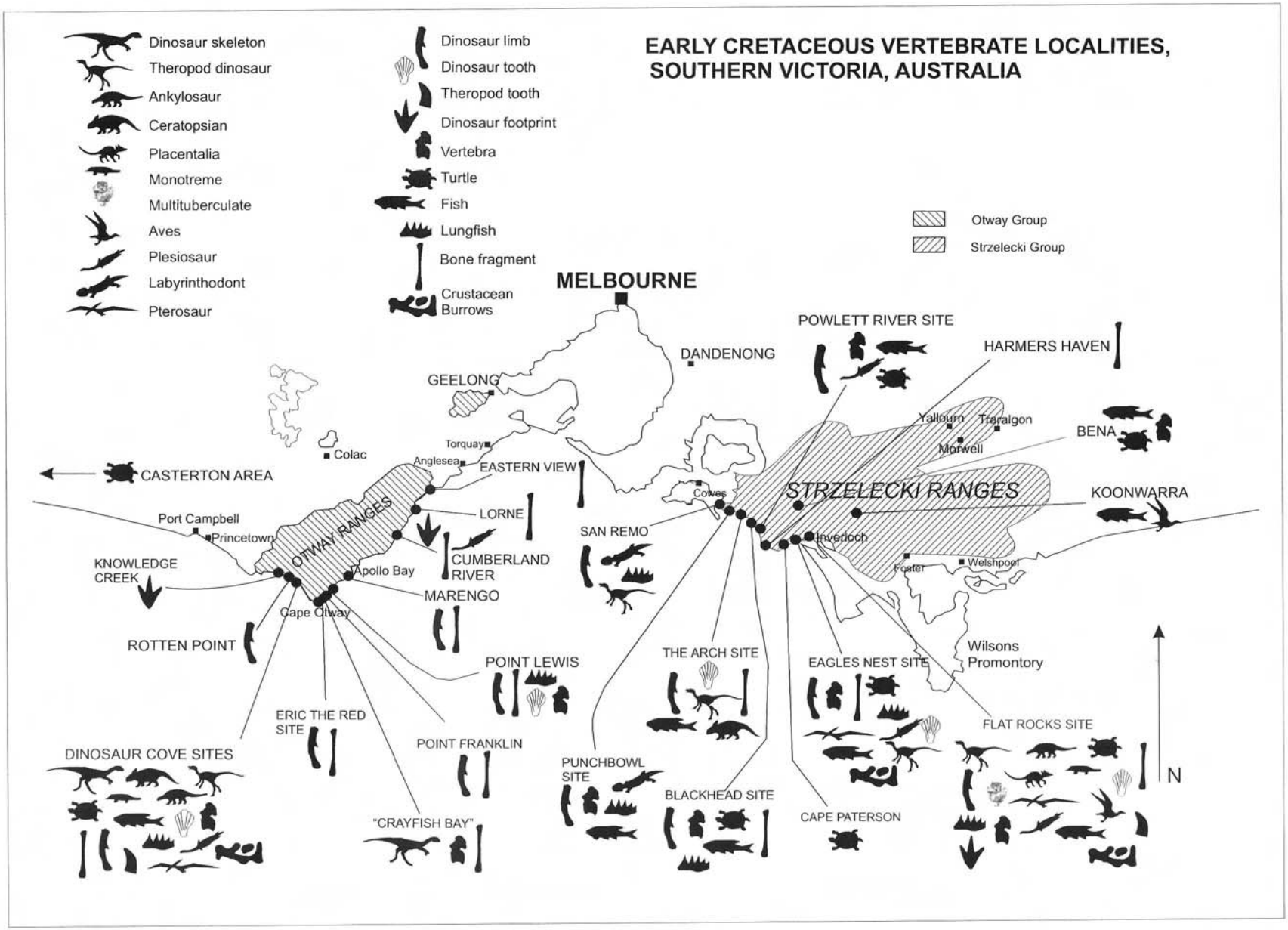
DINOSAUR DREAMING 2006 FIELD REPORT



MONASH University
Dinosaur Dreaming 2006 Field Report
museum VICTORIA

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The partial hypsilophodontid skeleton found by Michael Cleeland in November 2005 near Cape Otway, along the south coast of Victoria. The skeleton is comprised of the left hind foot, distal ends of the left tibia and fibula and most of the tail vertebrae.

The specimen is currently being studied at the Melbourne Museum

Field Report

By Lesley Kool

The Flat Rocks site is situated on the southern coast of Victoria approximately 150 kilometres south-east of Melbourne where Early Cretaceous sedimentary rocks outcrop along the coast from San Remo to Inverloch. It is the principal site of the Dinosaur Dreaming project and was discovered in 1991 as part of a prospecting program conducted jointly by Monash University and Melbourne Museum. The main part of the fossil layer lies within the inter-tidal zone and is only accessible for 3-4 hours either side of low tide. The first annual field season at Flat Rocks took place in 1994 and this year was the 13th time we had returned to this locality. Fortunately, palaeontologists are not superstitious. Touch wood.

These last twelve months have seen a great advance in Victorian palaeontological exploration, beginning last November with the discovery of a partial dinosaur skeleton at a new locality on the Otway coast. Our intrepid prospector, Mike Cleeland, has found some incredible fossils over the years, but when he and friend George Caspar found the only partial dinosaur skeleton outside Dinosaur Cove, he really excelled himself. Mike's report takes you back to where and how the skeleton was found and the excitement of discovery. Preparation revealed the partial skeleton of a hypsilophodontid dinosaur, consisting of a left hind foot and the remnants of the left tibia and fibula plus most of the tail. Future research will centre on the comparison of this specimen with the two partial hypsilophodontid skeletons from Dinosaur Cove. The skeleton features on the front cover of this field report.

Removal of the partial dinosaur skeleton near Cape Otway

Exploration was also the main focus of the 2006 Dinosaur Dreaming field season. At the end of the previous year's dig our excavation manager, Nick van Klaveren, noticed that a small area of conglomerate, exposed just seaward of the main site, looked lithologically different to the Main fossil layer. A small test pit was dug, which produced a number of bones, including a tiny bone that later turned out to possibly be a humerus (upper arm bone). The conglomerate also appeared to be getting thicker, so it was decided that the 2006 field season would focus on following this layer. The area was designated "Bridge East" as it outcrops to the seaward side of the sandstone bar that forms the eastern boundary of the Main fossil layer. As well as developing this area Nick thought it was worthwhile testing a number of small conglomeratic lenses (Areas I and J in Map 1) that outcrop even further east of main fossil layer, close to the low tide mark. We called these areas the "Outer limits" for obvious reasons.

The results of this exploration showed that Bridge East was much more extensive than was first thought and Area H could be a channel that predates the main fossil layer. Further exploration during Dinosaur Dreaming 2007 may shed more light on this area.

Area G produced the first partial turtle skull found at the Flat Rocks site as well as a turtle braincase. What is even more significant are the two mammal jaws that were also found in this layer.

If it turns out that Bridge East is a separate channel to the Main layer, then it extends the range of the mammals in this area.

Nick van Klaveren (in white hat) and crew members preparing the fossil layer for excavation

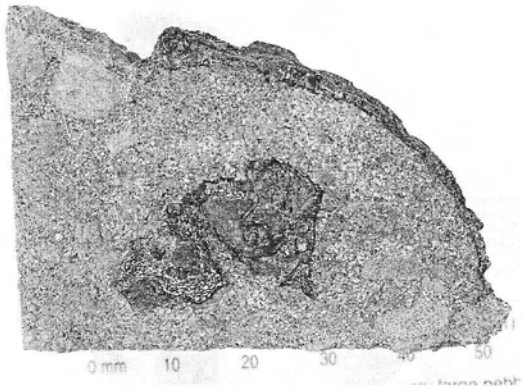
While these new areas were being explored Nick also decided to revisit an area of the main fossil layer that had been neglected in earlier digs. The very south boundary, or thinnest edge of the fossil layer (areas A F) had been skimmed over in the past to reach the thicker, more productive parts of the layer. Although the edge was not very thick it was, none-the-less, fossiliferous and during the course of the field season produced a number of small interesting bones, including two mammal jaws from Area D.

During the 2006 field season we were visited by Dr. Anthony Martin, a palaeo-ichnologist from Emory University, Atlanta, Georgia, who studies trace fossils, such as footprints and burrows. Tony spent a couple of days with us and found structures we had walked over for 14 years and never realised that they were fossil crustacean burrows and dinosaur footprints. After the dig ended he explored parts of the Otway coastline and found more evidence of these ancient crustaceans. His discoveries have given us "ichno-eyes" and the necessity to re-prospect the Victorian Early Cretaceous coastline to find more of these amazing structures.

Dr. Anthony Martin measuring one of the dinosaur footprints he identified near the Flat rocks site, Inverloch. May 200

Dinosaur Dreaming 2006 was the 13th field season at the Flat Rocks site and, for the first time, a new volunteer program was trialled through the Discovery Centre at the Melbourne Museum. In the past, volunteers contacted the Museum or Monash University and applied on an "ad hoc" basis. After the discovery of the first mammal jaw in 1997, a structured training program for new volunteers was put in place to ensure that future mammal bones would be recognised. This proved very successful with the recovery of a further four mammal jaws. However, over the years the crew numbers have grown and it was decided after the 2005 field season that new volunteers needed to apply and be processed at a central point. This could not have been achieved without the help of David Pickering, Sarah Edwards and Wayne Gerdtz from the Melbourne Museum. Sarah and David's report highlights the success of the program.

