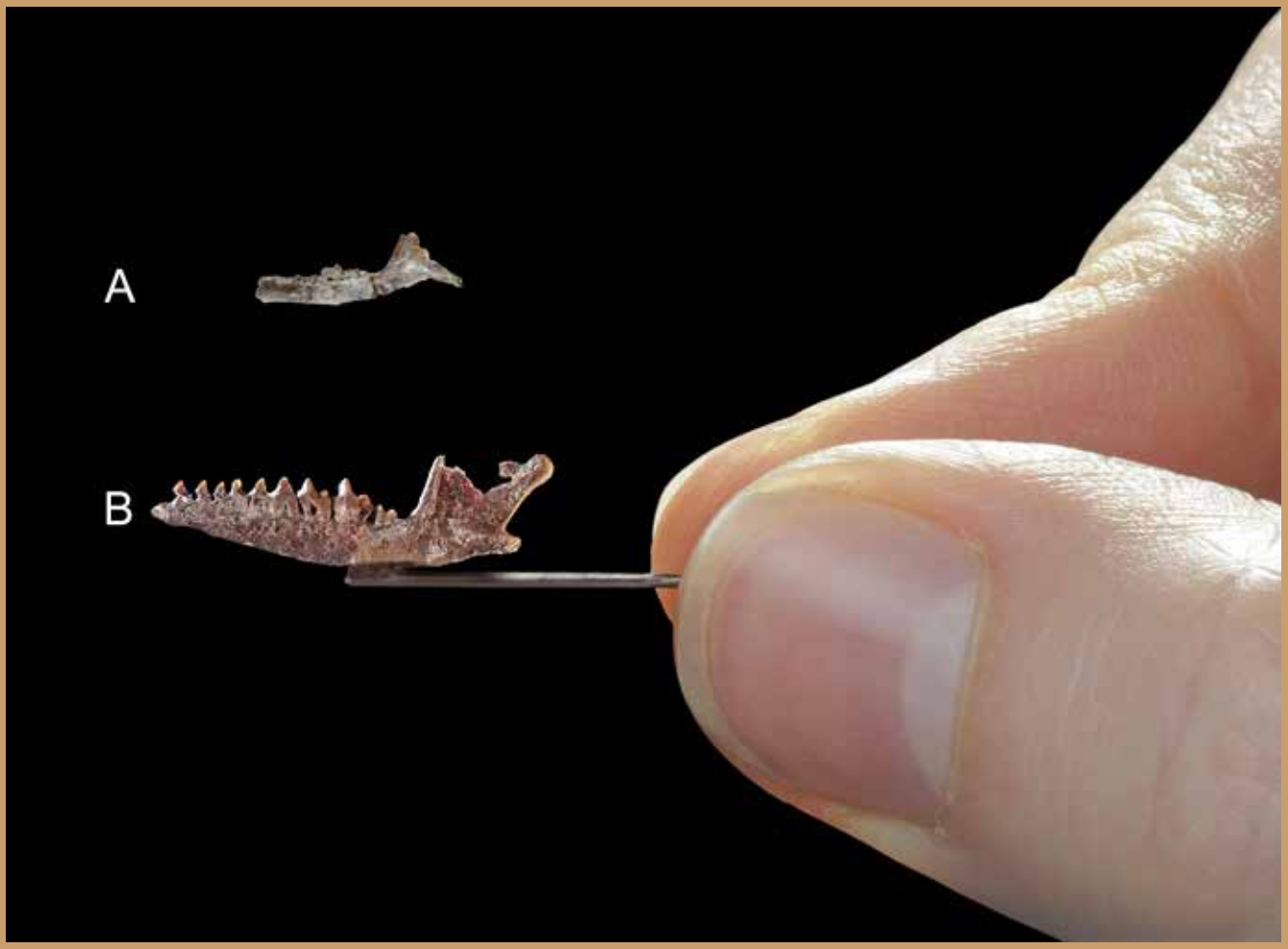
DINOSAUR DREAMING 2017 FIELD REPORT



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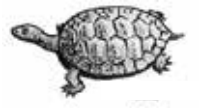

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Dinosaur Dreaming acknowledges the Eastern Maar and Bunurong peoples, the traditional owners of our dig sites, and pays respect to their elders past and present.

Collection of Victorian Cretaceous material was completed under the Department of Environment, Land, Water & Planning, National Parks Act 1975 Research Permit No. 10007336, File No. FF383356.

