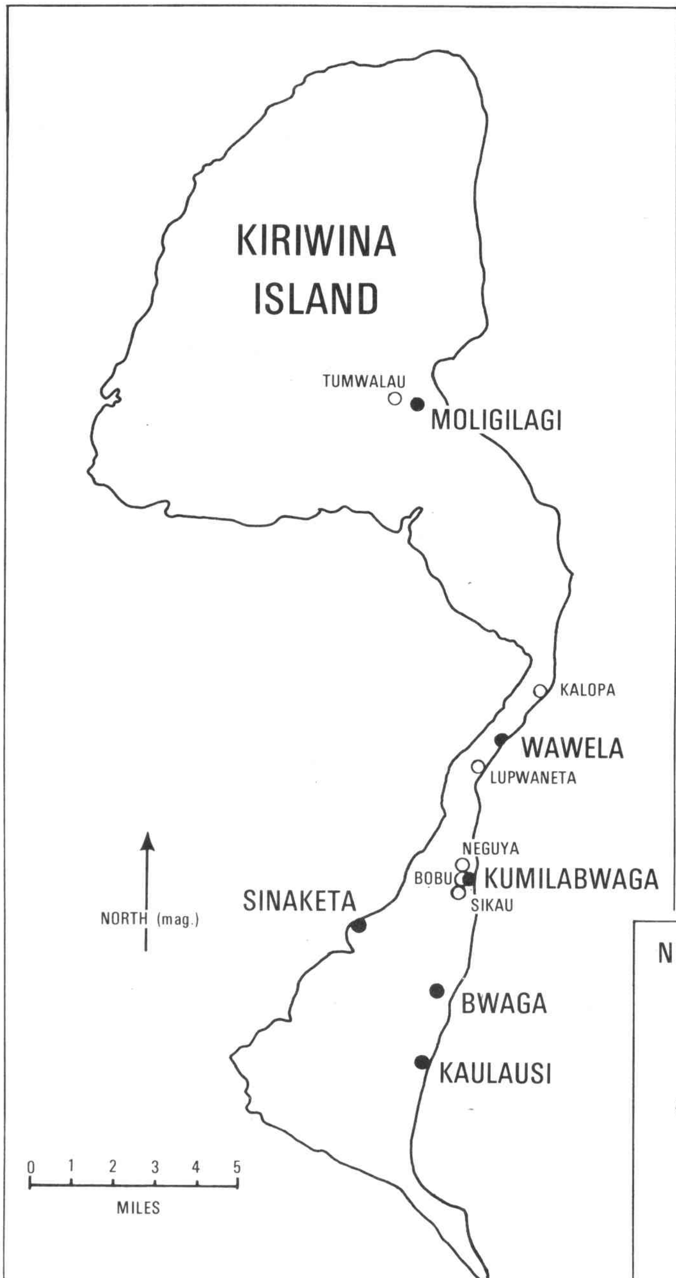
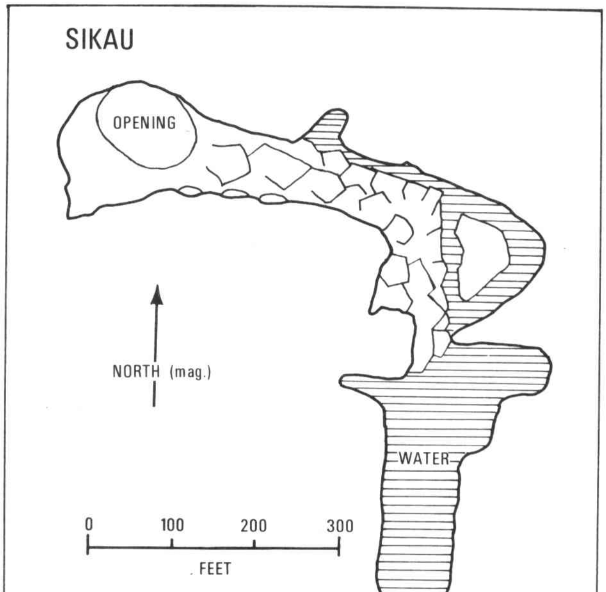


Figure 1. Location of caves and villages mentioned in text.



