Victorian Cave Bats

By Graeme George and Norman Wakefield

During the past several years, observers have paid some attention to the bat fauna which inhabits caves in various parts of Victoria. It is apparent that this field of study had been neglected, for recent comprehensive books on our mammals give a very incomplete picture of the local distribution of the three species with which this report is mainly concerned.

In the various editions of *Furred Animals of Australia* (1943-1957), Ellis Troughton cited the Bent-winged Bat (*Miniopterus schreibersi blepotis*) as "not yet recorded from the . . . south-eastern corner of the continent", the Eastern Horseshoe Bat (*Rhinolophus megaphyllus*) as ranging south to "the Murrumbidgee River, southern New South Wales", and the Large-footed Myotis (*Myotis adversus macropus*) as "apparently not yet recorded from eastern Victoria or New South Wales". None of these species appears in C. W. Brazenor's *Mammals of Victoria* (1950).

In actual fact, the Bent-wing is the common cave bat of south-eastern Australia, the Eastern Horseshoe Bat is plentiful in limestone caves of the Buchan district of eastern Victoria, and the Large-footed Myotis occurs at Buchan also. Our present knowledge of the cave bats of this state is due firstly to observations by members of cave exploration societies, and secondly to recent investigations by the Fauna Survey Group of the Field Naturalists Club of Victoria.

For the first correctly identified records in Victoria of *Miniopterus* and *Rhinolophus*, credit belongs to Miss Barbara Dew of the School of Public Health and Tropical Medicine, Sydney University. When asked recently for specific data about these records, Miss Dew replied that the observations were made at Buchan from December 24, 1953, to January 2, 1954. Her notes were as follows:

> The Eastern Horseshoe Bat, *Rhinolophus megaphyllus*, was caught and released in Blackwood Cave (only a few specimens seen) and one of a group was caught at the entrance to the Royal Cave (open to tourists) at night. These bats were only seen in this locality at night and then only in the first part. They were *not* found in the cave itself during the day. (Specimen Aust. Museum Reg. M 7823.)
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> *Miniopterus schreibersi* (*blepotis*) was very common and we took specimens from the following caves: Federal (a few), Blackwood (common), Moon (plentiful) and Wilson (very, very common). In this last cave they were so plentiful that we left them in complete possession as general exploration would have been most unpleasant due to the rain of guano. (Specimen Aust. Museum Reg. M 7824.)

Since its formation about a year ago, members of the Fauna Survey Group of the F.N.C.V. have made a number of field excursions to basalt caves in the Colac district of western Victoria and to the limestone areas

Small Groups of Bent-wings on the wall of Mabel Cave, East Buchan.

Photo: N. A. Wakefield

of the Buchan country. Notes have been kept of numbers of cave bats in certain of their habitats, and from these a general picture may be obtained of the status of the three species under discussion and of the fluctuation in their numbers in various places.

Bent-wing Bat

Miniopterus schreibersi blepotis

The Bent-wing is widespread and very common in Victoria, and we have identified it from caves in the Buchan and Colac districts, from rock crevices along the Yarra River at Warrandyte and from a granitic outcrop near Genoa. Cave bats are known to occur in other parts of the Western District and eastern Victoria, and most likely these are Bent-wings also.

Although it was not recognized in Victoria, *Miniopterus schreibersi* was identified correctly in South Australia. In 1925, Wood Jones cited "a good series captured in the Naracoorte caves". (Ref. *Mammals of South Australia,* Part III, p. 433.)

In the Buchan district, most of the accessible limestone caves and recesses opening on hillsides or in cliff faces contain colonies of Bent-wings at one time or another. They have been observed by members of the Fauna Survey Group in Moon, Maze and Spring Creek Caves in the Buchan Caves Reserve, in Mabel, Clogg's and Wilson Caves at East Buchan, and in the Anticline Cave* at Murrindal. About fifty miles north of Buchan, near McKillops Bridge on the Snowy River, there are some old copper workings; a tunnel has been driven into the hillside and this is a regular roosting-place of Bent-wings.

In the basalt at Mount Porndon, in the Stony Rises of the

*This name has been adopted by the Speleological Society for the old Federal Cave at Murrindal, to avoid confusion with the well-known Federal Cave at Buchan.

Western District, there are two lava tunnels which have collapsed at one end, making them accessible. One of these is O'Callaghan's Cave; it has long been used by large numbers of Bent-wings, and accumulated guano has been mined from the floor of the tunnel.

One of us (N.W.) has had a colony of Bent-wings under observation for over twenty years, in a granitic outcrop about two miles south-east of the township of Genoa in East Gippsland. A mass of rock has moved a little to leave a large crevice several feet wide and twenty feet or more deep. From this, lateral crevices take off, providing a day-time roosting-place for a colony of the bats.