VISIT OUR WEBSITE:

www.dinosaurdreaming.net

AND OUR BLOG:

www.dinodreaming.blogspot.com

FRONT COVER: A — The specimen that will be the holotype of Gerry's Jaw when it is formally named next year. B — The holotype of *Bishops whitmorei*. See Research Report, page 10. Image courtesy of T Rich, Museums Victoria.

BACK COVER: David Pickering at Eric the Red West, 2012. See David Pickering, page 4.

The Dinosaur Dreaming 2017 Field Report was compiled and edited by Wendy White. The editor would like to thank Robert Zugaro (Museums Victoria) for the generous use of his images, my proofreaders Alanna Maguire, Mary Walters and Stephen Poropat. Uncredited images by the editor.

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DEDICATED TO DAVID PICKERING
14 MARCH 1950 – 24 DECEMBER 2016

Image courtesy of Museums Victoria

DAVID PICKERING

BY TOM RICH

On Christmas Eve 2016, Dinosaur Dreaming lost one of our real stalwarts.

Vale David Pickering was born in Hiroshima, Japan on 14 March 1950 to Sumiko Pickering (nee Yamasaki) and Australian soldier Sergeant Lancelot Pickering. He first came to Australia as a child of five, learning English after his arrival.

He developed an early interest in palaeontology, in particular the Late Cenozoic Australian megafauna, fostered by his father who purchased books, magazines and encyclopedias for him.

After completing his education, he worked for National Mapping for 19 years, gaining practical experience that was of use later when he turned professionally to palaeontology. His first experience in that field was as a participant at a 1980 dig at a Pliocene site on the Grange Burn west of Hamilton, Victoria.

In Dave's palaeontological life he took on three roles — tireless field worker, highly talented fossil preparator, and meticulous collection manager.

In the field, he was also a person who, in a myriad of ways, bolstered the morale of the entire crew. We all observed his willingness to explain the intricacies of fossil collecting to new people and his wry sense of humour. As John Wilkins so aptly put it, Dave was "one of those people whose happiness and enthusiasm draws you in". Dave was a vital participant in collecting polar dinosaurs with Lesley Kool and me and Western Australian Devonian fish with John Long. He also initiated his own expeditions, collecting material from late Cainozoic sites in western Victoria. Dave's knowledge of this material contributed to the depth and extent of the Monash PhD dissertation by Katarzyna Piper. In appreciation of Dave's friendship and assistance, Kat named a new species *Palorchestes pickeringi*.

On the most difficult work we ever undertook together — proving a technique to excavate dinosaurs from an adit cut into permafrost on the North Slope of Alaska — Dave was a real pillar of strength in rather trying conditions.

Dave liked nothing better when at the museum than to spend his time removing specimens of dinosaurs from the rock that had enclosed them for more than 100 million years. He turned those same abilities to the exposure of the tiny jaws of mammals that from time-to-time turned up alongside the dinosaurs. This was a nerve wracking task. He stared down a microscope at the specimen in question and teased away, grain-by-grain, the rock obscuring the sought after specimen. Very few people can do that and get the desired result. Without that capability in people like Dave and Lesley Kool, those fossils, central to our understanding of the evolution of the very unique mammals on this continent, would be beyond our reach.

Dave was no fan of paperwork. But when it came to maintaining the order of the palaeontology collections of Museums Victoria, none were more dedicated to seeing that the job was done properly. Without putting that outlook into practice as Dave did, the retrieval and thus the future investigation of hard won fossils would be impossible.

Dave has left an indelible mark — not only on the collection at Museums Victoria, but on the many palaeontologists across the country, and indeed the world, that he has encouraged, mentored and supported.

David Pickering at Eric the Red West in 2002.

View from the Wrapping Station

By Wendy White

I knew this year's dino dig would be tough. Dave Pickering was such a presence at Eric the Red West (ETRW) that that landscape was bound to feel incomplete without him. Of course, he had missed digs before, but this was different.

Corrie Williams and I had spent much of our January drives to our respective homes from our respective offices on the phone to each other making plans and trying to think of all the things that Dave would have organised that were now up to us to put in place. I started making lists of everything that would have come from the lab, and pulled together the ingredients for a prep kit bucket. Paul Chedgey found a couple of big metal suitcases in the museum lab that I filled with all the spare vials and paper and tape that I thought I might possibly need.