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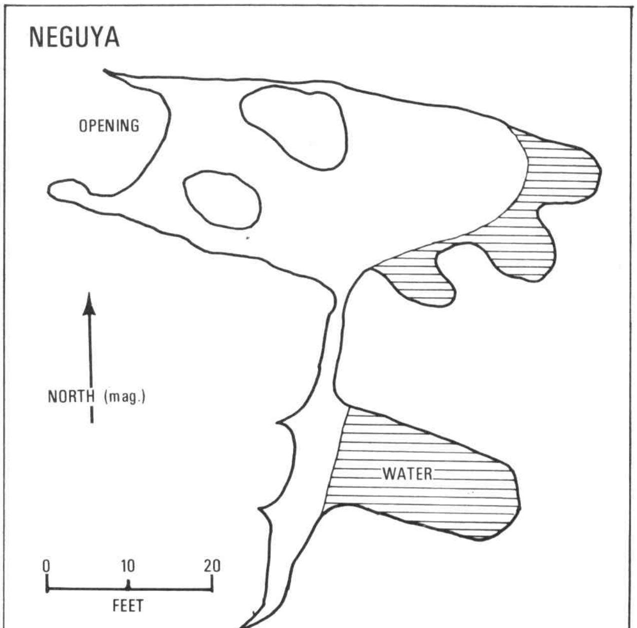

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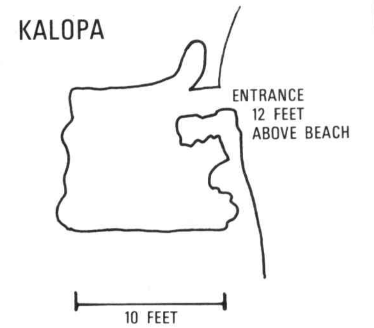

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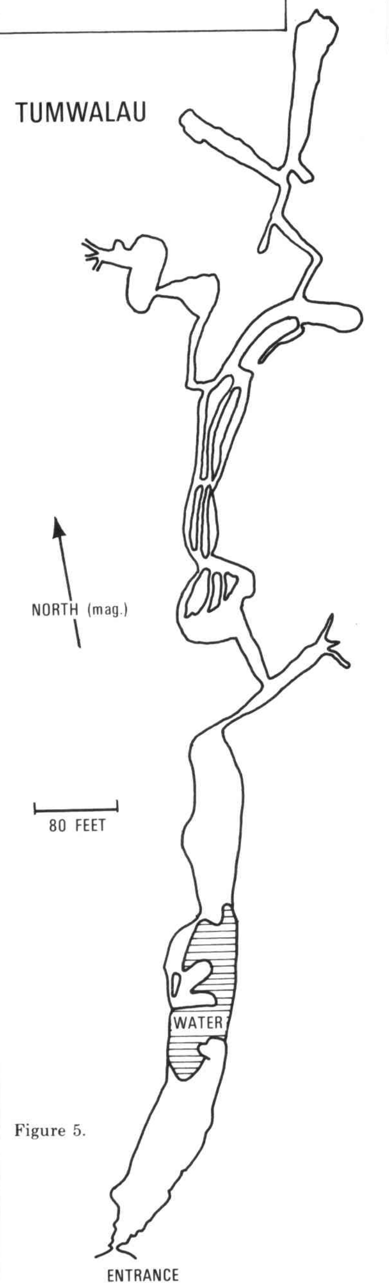

Figure 5.

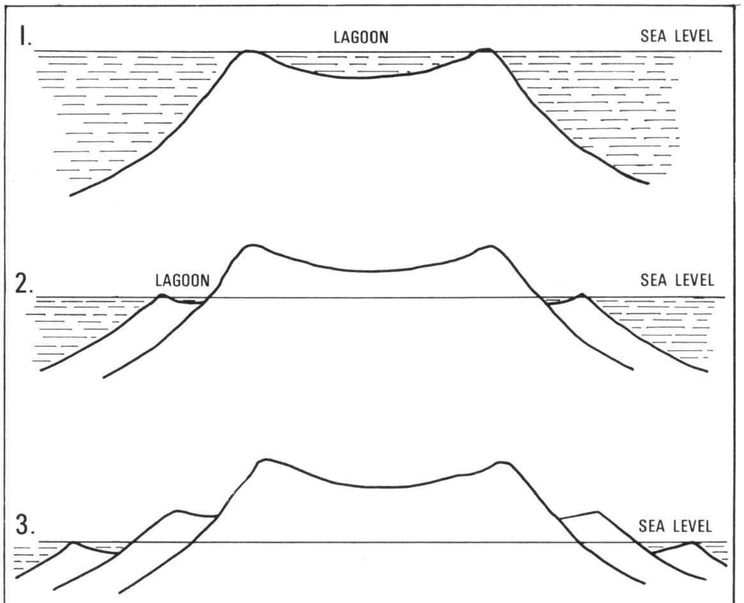

Figure 6. Successive stages in uplift of a coral island.

