

Fossils from the Chillagoe caves: a historical review

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Caves are ideal environments for the preservation of fossil bones, and the numerous caves in the Chillagoe and Mitchell-Palmer areas of north Queensland have produced several important discoveries. This paper aims to present a historical overview of fossil vertebrate finds from these caves. It builds on the work of Robinson (1983), but substantially expands it by including previously unpublished material from the Queensland Museum's (QM) collection. The QM collection contains several samples not documented here due to a lack of information regarding their source locality, collector or date of collection.

First finds.

In the late nineteenth century Robert Jack (government geologist for the colony of Queensland) and Robert Etheridge Jr (geological survey of New South Wales) published an extensive survey of the geology and palaeontology of Queensland (Jack and Etheridge, 1892); they mentioned that caves were prolific in the Chillagoe region, but didn't mention any vertebrate fossil deposits associated with them.

The earliest documented discovery of fossils from caves in the Chillagoe area is a sample of breccia and bones sent to the National Museum of Victoria (now Museum Victoria). This sample was collected from "Smelter's Junction, one mile from Chillagoe Railway Station, along the Mungana line, on the left hand side on the way to Mungana.", from "...a bluff 800ft. long, 300ft. wide and 50ft. above the plain of the surrounding country." (Archer et al., 1978, p. 56). Limestone was used in the Chillagoe smelters, and quarrying operations led to the discovery of the fossils some time between 1908 and 1911. Richard Tedford of the University of California (1967) examined this material, and suggested it was of Pleistocene age (approximately 2.6 million to 12 thousand years ago) due to the presence of extinct megafauna and a species of *Sarcophilus* ('Tasmanian devil'; once widespread on the mainland and unknown from pre-Pleistocene sites). The Smelter's Junction sample contained a unique species of propleopine kangaroo, noticed by Tedford (1967) and eventually named *Propleopus chillagoensis* by Mike Archer et al. (1978). This species is still unknown from any other site. Propleopine kangaroos are interesting because they may have been at least partially carnivorous (Archer and Flannery, 1985; Ride et al., 1997; although see Wroe et al., 1998 for an alternative interpretation). Mike Archer and Tim Flannery (1985) later prepared the breccias from Smelter's Junction and found additional specimens of *P. chillagoensis*, as well as other species including a thylacine ('Tasmanian tiger').

The sixties and seventies.

The middle to late 20th century saw a small trickle of new specimens entering the Queensland Museum's collection. Most of these were small samples with little associated contextual information. In 1964 Jo Trezise donated specimens from Royal Arch Caves and Markham Caves to the museum. These were presumably the same specimens mentioned by Trezise (1970) in her listing of vertebrate

remains from caves in the Chillagoe area. Trezise made notes on predatory accumulators of animal remains, but also noted the difficulty in determining the age of remains in caves.

In 1969 a P.D. Dwyer collected a sample of bones from Spring Cave. This sample was interesting because it consisted overwhelmingly of *Macroderma gigas* (ghost bat) skulls and jaws, suggesting the presence of a roost at some time. A jaw of *Macropus titan* (a giant kangaroo, related to the modern eastern grey kangaroo) was collected from a cave on Rookwood station by Willi Grimm in 1970. In 1975 John Webb collected a small sample of bones from Disney Cave, noting the presence of large blocks of bone breccia in the cave.

