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Helictite

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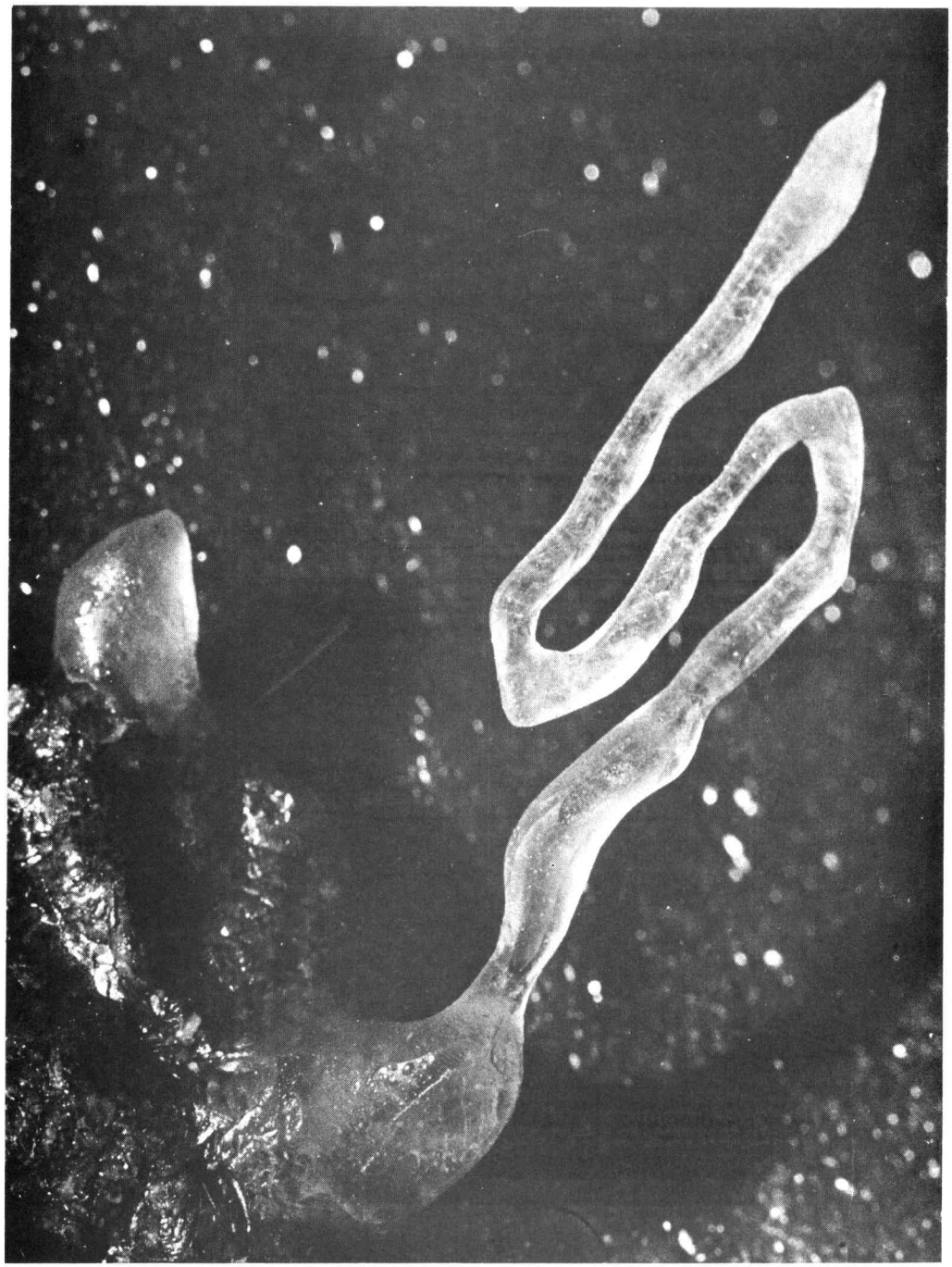

Helictite in Gem of the South formation, Temple of Baal, Jenolan, N.S.W.

Photo: A. HEALY

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"H E L I C T I T E"

Journal of Australasian Cave Research

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AUSTRALIAN BLATTIDAE (BLATTODEA) I. GENERAL REMARKS AND REVISION OF THE GENUS POLYZOSTERIA BURMEISTER. By M. Josephine Mackerras. Aust. J. Zool., 13, 1965 : 841 - 882.

The family Blattidae (Cockroaches) is well represented in Australia, numerous genera and species having been recorded, nearly all belonging to the subfamily Polyzosteriinae. Fifteen species of Polyzosteria Burm. are now known, and three of these are described in this paper as new. Of interest is the occurrence of two of these species in limestone caves on the Nullarbor Plain. P. pubescens Tepper has a wide distribution from the Murchison district right across into the Nullarbor Plain. It has been collected from Weebubbie Cave, near Eucla. P. mitchelli (Angas) is the most widespread species known, extending from Victoria, through South Australia to Western Australia. It has been taken from Warbla Cave, near the Western Australian border, and Kestrel Cavern, near Madura. Neither species shows any signs of cave adaptation. - A.M.R.

AUSTRALIAN BLATTIDAE (BLATTODEA) III. REVISION OF THE GENERA ZONIOPLOCA STAL AND EPPERTIA SHAW. By M. Josephine Mackerras. Aust. J. Zool., 13, 1965 : 903 - 927.

Nine species of Zonioploca Stal are now known, and three are described in this paper as new. Of interest is the species Z. medilinea (Tepper) which has a wide distribution from Victoria across to Perth in Western Australia. It has been collected from the surface of the Nullarbor Plain at Eucla, near Weebubbie Cave and near Cocklebiddy; and from inside Warbla Cave, near the Western Australian border. It shows no signs of cave adaptation. Four species of Eppertia Shaw are also discussed, but are not considered in this abstract as none of them occur in caves. - A.M.R.

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CAVES OF THE CHILLAGOE DISTRICT, NORTH QUEENSLAND

E. Hamilton-Smith*

Introduction

The caves of the Chillagoe District are well-known by repute, but have not been described in speleological literature to date. The author visited the area in April, 1964, in company with Mr. D. Fitzsimon, of Mareeba. This paper summarises observations made on that occasion.

Chillagoe is an almost deserted town, once the centre of an extensive mining industry, and is situated about 120 miles west of Cairns, North Queensland. Access may be gained either by road or rail from Cairns. It can be seen from Table 1 that the climate is monsoonal, with comparatively heavy summer rains, but with dry weather throughout the remainder of the year. The Silurian limestone in which the caves occur forms a belt some 40 miles long by four miles wide, extending from Almaden in the southeast to the Walsh River in the northwest. Caves probably occur throughout much of this belt, but known caves are concentrated in the Chillagoe and Mungana areas. Mungana lies approximately ten miles northwest of Chillagoe.