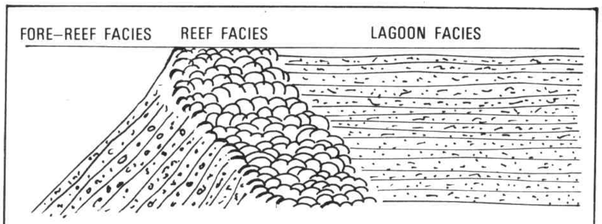

Figure 7. Distribution of facies in a coral reef.

Another unusual feature is the dominantly horizontal structure of the inner parts of Tumwalau. This reflects horizontal features in the rock structure, and suggests that this cave is formed in horizontally thin-bedded limestones of a lagoonal facies.

Growing coral lives on the outer side of a reef and grows outwards, and upwards if possible without permanent emergence. Breaking waves batter the reef and eroded coral debris falls down the side of the reef, accumulating with a steep slope. In the lagoon, limestone accumulates quietly and is frequently thin-bedded in nearly horizontal strata (Figure 7). This mode of formation of coral islands produces three kinds of limestone or facies - the fore-reef which has steeply dipping bedded limestone, the reef facies which is generally unbedded and contains a lot of coral in position of growth, and a lagoon facies which is horizontally bedded.

Nearly all Trobriand Islands caves are formed in the reef facies. But Tumwalau appears to be one cave that has extended into the lagoon facies, which accounts for its horizontal structure. More mystifying than the structure, however, is the extensive development of phreatic features, that is solutional features developed beneath a watertable. One might have expected that caves formed high on the island would be most likely to develop vadose features, that is formed above the zone of water saturation, but the reverse is the case. The best development of phreatic features is found in the caves at high levels, such as Tumwalau, but also including some of the high caves on the island of Kitava. The best development of vadose features is found in caves close to present sea level, such as Bwabwatu cave on Kaileuna Island.

This anomalous situation is difficult to explain. One can only surmise that any phreatic caves being formed at the present time are inaccessible to exploration, and that in the older, higher caves, collapse and modification has rendered the phreatic portions accessible.

Acknowledgments

The caves of southern Kiriwina were explored by the authors accompanied and assisted by M.J. Eden. Tumwalau was thoroughly explored before our visit by R. Lawton, who made his extensive knowledge of the system available to us. We also wish to thank G. Heers who assisted the authors, and R. Lawton in surveying the cave.

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R E V I E W

GEOLOGY OF THE HODGKINSON AND LAURA BASINS, NORTH QUEENSLAND. By F. de Keyser and K.G. Lucas. Bulletin 84, Bureau of Mineral Resources, Geology and Geophysics, 1968 : 254 pp + 1 folded geological map and 5 folded plates in pocket.

The Chillagoe district of North Queensland is of considerable speleological interest and falls within the area covered by this report. The Chillagoe Formation is outlined and the age given tentatively as Upper Silurian to Lower Devonian. The depositional environment is discussed (see pages 28 - 32). A table contains lithological descriptions of limestones typical of the Chillagoe Formation and cherts (mostly occurring in the Chillagoe Formation). Brief outcrop and air-photo characteristics are given. The report states that conspicuous jagged bare bluffs 300 feet high, showing fluted karren erosion, and containing many caves, are easily recognisable on air-photos by their karren erosion and dark tones. Other limestone exposures form low smoothly worn pavements.

In a sketch of the geomorphological history, the authors refer to the formation of holes in the Chillagoe limestones as the result of drainage. These holes now are pipes from the caves to the surface of the limestone bluffs (p. 148). Later (p. 151), the authors state that Late Cainozoic climatological changes are indicated and that the formation of the caves in the Chillagoe limestone (among other things) suggests a change from a tropical wet to a dry or seasonal climate. Karst development and the formation of the Chillagoe and Mungana caves probably originated during a wet climate, when the bottoms of the caves, which are below the level of the valley plain, were determined by the old groundwater level. With the drier conditions that followed, karst development almost ceased except for some superficial fluting, and the groundwater level was lowered until the caves became dry.

A section on economic geology contains brief references to mineralisation, mining and quarrying activities in the Chillagoe district. - E.A.L.