In 1979 Henk Godthelp collected breccia samples from Katy Breen Tower, on Rookwood station. Some of this material was published when Muirhead and Godthelp (1996) announced the discovery of fossil *Chaeropus ecaudatus* (pig-footed bandicoot) and *Isoodon ?obesulus* (southern brown bandicoot) at Chillagoe. The former of these was important because this species had never been recorded so far east, being mostly restricted to the arid interior. *Chaeropus* probably became extinct in the 1950's, and there is still much unknown about its ecology that would assist in interpreting the Chillagoe specimens. Additional specimens of *Chaeropus* have since been found at other sites in the Chillagoe area (Jonathan Cramb, unpublished data), as well as one site at Mount Etna (Hocknull, 2005). Muirhead and Godthelp's tentative identification of *Isoodon obesulus* has since been confirmed by the discovery of better-preserved specimens from Fern Cave (see below). *Isoodon obesulus* is better known from southern Australia, although an isolated population is also found on Cape York (this form is given subspecific status as *I. obesulus peninsulae*). Interestingly, *I. obesulus* is commonly found in fossil and recent cave deposits throughout eastern tropical Queensland, suggesting that populations were separated relatively recently.

Tea Tree Cave and the eighties.

In the seventies and eighties the Chillagoe caves gained much more attention from palaeontologists. In 1970 the Sydney University Speleological Society visited Chillagoe. In Tea Tree Cave Greg Middleton found a specimen of *Phascolonus*, a giant wombat (Middleton, 1970a, b). The largest species of *Phascolonus* is estimated to have weighed approximately 200kg (Johnson, 2006), nine times the weight of the largest living wombats. Even more interestingly, Lyndsey Hawkins found the toothless snout of a rather bizarre crocodile in the cave. This was donated to the Australian Museum, and written up by Ralph Molnar (then at the University of New South Wales) as a type of crocodile previously unknown from Australia (Molnar, 1977). The Tea Tree crocodile skull possessed several unusual features: the snout was deeper than any living Australian crocodile, and the teeth were apparently laterally compressed, unlike the roughly conical teeth of most crocodiles (laterally compressed teeth are referred to as 'ziphodont'). More complete fossils from overseas suggest that crocodiles with these features were largely land-dwelling.

Molnar visited Tea Tree Cave in 1977 with guides from the Chillagoe Caving Club. They were looking for more ziphodont specimens, but instead found an assortment of other species. One of these was an upper jaw of *Palorchestes*, which was a marsupial that probably resembled a tapir. Molnar went on to publish his ideas on the age of the Tea Tree Cave specimens (Molnar, 1978; Molnar, 1983). In 1982 an Explorers Club field trip led by Molnar collected additional specimens from Tea Tree Cave. On the basis of relatively few specimens, Molnar (1983) made initial investigations of the taphonomy (factors affecting preservation) of the Tea Tree deposits; the age of the fossils; the age structure of the faunal populations; and speculated on the nature of the ancient environment the fossil animals had inhabited.

More than ten years after its discovery the Tea Tree crocodile was finally given a name: *Quinkana fortirostrum*, in reference to mythological beings depicted in regional indigenous cave art (Molnar, 1981). *Quinkana* was initially thought to represent a late-surviving member of a group of largely terrestrial crocodiles found overseas (Molnar, 1977). It has since been recognised as a mekosuchine, a group of extinct crocodiles endemic to Australia and the south-west Pacific (Willis, 2006).

Molnar wasn't the only worker investigating Tea Tree Cave in the eighties. The Queensland Museum also has specimens collected by an L.S. Hall in 1980 (who also collected in Crocodile Cave, Crocodile Pot and Capricorn Cave) and a party led by Kerry Williamson (who similarly also collected from 99 Cave, Now Cave and Betelgeuse Cave).

In 1982 a W.A. Freeman donated to the QM a small breccia chunk from 'between limestone/marble blocks, Chillagoe'. This locality is horribly vague, and it's unlikely that the source will ever be located. Intriguingly, Lana Little of the National Parks service photographed a remarkably similar-looking breccia chunk in 2009. This sample had apparently been found some years earlier during quarrying operations. It is interesting to speculate that these breccia samples may have had the same source, although the truth is probably unknowable now.