Geology

Many accounts have been published of the geology of the area, but most are concerned with the rich mineral deposits of the region, including tin, copper, wolfram, lead, silver, gold and fluorspar. These occur generally in the contact zone between limestones and granites, although other deposits are found in shears or fissures within the limestone. The total value of production during the period 1909-1958 has been recorded as exceeding $10 million. Mining, however, was at its zenith in the first ten years of this century.

White (1961) has discussed the geological history of the area; a general geological account is provided by de Keyser, Bayly and Wolff (1960); and de Keyser and Wolff (1964) have published a detailed report, together with geological maps. The Chillagoe formation is described as consisting of steeply dipping limestones with interbedded chert and sandstones and minor intrusions of basic volcanics. However, the bedding is poorly expressed, and there seems to be no evidence of bedding having influenced cave development. On the other hand, cave patterns appear to have been largely determined by later jointing.

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* 17 Helwig Ave., Montmorency, Victoria.

This formation is bounded on the west by Precambrian metamorphics and on the east by the Almaden granites. The limestone is exposed as a series of conspicuous outcrops, generally trending in a northwesterly direction with near-vertical sides and spectacular, jagged profiles. As shown in Plate 2, Figure 1, there is a flat alluvial plain between the outcrops with a number of small creek beds. At the time of the author's visit these were generally dry, although a few isolated pools remained, and they apparently only run for a short time each year following the monsoonal rains.

Karst Landforms

The typical larger outcrops form hills that measure as much as 2,500 feet in length, and rise from 60 to 200 feet above the surrounding plain. These are generally steep-sided, and the highest points often occur along the edge or rampart. Plate 2, Figure 2, shows the vertical ramparts of the outcrop containing the Royal Arch Caves. The top of each outcrop is greatly dissected into pinnacles and ridges, enclosed depressions and sharp-edged, vertical grooves. Many enclosed depressions are blocked with broken rock, but some open into caves below.

Smaller outcrops often appear as a jagged mass of boulders rising to an apex in the midline. These minor outcrops are in many cases only some 40 feet long and 10 to 15 feet high. Some other smaller occurrences form towers, sometimes asymmetrically, and may well represent remnants of larger masses.

Around the base of each outcrop there is generally a mass of broken rock and soil forming a gentle debris slope to the plain (Plate 2, Figure 1). However, at Mungana, cliff-foot caves are found similar to those described from the Kimberleys by Jennings and Sweeting (1963). Here the limestone ramparts rise in almost vertical cliffs immediately above the cave overhang.

Karst corridors, again similar to those described by Jennings and Sweeting (1963), are also present. The best example seen was the series of corridors associated with the Markham Cave at Mungana. These are some two to six feet wide at the base and some 60 feet deep. The floor is often covered with fallen masses of broken rock. Several small bridges of rock roof sections of the corridor and a considerable amount of flowstone is deposited on the walls. However, in spite of the presence of these features, the narrow cross-section of the corridors, tapering to the bottom, suggests development by solution from the surface. The related cave passages were wider and tapered to an apex at the roof, presenting a quite different cross-section to the corridors, although often continuous with them.

Minor features of the rock surface include vertical flutings of all sizes, divided by ridges with extremely sharp edges. Solution pans are found occasionally on top of blocks, but are generally no more than 12 inches in diameter. These are generally clear of soil and have a smooth, almost

TABLE 1

Mean monthly rainfall at Chillagoe
Commonwealth Bureau of Meteorology figures

Jan.	829	Jul.	23
Feb.	767	Aug.	11
Mar.	508	Sep.	7
Apr.	123	Oct.	40
May	60	Nov.	117
June	42	Dec.	507

Annual total 3,034 points

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glassy surface. Other surfaces exhibit extensive pitting, again with sharp ridges or points occurring over the whole surface.

It will be seen in Plate 3, Figure 1, that some etching out has occurred in the horizontal plane, often quite deeply. This appears to have little influence upon vertical sculpturing and does not in any way affect the general pattern of fluting.

The Caves

The Royal Arch Cave, Chillagoe, is the best-known cave system in the area, and is the one usually known by the name of the "Chillagoe Caves." The cave passages are generally up to 50-60 feet in height and range from corridors only five feet in width to rooms 50 feet wide. Although no map of the system has been published, it would appear to be joint-controlled and to form a rectangular grid of passageways. In a number of rooms, small roof holes open to the surface, while in other cases, large openings expose virtually the whole chamber to daylight.

Some massive decorations, dry at the time, occur in this cave and coupled with the graceful tapering of the walls to the apex of the roof, and the white colour of much of the limestone, give the cave a certain beauty. Although not justifying the rapturous description of Archer (1946) or some other popular writers, this and other caves in the area are not unworthy tourist attractions.

The floors of the cave are generally flat and composed of red alluvium, although there are piles of broken rock in places. As far as can be ascertained, the cave floor is nowhere lower than the plain surrounding the outcrop. There are flood-water marks on the walls up to five feet from the floor and much of the limestone in the lower parts of the wall is considerably fretted, apparently by the action of flood-waters. There is no evidence

CAPTIONS TO PLATES

Plate 2, Figure 1 (opposite page): Southwestern wall of the outcrop containing the Royal Arch Cave, Chillagoe, North Queensland, showing the debris slope leading to the flat surface of the alluvial plain.

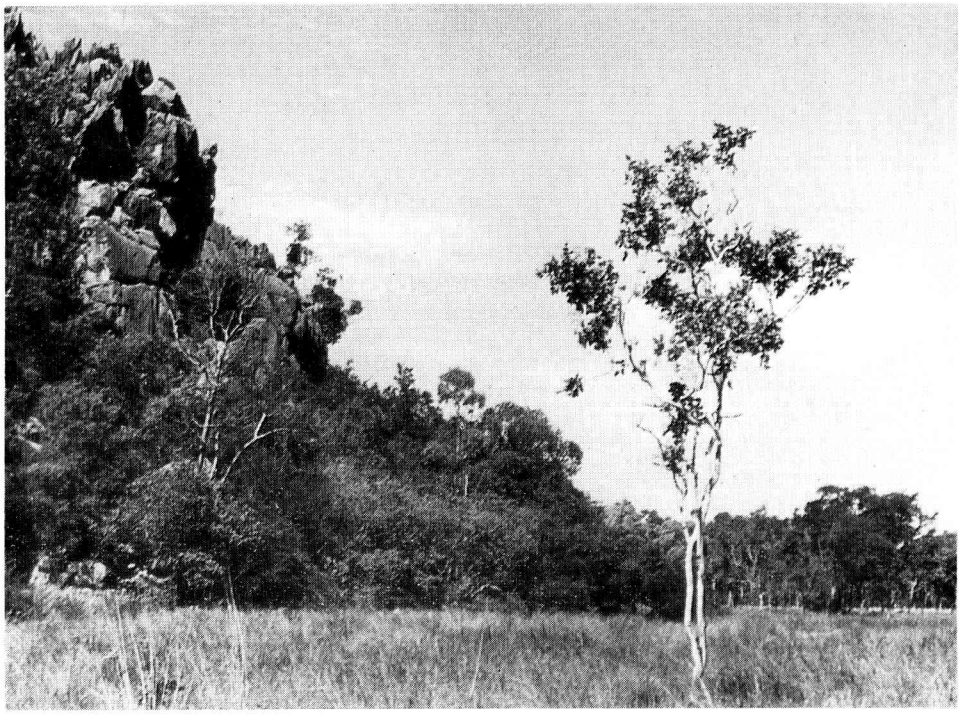
Plate 2, Figure 2 (opposite page): Near-vertical rampart of the outcrop containing the Royal Arch Cave.