A few days before the dig was due to start, Corrie told me that, under the new Safety Guidelines, we would now need to wear hi-vis vests on the beach, and asked if I wanted an orange or yellow one. The idea of having my own clean vest (instead of a communal one of unknown provenance) appealed, and once Stephen Poropat added an *Australovenator* on the back, I felt that I could truly embrace my new fashion style.

Image: F. Karakitsos

Nick van Klaveren, Wendy White and Stephen Poropat in hi-vis

Image: R Zugaro, Museums Victoria

Wendy White evaluates a fossil find

Then Corrie mentioned the bandanas. At the Flat Rocks digs, we used to make dig crew T-shirts and polo shirts which, whilst very popular with the crew, required some organisational effort to match colours and sizes to crew lists that sometimes changed at short notice. So, we have not done T-shirts for ETRW for a few years. Dave had been designing an Eric the Crayfish (our original tongue-in-cheek name for ETRW since it was located between Eric the Red and Crayfish bay) bandana for years, but we had never got around to making them. Corrie is a master of organisation and within days she had an order at the printers.

As usual, many of the core crew arrived on dig eve (Friday 3 February), to get a bit organised before everyone else arrived, and met at the Apollo Bay Hotel. I was greeted with the news that Pat Vickers-Rich would not be joining us for dinner because she was at Bimbi Park putting up shelves in the shed. And that Corrie would put up shelves in the kitchen the next morning. Each year, it seemed, we were working to make Bimbi more comfortable.

We drank a toast to Dave — of his favoured bison grass vodka — and ran through the check list to make sure that we had filled the important voids left by his absence. Stephen Poropat will run the excavation — check. Corrie Williams and myself will handle logistics — check. Ali Calvey is surprisingly enthusiastic about being safety officer — check. Nick van Klaveren will man the big rock saw and other heavy equipment — check. Pip Cleeland will take first shift as chef, we have first-aiders, Mary Walters is our official Monash University rep — check, check, check. We were ready.

Saturday 4 February dawned clear and bright, and the dig had started. A few crew headed down to site bright and early, to work out where to dig, and do lots of shovelling. I settled in to wait for the rookies and

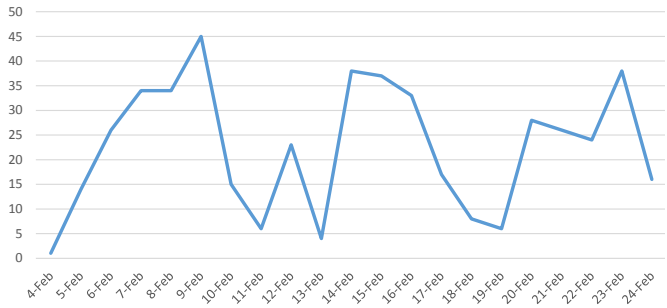
William Loads with Mike Cleeland at Eric the Red West

the rest of the crew. I sat on a picnic table, folding newspapers into a pile of single leaves so that they would be easy to grab from the prep kit bucket in brutal wind or drizzling rain, or whilst holding a fossil together with one hand. After lunch, I went down to site to join in the shovelling. It was good to be busy – it made it less obvious that Dave wasn't there. We found our first fossil (possibly a rib).

I graph the number of bones we found each day. On Saturdays we get new crew and find fewer fossils. The graph dips on the short days where we battle rain and on the days the tide fills up the hole and we spend half the day digging it out again.

On Sunday 5 February, the morning was bright sunny and beautiful, but a thunderstorm forced us off the beach mid-afternoon. We found 14 fossils including a possible skull element – that was pretty good. Amber was appointed baby rock saw queen. The next day was a full day but we found only 14 fossils, including our first unioid (shellfish). Bone of the day was a possible skull element found by the hole crew. In the evening, Tom Rich gave his Mesozoic Mammal talk, reminding us why we were there, then Eve Eidelson painted colours through the hair of any digger who held still long enough to let her.

Digging at ETRW



Field catalogue fossil counts by day

On Tuesday 7 February, we found 34 fossils, none of which inspired me to award bone of the day. It did, however, indicate that we had hit upon a good fossil layer. We started pulling large rocks from the hole, and invented the "Callum" unit of measure — 1 Callum is a bit under 20 kilograms, or what we can reasonably expect a digger (such as Callum Simpson) to carry up the hill.