THE USE OF TITANIUM TETRACHLORIDE IN THE VISUALISATION OF AIR MOVEMENT IN CAVES

E.J. HALBERT and N.A. MICHIE*

Abstract

The problems concerned with the visualisation of low-velocity air flow in caves are discussed. The behaviour of several chemical tracers in the Mammoth Cave, Jenolan, New South Wales, is described, in particular that of the compound titanium tetrachloride. A suitable method for the transport and use of this compound has been developed.

The problem of determining the direction and velocity of air movement often arises in the meteorological study of caves. In sections where the air velocity is high (0.3 - 3.0 metre/second) mechanical anemometers are suitable, however where air velocity is low (<0.3 m/s) sensitive electronic or very delicate mechanical anemometers must be employed. These instruments are difficult to maintain and are susceptible to damage under normal cave conditions, more importantly they are usually mono-directional in operation and give spot readings.

With such equipment it is difficult, and in some cases impossible, to obtain the "total picture" of air movement. Examples of typical situations where this applies are in the determination of (a) turbulent eddies around obstructions and (b) the gross slow movements occurring in many chambers.

In an effort to improve visualisation of cave air movement, we turned to chamical tracers and examined the behaviour of several materials in typical cave situations.

The primary requirement of a successful tracer is that it should be readily detectable. To gain satisfactory information on overall air movement, visual detection is best. Detection by such means as odour, chemical reactivity, radioactivity, etc., while possible in many instances, is limited in the amount of information obtainable, and in some methods could present a health risk.

Other attributes desirable in a tracer are: High visibility from a distance; non-toxicity to humans and cave life; non-thermal generation; simplicity and economy; similar in density to air.

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N.A. Michie, 9 Patrick Street, Beacon Hill, N.S.W. 2100

These points are generally self-evident. However, they embody subtle considerations which in practice interact with one another. This may be illustrated by one of the most common tracers - cigarette smoke. This tracer complies with several of the requirements listed and is useful over a range of air movements in the medium to strong field. In very low flow, however, it is unsatisfactory on two counts; (a) it is thermally generated and (b) it has a low visibility.

Firstly, being thermally generated, it has an inherent upward movement and this makes it more sensitive towards horizontal air movements than vertical ones. Also, it is not an intensely coloured smoke and therefore one must be close to it to observe it properly. This proximity allows the body and its associated thermal updraughts to create turbulent currents which mask and, in severe cases, destroy the natural currents being measured.

To avoid thermal generation we tested ammonium chloride smoke generated in situ by the interaction of hydrochloric acid and ammonia vapour. This process was bulky since it required two containers while the resultant smoke was produced in small quantity and was of low intensity. The smoke dispersed quickly and, while giving a truer picture of horizontal and vertical air movements, still suffered from being difficult to view from a distance.

Prompted by the requirement of high visibility we tested titanium tetrachloride. This clear, light yellow, mobile liquid has a relatively high vapour pressure (10 mm Hg at 21.3^{o}C) (Sax, 1968) and the vapour hydrolyses spontaneously on contact with a moist atmosphere to form brilliant white smoke of titanium oxychlorides, titanium oxides and hydrochloric acid. The oxychlorides are intermediate products, and the end result of the hydrolysis is conversion to hydrochloric acid and inert titanium dioxide.

Since the smoke is produced from a vapour it is extremely finely divided and has almost neutral density. The question of toxicity was considered. Sax (1968) indicates that the only risk to personnel is from the hydrochloric acid produced during the hydrolysis. Titanium is physiologically inert and dusts of titanium compounds may be placed in the nuisance category only. As far as the caves themselves are concerned, the dust is negligible in quantity and would not be visibly detectable after settling. The hydrochloric vapour becomes neutralised.

We obtained some titanium tetrachloride and tested it in the Mammoth Cave, Jenolan, New South Wales, for the first time on 21 August 1971, during one of a series of monthly visits to study the meteorology of this cave. It was used to trace turbulent air flow between the Cold Hole and the Railway Tunnel and to test still air in the Railway Tunnel region. Subsequent visits have seen use of the method in diverse areas throughout the Mammoth Cave and in other non-tourist caves at Jenolan.

The liquid was, in these initial trials, contained in a glass bottle closed by a plastic screw-top of diameter 1.7 cm. During a test the bottle was opened and set down on a level surface. Over a period of approximately two hours we found that

(a) Visibility of the smoke was excellent and several times as good as that of ammonium chloride.

(b) The smoke was extremely sensitive to air currents.