A S. Robson collected small samples from caves in the Chillagoe (Carpentaria Cave, Geck Cave, Surprise Packet Cave, and Tea Tree Cave) and Mitchell Palmer (Mordor Man Cave, Tier Cavern, and Gargoyle Cave) regions in 1986. Unfortunately for such a diverse collection of sites, the samples were small and lacking in context. In 1985 D. Barton from the Queensland National Parks and Wildlife Service collected remains of a small wallaby (*Petrogale* or *Thylogale* sp.), probably from Donna Cave.

During the eighties the Chillagoe caves also drew the attention of archaeologists. Teams led by Bruno David (then based at The University of Queensland) conducted excavations at several caves and rock shelters in the area. During work in Fern Cave (see David, 1991 for a summary of the archaeology of Fern Cave) in 1985 Bruno noticed an owl roosting high on the cave wall, and determined to excavate the roost to get a better idea of the regional fauna, and thus the faunal resources available to indigenous people. Analysis of this material has only recently been undertaken, but has produced several new insights. One of these is the presence of *Conilurus penicillatus* (brush-tailed rabbit-rat, a moderately large arboreal rodent) in the Chillagoe area (Cramb and Hocknull, 2010). This species had not previously been recorded from Cape York, but is found in northern Western Australia and the Northern Territory. It is currently in decline throughout its range so it is vital to ascertain whether any populations persist in Queensland.

Muldiva and the new century.

In 1994 palaeontologists Alex Cook and Colin McHenry accompanied a local, Ted Elliott, to an old limestone quarry at the Muldiva mines area, south of Chillagoe. They collected part of a bone breccia from a surface deposit, the original cave roof having eroded and collapsed long ago. The same site was visited again in 1999 when Ted Elliot and Tom Bolam led a QM group including Scott Hocknull, Paul Tierney, Mary Wade, Dawn and Chris Schur. They collected a much larger sample of the breccia. Initial attempts to acid prepare this breccia produced poor results, as the bones were brittle and damaged by the acid. A second effort to prepare the breccia blocks in 2007 was more successful. The Muldiva breccia fauna contains multiple arid-adapted species (e.g. *Chaeropus ecaudatus* and *Notomys longicaudatus*, the long-tailed hopping mouse), suggesting a drier climate at the time of deposition.

In 2001 a QM party completed the excavation of 'Dave the elasmosaur' (a large extinct marine reptile) on the banks of the Walsh River (the excavation began in 2000; a reconstruction of 'Dave' has since been erected on the outskirts of Chillagoe). They were then joined by members of the Central Queensland Speleological Society, and together visited several caves on Bellvue station. Members of the society, particularly Noel Sands, had been involved in cave fossil discoveries at Mount Etna, so it was only natural that they sought out fossil deposits on Bellvue. Samples of surface deposits and bone breccias were collected from Cattle Camp Cave, Kial Cave, and elsewhere on the station.

Fossils from the Chillagoe caves have been the focus of increased scientific attention in recent years. New finds elsewhere in Queensland (Mount Etna and Broken River) are allowing Chillagoe specimens to be placed in a larger regional and chronological context, allowing the drawing of a four-dimensional map of changing environments. It is known that the climate at Chillagoe was once drier than the present day (based on fossils from Katy Breen Tower and Muldiva), and it has become apparent that this was the case through much of eastern tropical Queensland. The timing of this 'arid phase' seems to be close to 200 000 years ago (Hocknull et al., 2007, Gilbert Price unpublished data). Advances in dating technology are allowing specimens from Chillagoe to be placed in chronological context. Price et al. (2009) used uranium-series dating to place the Tea Tree *Palorchestes* (and by inference several other associated specimens) between 199.1 ± 8.9 and 137.4 ± 1.1 thousand years before present. New cave sites are also being sampled. In late 2009 a team of palaeontologists and members of the Chillagoe Cave Club located fossil deposits in Crocodile Cave, Leafy Trees Cave and Macropedies Waterhole. One of these sites has already produced multiple new species. After a century of discoveries, it seems that the Chillagoe caves are just beginning to yield their fossil secrets.

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