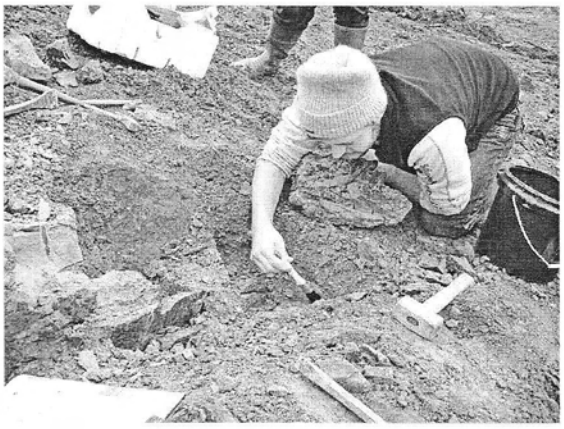
After the 2006 field season ended Mike Cleeland continued his prospecting and part-time lecturing on the local geology. In the course of one of his field trips he took his students to Cape Paterson, which is an area with interesting geological features, but is not well known for fossils. However, as you will read in Mike's report, he did find a fossil that day and it has turned out to be very interesting. It is not a dinosaur or a mammal but a humble turtle skull, or part of one. What makes this partial turtle skull so interesting is that it may well be related to a group of turtles that is unique to Gondwana and which gave rise to the amazing horned turtle *Meiolania platyceps*. This skull and the partial turtle skull found at Bridge East have been sent to Dr. Eugene Gaffney at the American Museum of Natural History in New York for further study. Dr. Gaffney is a world-renowned expert in fossil turtles, particularly the meiolaniid turtles. We wait in anticipation for his verdict.



The partial turtle skull found at Cape Paterson before preparation June 2006

Exploration inland of the Strzelecki coastline has always been difficult. The Early Cretaceous Strzelecki Ranges are quite extensive, covering an area of hundreds of square kilometres. However, most of this area is covered by farmland, towns and bushland and is only exposed along road cuttings and creek beds. The only inland site in the Strzeleckis, Koonwarra, was discovered in the 1960's when the South Gippsland Highway was created and cut through an ancient lake bed. The site produced hundreds of wonderfully preserved fish fossils, insects and half a dozen bird feathers, but there were no tetrapod remains discovered there.

Recent road works close to the South Gippsland town of Bena prompted Matthew Pankhurst, a Monash University science student who lives in the area, to do some exploring of his own. Not only did he discover the first evidence of Early Cretaceous tetrapods in the inland Strzeleckis but he had the initiative to organise permission from Vic Roads to allow further prospecting of the newly exposed cuttings. His report makes excellent reading.



Matthew Pankhurst carefully removing a fossil bone near Bena, South Gippsland, Victoria. June 2006

The four mammal jaws and the turtle skull fragments were only a small part of the 800 plus specimens that were catalogued during the dig. A number of hypsilophodontid femora were recovered, as well as a number of isolated dinosaur teeth, including an ankylosaur tooth, which are pretty rare in the fauna. A tiny frontal (part of the skull) was also found. It measures only 10mms long and could prove to belong to one of our elusive mammals.

Since annual excavations began at the Flat Rocks site in 1994 more than 11,000 specimens have been catalogued. This does not include an equal number of uncatalogued fossil bones that were too fragmentary to be of scientific value. The exploration carried out during the 2006 field season has extended the boundary of the Flat Rocks site and has shown that the fossil layers are still just as rich as they were when we first started annual excavations in 1994.

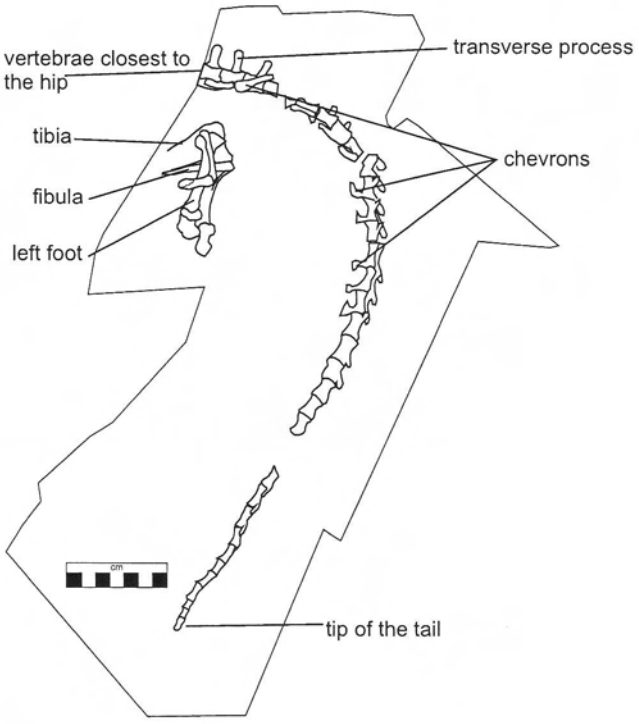


Diagram of partial hypsilophodontid skeleton (front cover image)found by Mike Cleeland near Crayfish Bay, the Otways, Victoria,

Excavation Report

by *Nicholas Van Klaveren*

The Flat Rocks fossil locality was excavated for a period of six weeks, from late January to early March 2006. This period was chosen to coincide with the university holidays and to avoid the tourist season at Inverloch.
All the fossil material was collected under National Parks Permit Number 10003392 of the Department of Natural Resources and Environment Victoria.
This year excavations targeted remnant lag material in the lowermost conglomerate in the main pit area and continued at Bridge East.

Excavation Methods
The excavation method this year continued with the use of large iron wedges and sledge hammers to remove the bulk of the fossil layer from the targeted areas. Exposed specimens were removed with a diamond saw blade equipped Stihl TS460 Cutquik.
The unfossiliferous overlying sandstone overburden at Bridge East was removed with the two Cobra petrol driven jackhammers. Once the majority of the overburden was removed, the method was then switched to sledge hammers and wedges so as to provide greater control to protect the underlying fossil layer from damage.

Equipment
The Flat Rocks fossil locality, due to its location at the bottom of a cliff in the inter tidal zone facing Bass Strait, presents a number of difficulties with regard to the difference in elevation and large waves at high tide.

Sump Pumps
Two small sump pumps used in previous years were replaced by salt water boat bilge pumps. These new units have the advantage of being able to run dry without damage and a slightly higher output rate.
Power was supplied by two twelve volt sealed lead acid batteries that were recharged as needed.

Petrol Driven Pumps
The four stroke petrol driven pump and the old two stroke were increasingly used as progressive excavation deepened the work areas. It is anticipated that the latter is in its last years (it is of Dinosaur Cove vintage) and a replacement has been procured.

Excavation Areas

Area A
The small sandstone lens first excavated in 1998 which produced a single hypsilophodont femur was completely removed with only a small fragment of bone recovered. The lens rapidly shrank and then disappeared over a distance of one metre.

Area B
Last worked by Roger Close in 2005, this remnant of Lower Conglomerate has historically produced turtle limb material and fish. This year it was completely removed and no fossils of note recovered.

Area C
A small remnant of Lower Conglomerate measuring approximately one square metre was removed from this area and again no fossils of note recovered.

Area D
Approximately three square metres was removed at this area and produced two mammal jaws and many bones of interest. The Lower Conglomerate here was bifurcated into two thin layers about 5cm thick of which the lowermost was nearly barren. Unfortunately down dip and to the east the layers had already been excavated.

Area E
Lying below the western edge of Area D and bounded by the fault at 188mE is a channel of 2-5mm clast supported conglomerate approximately 15cm thick and 50cm wide. This channel discovered by Norman Gardiner was unfortunately somewhat poor in fossils. Further excavations here will require a sandbag wall. It opens down dip and may be excavated in future seasons.

Area F
Continuation of the layers at Area D was excavated here for a short time but being on the upside of the fault it had been mostly removed already and only small patches remain.

Area G
Continuing excavation at the Bridge East site produced many interesting bones and will be the focus of future operations. Increasing overburden and depth will necessitate the future construction of low sandbag walls and eventually a construction.

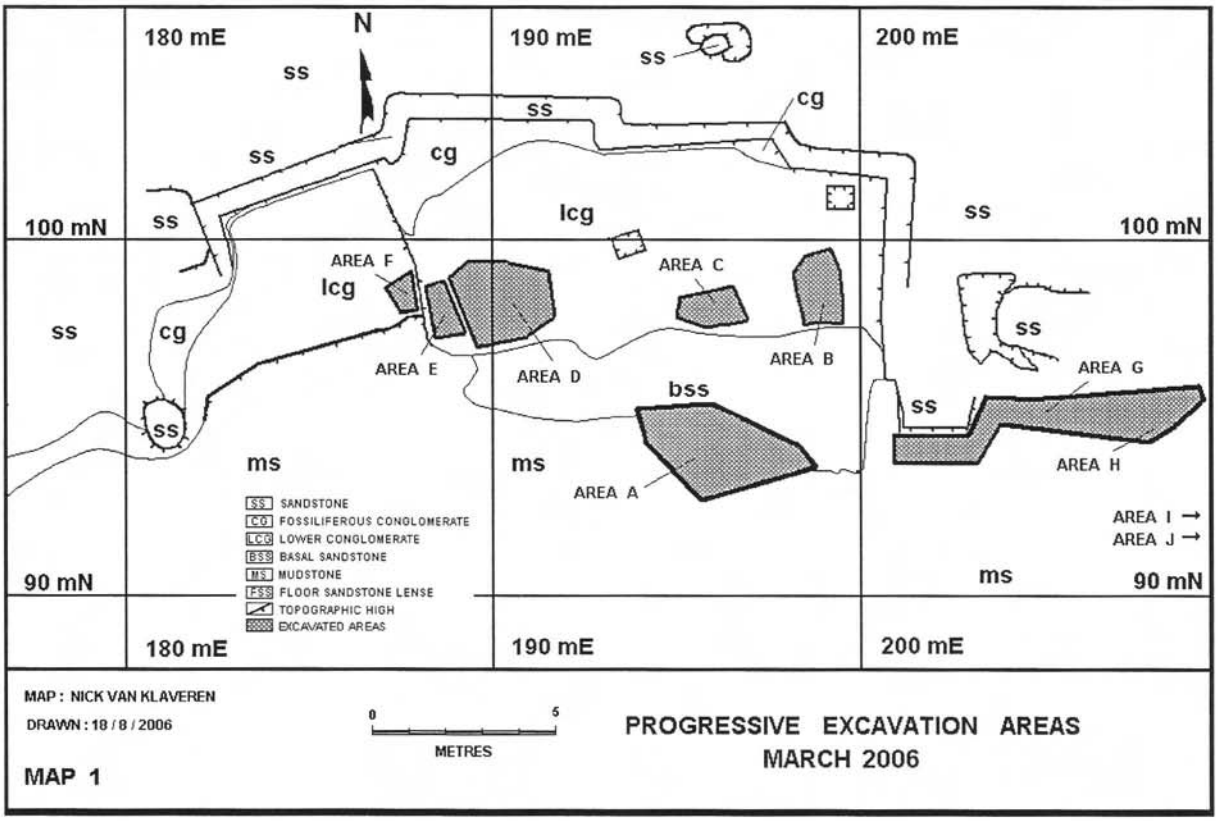
One group, in the foreground excavating Area G, while another group works Area E in the background