The Bent-wing has apparently never been specifically recorded for Victoria in our literature on mammals, evidently because of its confusion with the Wattled Bats (*Chalinolobus*). Three specimens from the Genoa colony were presented to the National Museum of Victoria in 1959 and, when acknowledged by letter, they were identified as *Chalinolobus gouldii*.

Bats of the genus *Chalinolobus* derive their popular name from the wattle-like lobe near the angle of the mouth. *Miniopterus* lacks this lobe. The latter may be distinguished by the very long third digit of the front limb, which is folded against the upper wing when the animal is at rest — hence the name

"Bent-wing". The Bent-wing is uniform chocolate brown, as is the smaller Chocolate Bat (*Chalinolobus morio*). Gould's Bat, (*C. gouldii*), although about the same size as the Bent-wing, is distinguished by its light-brown sides and the contrasting black colour of the head. All three have short muzzles and short rounded ears. The two genera differ in dentition: in *Chalinolobus* there are only two lower premolars on each side, compared with three in *Miniopterus*.

Bent-wings are gregarious, congregating in tightly packed clusters on favoured parts of a cave or tunnel roof. The clusters usually vary from two or three individuals to several hundred, but occasionally about 2000 have been seen in one group. Regular roosts are indicated by piles of guano and by etching in the roof—probably the action of excreta. On several occasions, solitary Bent-wings have been examined and these have proved to be males, while animals taken from large clusters have been females.

These bats are often in a torpid state during cold weather, owing to a lowering of body temperature. Towards evening, in preparation for feeding flights, the animals overcome this state by a period of shivering, to promote better circulation. During warm weather, however, Bent-wings usually move as soon as one enters their roosting chamber, a torch-beam being sufficient to cause them to fly further into a cave.

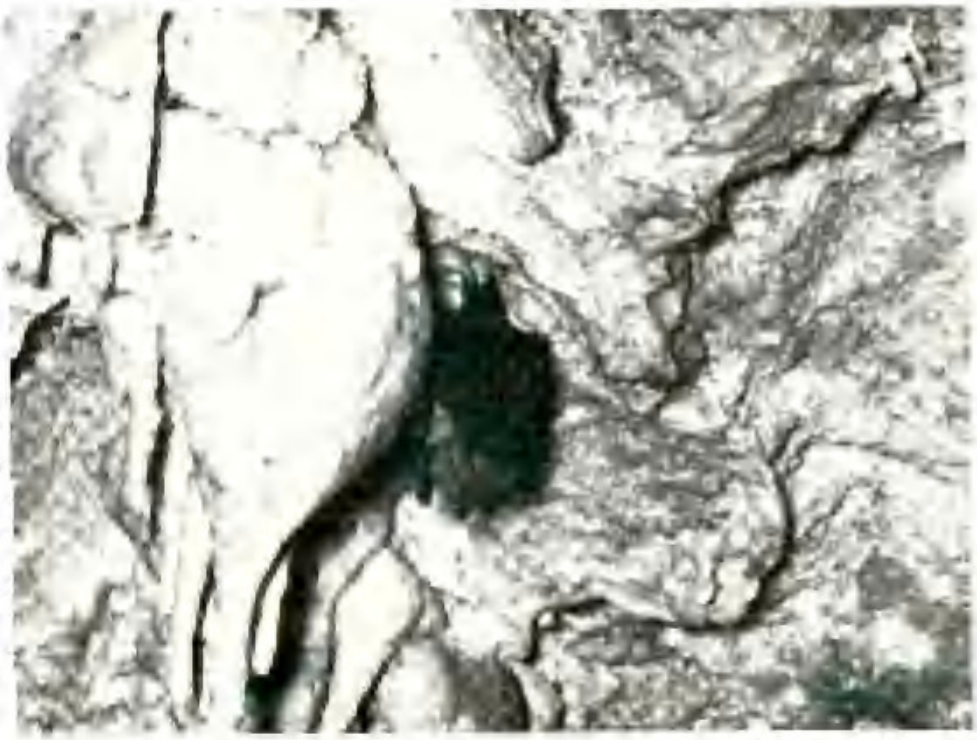
During visits by the Fauna Survey Group to the Buchan and Colac areas, fluctuations have been noted in numbers of Bent-wings in various of their habitats. However, observations have been insufficient to allow definite conclusions to be drawn about their movements.