Plate 3, Figure 1 (opposite page 57): Upper surface of the outcrop containing the Royal Arch Cave, showing erosional ridges and pinnacles. Note horizontal etching.

Plate 3, Figure 2 (opposite page 57): Aboriginal paintings in cliff-foot cave near Mungana, North Queensland.

Photos: Plate 2, Figures 1 and 2, and Plate 3, Figure 1, from Agfacolor transparencies by E. Hamilton-Smith. Plate 3, Figure 2, from a black and white negative by E. Hamilton-Smith.

PLATE 2



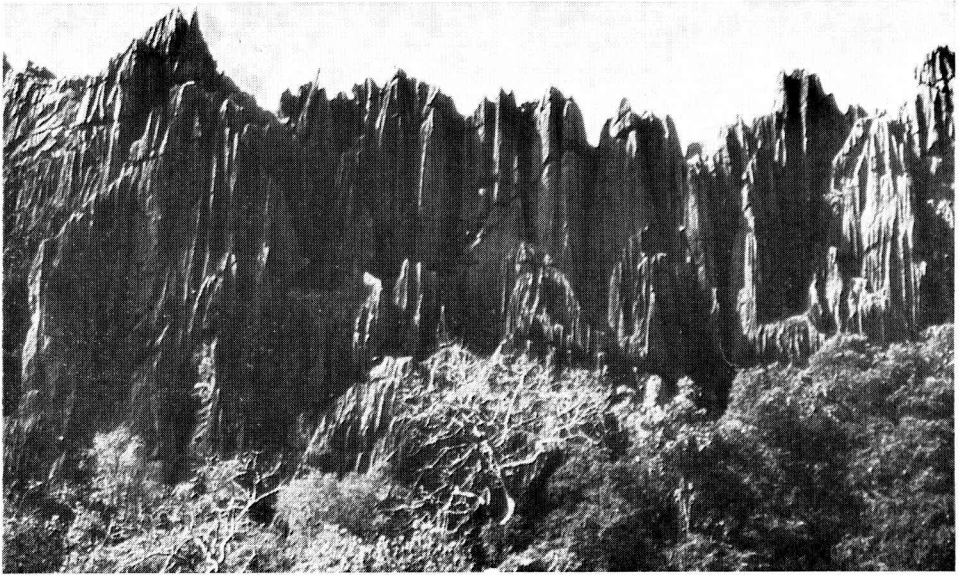
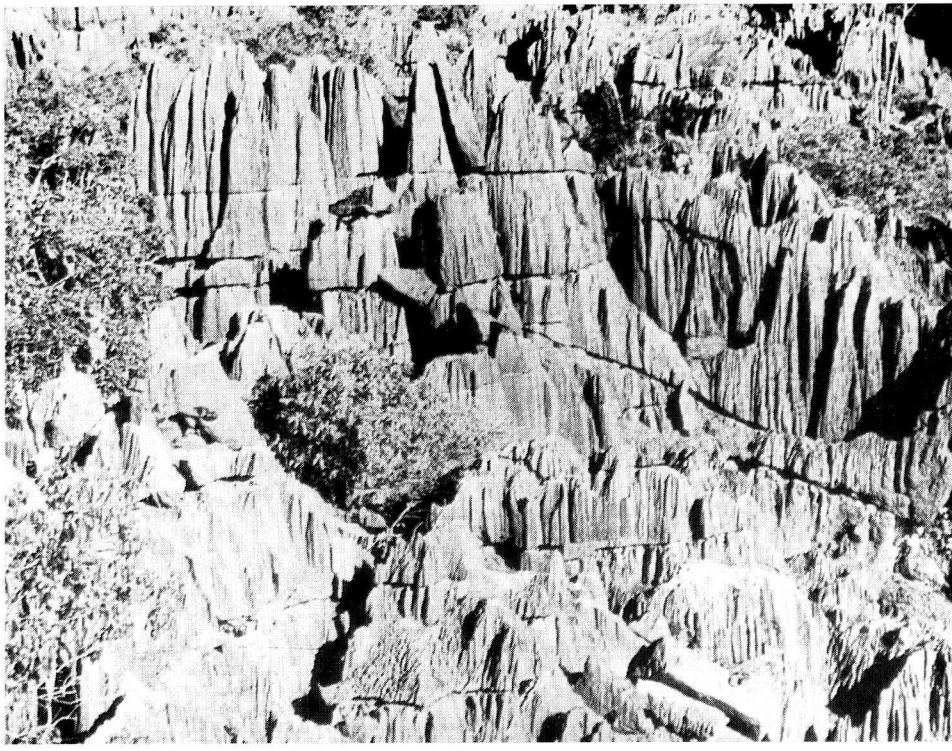
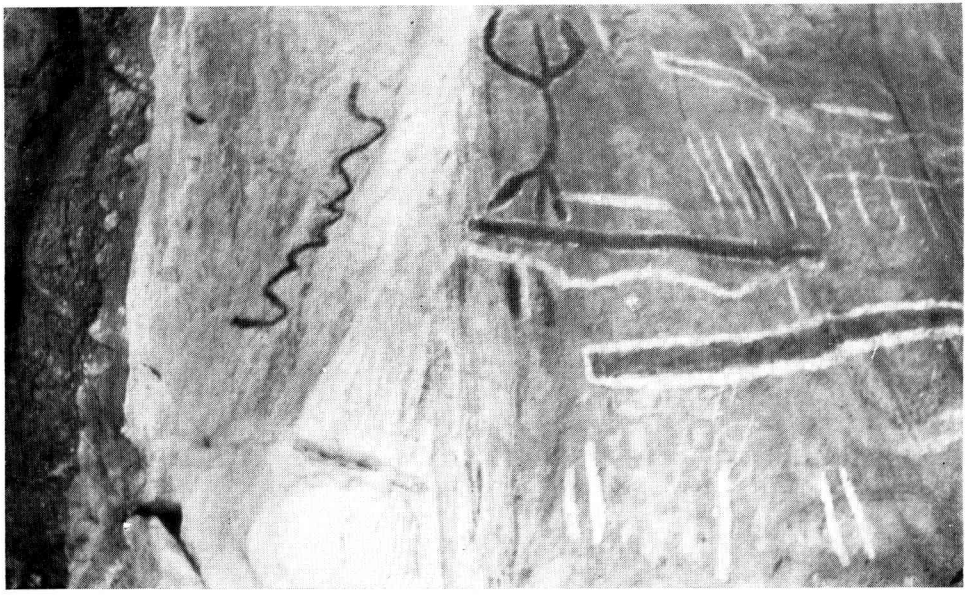


PLATE 3





in this or any of the other caves seen of the "underground streams" mentioned by Archer.