On Thursday 9 February, my favourite fossil was one with "Bart Simpson hair" (#114) – Lesley Kool later informed me that it was a lungfish tooth. Alan Tait, our sedimentologist, balanced all this focus on fossils by finding "pebble of the day", which demonstrated many of the things he had taught us about how the site was laid down. The pebble was shaped by winds and floods and maybe even glaciers from long ago, and as a bonus, changed colour when it was wet. The crew listened enthralled, and took selfies with the pebble.

On Friday 10 February, we were visited by William Loads (of *Atlascopcosaurus loadsi* fame), who entertained us with stories of the old days at Dinosaur Cove. Victoria Kaloudis found what we thought was a dinosaur pelvic element (#194). The red bandanas arrived from Melbourne, and we wore them with pride and a touch of sadness.

On Saturday 11 February, the new crew arrived. It was a short day with only a few fossils. Nova Taylor took over as baby rock saw queen and also found a beautiful ornithopod femur, which Stephen Poropat coated in paraloid (plastic beads dissolved in acetone). John Swinkels found an interesting curly bone with holes (#203), and won bone of the day.

Monday 13 February was cold and a bit wet, and the tides were high enough to have filled in our hole overnight, which we had to dig out again. At least it kept us warm. The tide came back in during the early afternoon and filled up our hole again. We knocked off early, knowing that we would have to dig the hole out again the next day. Mary Walters found a bone we thought might be a very small ornithopod femur (#234).

Stephen Poropat, John Wilkins, Alan Tait and Darren Bellingham in the rain

On Wednesday 15 February, we had a visit from Virtual Reality experts from Deakin university and reporters. We found several fossil teeth – theropod (#306), ornithopod (#284), plesiosaur (#295) and one (#300) that I tried very hard (but failed) to turn into a mammal.

Dean Wright found a beautiful ornithopod jaw (#340) on Thursday 16 February. Mary found an interesting bone with holes (#339). The afternoon tea quiz was interrupted by the tide filling our hole (so diggers rushed off to save equipment and fossil halves).

On Friday 17 February, sand-blasting wind forced us off the beach by mid-afternoon.

On Saturday 18 February, Sanja van Huet and her assistant James Fife arrived to take over the cooking. They brought along a penchant for mulling wine on a cold evening. The new hole crew (Wendy Turner and Fotini Karakitsos joined Stephen Poropat) decided that they needed a Brangelina name and became Wevetini for the rest of the dig. James Rule took over the baby rock saw.

Sunday 19 February had been earmarked as "Friends' Day", but was so wet that we had no actual Friends (although we did get some Poropat parents) and even the crew spent only a couple of hours on the beach. We found six bones, none of them very good.

On Monday 20 February, we welcomed a crew from Museums Victoria to record video and oral histories of the dig. Some crew went off to collect footprints (Tom Rich talks about that adventure later in this report).

On Thursday 23 February, our second last day at site, we found fossil #451. It started as an ilium, but then became a parcel of associated bones. The crew

Wendy Turner paints a fossil with paraloid

speculated as to whether it was something articulated (Lesley will talk about that later in this report). It came to the wrapping station an hour before knock-off time as three large rocks with many fossils on all sides. I stared at it in two minds – the fossils were beautiful but the wrapping challenges extreme. Dave would have known what to do. Or Lesley Kool, whose broken foot had confined her to Bimbi Park. I let it dry out a little to make it less brittle and to give the tape a chance of sticking, and started taping wads of toilet paper over any exposed fossil halves. As it got later and later, we decided to carry the last, most brittle rock up the hill to Lesley without doing anything else to it. We resolved to return to site early the next morning to extract the final halves before shutting down the hole.

There are many people I should acknowledge —Tom and Pat Rich for making Dinosaur Dreaming happen, the Friends of Dinosaur Dreaming for ongoing support, the chefs and the bakers (thanks James's mum!) and the morning tea carriers, our wonderfully enthusiastic rookies and every one of the experienced crew who stepped up to fill one of the voids left by Dave's absence.

Stephen Poropat, Callum Simpson and Corrie Williams excavate the hole

FOSSILS PREPARED THIS SEASON

BY LESLEY KOOL

The loss of David Pickering in December 2016 was felt throughout the whole palaeontological community in Museums Victoria. Not only had the Vertebrate Palaeontology Department lost its collections manager and head preparator, but also the annual dinosaur dig had lost its field leader. Palaeontologist Steve Poropat stepped in to fill the void during the dig and I took over the task of assessing the fossils that were recovered. Dave normally checked the fossils once the dig had ended and they had been transported back to Museums Victoria, but as that could no longer occur I spent the last week of the dig at Bimbi Park, checking each specimen after it was catalogued by Wendy White.

