

SOFT ROCK CAVING IN VICTORIA
CAVES AND KARST IN THE LIMESTONES OF WESTERN
VICTORIA

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Abstract

South western victoria has extensive areas of Pleistocene and Tertiary age limestones. Significant karst features and cave development occurs at a number of localities from the Otways to the South Australia border. The authors will present an outline of these areas and their caves, with the aid of slides, maps and diagrams.

Caves and karst in western Victoria is in two main limestones - the Pleistocene calcarenites (aeolianites) of the Bridgewater Formation and the Tertiary (Miocene) Port Campbell Limestone. The Tertiary limestones are extensive in Western Victoria but are of variable carbonate purity and only limited areas show major karst development despite the extensive area of carbonates. These are Glenelg River area, Kentbruck, Timboon, Warrnambool and Drik Drik as well as some coastal areas such as the coast between The Twelve Apostles and Peterborough along the Port Campbell coast.

More extensive karst development occurs in the Pleistocene aeolian calcarenite (aeolianite). These near coastal dune systems show karst development which is contemporaneous with lithification (syngenetic karst). One significant area is Bats Ridge which is a series of Pleistocene Bridgewater Formation dunes inland from Cape Bridgewater. Other areas of syngenetic karst are found at Cave Ridge, Portland area, Cave Hill (Heywood) Warrnambool, and Codrington. In some places, such as the Lower Glenelg, these Pleistocene dunes overlie the Tertiary carbonates and show karst development in the form of solution pipes into the Tertiary limestones where the main cave development occurs.

Marine influence is also shown in the sea caves along the western Victorian coast. Sea caves are found in the basalt cliffs around Cape Bridgewater. These have the interesting feature of secondary calcite formation and tufa associated with them as they are overlain by the Pleistocene calcarenites and the percolating water from the groundwater deposits calcite over the basalts. Further east along the Otway coast are joint enlarged caves modified by marine action in the Mesozoic sediments, e.g. Ramsdens Cave at Cape Patten. Although marine action is important along the Port Campbell coast as can be

seen in the rock stacks offshore and other features, the area does show evidence of karst solution from ground water and underground streams . The two caves at Loch Ard Gorge are good examples of this as they show underground fresh water streams, and percolating groundwater and speleothem development. These features show the definite joint control exhibited in the karst in the Tertiary limestones which relates to other features in the area as well.

The caves are not notable for length or depth, or technical difficulty. They do however show a diversity of forms and speleological interest as well as being 'caver friendly'. Some of the caves are simple passages developed along a single major joint, others present a more complex network and often have multiple entrances. The distinctive features of phreatic development are widely in evidence. Collapse modification is also common. Vadose enlargement can be clearly seen in some of the caves in the tertiary rock.

The characteristically soft and lower density limestone and often sandy floors makes for generally easy caving. Cavers can concentrate on appreciation of the cave environment rather than be preoccupied with gear or demanding techniques. Never the less, hazards do exist in the form of sometimes unstable rockfall, loose sand, waves (sea caves) and occasional unwelcome accidental fauna like tiger snakes.

Many of the south western caves are used by bats as casual or regular roosting sites. One of Victoria's two known breeding caves for bent wing bats (*Miniopterus schreibersii*) is located near Warrnambool. Several caves along the Glenelg River are home for the comparatively rare (in Victoria) *Myotis adversus* or large footed bat. Wetas are common inhabitants of the entrance sections and various spiders and insect life can also be observed near entrances. Frogs, lizards and the odd snake are involuntary and doomed victims of straying too close to solution pipe entrances.

A number of caves with solution tube entrance shafts have acted as natural animal traps for thousands of years. As a result, extensive collections of bone material is found on the cave floor and in the soil fill. Palaeontological excavations have been carried out in several of these caves, yielding important information on past surface fauna.

Following is a brief outline of the main cave areas:

Lower Glenelg (G)

Located in the far south west corner of Victoria, the flat topography of the area is traversed by the gorge of the Glenelg River which has cut deeply through the Tertiary marine limestone. The river gorge is typically 100 m wide with sheer sided limestone cliffs rising up to 35m above the river level. The river and natural bushland to the south is

within the Lower Glenelg National Park. State Forest, planted with pines, occupies much of the land immediately north of the river.

Some seventy caves and karst features have been recorded at date. Many caves have entrances in the river cliffs. Several permanently active outflow caves are located at the present river level. Other now abandoned dry caves are found higher in the cliffs. The one tourist cave, Princess Margaret Rose Cave, is part of a former underground bypass across a prominent bend in the river, now abandoned as a result of later down cutting of the river gorge.