Examination of the top of the outcrop which contains the Royal Arch Cave, reveals a number of holes which lead to what appeared to be large caves, but not corresponding to those explored already. The Royal Arch Cave only occupies a small part of the outcrop and intensive investigation could doubtless reveal many further caverns.

Donor's Cave (or the Madonna Cave), Chillagoe, is entered by a steeply sloping passage on the side of an outcrop. The cave consists of a large chamber with extensive smaller passages leading off it at various levels and forming a maze. Some decoration was still dripping and several static pools occurred in the passages.

A large doline in the centre of an extensive outcrop affords entry to a karst corridor which leads into the Markham Cave, Mungana. This cave contains a number of passages, clearly joint-controlled and forming an obvious grid pattern. A number of large circular rooms also occur, some again having skylights of various sizes. In one of these, an enormous fig tree has grown from a ledge on the edge of the skylight and its roots form bizarre patterns over the walls and floor of the cave.

In several places high roof domes are matched by vertically sided pits in the floor. These are from six to ten feet in diameter and up to 15 or 20 feet deep. They appear similar to the domepits common in the caves of certain areas of the U.S.A. as described by Moore and Nicholas (1964). Again, although mapping is needed to confirm this, it appears that at no point does this cave penetrate below the level of the plain surrounding the outcrop.

The Haunted Cave, Mungana, is similar in form to the Markham, with big rooms connected by corridors or passages on a grid pattern. Another entrance alongside the Haunted Cave, but apparently not connected with it, leads to a deep vertical pit which could not be explored further owing to lack of equipment. This pit appears to receive considerable amounts of water draining from the surface of the outcrop.

The cliff-foot caves at Mungana (referred to above) are decorated with a number of aboriginal paintings, some of which are shown in Plate 3, Figure 2. A number of artifacts have been collected from these caves, although there appeared to be little depth of occupational debris.

Cave Geomorphology

The brief investigation described here is insufficient to arrive at any conclusions regarding geomorphology or speleogenesis, but a few interesting features may be pointed out.

The boxwork pattern of many caves reveals marked structural control, probably by joints in the limestone, but this is complicated by the presence of large chambers and the circular rooms in particular are hard to explain. The horizontal nature of the caves and their flat floors suggest control by water level and this is apparently controlled by the general ground level outside the limestone hills, as no cave appears to extend below this level. A number of possible explanations may be advanced. The caves may have filled with debris, or cave formation may be taking place above the permanent water-table, perhaps by erosion during the monsoonal flooding. The fretting of the walls in the Royal Arch Cave suggests the latter may occur, at least to some degree. It is of interest to note that the actual entrance of all caves seen is above both the general level of the surrounding plain and of the cave floor, so that flood waters would tend to be retained for a period within the caves. On the other hand, the pattern of cave structure may have been determined completely by earlier climatic patterns.

The various levels of cave passages in Donor's Cave certainly suggest cave formation at several old watertable levels. In the United States, dome-pits are usually considered to have been formed later than, and independently of, other cave passages. It would be interesting to know whether the domepits of the Chillagoe area are younger than the horizontal passages or of similar age.

Although the general scenery of the area appears to be typical tropical karst, the caves present a number of unusual features. However, much more thorough investigation and, in particular, detailed survey of a number of caves is required before any conclusions may be drawn.

Biological Observations

A small group of Miniopterus schreibersi (Kuhl) were seen in the Royal Arch Cave and a single specimen of Miniopterus australis Tomes taken from a small alcove near the cave entrance. This latter species has not previously been recorded from the area. Both the Markham Cave and the Haunted Cave sheltered a number of Taphozous sp., all of which were roosting in the twi-light zone and took flight readily.

Few invertebrates were seen in the caves. These consisted of a cockroach hiding in rubble on the floors, several species of spider, and a small purplish-brown cave cricket. In one section of the Royal Arch Cave an ant colony had penetrated into the cave, apparently by following tree roots from the surface. These were accompanied by a number of larvae of one of the Homoptera, while an ant-lion had made its pitfall in the sandy floor of the cave below the colony.

National Parks

Many of the caves and the area surrounding them have been gazetted as

National Parks. Mr. V. Kinnear, of Chillagoe, has been appointed a part-time warden and has taken a keen interest in the preservation of the caves. Much rubbish has been removed and writings cleaned from the walls by Mr. Kinnear so that the caves now present a reasonably pleasant appearance.

Acknowledgments

The author wishes to record his thanks to his companion during the visit, Mr. D. Fitzsimon, of Mareeba, without whom the visit would have been impracticable. Mr. and Mrs. P. Freney, Mr. and Mrs. F. Tresize, and Mr. V. Kinnear also provided much appreciated help and hospitality. Mr. D. Taylor, of Melbourne, provided preliminary data relating to the area, while both he and Mr. C. Ollier of the Department of Geology, University of Melbourne, have assisted by reading the first draft of this paper and making invaluable comments thereon.

References

ARCHER, R. 1946 : Weird Rocks of Chillagoe. Walkabout, 12(7) : 11 - 12.

de KEYSER, F., BAYLY, M.B., WOLFF, K.W. 1960 : The Chillagoe Area. J. Geol. Soc. Aust., 7 : 116 - 123. (The Geology of Queensland).

de KEYSER, F., WOLFF, K.W. 1964 : The Geology and Mineral Resources of the Chillagoe Area. Geol. Surv. Qld. Pubn., 317 : 136 pp.

JENNINGS, J.N., SWEETING, M.M. 1963 : The Limestone Ranges of the Fitzroy Basin, Western Australia. Bonner Geographische Abhandlungen, 32 : 60 pp.

MOORE, G.W., NICHOLAS, G. 1964 : Speleology - The Study of Caves. D.C. Heath, Boston : 120 pp.

WHITE, D.A. 1961 : Geological History of the Cairns-Townsville Hinterland, North Queensland. Bur. Min. Resour. Aust. Rept., 59 : 33 pp.

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GECKO CAVE (N51), EUCLA BASIN, WESTERN AUSTRALIA

D.C. Lowry, M.Sc.

Geological Survey of Western Australia

Gecko Cave (N51) was found in June, 1965, by the author in company with Mr. W.A. Crowle during geological mapping of the Eucla Basin, Western Australia. Although the cave is small, it is worth describing as it is typical of a large number of shallow caves in the southwestern part of the Eucla Basin.