Area H
Large bones discovered in the floor of Bridge East at this location were found to be the top of another entire channel predating all other channels. A thin layer of mudstone separated this new unit from the overlying Bridge East unit. Bones excavated from this layer will predate those of the main areas and may contain a different faunal assemblage.

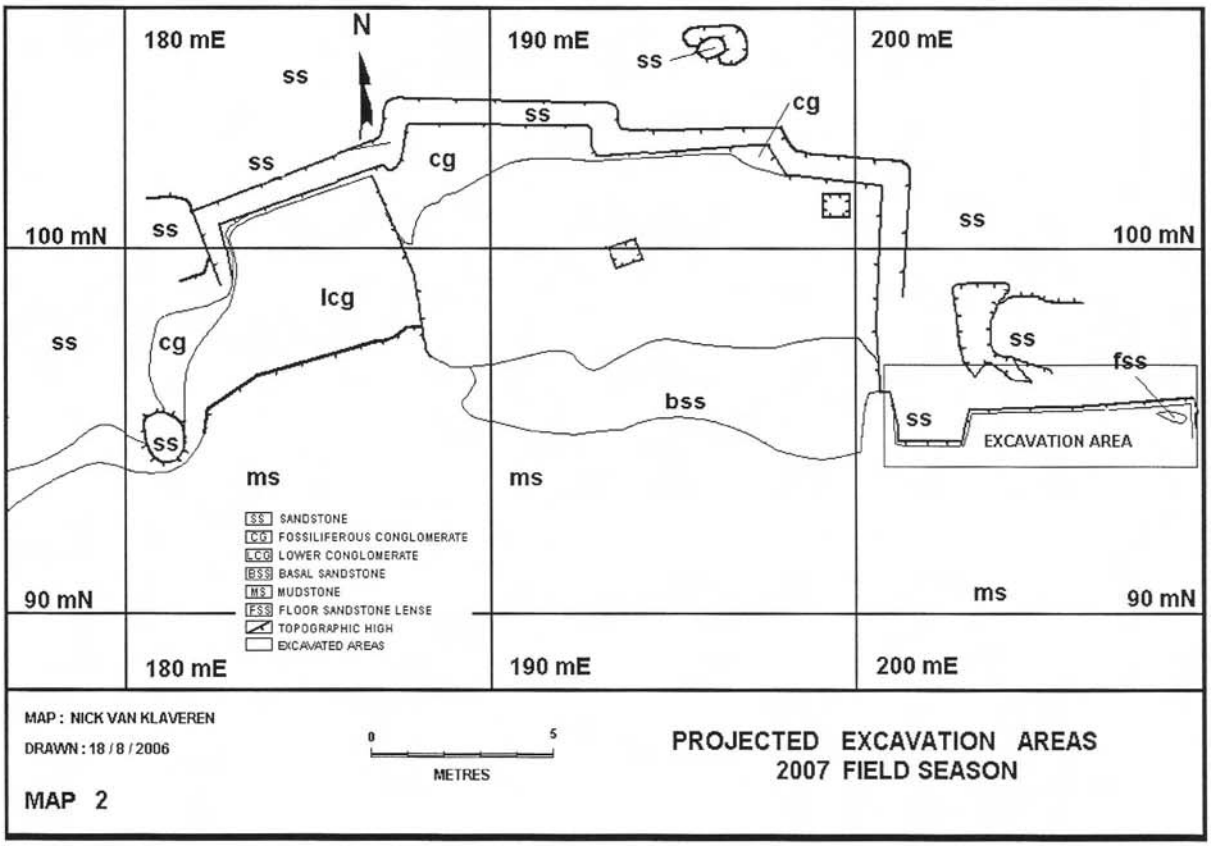
Area I
Located approximately 10 metres east of the seaward edge of Bridge East, a new channel with five very thin pulses of conglomerate was discovered by the author. The area was carefully mapped, gridded and photographed prior to excavation. Two days of excavations produced a single hypsilophodont tooth and approximately a dozen small bone fragments.

Area J
A small wedge of conglomerate truncated by an overlying sand lens was discovered by the author approximately 5 metres ease of the Bridge East site. This site was excavated by John Wilkins for a single day and produced a small number of bone fragments.

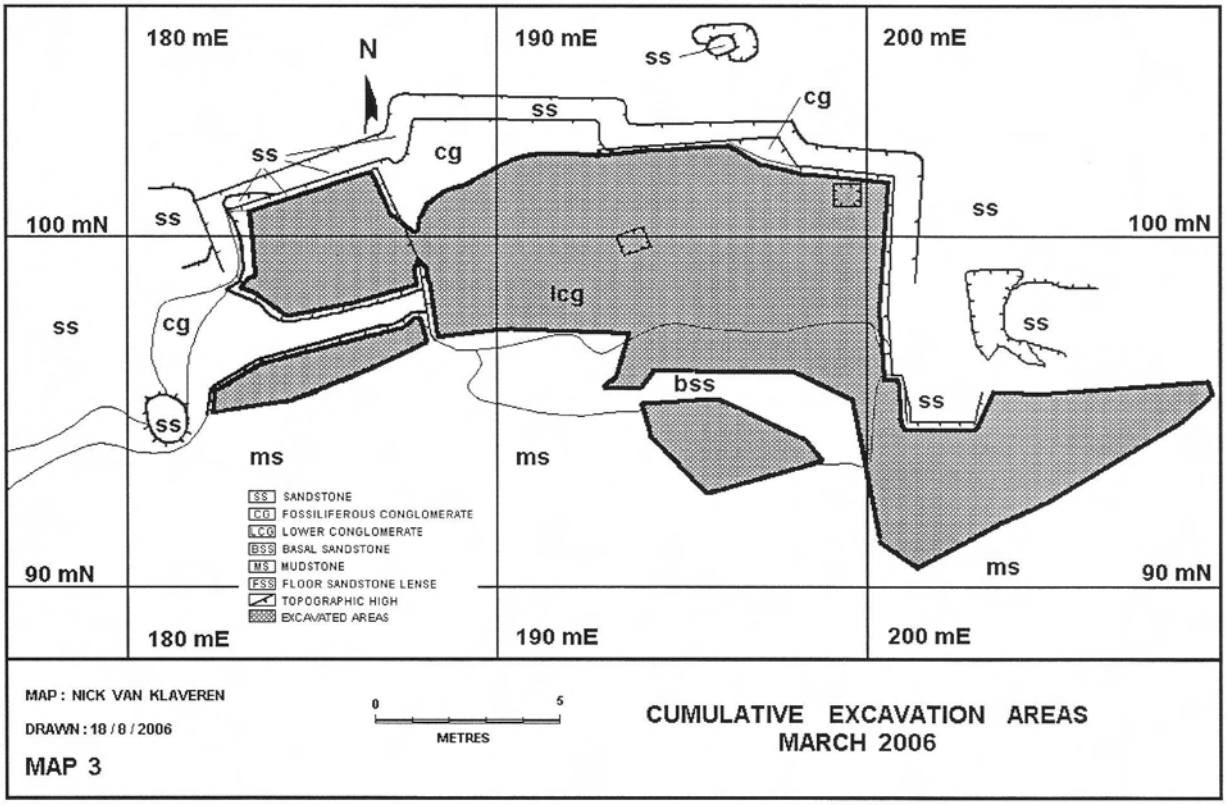
Future Plans
Bridge East and the new underlying channel will continue as the target of future excavations (Map 2). The recognition of the bridge itself as representing a palaeo-sandbank with low stream energy zones on either side and hence a target for small bones such as mammal jaws will also need to be investigated.