When O'Callaghan's Cave at Mount Porndon was first visited, in June 1960, there were about 1400 bats in occupation. It was afternoon and the animals were torpid. A day later, they did not appear to have shifted position and it was thought that they may have been hibernating, but a visit after dusk revealed that most of the colony had left the cave. The remaining 200 or so had shifted and were in a cluster about 18 inches in diameter. These were restless and, disturbed by the torch beam, began to fly about. Most of them did not leave the cave but settled eventually in the original daytime position.

In August, there were about 2000 Bent-wings in O'Callaghan's Cave, and in December there were only thirty. Members of the Colac F.N. Club have occasionally found this cave to be empty of bats.

In late May 1960, there were about 150 Bent-wings in a cluster high up in the large inner chamber of Mabel Cave, and here and there groups of three or four on the walls. In August there were several near the entrance of the cave but none further in, possibly because the low access tunnel was partly filled with water. In December, there were no Bent-wings in Mabel Cave.

The mine tunnel near Mc-



Killops Bridge contained 200 bats in early December but was empty three weeks later. In August there were few bats in Moon Cave, but in December there were about 200 Bent-wings. On the latter occasion, Spring Creek Cave had about 300. Despite the very large numbers reported by Miss Barbara Dew in Wilson Cave in 1953-4, there were only about a dozen Bent-wings there in December 1960—one cluster of five and the rest solitary.

The Anticline Cave at Murrindal and Clogg's Cave at East Buchan usually contain 20 to 40 Bent-wings and, on each occasion when the Genoa colony has been visited recently, there has been a similar number there.

Eastern Horseshoe Bat
Rhinolophus megaphyllus

The Eastern Horseshoe Bat is more static than the Bent-wing. We have observed it only in the limestone country about Buchan—in the Anticline, Mabel, Maze and Moon Caves. The Anticline Cave at Murrindal carries the largest numbers and a few dozen are usually to be found there.

One of us (N.W.) visited the Anticline Cave, with a local resident, Mr. Peter Hodge, on January 20, 1959, and an Eastern Horseshoe Bat was caught as it flew through a passage near the entrance. This was presented later to the National Museum of Victoria—the first example of the species from this state to reach that institution. No observations were made then in the large inner chamber of the Anticline Cave and it was not realized that the place was frequented by Bent-wings as well.

In May 1960, there were about thirty Horseshoe Bats in the Anticline Cave, all solitary; a few Bent-wings were there also but not in the clusters that this species usually makes. In

August, an estimate was made of fifty Horseshoe Bats, and about a dozen Bent-wings were noted; and in September about twenty Horseshoe Bats were seen. It is difficult to assess the exact numbers of bats in the Anticline Cave, for they move individually from place to place in the vast cavern as they are disturbed; the population seems to remain fairly constant, however.

Mabel Cave at East Buchan had about a dozen Horseshoe Bats in May, none in August, and four only in December; and on occasions a few of the species have been seen in the Maze and Moon Caves at Buchan.

We have not observed the Horseshoe Bats in clusters of any kind. Each individual apparently prefers to roost away from its neighbours in the same cave. Probably because of its solitary habits, the Horseshoe Bat, unlike other local cave species, characteristically wraps the wings round its body, evidently for warmth, as it hangs from cave roof or stalactite.

In *Rhinolophus* the rear part of the nose-leaf projects upward to form a somewhat acute triangular segment. The group to which it belongs is characterized by the front part of the nose-leaf being shaped like a horseshoe. Neither *Miniopterus* nor *Myotis* has a nose-leaf.

Large-footed Myotis

Myotis adversus macropus

The Large-footed Myotis is apparently an uncommon species; we have found it only at East Buchan, in Clogg's Cave. It was first noted there in late September 1960, when one of us (N.W.) found two lots of bats in that habitat. There were numerous Bent-wings, which were very restless and flew about the cave when approached; and there was a clus-

Eastern Horseshoe Bat, showing details of Nose-leaf.

Cluster of Large-footed Myotis, in Clogg's Cave, East Buchan.

ter of about twenty smaller bats which were so torpid that those handled made no attempt to fly. The latter proved to be *Myotis*.

Two members of the Fauna Group visited Clogg's Cave in December and found two groups of *Myotis* there. A cluster of about fifty were identified, by means of spotlight and binoculars, high in the main chamber, and there was a cluster of 23 on a low part of the roof. Young bats were present in both groups.

When Clogg's Cave was visited in May 1960, some Bentwings were caught and identified. It is likely, however, that *Myotis* was present also but escaped notice. Probably Clogg's Cave is a regular home of the latter.

Myotis adversus macropus has very large feet (1 cm. long) and, compared with *Miniopterus*, its ears are long and narrow and project well out from the head. The *Myotis* is a lighter brown and the under-surface is grey to grey-brown. One specimen observed at East Buchan was somewhat rufous on back and under-surface.