The cave lies approximately 16 miles on a bearing of about 105° from Mount Ragged (see Figure 1). It occurs in a dense patch of scrub which appears on air photograph Malcolm Run 10 No. 5153 (WA 805, 1962 hotography). It is 2.95 inches on a bearing of 208.5° from the centre point of a standard print. The cave is reached after ten miles of tedious cross-country driving through dense mallee scrub.

The cave occurs on the southeastern side of a shallow doline 50 yards in diameter and 5 to 10 feet deep. On the south, the wall of the doline forms a low bluff which overhangs in three places (see Figure 2). Gecko Cave leads off from the easternmost overhang and consists of a single passage about 30 feet long, 5 feet wide, and 1.5 to 3 feet high. The passage lies 10 to 15 feet below the surface of the surrounding plain. The cave is developed in friable Wilson Bluff Limestone of Eocene age, and has a floor of fallen limestone blocks.

The Gecko Cave was inhabited by at least three gecko lizards (hence the name), and a specimen sent to the Western Australian Museum has been identified as Phyllurus milli Bory.

The air photographs indicate the existence of scores of other shallow dolines in the vicinity, distributed along joints trending in a northeasterly direction. Four other dolines were visited nearby and all had overhangs or small shallow caves similar to Gecko Cave.

The Wilson Bluff Limestone is soft and weathered near the surface and is overlain by a cap of kunkur. The dolines and caves appear to have been formed by collapse, and the overhangs were formed by the soft limestone falling away from the kunkur crust. Although both Gecko Cave and the "deep caves" of the Eucla Basin appear to have been formed by collapse (Lowry, 1964), Gecko Cave appears to have resulted from collapse into a cavity that was developed at a depth of some 20 feet below the surface, and not at a depth of several hundred feet. It is tentatively suggested that the initial

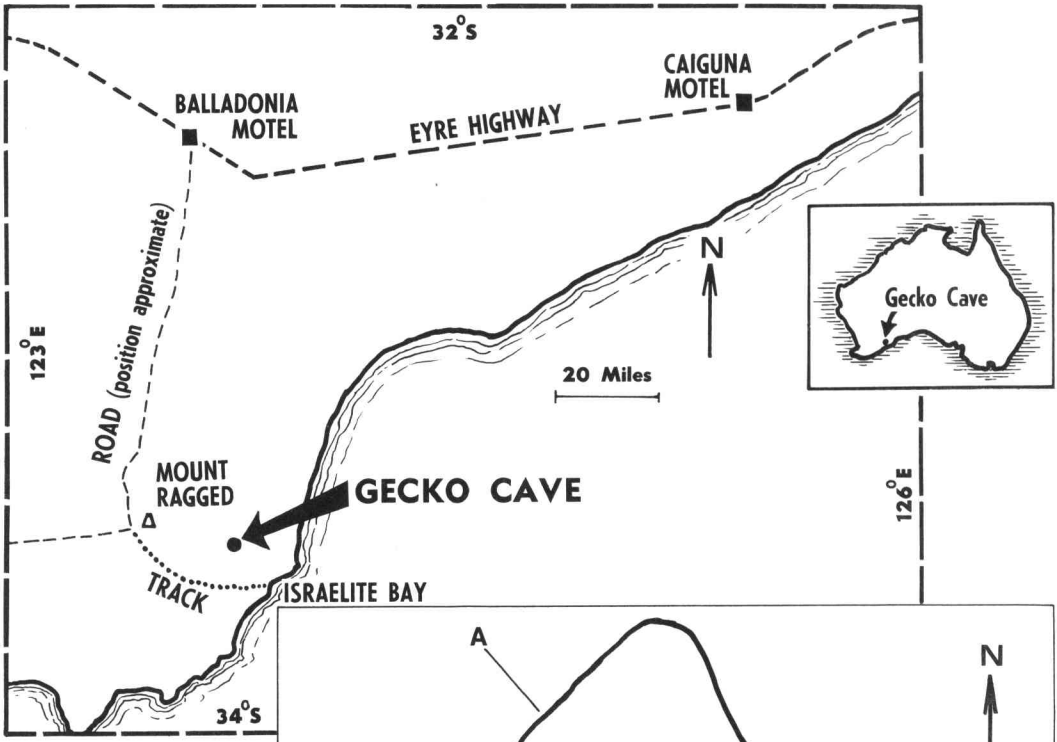

Fig. 1 Location Diagram

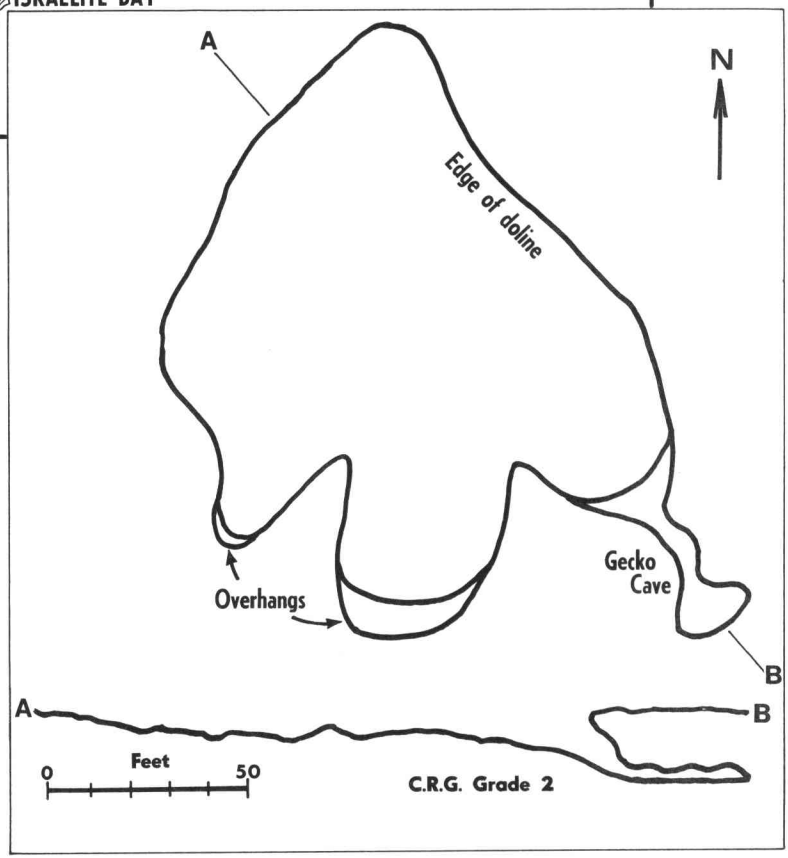

Fig. 2 Map and section of Gecko Cave and doline

cavity was formed by solution of the weathered limestone by vadose water.

Reference

LOWRY, D.C. 1964 : The Development of Cocklebiddy Cave, Eucla Basin, Western Australia. Helictite, 3(1) : 15 - 19.