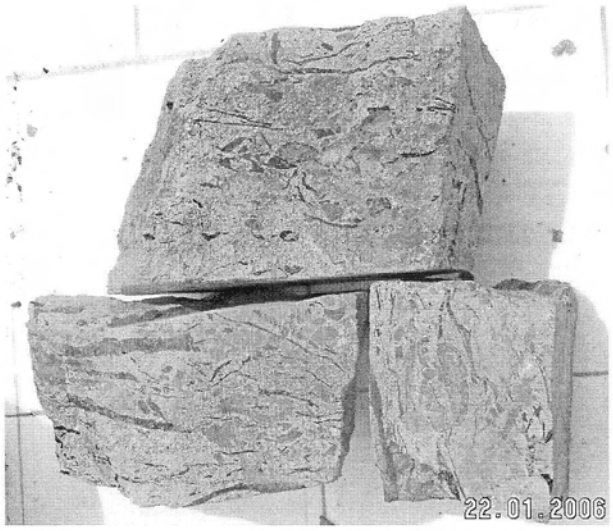
Map 1. Progressive excavation areas



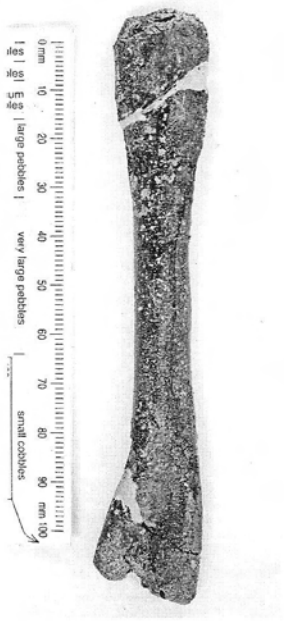
Map 2. Projected excavation areas



Map 3. *Cumulative excavation areas*



A dinosaur limb bone, seen in cross-section in the three pieces of rock. The two lower pieces have been cut with a rock saw.



The same limb bone, after preparation. The missing part of the bone, which was rocksawn through, has been infilled with putty. It is a tibia (lower leg bone) from a small dinosaur similar to a hypsilophodontid.

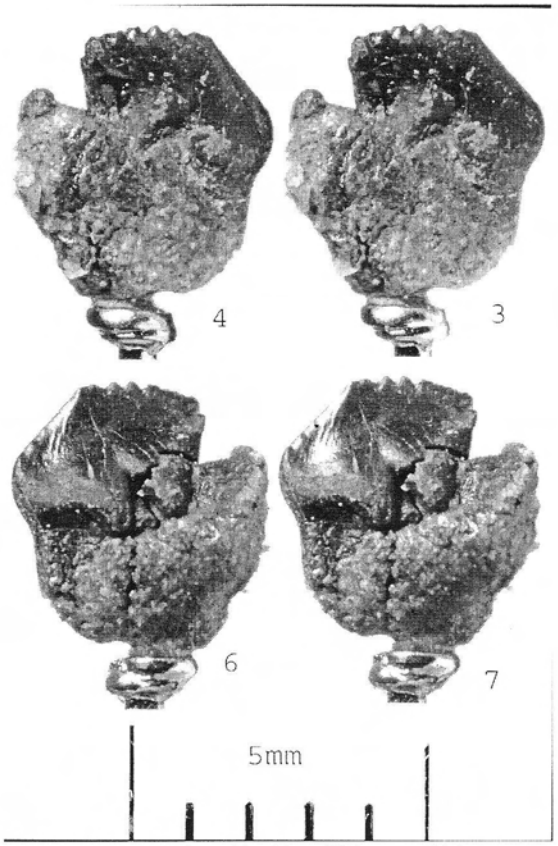
RESEARCH REPORT

By Dr. Tom Rich

Mike Cleeland found and collected a partial skeleton of a hypsilophodontid dinosaur just east of Cape Otway. It is only the third partial skeleton of a dinosaur found in Victoria after twenty-eight years of searching for them. Other fossil bones were found nearby so it may well be that this locality will become the third one found in Victoria after Dinosaur Cove and Flat Rocks that will warrant systematic excavation. Another visit will be made to this site in the coming November to get a better idea of the nature of it.

The partial skeleton appears to be that of a hypsilophodontid dinosaur, the same group represented by the two previous skeletons found. At this stage, it has not been determined whether this new skeleton is the same species as the other two, *Leaellynasaura amicagraphica.*

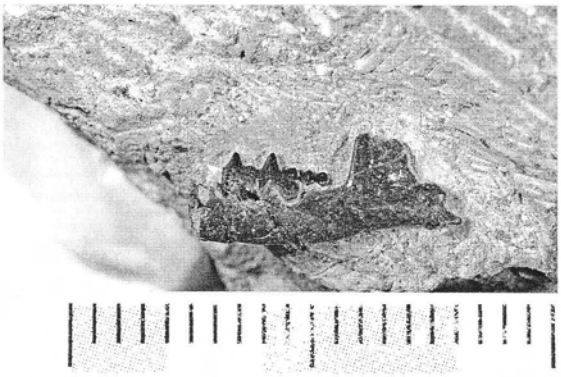
One year ago I was confident that a blade-like tooth found by Mary Walters at the Flat Rocks locality was the first record of a multituberculate mammal from Australia. The multituberculates were a highly successful group in the Northern Hemisphere in the late Mesozoic. A blade-like tooth characterises them so it was natural to assume that Mary's specimen was just that.



The unusual tooth found by Mary Walters , which was originally thought to belong to a multitubercualte mammal. Now Dr. Tom Rich is not so sure

However, further investigation of this specimen shows it has three features unknown in any other multituberculate. So it now appears to be one of two alternatives. Either it is an extremely atypical multituberculate. Or it represents an enntirely new group of mammals not previously seen before. Because the Mesozoic mammalian record of Australia is so sparse, the latter possibility is no less probable than the former.

Of the four mammal jaws found in the 2006 season, one with a single tooth stands out. That tooth is remarkably small. If it is not the smallest mammal that ever lived, it is close to it. Another jaw with a few broken teeth in it, "Gerry's jaw" gave the first hint that such small mammals occur at Flat Rocks. It was not made the basis of a new species because of the damage it had undergone. With a single tooth, this new specimen is unsuitable for that purpose as well. But together they show that with further work, an adequate specimen of these tiny mammals will be found upon which a name can be based.



An Ausktribosphenid mammal jaw found by Roger Close during the 2006 field season

As these lines are written, a paper is in preparation about the relationships of the two extant monotreme families to one another and to the other mammals. This study is being carried out by colleagues in Texas, California, and NSW and utilises fossils from both Flat Rocks and Dinosaur Cove.

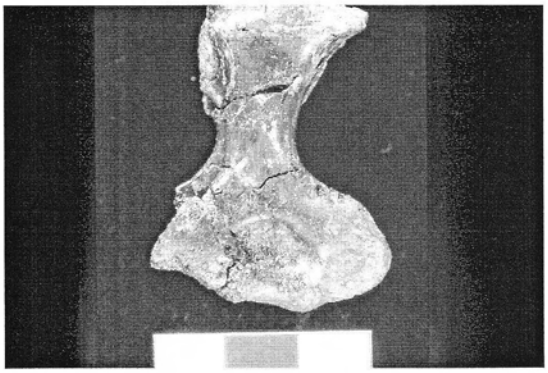
A month was spent as a guest of the Smithsonian Institution in April/May 2006. This was for the purpose of attempting to identify 102 specimens from Flat Rocks and Dinosaur Cove that had defied previous attempts to work out what they were.

Owing to the nature of the collections there (all large dinosaurs) versus the small ones from Victoria, it was not possible to find closely similar animals. However, what could be determined was that about half the specimens were small ornithopods and the other half, small theropods. The hypsilophodontids which are so common in Victoria are ornithopods. The small theropods are carnivores that include the most agile dinosaurs. What was surprising is that the two groups were about equally represented because based on femora previously identified from Victoria, the hypsilophodontids are far more abudant than the theropods.

One specimen of the 102 that turned out to be something other than a dinosaur was the tooth of a crocodilian. Thomas Huxley once said, "Many a beautiful theory has been destroyed by a harsh fact". This specimen did just that. Previously, what few crocodilian specimens found in the Cretaceous of Victoria occurred in the Otway Group. From the older Strzelecki Group outcrops have been recovered temnospondyls, animals that looked very much like crocodiles but were amphibians rather than reptiles. It made a nice, neat story that the temnospondyls that could tolerate cold better than crocodilians thrived in polar latitudes where the latter could not go until it became warmer in Otway Group times. Then when it did become warmer, the crocodilians entered the area and displaced the temnospondyls. The harsh fact was that the crocodilian tooth in question came from the Strzelecki Group and thus could tolerate the same conditions that the temnospondyles thrived in and the two groups lived alongside one another.

A visit to a dinosaur exhibition in Japan made it possible to learn something useful about only one of the same 102 fossils that went to the Smithsonian earlier. The specimen in question was for Victoria a rather large partial vertebra. What was established was that surprisingly this specimen was not a dinosaur. Now that it is recognised that this specimen is quite anomalous in the Victorian land vertebrate assemblage, much more effort will be devoted to working out what it is.

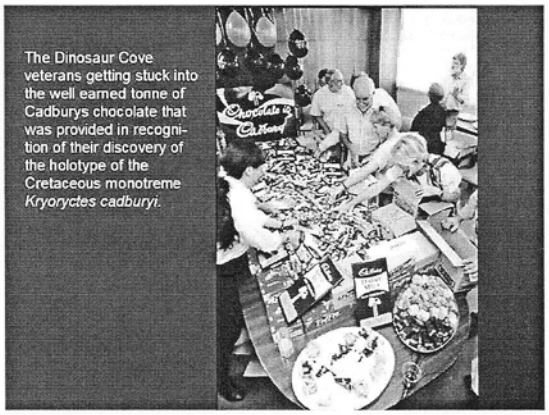
At the end of December, a name was given to the only fossil mammal from Dinosaur Cove. It is the humerus or upper forelimb of a monotreme called *Kryoryctes cadburyi*.
Kryoryctes means "The cold digger". The animal's humerus is broad at the base indicating that it could dig. "Cold" refers to the fact that it lived within the Antarctic Circle of the day.
"cadburyi" refers to the Cadbury chocolate company. Why Cadbury is so honoured is rather a long story. About 1987, after work had gone on at Dinosaur Cove for four years, one of the stalwart volunteers, Helen Wilson, knew that what I really wanted to find there was not dinosaurs but mammals. One day she asked me what I would give her if she found a fossil mammal at Dinosaur Cove. Knowing that she loved chocolate and by that time sure no mammal would ever turn up there, I flippantly replied, "a cubic metre of chocolate". Never make a promise that you think you will never have to honour. That I did this was a big mistake on my part.