A striking feature of all the major caves is their general 120 - 300 degree (magnetic) orientation. This corresponds to the uniform alignment of major joints in the horizontally bedded Miocene age limestone. Apart from horizontal entrances in the river cliffs, solution pipes are the surface connection for quite a few of the Lower Glenelg caves. Well formed solution pipes ranging up to two metres in diameter and 15 m deep, penetrate overlying consolidated calcareous dune deposits to connect with cave development in the Tertiary limestone.

Other karst features of the area include dolines with permanent standing water, springs and swallets.

Eight of the caves within the National Park have been classified as being of special significance (Category 2.2) in the Park's 1991 Management Plan. Visits to caves within the National Park are subject to prior arrangement and a permit is required for access to the designated special significance caves.

Warrnambool (W)

This area of coastal limestone has spectacular high cliffs, exposed solution pavements and sinkhole features as well as caves. The twenty-five numbered karst features range from tight, joint controlled cave systems to the spacious Starlight cave. Starlight Cave (W5), which has been known since the 1850s, has two interconnected, 40 m high, bottle shaped dry 'cenotes', one of which has multiple short solution tube openings to the surface. Natural light entering through these openings gives rise to the cave's name. A spacious upwardly rising passage from the base of the cenotes leads to an impressive entrance in an overhanging sea cliff. The cave was mined for guano early this century and is an important bat cave, and a possible breeding site. For this reason, visits to the cave are normally confined to late summer.

Most of the Warrnambool Area caves are located on private land and permission is required from landholders for any visits.

Bat Ridges (BR)

Bat Ridges on Cape Bridgewater is an area of syngenetic karst in Pleistocene calcareous dune limestone. In a relatively small area of about 500 ha, some 90 cave numbers have been assigned by V S A. The caves are shallow but often quite extensive. The largest cave, BR4, has a surveyed extent of about 1.4 km.

A common feature of many of the Bat Ridges caves is the large areas of low flat ceilings at the lowest level. Collapse is a significant part of the development of most caves. Speleothems are not a prominent feature, but in places, substantial flowstone deposits, stals, and columns can be seen, albeit often dry. Moon milk and cave coral is common on cave walls. Delicate straw formations also occur in a few of the caves.

The cave entrances to the are typically horizontal from the sides of the dune ridges with characteristic caprock arches. Multiple entrances are common with the interlinking of caves in a single dune. A small selection of the caves have solution pipe entrances.

In line with the area's name, bats roost in a number of the caves. These are mainly bent wing bats (*M. schreibersii*).

Many of the caves are located within the Bat Ridges State Faunal Reserve. Others are on adjoining private property. Most of the area is native bushland.

Codrington (CD)

Codrington is another area of cavernous calcarenite dune ridges similar to Bat Ridges. Located on private land between Port Fairy and Portland, some forty caves have been documented since V S A began systematic investigations in 1989. Like Bat Ridges, the density of cave entrances is high. Many caves interconnect and others probably could be connected with determined effort.

Although usually dry, the lower parts of these caves are liable to inundation from surrounding low lying ground after prolonged wet weather. Phreatic development is strongly in evidence in many of the caves in the form of solutional ceiling pockets, rounded pillars and distinctive rock pendants. Like Bat Ridges, decoration is limited, but some caves have sections of attractive speleothems.

Portland (P)

The Portland area includes Cape Nelson and Cape Bridgewater, both of which provide rugged coastal scenery with high cliffs and frequently rough seas. Features include 'blowholes' and 'petrified forest' formations as well as some splendid sea caves.

At Cape Bridgewater two large adjoining sea caves in basaltic tuff provide shelter for seal colonies. One of these caves has two seaward entrances and an internal beach. A branch passage is home to often large numbers of bats. Difficulty of physical access and the active presence of the sea provides both challenge and hazard.

On the inland side of Bridgewater Lakes, the prominent Bridgewater Lakes cave, formed in dune limestone, exhibits calcite draperies, stalactites and columns, all clearly visible to passing motorists.

Timboon (T)

The Timboon area designation covers caves and karst in the vicinity of Timboon and Cobden to the west of the Otways. To date only ten caves and karst features have been numbered, but opportunity exists for more discoveries. Although the known caves are not large, they include four active stream caves, two of which have prolific white flowstone deposits.

CONCLUSION

In all, the soft limestone cave areas of south-western Victoria offer a diverse range of caving experiences and are enjoyable to visit. Each area also has its own character ranging from pleasant native bushland and scenic river gorges to wild coastal environments. As well as the main areas listed above there are a number of isolated caves which have their own interesting aspects. Cavers do not need to be "gung ho", and while a single cave is unlikely to attain a length record, there are plenty of caves, each with their own features and surprises. There is also much to interest the more serious speleologist, whether it be in the fields of geology and geomorphology, cave development, paleontology, bats or other cave science.

REFERENCES

Mill, L., White, S., & Mackey, P. (eds.) 1980 Victorian Caves and Karst Guidebook for the 13th A.S.F. Conference Melbourne 1980.