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JENOLAN OBITUARIES

W.L. HAVARD, MISS HAZEL WIBURD, A.J. PERIER, J. O'CONNOR

During the past 2½ years, the deaths have occurred of four people closely connected with the history of Jenolan Caves, New South Wales - the historian, W.L. Havard; Miss Hazel Wiburd, the daughter of Jenolan's great explorer and guide, J.C. Wiburd; the pioneer photographer, A.J. Perier; and J. O'Connor, a recent chief guide at Jenolan and a young contemporary of J.C. Wiburd.

Although I had spoken to Ward Havard on a number of occasions, I knew him best through his many fine historical papers, in particular his paper first read before the Royal Australian Historical Society on November 28, 1933, "The Romance of Jenolan Caves." This 48 page paper was printed in Volume XX, Part 1 : 18 - 65, of the Society's Journal and reprinted privately by Havard from the typeset (no date). The history encompassed many years research and covered a period from the 1820's. This paper is still the only published full-scale history of Jenolan Caves, from its discovery (1838) to 1929.

Havard's historical papers were largely concentrated on the Blue Mountains-Jenolan Caves area, although he produced many studies of such people as Sir Thomas Mitchell, Sir Paul Strzelecki and Francis Greenway. In his historical research he was associated with such well-known workers in this field as B.T. Dunlop, B.T. Dowd, J. Jervis and W. Foster.

Ward Havard is notable also for vast effort put into card catalogues of Australian history - 30,000 cards covering the contents of the R.A.H.S. Journal and Proceedings from its first publication in 1906 to 1957, now held by the Historical Society, and an index of the Historical Records of Australia containing more than 100,000 entries and comprising about 48,000 cards, and presented to the Public Library of N.S.W. in 1958. W.L. Havard's death on August 6, 1964, at the age of 67 was indeed a great loss to N.S.W. historical research.

On April 11, 1964, Miss Hazel Wiburd died at Mosman, Sydney. Miss

Wiburd was the daughter of J.C. Wiburd who retired in 1932 after 42 years as a guide at Jenolan, Caretaker and Chief Guide, and finally Superintendent of Caves in N.S.W. He died in 1942 in Sydney.

I visited Miss Wiburd at her Mosman home several times and found her a delightful person, full of tales of Jenolan, of her father's explorations, and her own earlier life there. My various talks with Miss Wiburd and her brother, Dr. C.R. Wiburd, were instrumental in answering many questions regarding the history of Jenolan since the turn of the century. For example, the significance of the rock scratching of a pennyfathing bicycle and caption near it in the squeeze under and behind the Lily of the Valley, Imperial/Jubilee Cave system.

Miss Wiburd presented me with a large collection of historical photographs and albums, guide books, and other souvenirs - the remains of a huge collection of her father's, much of which had been destroyed earlier, including, alas, all his exploration notebooks! After her death, I found Miss Wiburd had willed me a group of beautiful wood carvings of Jenolan cave scenes executed by her uncle 50 years earlier.

One of the best-known figures in early photographic circles in Sydney, Albert J. ("Mons") Perier, also died in 1964 - on January 8 at the age of 92.

Mr. Perier, a Frenchman, came to Australia in 1892 and joined the photographic firm of Baker and Rouse, later to become Kodak (Australasia) Pty. Ltd. Mr. Perier and his late brother visited Jenolan a number of times between about 1897 and 1902 and made large numbers of glass-plate stereo photographs of the caves, developing the plates underground and washing them in the cave rivers and pools. A kind of instant darkroom. Mr. Perier had the distinction of being one of the first persons to drive a car to Jenolan - a De Dion, about 1904, if my memory of a talk with Mr. Perier some years ago serves me right. In 1960, Mr. Perier gave me a collection of about 100 glass-plate negatives of Jenolan, many of which have historical value.

Finally, Jack O'Connor who retired as Head Guide at Jenolan in 1955. He first came to Jenolan as a boy and spent the greater part of his life employed at the caves. I had my first experiences as a vacation-time guide over Christmas and other holiday periods under Mr. O'Connor's tutorage at Jenolan about 1953 or '54. I still have memories of shunting a tourist party of 170 through the narrow passages of the Imperial Cave and a nice, neat little party of 250 through the Lucas Cave. Jack O'Connor had many tales to tell of Jenolan, especially of the depression days when hundreds of feet of tracks and tunnels were dug in caves on both sides of the Grand Arch to provide relief work for the unemployed. I missed our many chats after he retired to Bathurst, N.S.W., where he died two years ago.

- E. A. LANE.

ACTIVITY RHYTHMS IN RHAPHIDOPHORIDAE (ORTHOPTERA) FROM AUSTRALIA AND NEW ZEALAND

Aola M. Richards, M.Sc., Ph.D.

School of Biological Sciences, University of New South Wales

Throughout 1955 and early 1956, a series of observations were made on the activity rhythms of two species of Rhaphidophoridae (Subfamily Macropathinae), Gymnoplectron waitomoensis Richards and Pallidoplectron turneri Richards in the Waitomo Cave (Glow-worm Cave) at Waitomo, New Zealand.

From a total population of about 500, more than 300 P. turneri were caught, marked with a dab of paint and released. Their subsequent movements on the walls of the Grotto tunnel and at the river entrance to the cave were then observed. A colony of about 20 G. waitomoensis living near the main entrance to the cave were also under observation throughout November, 1955, and January, 1956.

During 1963 and 1964, comparative observations were made on two Australian species of Macropathinae - over 1,500 specimens of an unnamed species in the Alexandria Cave, Naracoorte, South Australia, and about 75 Australotettix montanus Richards in the Blue Mountains of New South Wales.

In all cases, the insects began moving outside the cave entrances about half an hour after sunset. A peak of activity was reached about an hour after sunset and from then on the insects gradually returned inside the cave. During the two hours following dusk there was a constant, slow stream of insects moving towards the entrance and another stream returning. Some insects could be observed feeding on the surrounding vegetation. In many cases they rested on the walls outside without showing any signs of activity. By two and a half hours after sunset most of the insects had returned inside the cave. Varying weather conditions effected the number of insects which emerged, and the length of time they remained outside. Under favourable conditions, 20 to 30 percent of the total population emerged. In the case of P. turneri, if weather conditions were unfavourable, the largest aggregation was about 13 feet inside the entrance.

A renewal of activity an hour and a half before dawn was recorded for G. waitomoensis. By about 20 minutes before sunrise the insects had moved deeper into the cave. No Rhaphidophorids were observed round cave entrances during daylight.

Thus observations on New Zealand and Australian Macropathinae indicate

a bimodal rhythm consisting of a burst of activity shortly after sunset, a quiescent period during the night, a renewed period of activity shortly before dawn, and a further quiescent period during daylight. A similar rhythm has been recorded in the aestivating Bogong moth, Agrotis infusa (Boisd.), in caves on Mount Gingera, Australian Capital Territory.