Kryoryctes cadburyi - a monotreme humerus from Dinosaur Cove

Years later, after Dinosaur Cove had been closed down, a volunteer was given a specimen to prepare by Lesley Kool. Labelled "Turtle? Humerus?", when removed from the rock, it was seen to be a humerus alright but certainly not a turtle. Rather it was clearly a monotreme.

Now I was in hot water. How was I going to obtain a cubic metre of chocolate? That is worth about $10,000 and no fund granting agency would take a grant proposal seriously for $10,000 to buy a cubic metre of chocolate. Fortunately, another long time volunteer, Cindy Hann, had been teaching a student whose family she got to know rather well. The student's father, Frank Miller, just happened to be the manager of the Cadbury factory in Ringwood. Frank agreed to provide the chocolate and thus my debt of honour was repaid. As the specimen that caused all this to happen is a beautiful mahogany brown, it is apt that the Cadbury company should be thanked by having the species named in their honour.

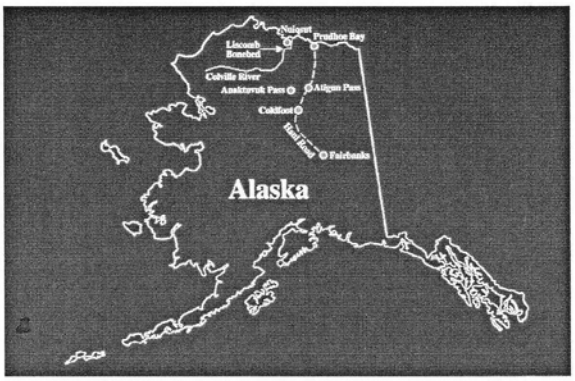


The day Cadburys gave away one cubic metre of chocolate

In March/April 2007 it is planned to cut an adit {a tunnel with only one entrance} into permafrost at a site called the Liscomb Bonebed on the banks of the Colville River which cuts across the North Slope in northern most Alaska. The purpose of the adit will be to test the feasibility of using this approach to recovering dinosaurs in this manner. So this is more palaeontological engineering than the usual palaeontology fieldwork. The reason for an interest in doing this is that as might be expected, the dinosaurs from there are polar just as are those in Victoria. For fourteen years, I have been trying to fund this trial dig and gotten nowhere. Enter Ruth Berry of Big Island Pictures, Brisbane. When I mentioned this project which by that time I had given up on, she thought it would make a great documentary. So she gets all the credit for finding the money to fund it.

In the past year, I have made three trips to Alaska to organise this project. But next March/April, the preliminaries will be over. Then steel will touch rock and the excavating will begin. This will be at the end of the northern winter when temperatures there can be -40oC but at least there will be 8 hours per day sunlight when the digging starts and 16 hours per day by the time it ends. When the dig is over in mid-April, the adit will be sealed. The following August, a return will be made. Then the floor of the adit will be excavated to recover dinosaur bones.

I do not particularly like bone-chilling cold, so the reason to do this is not to enjoy the scenery. Rather it is to develop a technique which might make the excavation of dinosaurs on the North Slope more efficient. A more extensive collection of North Slope dinosaurs would be useful for comparing those dinosaurs with the polar dinosaurs of Victoria.



Map of Alaska showing route to dinosaur site on the Colville River

Sedimentology and Palynology Report

By Doris Seegets-Villiers

Sedimentology SEDIMENTOLOGY

Excavation at the Bridge East Area (BEA) have revealed a large range of fossil bone material, including the much sought after mammal jaws. Little is, however, understood about the connection of this area with the Main excavation site. Brown soft clasts and layers (possible palaeosol) preserved within the deposits of the BEA are also found within the sedimentary layers of the uppermost unit of the original channel, here they are, however only found as clasts.

There is the possibility that these brown clasts were reworked from the BEA area and this section therefore predates the main excavation area. This is one of the theories that we have got but we can not prove it. The crucial area that might lead us to an answer towards how the two different excavation areas are connected is either obscured (by a sand cover) and/or the badly weathered section of the excavation site. Either we can't get to it or we can not see what the sediments look like let alone see what is happening to the different layers. The only way we will ever be able to get any more information on the exact extent and connection of the individual sedimentary units involves a fair bit of elbow grease.

The old excavation area will have to be dug up and the weathered material will have to be removed. Depending on the wave action there can be a fair bit of sand deposited in the original "hole" making the excavation a big task. The good news is that the large rock unit that separates the BEA from the main hole does not have and more importantly can not be completely removed. We only need to take off a bit of the rock surface in order to achieve an unweathered profile. We must be very careful not to remove too much in this area as we want to preserve the protective nature of the Bridge. Excavation of the entire unit will see the main hole exposed to the full force of the tides. It will also mean that there is no limitation to the amount of sand dumped into the Main excavation area and that there is no natural barrier that will stop sand and water from seeping into the Main hole once the dig goes back to that area.

PALYNOLOGY

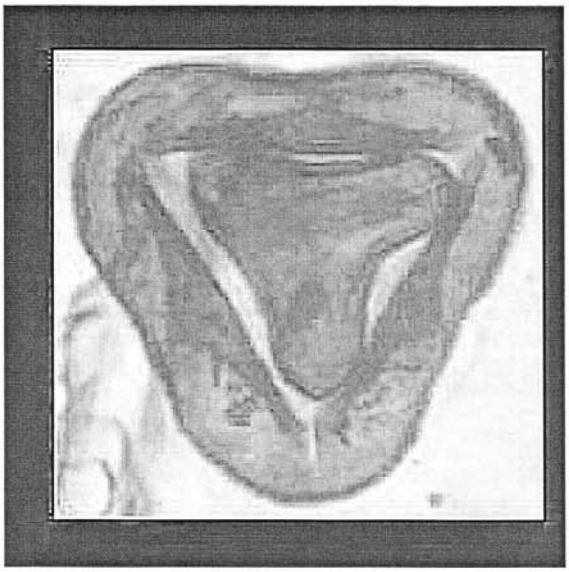
All samples have been counted and scanned. The slides are scanned in order to make sure that all, even the rare plant species within an individual slide are recorded. That means that not only transects, used to establish the pollen count have to be examined, but also the entire rest of the slide. In our case, this task took quite a while and caused some problems. As was expected, in almost all of the slides, species were discovered that had been observed within the Inverloch assemblage but not within that particular slide. Then there were also the grains that looked very unfamiliar.

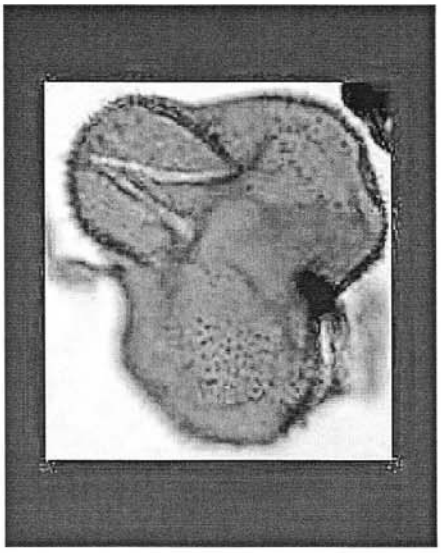
Unfortunately, each new grain was only represented by one individual making identification and establishing a time frame very difficult. Consultation with another palynologist (Basil Balme from the University of Western Australia) has established a very likely age of Late Triassic.
These grains were mostly well preserved with small appendices on two of the grains and frills on others. This could only mean a relatively short distance of transport. The problem that we are facing now is trying to figure out where the reworked Triassic sediments came from.

There are very few Late Triassic surface outcrops remaining and all of them are quite a distance from the Flat Rocks site making a provenance almost impossible.

The palynomorphs could also come from reworked sediments that are now completely eroded. That means all the Late Triassic (and possibly other sediments younger than the Cretaceous) deposits were completely removed by the action of our ancient river system, incorporated into the transported sediment material, carried by the rivers and finally dumped as the fluvial deposits of the Gippsland Basin.

In this case, which looks like the most likely one at the moment, we can not even vaguely pin point where the sediments derived from. Only palaeocurrent data will hopefully help us solve the mystery provenance of the sediments.





Two pollen grains extracted from the Early Cretaceous sediments at the Flat Rocks site, Invelroch, Victoria

THE DISCOVERY OF A PARTIAL ARTICULATED DINOSAUR IN THE OTWAYS

by Mike Cleeland

The rusting anchor of Eric the Red has long marked a site of interest to vertebrate fossil prospectors along the Otway coast since a party with Tom Rich collected several specimens from the nearby shore platform. To the east, Point Franklin has also been a productive locality. Westward towards the Otway Lighthouse itself previous expeditions had noted increasing dominance of fine sediment, as well as the unconformity with the overlying tertiary dipping to a lower level in the cliff and covering the cretaceous exposure with copious pestiferous boulders of grit. Nothing had hitherto been found here.

