Invertebrate Biodiversity in the Karst Bio-space of Tasmania

Arthur Clarke

ABSTRACT

Karst is a word used to describe the landforms (eg. caves) derived from the natural solution of carbonate rocks, such as limestone or dolomite. Karst bio-space is a convenient term to describe the total habitat space for the aquatic and terrestrial species living in carbonate rock karst areas. The karst bio-space is represented as the sum-total of the actual or potential habitats and micro-habitats of all living species in karst. This bio-space can be described in dimensional terms as micro-caverns (<1mm), meso-caverns (1 to 15-20mm) and macro-caverns (>15-20mm). Although most of our cave fauna records relate to species known or collected from caves (the macro-cavern component of the bio-space), in many karst areas, the meso-cavern size voids, tubes or cracks probably represent the major habitat component for invertebrate cavernicoles in the karst bio-space: either in the saturated zone below the water table), or in the unsaturated zone above the water table. The spatial component of these meso-cavern spaces includes the numerous interstitial voids in cave streambed or streamside substrates as well as the minutely small solution tubes, cracks and fissures that distribute waters through the carbonate rock, draining surface mantles, surface soils and forest litters or ground cover. There are about 4,000 known caves in Tasmania in 135 karst areas and additional non-karst areas. Cavernicolous invertebrates have been recorded from almost half of the cavernous areas of Tasmania. The cave fauna database for the 1997 Tasmanian Regional Forest Agreement (RFA) includes a list of 692 recorded invertebrate species and a map shows the location of the major karst areas where cave invertebrates have been collected or recorded. The cavernicolous invertebrate biodiversity in Tasmania includes a range of aquatic and terrestrial species from several ecological niches, with varying dependence on the cave environment, and the relationship between some of these species can be demonstrated with a food web, typically expressed in some of the stream caves in Tasmania.

REFERENCES

CLARKE, A. (1997a). Management prescriptions for Tasmania's cave fauna. Report to the Regional Forest Agreement Environment and Heritage Technical Committee. 167pp.

CLARKE, A. (1997b). Karst Bio-space (and Glossary of Terms). *Proceedings of the 21st Biennial Conference of the Australian Speleological Federation Inc. (Quorn SA)* pp.78-92.

CLARKE, A. (2002). Surface Disturbance Threats to Karst Faunas in Tasmania, Australia. *Proceedings of the 14th. National Cave and Karst Management Symposium. Chattanooga, Tennessee, USA*. pp:23-28.

RICHARDS, AM & OLLIER, CD (1976). Investigation and report of the ecological protection of Exit Cave, near Ida Bay, Tasmania. Unpublished report to National Parks and Wildlife Service - Tasmania. 73pp.

Graffiti at Loch Ard Gorge, Port Campbell National Park, Victoria

Nicholas White

ABSTRACT

Port Campbell National Park with its striking coastal scenery of rugged cliffs and stacks, The Twelve Apostles, is one of Victoria's icons. It is promoted in all tourist literature and Loch Ard Gorge is one of the featured attractions with a car park, developed walking tracks along the cliffs and a track with a timber stairway down to the beach in the Gorge. Loch Ard Gorge was the scene of the shipwreck of the Loch Ard in 1878 from which there were only 2 survivors. The two caves in the gorge are named Pearce Cave (3SW-2) and Carmichael Cave (3SW-3) after these survivors. Reputedly, they sheltered in the caves before being rescued.

Many people, however, do not realise that this is a karst landscape developed on Tertiary limestone. The gorge is now showing signs of wear and tear and graffiti is accumulating on accessible cliff areas and within the caves. Recently this was brought to the attention of Parks Victoria and steps are being taken to address the problems. More information will be available at the Conference.

Contact details
123 Manningham Street, Parkville VIC 3052.

Speleogenesis in Cainozoic Limestones, Western Otway Basin, Southeastern Australia

Susan White

ABSTRACT

Southeastern Australia has extensive areas of Cainozoic limestones. These include both Oligo-Miocene marine calcarenites and calcilutites and Pleistocene dune calcarenites. This talk will illustrate the factors involved in speleogenesis in these limestones and outline the relationships between speleogenesis, hydrogeology and lithology in relatively young limestones.

These limestones, whilst more extensive in area than the Palaeozoic impounded karsts of eastern Australia, are less well known especially for cave exploration. However they have both extensive and intensive cave systems including the flooded cenotes of the Mount Gambier area, large caves with important palaeontological deposits and maze-like systems in the Pleistocene dune ridges.

Speleogenesis in these lithologies is an interplay between the groundwater conditions and the lithification and diagenesis of the calcareous sediments. As such sediments are highly variable in their calcareous content, the solution/precipitation balance also varies from site to site. This variability is combined with both high primary porosity and permeability resulting in diverse surface and underground karst features.

The caves are dependent on the ability of the calcarenites to develop sufficient structural strength in the form of an indurated layer. This "caprock" is necessary for the development of many karst forms, especially caves, as it gives the relatively unconsolidated calcarenite structural strength. The caprock develops in both limestone sequences where conditions are favourable but somewhat better in the Pleistocene dunes.

The development of cave systems is also directly related to the groundwater conditions. Evidence of fluctuating groundwater conditions over time can be seen in the caves, especially the drowned cenotes of the lower southeast of South Australia. The inter-relationship of groundwater conditions and relatively horizontal lithologies, combined with the development of an indurated layer are the keys to understanding speleogenesis in these limestones.

Karstification in lithologies that have not been traditionally regarded as having high potential for caves can bring insight into the interplay of factors controlling speleogenesis. The variation in host lithology, hydrogeology and an ability to develop a structurally competent roof must be taken into account in the context of the time available for solution and speleogenesis.

Contact details
123 Manningham Street, Parkville VIC 3052.