In North America, studies have been made on the Rhaphidophorid Hadenoecus subterraneus (Scudder) (Ceuthophilinae) in Cathedral Cave, Mammoth Cave National Park, Kentucky. Some workers have found a peak of activity about midnight, and an inactive period during the day. Others claim that each night one third of the population of H. subterraneus leaves Cathedral Cave after twilight, but does not return till dawn. This exodus is assumed to be for feeding.

The activity rhythm of another North American Rhaphidophorid, Ceuthophilus guttulosus Walker, is closely related to the rhythm of Southern Hemisphere Macropathinae, having a period of activity for about three hours after dusk.

European Rhaphidophorids (Rhaphidophorinae) have been observed to leave caves to search for food at any time throughout the 24-hour day, as they have been found in forests in full daylight. Here, diurnal activity, and not nocturnal activity, is regarded as characteristic of the fauna from caves of the Mediterranean region. Thus, temperature and relative humidity, rather than darkness, are considered responsible for the emergence of these insects. Observations in North America, Australia and New Zealand do not agree with the conclusions reached on European species. Richards (1965) has shown that moonlight and daylight, rather than temperature and humidity, have inhibiting effects on Rhaphidophorid activity. The insects are unable to tolerate light above the low optimum intensity required for them to carry out their nocturnal activities.

Rhaphidophorids are scavengers, and there is a plentiful food supply available to them in most caves where they are found. Feeding therefore need not be the primary, or only factor, which stimulates them to leave caves. Bogong moths do not feed during the period of their emergence, and with the Macropathinae feeding appears to be of secondary importance. Experiments with the cockroach, Periplaneta americana L., have shown that there is no direct connection between a hunger cycle and the activity rhythm. The similarity in the locomotor activity rhythm of the Bogong moth and species of Macropathinae leads one to suppose that, in both cases, rapidly changing light intensity is the main stimulus initiating their activity. In the cockroach the stimulus passes to the suboesophageal ganglion. Here, certain neurosecretory cells immediately begin secreting into the blood or tissues a substance which is involved in the production of the locomotor activity rhythm. Although no experimental proof is yet available for Rhaphidophoridae, a similar mechanism is thought to be at work. There is a lag of two to four hours in the cockroach before activity reaches its

peak, but in Rhaphidophorids and the Bogong moth this peak is reached within an hour.

Summary

Three definite and different activity rhythms are recorded for the three subfamilies of Rhaphidophoridae. In Europe, Rhaphidophorinae have been recorded outside caves in broad daylight, as well as at night. In North America, Ceuthophilinae emerge at dusk and return to the caves before dawn, and there is a peak of activity about midnight. In Australia and New Zealand, Macropathinae have a bimodal activity rhythm initiated by rapidly changing light intensity at dusk and dawn. A peak of activity is reached one hour after the rhythm is initiated.

Reference

RICHARDS, AOLA M. 1965 : The Effect of Weather on Rhaphidophoridae (Orthoptera) in New Zealand and Australia. Annal. Spéléol., XX(3) : 391 - 400.

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B O O K R E V I E W S

HORS DU TEMPS - L'expérience du 16 juillet 1962 au fond du gouffre de Scarasson par celui qui l'a vécue. By Michel Siffre. René Julliard, Paris. 1963 : 310 pp., with 14 figures and 36 photographs.

"Beyond Time" is Siffre's account of his 63 days spent alone in Scarasson Cavern in the French Maritimes Alps in 1962. The cave is near Mount Marguareis, northeast of Nice. During this period, Siffre lived in a tent set up on a fossil glacier at a depth of about 110 metres, for the purpose of studying the physiological and psychological effects of prolonged existence deep underground, and the problems of survival, adaptation and human resistance to a hostile environment.

The volume describes the planning and preparation of equipment, and Siffre's descent to the glacier. He then provides a long chapter on his subterranean life and follows it with a 110 page copy of his Journal written during the 63 day sojourn. The Journal is fascinating reading, though somewhat poetic at times rather than scientific. Finally, Siffre records his difficult return to the surface and gives an all-too-brief chapter on assessing the results. Perhaps one of the most interesting effects of Siffre's long stay underground was his gradual loss of sense of clock time and its replacement by natural cycles in his cavern-day.

Hors du Temps, a gift to the reviewer from the author, has already been supplemented by several published papers in French journals, the total work

forming a most interesting study in human rhythms, similar in many ways to that carried out by space specialists. Siffre wrote recently (personal communication) that the Institut Français de Spéléologie expected to publish, in the near future, a further paper following computer analyses in the USA.

Hors du Temps was recently published in translation as Beyond Time by McGraw-Hill Book Company, New York, 1964 : 228 pp., with 21 photographs. However, I have not as yet seen this volume. - E. A. Lane.

CAVING AND POTHOLING. By Donald Robinson and Anthony Greenbank. Constable and Co., London. 1964 : 171 pp., with 13 pages of text figures and 15 photographs.

The authors of this book are both experienced cavers. Robinson is a lecturer and instructor in outdoor pursuits in schools and colleges, and has been a CRO warden for some years. Greenbank is a professional writer and was formerly an instructor at an Outward Bound School.

The book is intended for newcomers to speleology, but all who take an interest in caving can read it with profit. It is excellently written and illustrated, the line drawings in particular are admirable, and clearly convey the points they illustrate. The first chapter is an introduction to caving in the form of a brief description of a cave trip, detailing the difficulties that may be encountered. This is followed by an up-to-date chapter on personal and club equipment, including methods of constructing both wood and metal ladders, and the latest ropes and their advantages. There are sections also on Standard Practice (I wish it were), Techniques, Mapping, Photography; brief chapters on Formation and Formations and Speleobiology; and an excellent chapter on Cave Rescue, which contains clearly written advice which should be compulsory reading for all cavers.

- G. A. Roberts.

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A B S T R A C T S

REVISION OF THE RHAPHIDOPHORIDAE (ORTHOPTERA) OF NEW ZEALAND. PART XII - A NEW SPECIES OF PALLIDOPLECTRON RICHARDS. By Aola M. Richards. Trans. Roy. Soc. N.Z. Zoology, 7(8), 1965 : 135 - 139.

A new species of Rhaphidophoridae belonging to the genus Pallidoplectron Richards, P. subterraneum Richards is described. The species was collected from limestone caves in the Waikato district at Onewhero, east of Port Waikato, and at Matira, west of Huntly. So far all the species in this genus are confined to the northern half of the North Island of New Zealand. They are closely associated with water, and usually are found in limestone caves supporting a large population of glow-worms, Arachnocampa luminosa (Skuse).

P. turneri Richards occurs in the Te Kuiti district, particularly around Waitomo. P. peniculosum Richards has been collected only from Waipu Cave, Waipu, about 100 miles north of Auckland. It is of interest that P. subterraneum not only lies between the other two species geographically, but also is intermediate in many taxonomic characters. - A.M.R.

