

OFF the TRACK with BONES and STONES: BRINGING JENOLAN CAVES' PAST to LIFE

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I work at Jenolan Caves as tour guide, but am a vertebrate palaeontologist by training. My primary palaeontological interests are monotreme mammals and the biotas of Mesozoic and Pleistocene Australia. I have a longstanding relationship with the Australian Museum in Sydney, where I am an Honorary Research Associate, and have been a show cave guide at Jenolan Caves west of Sydney for four years.

As a guide and Jenolan resident, I have become deeply interested in the palaeontological history of the caves and of the Reserve - how could I not? Jenolan Caves are some of the most spectacular in Australia if not the world, and the Reserve is home to many species of rare or endangered animals and plants (including Brush-tailed Rock-wallabies and Spotted-tailed Quolls, seen on a regular basis around the Reserve). The caves are also the oldest open, dated caves known (Osborne *et al.* 2006), adding greatly to their prehistoric allure.

As time allows between guiding and museum work, I am conducting surveys of show caves and wild caves for vertebrate fossils with the help of the highly experienced Jenolan staff and members of Sydney University Speleological Society (SUSS). These surveys include the recording and identification of previously known specimens and the discovery of additional fossil bones or deposits, leaving each survey area as found. Future plans may include limited excavations once the caves have been surveyed and priorities established.

Vertebrate fossils identified to date by these surveys include Pleistocene species such as the diprotodontoid *Zygomaturus*, a cow-sized plant-eating marsupial that perhaps became lost in the caves many thousands of years ago. Previously discovered 'keystone' species include the Tasmanian Devil (*Sarcophilus* species) and Tasmanian Thylacine (*Thylacinus cynocephalus*). 'Ice Age Jenolan' was a world of megafauna, Aboriginal habitation and now-extinct small mammals like the Mountain Pygmy Possum living here when the Jenolan area was a much colder place.

Along with fellow guide Ted Matthews, I am also looking at the late Silurian invertebrates that comprise the Jenolan limestone. Excellent examples of straight-shelled nautiloids (relatives of the living chambered nautilus) can be seen in the walls of show caves, along with numerous shellfish (brachiopods in particular), corals and other marine invertebrates. In addition to the denizens of our long-gone reefs, Jenolan is home to living relict species whose ancestry is every bit as ancient. There are syncarid crustaceans inhabiting subterranean waterways most likely descended from marine species here when the Jenolan area was a Silurian sea. We also have some of oldest known

terrestrial insect species, dating from the time of our limestone formation, that are still living in our caves (cave-adapted springtails, or Collombola). The tiny spiders that prey on springtails may also be seen if one is particularly lucky.



A late Silurian brachiopod in cross section in Imperial Cave.

My work has progressed to the point where a story is emerging - the 'lost world' of the Jenolan karst - a story I feel would be of interest to many of Jenolan's visitors. To this end, I have presented a proposal to Dan Cove, Manager of Caves Operations, for a palaeontology-themed tour highlighting the fossils and karst features that can be seen in our caves and around the Reserve. Jenolan's prehistoric past can be illustrated by the numerous fossils seen in various show caves, older parts of the show cave system not generally shown to visitors, and in open areas like the Devils Coach House with its fine limestone outcrops and owl pellet bone deposits. Such in-depth interpretation would not be possible on standard show cave tours.

In addition to the general public, it is anticipated that a palaeo-themed tour (or series of tours) would be of interest to schools and specialist clubs (a 'trial tour' was given to members of the Riversleigh Society, a palaeontological organisation based in Sydney). Tours could run as a special holiday offering and/or as special bookings (details are yet to be finalised). Current plans are to run the tour like our 'Off the Track' night tour, where visitors are outfitted with caving helmets and lights in order to navigate old show caves and passages.

The layout of Jenolan Caves - divided via the Grand Arch into North Side Caves and South Side Caves -



A partial skeleton of a small macropod in Lucas Cave

lends itself well to development of two different but complementary tours: a tour of the North Side system and a tour of the South Side system. Both North Side and South Side tours would include a visit to the Devils

Coach House. The Devils Coach House is a fascinating site illustrating several key concepts: there are subaerial stromatolites, owl pellet deposits, rock-wallaby habitat, limestone uplift, and the Aboriginal Dreamtime Cave seen high up on the limestone.

The North Side caves include the Imperial, Diamond, Jersey and Chifley caves, all of which have significant fossils and geological features on display or within the less accessible parts of the caves. Tasmanian Devil and rock-wallaby bones are on display in the Imperial Cave along with fine examples of Silurian invertebrates. The bones of a young thylacine, most likely too fragile to remove, lie off the path in the seldom-visited Jersey Cave. Further into the cave system the Diamond Cave includes a small pond with springtails, a wall of limestone invertebrates, and sections of palaeokarst. Bones in flowstone can be seen on the path up to the Chifley Cave. The huge skull of a Pleistocene herbivore – probably a *Zygomaturus* – is encased in crystal off the Wilkinson Branch; although the skull cannot be seen directly, it is just out of sight and will provide an interesting ‘talking point’ for the tour.

South Side caves with important fossils or features include the Lucas, Cerberus, River and Temple of Baal



An Eastern Horseshoe Bat skeleton in Ribbon Cave



Above. Paleaokarst deposit in Diamond Cave, possibly of Devonian age.

Below. Subaerial stromatolites in Nettle Cave.

caves. The tour would begin with a look at a small macropod skeleton along the Lucas exit path then proceed to Bone Cave (where I have recently surveyed megafauna bones just out of sight). The Pool of Cerberus, accessible off the River path, has an articulated rock-wallaby skeleton deep in the cave. Proceeding along the River path, visitors can see a small bat skeleton in the Tower Chamber and palaeokarst in the Mud Tunnels. Exiting out through the Temple of Baal, it is again possible to see living springtails as well as a wall of invertebrates (including beautiful nautiloid fossils) and the study site for the dating of clays in the Baal.

Jenolan is a natural laboratory, teaching us much about geological time, changes in animal and plant communities due to factors such as climate change, the critical roles karst areas play in preserving ancient relict species, and the current role reserves like Jenolan play in the conservation of living but threatened species. It is hoped that putting together this information in a themed tour and taking the visitor back through the long and rich history of the Jenolan area will result in not only a deeper appreciation of Jenolan's unique heritage but a greater understanding of Australia's history through deep geological time



References

Osborne, R. A. L., Zwingmann, H., Pogson, R. E. and Colchester, D. M., 2006. Carboniferous clay deposits from Jenolan Caves, New South Wales: implications for timing of speleogenesis and regional geology. *Australian Journal of Earth Sciences*, Vol. 53(3), 377-405.