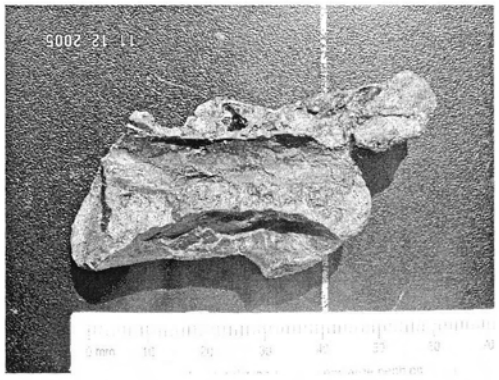
On November 13th 2003 I was looking over the area and noticed a potentially prospective layer of conglomerate a couple of hundred metres west of the anchor. It contained a small nondescript limb bone, about the size of a little finger, which I removed at the time. The western extension disappeared under sand, but encouraged by the find, and by the quality of the exposed rock, I determined to revisit the site in the hope of finding the sand down.

Several fruitless visits were to pass before the lucky strike.

The field trip of November 2005 included regulars Malcolm & Deidre Carkeek from Kennett River, and George Caspar who had joined after a chance conversation with a mutual friend some weeks earlier. George is well versed in minerals and fossils having worked in the industry, and is something of a self taught expert on carnivorous plants, currently embarking on a project to write a book on the carnivorous plants of south-eastern Australia. It soon became obvious that he had an eye for fine detail, as he intermittently burst into excitement at not only spotting botanical specimens <5cm high, from the window of the moving 4wd on the Blanket Bay track, but also identifying them to subspecies level!

When we arrived at the site on the afternoon of Friday 18th November 2005 we were fortunate to at last find the sand down some 30cm lower than normal, and new rock was exposed at the western end.

I suggested that the team work ahead of me, and that I would follow along to try to identify anything they might overlook. George soon found a large vertebra exposed in longitudinal section showing the neural canal, on the surface of the rock layer. I would have happily called the expedition a success at that point and headed home,



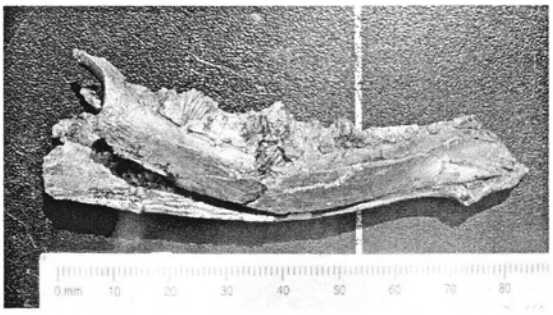
Mystery vertebra found by George Caspar at Crayfish Bay

When working further west into the newly exposed section George called me over to examine another object protruding from the rock. I could see that it was bone, and that there appeared to be a tooth, exposed in circular cross section. beside it. I then noticed what I took to be a second tooth, exposed in oblique section further to the left, and another outcrop of bone several centimetres further left of that. Taken together, I was hopeful that the structure represented a jaw with several teeth in situ, and commenced to saw it out accordingly.

In the process of sawing the specimen out it was revealed that the bone furthest to the left was not jaw, but was actually part of an articulated vertebral column extending north into the platform, so we continued removing rock until we believed we had collected everything exposed.

Lesley's preparation has now revealed that what we thought was a jaw with teeth is actually a foot with toe bones, and that the vertebral column is from a tail, presumably from the same individual. While the orientation of the material suggests that what may have existed of the upper body has probably now been lost to erosion, the possibility remained of further bone buried in the same layer.

Congratulations are due to George for finding this remarkable specimen on only his third day of prospecting, a feat which was probably made easier by his previous experience with handling numerous fossil specimens. Nevertheless his achievement in spotting the initial outcrop of bone was not to be underestimated since the specimen was not obvious or well exposed, and presented in an awkward position which required detailed observation to discover. More experienced prospectors may indeed have missed it altogether, and possibly have in the past. Thanks also to Malcolm & Deidre Carkeek for their assistance with carrying gear and helping with excavation of the specimen. The occasion was marked, appropriately, by a celebratory refreshment at George's Café in Apollo Bay on the way back to camp.



Hypsilophodontid lower jaw found by Mike Cleeland and George Caspar at Elliott River, in the Otway Group, Victoria

The site was revisited on December 19th & 20th 2005 as preparation had revealed that the full length of the tail had not been collected originally. This task was successfully completed and a quantity of rock from around and above the specimen was broken up, but only two further small bones were recovered.
A later trip collected several more bones from within the layer, suggesting that the site is worth counting as one of several that may continue to yield interesting bones to future collection trips.

Unfortunately no more articulated material has come to light, leaving the foot as only the third articulated specimen known from the Victorian Lower Cretaceous, and the first ever to be discovered by surface prospecting.
The episode was yet another lesson to me of the ease with which surface exposures of bone can be misidentified. In this case what I thought was a jaw was revealed to be a foot, and what I thought was the distal point of the same jaw was shown to be a tail. The locality I thought to be Crayfish Bay was not actually Crayfish Bay, and the actual wreck of Eric the Red was not at the site marked on the map of fossil discoveries. Things, at this site, are not as they seem! For this reason I had taken to referring to the specimen as Alice, and the site, naturally, as Wonderland. Who knows what the 10x looking glasses of the next field trip will reveal?

CAPE PATERSON

Repeated exposures of enticing conglomerate channels had long drawn prospectors to Cape Paterson in the hope of repeating the success of exploration in the Inverloch area. Little had ever been found, the only specimens known being a vertebra (?) found by Tim Flannery near the boat ramp and a handful of bones on the shore platform at the eastern end of The Oaks beach.
Against this background I told my students not to get their hopes up too high as we left Wonthaggi Adult Education Centre for the trip to Cape Paterson, as part of the Local Geology course, on the morning of Saturday 22nd April 2006. It was the first session of the course, and all I really wanted to do was to show them some real live rocks! Cape Paterson was only 10 minutes down the road from the campus, and it has a nice selection of rocks including well exposed Strzelecki Formation, a pipe shaped intrusion of basalt, and a fringe of metamorphosed sandstone around the basalt. I didn't want to give them information overload on their first day but it's not every site where one can show students igneous, sedimentary and metamorphic rock in close proximity.
As the tide came in and covered the site we headed west from the boat ramp, looking for a dyke that I remembered seeing somewhere in the cliff on a previous visit. While idly scanning the cliff my eye was caught by an odd curved shape, which on closer inspection turned out to be a platy bone closely associated with a bony knob. Ever hopeful that one day one of these infernal fragments of curved turtle plate would turn out to be a dinosaur skull, I returned the following week to saw out the specimen and a small scrap found nearby.
I could have no inkling at the time of the controversy the specimen was to generate, and the number of emails that would traverse the world arguing alternately for this or that identification. With the matter now seemingly settled on Meiolanid turtle I can only wonder at the implications of the find both for the phylogeny of the group, and the identification of much of the Inverloch turtle material. Life, alas, is too short, and the discovery has shown that much remains to be done before we can safely claim to have found the last exposed vertebrate fossil in the Strzeleckis!

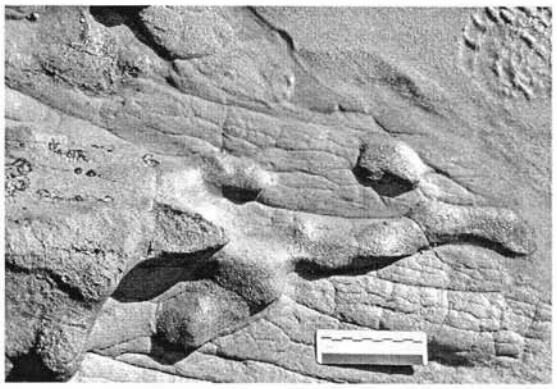
Mike Cleeland at the site where he found the turtle skull in June 2006, Cape Paterson, Victoria

BURROWS AND FOOTPRINTS

Anthony J. Martin
Department of Environmental Studies
Emory University
Atlanta, Georgia USA

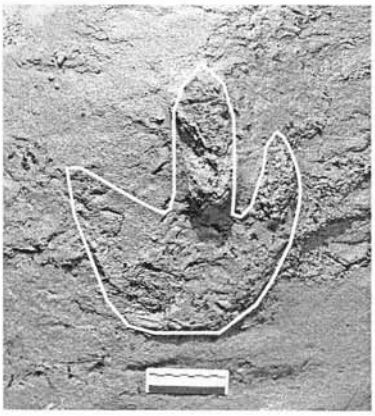
While being hosted by Monash University on sabbatical from Emory University, I was invited by Tom Rich (Melbourne Museum) to visit the Dinosaur Dreaming site in Inverloch with him toward the end of the 2006 field season. The purpose of my visit was to investigate whether or not strata in the Dinosaur Dreaming site contained any trace fossils, such as invertebrate burrows or vertebrate tracks. Before my examination of the site, no trace fossils of any kind had been described from Inverloch; indeed, only one isolated dinosaur track had been found in all of the Lower Cretaceous strata of southern Victoria, and that was far to the west of Dinosaur Dreaming and in the Otway Group.

With that perspective in mind, I am pleased to report that I did find some probable invertebrate burrows in some of the strata exposed at the site, as well as some possible dinosaur tracks. The burrows are being described and interpreted for an upcoming research article, and the possible dinosaur tracks will provide inspiration for another area of research that deserves more study at the Inverloch site. I also expect that these discoveries will justify a re-examination of outcrops in both the Strzelecki and Otway Groups for more trace fossils, and I am developing a research plan that will do just this in upcoming years.