(c) Economy was notable, between 0.1 and 1.0 ml liquid being consumed.

(d) The vapour pressure was adequate for continual self-generation of smoke.

(e) There was some irritation when standing immediately downwind and in the path of the escaping vapour. This was probably caused by hydrochloric acid and was easily avoidable. Hydrochloric acid, although corrosive, has no cumulatively poisonous effect (Sax, 1968).

(f) There was a tendency for a layer of acidic by-products to build up around the area of hydrolysis on the container. This layer made the bottle difficult to seal. With the ampoule method (see later), this layer is unimportant and has little effect other than to cause a slight broadening of the smoke emission.

Approximately half an hour after finishing the trials we found that the Railway Tunnel between the Horseshoe Cavern and the Hell Hole region was full of light fog. This section has an approximate volume of 7 by 10^9 ml. In this volume was dispersed 0.1 - 1.0 ml of compound. Thus the material created a visible response at a dilution of 1 in 10^{10} or 10^{11}. This provoked the facetious label of "aerial fluorescein" for the compound.

The mist was most likely composed primarily of titanium dioxide particles which had acted as nucleating bodies for water vapour to condense upon. Remnants of the mist were still visible 24 hours later. One of the authors (EJH) noted the occurrence of a similar effect in the Oolite Cavern of the Mammoth Cave during a speleological society photographic visit many years ago, when the smoke from one cigarette was sufficient to cause the formation of a mist which lasted for several hours.

Subsequent tests in this cave were made as follows. Small glass ampoules were prepared. To each was added with a syringe before sealing about 0.2 ml of titanium tetrachloride. After sealing, the ampoules were robust and no special precautions were necessary for their safety in transport. To conduct a test the ampoule was grooved with a file, the neck removed and a small piece of multi-strand copper wire introduced, leaving about 0.3 cm exposed. Capillary action caused the wire to act as a wick and the liquid was carried to the outside where it hydrolysed, forming a thin bright line of smoke. A smoking ampoule was easily supported in mud, soil or on a tripod, and lasted for up to one hour.

Our overall conclusions from these tests were that titanium tetrachloride made an excellent air flow detector in caves. We did not find any areas having insufficient air movement to detect and so no attempt was made to determine the lower limits of sensitivity.

The only reservation we had was that mentioned earlier regarding irritation to personnel close downwind of the source. This risk is minimised by the use of ampoules and it is recommended that this method be adopted at all times. Bearing this point in mind, it would appear that titanium tetrachloride adds a very useful tool to meteorological studies in caves.

Acknowledgment

The authors would like to thank members of the Sydney Speleological Society for assistance during the in-cave experiments at Jenolan.

Reference

SAX, N.I. 1968 : Dangerous Properties of Industrial Materials. Van Nostrand Reinhold, New York, 3rd edition : See page 1167.

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R E V I E W

THE STALACTITE GROUP OF CAVE MINERALS. By P.L. Broughton. NSS News, 29 (8), 1971 : 102.

The author has compiled an extensive list of 26 cave minerals that occur in stalactitic form in solutional limestone caves. This list excludes stalactitic forms in lava tubes, sea caves and non-solutional limestone fissures. He notes that in several instances the minerals may form only a small fraction of the stalactite or stalagmite. Broughton gives what I assume is a first reference to each stalactitic mineral in the literature. He adds that mud, clay and pitch stalactites have been observed also in limestone/dolomite caves. For halite he lists the paper by D.C. Lowry and J.W.J. Lowry in Helictite, 5, 1967 : 25 - 29; Discovery of a Thylacine (Tasmanian Tiger) Carcase in a Cave near Eucla, Western Australia. Readers interested in this mineral in caves should also read a later paper by D.C. Lowry - Halite Speleothems from the Nullarbor Plain, Western Australia. Helictite, 6, 1967 : 14 - 20. - E.A.L.

ABSTRACTS AND REVIEWS

AN ECOLOGICAL STUDY OF THE CAVERNICOLOUS FAUNA OF THE NULLARBOR PLAIN SOUTHERN AUSTRALIA. By Aola M. Richards. J. Zool., Lond., 164, 1971 : 1 - 60.