QUOKKA AT YANCHEP IN HISTORIC TIME. By D. Merrilees. W. Aust. Nat., 10(1), 1965 : 18.

A complete skeleton of a Quokka, Setonix brachyurus, was found in a cave at Yanchep in May, 1965, by two members of the Speleological Group of the W.A. Naturalists' Club. The skull contains a small iron rod or spike penetrating the right anterior palatal vacuity. The neighbouring second and third upper incisors are the only teeth showing signs of damage, and it is suggested this was probably caused by the iron spike. The spike was probably implanted during the animal's life-time, so that the quokka must post-date European occupation of the Yanchep district. This skeleton is evidence of the persistence of Quokka populations near the Perth metropolitan region up till very recent times. - A.M.R.

SUBTERRANEAN OCCURRENCE OF ANASPIDES TASMANIAE (THOMSON) (CRUSTACEA, SYNCARIDA). By W.D. Williams. Internat. J. Speleo., I(3), 1965 : 333 - 337.

Anaspides tasmaniae (Thomson) has been recorded from a variety of habitats in Tasmania, ranging from small moorland pools to upland lakes and streams. In this paper it is recorded from a subterranean habitat for the first time. Specimens were collected from an unnamed cave near Sassafras Creek and from Marakoopa Cave. Both localities are in north-central Tasmania near Mole Creek. The only difference noted from surface forms of A. tasmaniae was the smaller amount of pigment present in the cavernicolous specimens. - A.M.R.

ETUDE DES STALACTITES TUBIFORMES MONOCRISTALLINES. MECHANISME DE LEUR FORMATION ET CONDITIONNEMENT DE LEURS DIMENSIONS TRANSVERSALES. By C. Andrieux. Bull. Soc. Franc. Miner. Crist., 88(1), 1965 : 53 - 58.

The author gives an explanation of how monocrystalline tubular stalactites (straws) commence development on the roof of a cave and how they subsequently grow. Some polycrystalline forms resemble the monocrystalline types and thus the popular term, straw, could also be applied to these.

These stalactites form in caves with stable temperature, humidity and carbon dioxide content, and an absence of condensation and mineral or organic dust. The roof must possess porous zones and from each pore there must be constant dripping at a slow rate.

The physics of drop formation and how this relates to the form of the stalactite are discussed. The author demonstrates that the drop formed at

the end of the tube does not overflow onto the outside wall. The water film covering the outside wall is in equilibrium with the underlying calcite and consequently there can be no increase in external diameter. The external diameter is therefore fixed at the tube's origin and depends on the flow and degree of supersaturation of the water from the feeding pore, and also on the conditions of drainage on the horizontal roof. The inside diameter of the tube varies with the flow of water supplying it.

The straw stalactite begins as a polycrystalline annulus of randomly orientated calcite crystals. The embryo tube thus formed acts as a template on which a single crystal, by chance orientated with the axis of greatest growth vertical, can grow. (The crystallographic orientation is discussed in more detail in a previous paper: "Etude cristallographique des edifices stalactitiques." Bull. Soc. franc. Miner. Crist., 85, 1962 : 67 - 76.)

If flow is too great there is a reversion to a polycrystalline state. Of particular interest is his belief that a very slow flow rate is responsible for the formation of helictites, discussed in a later paper, Bull. Soc. franc. Miner. Crist., 88(2), 1965. - G.S. Hunt.

PSELAPHIDAE (COLEOPTERA) FROM AUSTRALIAN CAVES. By E. Hamilton-Smith. J. ent. Soc. Qd., 5, 1966 : 70 - 71.

Members of the family Psalaphidae have been widely recorded from caves throughout the world. This note is the first record of their presence in Australian caves. An unidentified species of Rybaxis is recorded from the Basin Cave, Wombeyan, N.S.W. Another unidentified species of Rybaxis is recorded from the Grill Cave, Bungonia, N.S.W. Tyromorphus speciosus (King) is recorded from Anticline Cave, Murrindal, Victoria; Southern Limestone Cave, Jenolan, N.S.W.; and Johanson's Cave, Rockhampton, Queensland.-A.M.R.

SOME DISTRIBUTIONAL RECORDS OF BROAD-NOSED BATS (NYCTICEIUS SPP.). By J.L. McKean. Vict. Nat., 83(2), 1966 : 25 - 30.

The ranges of Australian forms of the genus Nycticeius are defined and in some caves extended. N. balstoni balstoni is recorded for the first time in New South Wales. N. orion orion is recorded from Bullio Cave, Wombeyan, N.S.W., and the Grand Arch Cave, Jenolan, N.S.W. These cave records are considered unusual as members of the genus are usually tree and house dwelling. - A.M.R.

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"INTERNATIONAL JOURNAL OF SPELEOLOGY"

A new quarterly periodical, the "International Journal of Speleology," is being published by J. Cramer, Natural History Publisher of Weinheim, West Germany. The editor is Dr. George Claus, a Hungarian microbiologist now living in America. Members of the Board of Consultative Editors have been drawn from several countries. The publication is divided into three sections - microbiology and botany; zoology; and geology and geomorphology. Articles will be printed in one of five languages: English, French, German, Italian and Spanish, with a summary in English, French or German in addition to the original language. Volume 1 (1964-65) has now been published and has a total of 571 pages.

Papers in the first volume were printed in the following languages - French, 16; English, 12; and German, 10. Short notes of general interest, announcements and abstracts of articles appearing in other journals are included in English. Several papers from "Helictite" have already been abstracted in this Journal. Price per year is $US 20 or £7.4.0 sterling, which will place it outside the price range of most Australian speleologists, particularly in view of the restricted knowledge of foreign languages in this country. This Journal aims at a balanced coverage in the three nominated fields of research. However, in the first volume, the editors have failed to achieve this and there is a considerable bias towards zoology and botany - zoological articles, 18; botanical, 10; geological including palaeontological, 8; geophysical, 1; general, 1.

Quality of production, printing and soft binding are excellent. The standard of half-tone and line illustrations is generally satisfactory, with certain exceptions in the zoology section. The practice of putting groups of plates en masse at the end of each part is undesirable. As the Journal is expensive and aims at high standards, surely all the figures could have appeared in their proper context as no special printing methods or paper stock were required.

The Continental method used here of putting the abstracts at the end of articles makes the abstracts more difficult to find than if they were placed at the beginning of the papers. An even better scheme for a journal of this size would be to place the abstracts of all the papers at the beginning of each issue.

It must be realised, also, that several important speleological journals of comparable scope and size are already being published in Europe and America, and have been for many years. e.g., "Annales de Spéléologie" (France) (Volume XX, 1965, totalled 534 pages), "Karszt-es Barlangkutatas" (Hungary), "Stalactite" (Switzerland), "Spelunca" (France), "N.S.S. Bulletin" (U.S.A.), etc. This new International Journal can best serve speleology by restricting itself to significant papers of international interest.