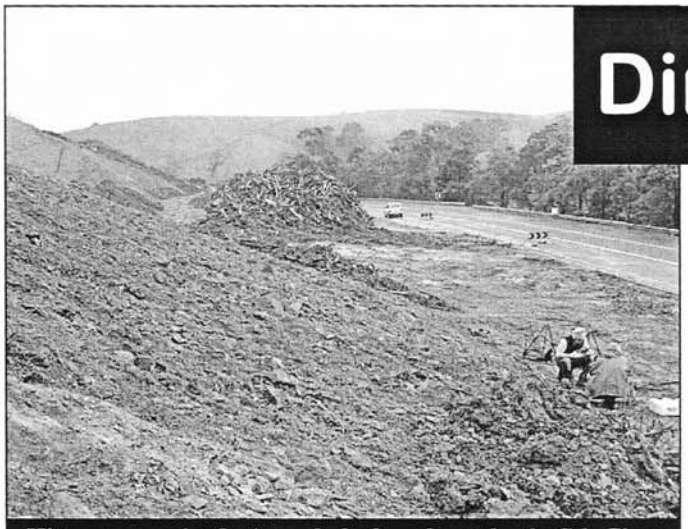


An example of some of the oldest freshwater crustacean burrows in Gondwana found at the Flat Rocks site by Dr. Tony Martin in February 2006

The importance of these trace fossils is multifaceted: they give independent evidence of animal presence; they indicate behavioral modes of those animals; and they reflect paleoenvironmental parameters at the time of their formation. Consequently, my initial findings bring a new and exciting angle to the already-considerable paleontological research done at Dinosaur Dreaming.



Dinosaur footprint, outlined in white, found by Tony Martin at the Flat Rocks site, February 2006



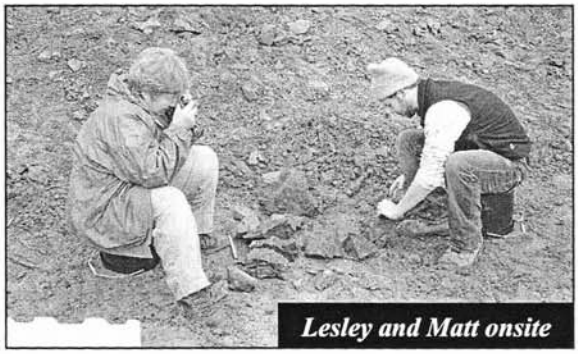
History repeating? A cool, dark and wet day in Sth Gippy

Dinosaur Gully

The first discovery of Dinosaurs in Victoria's Inland!

Dinosaurs, turtles, fish, insects and fossil plants have been found in road cuttings along a re-alignment of the South Gippsland Highway

On the third of June 2006 a group of Monash Uni-versity palaeontology students and local geologists prospected a stretch of roadworks along the South Gippsland Highway realignment between Korum-burra and Loch townships. Most of the rocks sur-veyed were unfossiliferous mudstone and sand-stone, but at a few localities fossiliferous rock was found. These small lenses of rock are typified by high concentrations of sticks, leaves and pieces of wood randomly distributed within a usually sandy matrix, and are interpreted as 'garbage beds'.



Lesley and Matt onsite

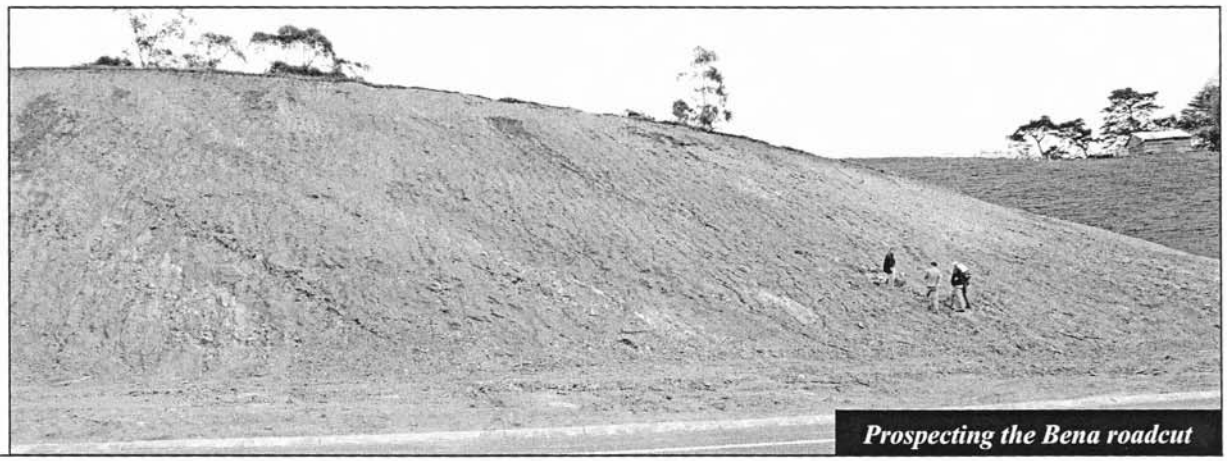
Garbage beds form when floodwaters pick up leaf-litter and other debris (including bones and other animal material) and dump them along with sedi-ment where the material is inhibited by a solid object (such as tree roots/stump) or when the flow rate suddenly drops (such as when the water breaks Lesley and Matt onsite against a natural levey). A good analogy is the collection of autumn leaves in storm-water drains after heavy rain.

Hipsilophodontid centrum in-situ at Bena

A great start: more to come!

Efforts are currently underway to secure a sheltered home for the truckload(s) of rock kindly offered by VicRoads when earthworks resume in late Oct. The rocks need a dry place to be stored until they can be chipped down effi-ciently. It is hoped that if sponsor-ship can be found for a suitable shed to be constructed at a local secondary college, the full potential for this exciting site can be realised.

Photos: Gary Wallis and Danielle Shean



Prospecting the Bena roadcut

museum VICTORIA

DINOSAUR DREAMING - VOLUNTEER SUPPORT AND RECRUITMENT

by Sarah Edwards. Discovery Program Manager. Museum Victoria

David Pickering. Assistant Collection Manager – Palaeontology. Museum Victoria

When we think of Dinosaur Dreaming, we think of a group of motivated, skilled people trained to see minute traces of fossils in the rock they are breaking open.

But how do we find these people to do this intricate, and sometimes, tedious work? Work for no monetary reward; only the satisfaction of discovering pieces of a little known world and the chance of finding something "special".

For over twelve years, the responsibility of recruiting the volunteers resided in the capable hands of Lesley Kool who single-handedly fielded email enquiries, responded to the many demands and sometimes strange requests of applicants, juggled schedules and practised her diplomacy. The indicator of how well Lesley did this job was the extraordinarily high "strike rate" of good workers she uncovered.

In 2005, it was suggested that aspects of the recruitment process could be supported by a broader team. It was proposed that Museum Victoria and Monash University's School of Geosciences collaborate to support the recruitment process.

Wayne Gerdtz generously offered the support of Melbourne Museum's Discovery Centre.

The Discovery Centre is a free access study area located on the Lower Ground floor of Melbourne Museum. It's here you can delve into vast information resources using the print and multimedia reference library, find help with identifications or compare your find with thousands of on-site specimens. And now it served an additional function: to provide a venue and administrative support for the recruitment of the 2006 field season volunteers.

Bronwyn Thompson, Museum Victoria's Discovery Centre Manager, arranged a meeting with Lesley and the museum's Volunteer Manager who gave general advice on volunteer recruitment and training processes. These were adapted to suit Dinosaur Dreaming's specific needs.

The Discovery Centre fielded initial enquiries, responding to telephone and email enquiries to support the first steps of the volunteer application. Discovery Centre also generously provided a training space in their Seminar Room for information sessions and interviews for potential Dinosaur Dreaming volunteers.

The applicants were then interviewed by teams of experienced Dinosaur Dreaming workers in an informal "get to know you" session.

Those applicants chosen by group consultation of the interviewers and organizing group were invited to a training session held at the Museum's Vertebrate Palaeontology Department Preparation Laboratory. The aim of this session was to demonstrate and teach the breaking down of the fossiliferous rock and spotting the fossils with the aid of a hand lens.

The final phase of the selection process was a field trip to the Flat Rocks site in Inverloch where the trainees carried out many of the tasks involved in the dig. Equipment was carried down on site, water was pumped from the site, sand was cleared to expose the rock and then the group began to break down the rock and inspect it carefully for fossils under the guidance of the experienced crew.

We look forward to the ongoing support of the Discovery Centre in recruiting and gaining ongoing commitment from high calibre and dedicated Dinosaur Dreaming volunteers.

Finally we acknowledge the contribution of Dr.John Long , Head of Science Museum Victoria who organized funding which made the 2006 dig possible.

The group settles down for a session of rock-breaking

A couple of "experts" - Nick and Roger show the new crew how to find the bones

During the dig, we sometimes had to break rock in the back garden of the "dig" house.

BY GUM

by Wendy White

On the Dinosaur Dreaming dig, we are always thinking about ways to do things better. Sometimes that has to involve exciting and expensive new equipment, which our Friends and Sponsors have often generously provided, but where we can, we go quite low tech.

This year, we were faced with an interesting challenge.

Let me recap what the site looks like for those who have not had the opportunity to visit during the dig. We have one or more "holes" dug in the beach so as to expose the fossil-bearing rock. Two or three people with big hammers and chisels are tasked with removing large chunks of this rock from the hole. Removing chunks from the hole includes examining all exposed surfaces for fossils found during the removal.

Everyone else finds a pleasant spot on the beach to break this rock down to sugar-cube chunks. Any rock that is not broken down gets carried up the hill in backpacks at the end of the day.

So, this year, on Friends Day (a balmy Sunday), the hole crew examined the exposed rock surface. A small bone was visible. This bone looked interesting – not a jaw, but small and dense. But it was in a part of the rock that was starting to crumble. If we used the hammer and chisel it would splinter into fragments. If we used the rock saw it would also be coveedr with water and mud and small shards of rock and get damaged that way.