The Nullarbor Plain is a low plateau of Tertiary limestone in southern Australia. Its caves may be classified as deep or shallow. They occur in the inland open shrub steppe zone, and the coastal mingled arid scrub and semi-arid mallee zone. Comparison is made between surface, doline and cave climate in both regions, and the significance of the special climatic conditions on the fauna is discussed. Although caves appear extremely dry, relative humidity is fairly high. Animal burrows have a microclimate intermediate between caves and surface. Plants on the surface are xerophytes, and many are halophytes; but in the dolines they are less salt-tolerant and require moister, more sheltered conditions. Many vertebrates use the caves as temporary shelters, while others may be trapped in them accidentally. Nineteen species are recorded - eight mammals, eight birds and three reptiles.

Arthropods are the principal inhabitants of the caves. Ninety-five species belonging to 17 orders and 58 families are recorded from 47 caves, and their distribution is given. Of these 25% are accidentals, 17% trogloxenes, 52% troglophiles and 6% troglobites. About 80% are identified to genus or species. Within the caves four biotopes are examined - the Parietal Association, the Guano Association, the Dark Zone and the Liquid Medium. The species are grouped into several associations within the first three biotopes - on walls, on floor, under stones, around carcases, amongst guano and decaying vegetation. No macroscopic species have been found in the underground lakes. Only one arthropod species is definitely associated with deep as opposed to shallow caves. About 69% of the species are predators or saprophages; the rest are coprophages, necrophages or ectoparasites. Saprophages or coprophages comprise the greatest number of individuals in the population. Food preferences are listed for a number of arthropods, and a generalised food web has been constructed. Some species travel considerable distances throughout the caves, and a number of Dark Zone species are recorded on the entrance talus slope, in the dolines, or on the surface. About 59% of the species are known only from a single cave, but 29% are widely distributed across the plain. Cave "breathing", the cool, humid night climate, strong winds, occasional heavy rain and numerous animal burrows all contribute to the distribution of cave-frequenting species across the plain. Subterranean migration may also occur. The cave arthropods may be divided into two groups, one much older geologically than the other. It is suggested that specific climatic conditions have been required for colonisation of the caves, and these are considered in relation to current information on the Quaternary climate of the Nullarbor. Much recent colonisation has been by species from eastern Australia. - Author's abstract.

SMALL FOSSIL VERTEBRATES FROM VICTORIA CAVE, NARACOORTE, SOUTH AUSTRALIA. 1. POTOROINAE (MACROPODIDAE), PETAURIDAE AND BURRAMYIDAE (MARSUPIALIA). By Meredith J. Smith. Trans. R. Soc. S. Aust., 95 (4), 1971 : 185 - 198.

Abundant fossil remains of marsupials and rodents have been found in a silty deposit in Victoria Cave, near Naracoorte, South Australia. The animals range in size from diprotodontids to macropodids and down to dasyurids and rodents. The abundance of large extinct herbivores and *Thylacoleo* suggests that the deposit was formed during the Pleistocene and sealed before the Recent. No remains have yet been found of non-endemic mammals, such as rabbit, fox or house-mouse, nor of man or dingo. This paper describes remains of *Potorous apicalis*, *P. platyops*, *Bettongia gaimardi* and *B. penicillata* (Macropodidae, Potoroinae), *Pseudocheirus peregrinus* and *Petaurus breviceps* (Petauridae) and *Cercartetus nanus* (Burramyidae). Extensions of the previously known ranges of *P. apicalis*, *P. platyops* and *B. gaimardi* are noted. *Potorous morgani* Finlayson, 1938 is shown to be a synonym of *P. platyops* (Gould, 1844). It is suggested the accumulation of *Potorous* and *Bettongia* bones may be due to a predator such as a marsupial carnivor or large owl; the cave may have been a simple pitfall trap; or the animals may have died elsewhere and been washed in at a later stage. The total environment will be considered in detail when the stratigraphy of the deposit and the animal remains have been more fully investigated. - A.M.R.

ADDITIONAL NOTE TO BUNYA MOUNTAINS CAVE

PAPER COMMENCING PAGE 73

Since the earlier part of this issue went to press an additional note on the Bunya Mountains Cave paper has been received from the author. The author states that he recently visited Tunnel Cave, a lava cave in the Mt. Eccles National Park, in Victoria, and observed that some sections of the walls were smooth and decomposed in a manner similar to that described in his paper, except that no zeolite veins were noted at the surface of the wall. This similarity, combined with a recent report of up to nine inches of water in the main crawl passage in the cave in the Bunya Mountains, supports the theory of a modified lava cave origin for the Bunya Mountains Cave.

Also, under the heading of "Biology" on page 76, the author adds an additional report in the bat record list -

? September 1971 nil R.A. Young

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END OF VOLUME NINE