

Flat Rocks site - Part 3: Fossils Galore

Site #16 on the Strzelecki Taxonomy Map

When the Flat Rocks site was first discovered in 1991, no-one dreamed that we would still be digging there 22 years later, or that the site would yield some of the most amazing fossils ever found in Australia. Not only is the Flat Rocks site one of only a handful of Cretaceous Polar dinosaur sites in the world, but it is the only fossil locality in Australia to contain evidence of dinosaurs and three different groups of mammals. Its merits also include the oldest multituberculate mammal in the Southern Hemisphere (*Corriebataar marywaltersae* featured in August 2013), the oldest and smallest monotreme in the world (*Teinolophos trusleri* July 2013), the oldest evidence of birds in Australasia (April 2013) and the oldest freshwater turtle in Australasia (December 2012). Quite an impressive list, and that does not include the many other animals that have been identified from a single tooth or bone.

Over the last 20 field seasons at the Flat Rocks site, many thousands of bones have been excavated. Many of these bones are too incomplete for the researchers to be able to assign them to a genus or species, but many bones can be identified to family level. Fortunately the bones of different animals have different textures and shapes. For example, a turtle limb bone is solid in the centre, whereas an ornithopod dinosaur (plant eater) has hollow bones, but the walls of the shaft (the long part of the bone) are quite thick. Compare this with a theropod dinosaur bone which also has hollow bones but the walls of the shaft are very thin, like a bird. Their bones were also air filled like modern bird bones, not filled with marrow like mammal bones. Even the smallest bones in the body of a theropod, like the toe bones, are hollow, as are the vertebrae (backbones). So if a digger finds a thin-walled hollow bone, it means that it probably came from a theropod dinosaur or a bird or a pterosaur, which also had thin-walled hollow bones. That is why the ends of the bone are so important. The end of a bone varies in shape depending on what it articulated with and what part of the body it came from. This is where a good comparative collection is essential. When we began collecting fossil bones we had very few similar specimens to compare them with and we were forced to compare them with specimens from other institutions. In the last 30 years, including ten years at Dinosaur Cove in the Otway Ranges, we have built up a comprehensive collection of fossil bones. Today, when we find a fossil bone, there are usually similar specimens in the Collection at Museum Victoria to compare it with. This makes identification of that bone much easier. We also invite visiting palaeontologists to examine the Collection, in the hope that they may be able to identify any "mystery" bones. In March this year, Paul Barrett, an expert in ornithopod dinosaurs from the Natural History Museum in London, visited the Museum and identified a number of isolated skull elements in the Collection as belonging to ornithopod dinosaurs.

Of the many thousands of bones that have been collected from the Flat Rocks site in the last 20 years, only a fraction have been fully prepared, which means completely removing them from the rock in which they were found. Preparation is a time-consuming job in which the preparator needs a steady hand and lots of patience. It can sometimes take days to remove one bone from the rock and in the case of "Noddy" the partial dinosaur skeleton found in 2011 just north of the Flat Rocks site, it has taken many months of painstaking work under a powerful microscope to expose all the bones.

Many bones that are initially collected and catalogued are so incomplete that it is not worth the preparator's time to fully prepare them. All bones are checked after each field season and some cursory preparation is done to determine how complete the bone is. If it is incomplete and has no scientific value then it is used as a demonstration bone in the training of new volunteers. There are still many boxes of unprepared fossil bones that still need preparation and who knows what any one of them may turn out to be. Only time will tell.

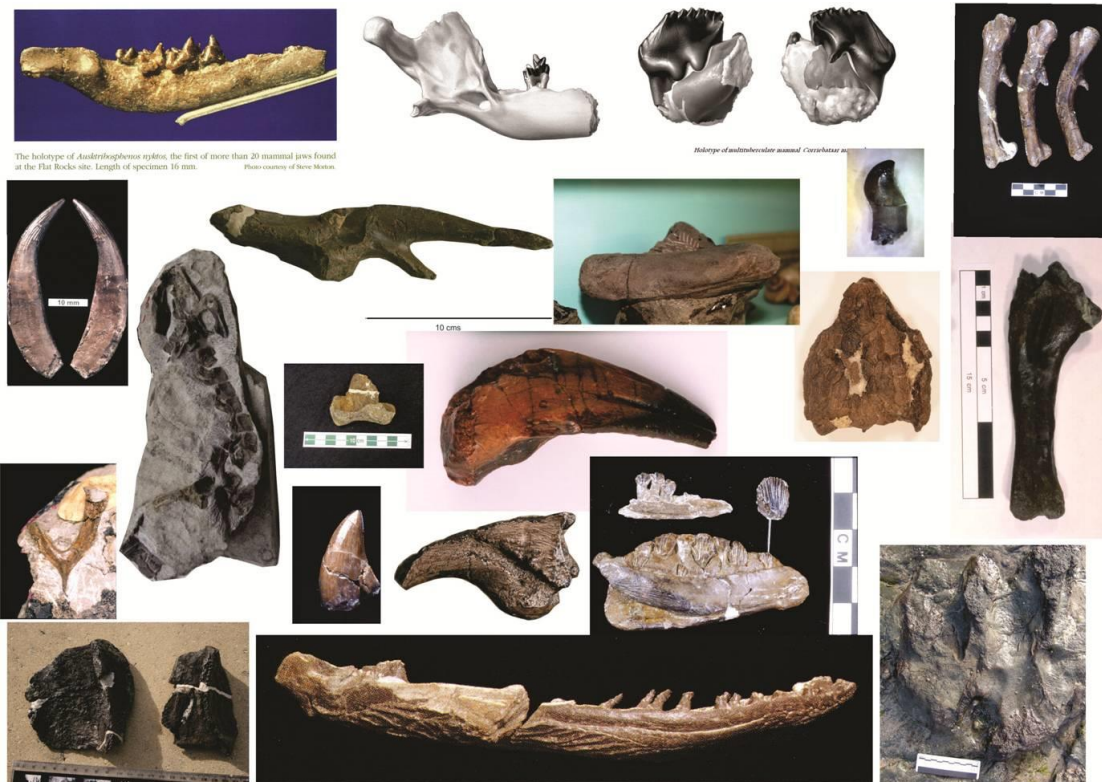


Image: Collage of some of the amazing fossils that have been found over the last 20 years.
 Photographer: Lesley Kool