So, as usual, a number of experienced diggers (Monash University, Museum people and volunteers) looked at the rock. We stood. We stated opinions. We scratched our heads. We gazed at the sea-birds for inspiration (there are beautiful sea-birds at the dig). We looked at the fossil again and tried to make it seem less interesting (some fossils, such as small turtle shell fragments or post-cranial (non-skull) fish scraps are not very scientifically interesting).

But it had to come out.

Then Kim Davis asked if her chewing gum would help. This was Kim's first year on the dig - new volunteers generate less orthodox solutions.

We decided to stick a film canister lid over the fossil by using gum to hold down the edges. We usually have film canisters on site to put small fossils in. (I'm not sure what we will do when all pictures are digital.)

Gum-chewing was undertaken by volunteers, happy to be assigned a task that did not involve lugging rock around. And Dave collected the used gum and stuck the lid to the rock.

Nick rock-sawed around the fossil, and preserved it whilst we removed it from the ground. The fossil was beautifully preserved, even if other parts of the rock did not look appetising.

At the end of the day on the beach, we took it back to the microscope at the house.

"So?", we asked impatiently, "what is it?. Is it wonderful?"... we diggers are not known for our patience when we might have found something interesting.

"Probably a dinosaur toe," was the verdict from Lesley, the arbiter of fossils.

Pretty cool. Not a bone that will let Dr Rich name a new species, or teach us a lot more about the ones already named, but pretty cool.

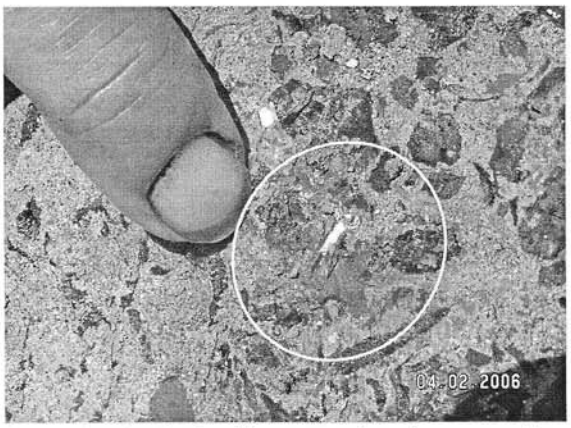
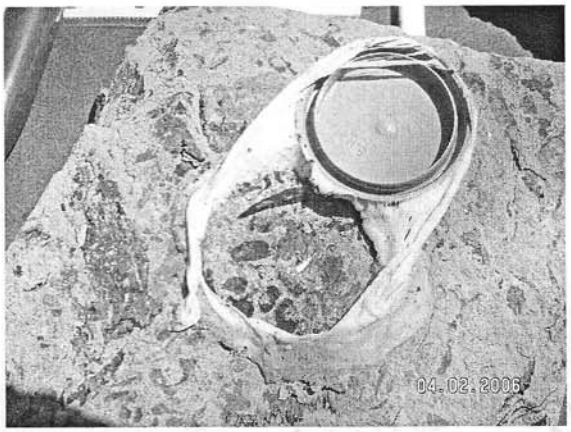


Image showing the tiny dinosaur toe bone in cross-section - circled in white

David Pickering sealed the film cartridge cap with chewing gum



Cartidge cap partly removed to show the tiny bone no worse for wear after being rock-sawn out of the large rock

Friday March 24, 2006 5
mx

began, attracting tags that were removed the same night.

it was found to infringe games copyright.

● FOSSIL SAVED

By gum, they've done it

A piece of chewing gum and a plastic film canister lid helped palcontologists extract a newly discovered dinosaur bone.

Paleontologists at the Melbourne Museum and Monash University's Dinosaur Dreaming dig site near Inverloch in Victoria used the gum and lid to protect the bone from a rock saw.

When the team made a pattern of cuts in the rock around the covered bone, the chewed gum was used to fix the canister lid on to the rock.

This protected the bone while the dust was washed off.

The tiny toe bone is thought to be from the foot of a meat-eating dinosaur.

This article appeared inthe MX Newspaper on the 24th March.

ACKNOWLEDGEMENTS:

Once again Dom Brusamarello and his great staff at the Inverloch Foodworks generously gave us a discount on our grocery bill. It certainly makes a difference when you are feeding close to 60 hungry volunteers.

Our very good "friends" Bernie and Margaret Brown like to help with a little "something" each year. This year it was a 25kg bag of rice that lasted for almost the duration of the dig. More good "friends" Rob and Bev Huntley used their "Bob-mobile" to move dig equipment to the dig house. Thankyou to you all. We are very fortunate to have friends like them.

Our crew was once again enriched with the addition of a number of enthusiastic overseas volunteers. Our good friend Keiichi Aotsuke from Japan joined us once more and his excitement at being back with the people he has come to know so well over the years was obvious.

Akemi Wakimoto, also from Japan, joined us for the first time and it was very gratifying to see her confidence grow as she came to know the other crew members. She was initially assisted by our indomitable Matt Inglis, whose grasp of the Japanese language is superb. It was also good for Matt to practise his Japanese as he has applied for a scholarship to study at Kyoto University next year.

Cindy Schraer was our token -American for the dig., Coming all the way from a dark and cold Alaska, she was delighted to be in the sun and warmth again. She fascinated us with tales of stamina and survival of her travels across the frozen wastelands of Alaska. We are hoping that she will make the long journey back to Oz next February.

We would like to thank Dr. John Long and the Melbourne Museum for funding the Dinosaur Dreaming 2006 field season. It is an exciting time to be involved in palaeontology in Australia and in Victoria in particular. The wonderful discoveries that have been made in the last 12 months by explorers like Mike Cleeland and Matt Pankhurst augur well for even more discoveries to come. A return to Crayfish Bay later this year will determine how extensive that locality is.
There is plenty of scope for more discoveries inland at Bena and although Matt is heading over to Western Australia to work for three years, he has set up a process that will continue while he is away.
We are currently preparing for the 14th annual field season at the Flat rocks site. With the realisation that Bridge East could be an older fossil layer than the main layer we are all "champing at the bit" to get back there.

So thank-you all for your support and don't forget to keep track of our latest adventures on our website:
www.sci.monash.edu.au/msc/dinodream
or at: www.museum.vic.gov.au/hottopics

TAXONOMIC LIST OF EARLY CRETACEOUS FOSSILS FROM THE STRZELECKI GROUP SITES, VICTORIA

TAXA	San Remo	Potters Hill	Punch Bowl	The Arch	Blackhead	Harmers Haven	Powlett River	Cape Paterson	Eagles Nest	Flat Rocks	Koonwarra	Bena
MAMMALIA:												
Ausktribosphenos nyktos										X		
Ausktribosphenos sp.										X		
Bishops whitmorei										X		
Teinolophos trussleri										X		
Monotreme indet.										X		
DINOSAUR indet.	X	X	X	X	X	X	X		X	X		X
Qantassaurus intrepidus										X		
Hypsilophodontid sp.	X	X	X	X	X		X		X	X		
Theropod dinosaurs	X								X	X		
Ankylosaurs/nodosaurs										X		
Ceratopsian dinosaurs												
Ornithomimid dinosaurs	X			X	X					X		
Plesiosaurs							X		X	X		
Pterosaurs									X	X		
Testudines				X	X		X	X	X	X		X
Aves										X	X	
Ceratodus sp.	X						X		X	X		
Paleoniscoid fish				X	X		X		X	X	X	X
Koolasuchus cleelandi	X	X	X	X								
Crustacean burrows									X	X		
Dinosaur footprints										X		

Table 1: Distribution of taxa recovered from the main fossil localities within the Early Cretaceous sediments of the Gippsland Basin

TAXONOMIC LIST OF EARLY CRETACEOUS FOSSILS FROM THE OTWAY GROUP SITES, VICTORIA

TAXA	Knowledge Creek	Rotten Point	Dinosaur Cove	Crayfish Bay	Elliott River	Eric the Red	Point Franklin	Point Lewis	Marengo	Cumberland River	Lorne	Eastern View
MAMMALIA:												
Kryorycktes cadburyi			X									
DINOSAUR indet.		X	X	X	X	X	X	X	X		X	X
Atlascopcosaurus loadsi			X	?	?			X				
Leaellynasaura amicagraphica			X									
Timimus hermani			X									
Theropod dinosaurs			X									
Ankylosaurs/nodosaurs			X									
Ceratopsian dinosaurs												
Plesiosaurs			X							X		
Crocodilia			X									
Pterosaurs			X									
Testudines			X									
Aves												
Ceratodus sp.			X									
Paleoniscoid fish			X									
Crustacean burrows			X									
Dinosaur footprints	X											

Table 2: Distribution of taxa recovered from the main fossil localities within the Early Cretaceous sediments of the Otway Basin

DINOSAUR DREAMING 2006 WAS PROUDLY SPONSORED BY:

Atlas Copco

Australian Research Council

Blundstone Pty. Ltd.

Bunurong Environment Centre

Denis Hawkins, Leongatha

Foodworks Supermarket, Inverloch

Friends of Dinosaur Dreaming

Melbourne Museum

Monash Science Centre

National Geographic Society

Peter Trusler, Melbourne

DINOSAUR DREAMING 2006 FIELD CREW

Marion Anderson
Keiichi Aotsuka
Darren Bellingham
Jeremy Burton
Bree Cawsey
Paul Chedgey
Win Chedgey
Kellie Clayton
Mike Cleeland
Roger Close
Peggy Cole
Michael Curry
Kim Davis
Sarah Edwards
Caroline Ennis
Alan Evered
Nicole Evered
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Wayne Gerdtz
Mike Greenwood
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Rachel Hughan
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Peter Kirkwood
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Lesley Kool
Anne Leorke
Rohan Long
Alanna Maguire
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