Cave Bats of New South Wales

Over the past twelve years, speleologists have compiled data about cave bats in New South Wales. They have found this fauna to be the same in their

state as we have at Buchan, both in the species represented and the relative abundance of each.

Bent-wings have proved to be the commonest, having been noted, often in hundreds, in about a dozen cave systems or artificial shelters in eastern New South Wales. The Eastern Horseshoe Bat has been recorded from three of the cave areas of the same region. The cave explorers found the *Myotis* once only, at Narrangullen near the Burrenjuck Reservoir, evidently in May 1953.

A recent record of the *Myotis* has come from Mr. D. Purchase of the C.S.I.R.O. Wildlife Survey Section, Canberra. He reports that there was a colony of about 100 individuals in a cave on the Burrenjuck prior to 1960 but that it had disappeared from there over the past year. They may have been the same group that the speleologists observed.

The C.S.I.R.O. has for some time been carrying out a bat banding programme in New South Wales, mainly dealing with *Miniopterus*, and it is proposed that the banding be extended to the Buchan district of Victoria. Some data on this work has been published in "A First Report on Bat-banding in Australia", by D. Purchase and Pauline M. Hiscox, in *C.S.I.R.O. Wildlife Research 5 (1)*: 44-58 (1960).

Large-footed *Myotis*, showing details of Foot, Ear and Muzzle.

Appendix

The confusion which has existed between *Miniopterus* and *Chalinolobus* places considerable doubt on some of the published information about the latter. Neither the recent New South Wales observers nor we have found Wattled Bats in caves, and the question arises whether the two local species (Chocolate Bat and Gould's Bat) are either gregarious or cave-dwellers.

The little Brown Bat (*Eptesicus pumilus*) was reported from the Anticline Cave at Murrindal in 1958, but we have been unable to authenticate this record.

Field naturalists may help to further our knowledge of these interesting little animals, by reporting the presence of groups or colonies of them when they are found. Live specimens may not be taken except by permit,

as all species of insectivorous bats are now protected by law in Victoria. It would be helpful, too, if any dead specimens that are discovered, such as victims of domestic cats, were placed in spirits and passed on to an appropriate authority.

Acknowledgements

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We wish to acknowledge the help which has been forthcoming from Miss Barbara Dew, who made available notes on the cave bats of New South Wales and of the Buchan area.

MICROSCOPISTS' CORNER

By C. S. and G. J. MIDDLETON*

Home-made Waterproof Glass Troughs

Hitherto the only satisfactory glass trough available for microscopy was expensive, being professionally made —with vitreous cement and baked in a furnace—and was beyond the capacity of the amateur to construct. The result of his attempts with such materials as glass, ebonite and marine glue, inevitably leaked after a period of use.

Now, with a modern cement—an epoxy resin marketed as "Araldite" —glass troughs for most purposes of the naturalist may be readily made at home with no equipment other than a glass-cutter. They are extremely strong and will not leak.

A good source of glass suitable for troughs is old photographic glass negatives, with the emulsion removed with hydrochloric acid. It is very flat and of good quality.

Among other accessories we have made using this cement is a *Rousselet Aquarium Microscope*, as illustrated on page 269 of *The Microscope and its Revelations* (8th ed.) by Carpenter and Dallinger.

The trough was made from two half-plate negatives separated by three glass strips ¾-inch wide to form the ends and base and cemented at the edges with "Araldite".

The wooden framework to hold the focussing magnifier and the trough was also cemented with "Araldite". This is a stronger join than is given by nails, screws, or any other glue.

This aquarium microscope, like all devices of Rousselet, is extremely useful for anyone studying pond life. So far as we know, it, in common with many other useful devices, is not now made commercially but may occasionally be available secondhand.

With it one can search the water for specific or minute organisms for further study under the microscope, and since it leaves both hands free for using the pipette, the organisms can be readily transferred from tank to slide without being lost.

Notes on use of Araldite

1. Ours was purchased from Brooks Robinson, Melbourne, but doubtless it is available elsewhere and perhaps under other trade names.
2. Directions for use come with the product.
3. It is very easy and convenient to use provided it is not contaminated with water while in the plastic state, as this prevents its setting.
4. It is not affected by the reagents commonly used by microscopists but can be dissolved by powerful paint removers.
5. It could often replace solder as it will join almost anything to anything and is extremely strong.

We have successfully cemented brass rings to glass slips to form moist chambers, etc.

Note: Queries on microscopy are invited. For personal replies, please enclose stamped, addressed envelope.

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