A total of 504 specimens were catalogued during the dig and of those approximately one third were discarded in the preliminary assessment. The remaining specimens were prioritised in order of their potential importance. The specimens that would give us the most information regarding identification were the first to be prepared.

Preparation of the specimens began shortly after the end of the dig with assistance from Paul Chedgey, one of Dave's volunteers in the prep lab at Museums Victoria, John Wilkins and Wendy Turner, both experienced Dinosaur Dreaming crew members.

Image: L Kool

P252711 Ornithopod maxilla with three teeth

As mentioned in Tom Rich's report, the most exciting discovery during the dig was a group of three associated blocks containing 11 fossil bones. In most cases the preparation of a bone entails its complete removal from the rock so that it can be studied more intensely, however the most important aspect of the 11 bones was their association with one another. It was first thought that they may be the remains of a single individual, but it soon became clear that we were dealing with at least three individuals — two dinosaurs and a turtle. After all the bones were exposed, the blocks were expertly glued back together again by Collections Manager Tim Ziegler. They are currently on display in the prep lab at Museums Victoria. A number of other blocks of rock-containing fossils were collected from the same area as the associated blocks, indicating that this part of the fossil layer is particularly rich.

Other bones and teeth were recovered during the dig, including an interesting tooth (field catalogue #295), which is approximately two centimetres long, slender and curved. It is definitely not from a dinosaur but

Image: L Kool

P252700 theropod cervical rib

Image: L Kool

P252704 Theropod caudal vertebra

it could be from a plesiosaur or pterosaur. Further research is required to identify this mystery tooth. A number of crew members discovered dinosaur teeth during the dig, including a large ornithopod tooth found by Mary Walters; a worn ornithopod tooth found by Steve Poropat; an ornithopod tooth found by Ali Calvey; an ornithopod tooth crown found by Mel Mackenzie; a pterosaur tooth found by Dani Measday; and a small theropod tooth found by Amber Craig. Experienced Dinosaur Dreamer Dean Wright not only found an isolated ornithopod tooth but then went on to find a well preserved partial ornithopod maxilla (upper jaw) with three teeth preserved. He has since had an image of the maxilla tattooed on his shoulder — now that is commitment!

A couple of interesting theropod dinosaur bones were discovered during the dig. The first was a large theropod cervical rib. Cervical ribs (found in the neck) are quite distinct from thoracic ribs in the chest. They are much shorter and have a prominent head where they attach to the neck vertebra. The specimen found at Eric the Red West is large enough to have come from a dinosaur about the size of an *Allosaurus*. No cervical ribs are preserved in *Australovenator wintonensis*, so we cannot make a comparison.

Image: L Kool

The theropod claw from the group of three associated blocks

Another theropod dinosaur specimen found this season was a large caudal vertebra from around the mid-section of the tail, measuring seven centimetres in length. This specimen was found in association with two other bones, neither of which were theropod. It is the largest caudal vertebra yet discovered at the Eric the Red West site. Unfortunately, *A. wintonensis* has no caudal vertebrae preserved, but Steve Poropat, who is the palaeontologist in residence at the Australian Age of Dinosaurs in Winton Queensland, is reasonably convinced that the Eric the Red West caudal vertebra is about the right size for that particular dinosaur. A number of smaller caudal vertebrae were found during the dig, but these have yet to be prepared.

Meanwhile, Paul Chedgey prepared a really nice theropod phalanx, large enough to come from a dinosaur the size of *A. wintonensis*. John Wilkins started learning the art of preparation and was given a number of ornithopod dinosaur centra (the cotton reel part of a vertebra) to practice on. He did a great job and is on his way to becoming a fine preparator. Wendy Turner was given two ornithopod femora (thigh bones) to work on. They were both in many pieces and will take a lot of patience to reconstruct.

Fossil preparation of the Eric the Red West 2017 specimens continues at its slow and steady rate. Finding the fossils is often the easy part, and the most fun. It can sometimes take years for a fossil to be finally prepared, particularly when new, more exciting fossils are found in the meantime.

Image: L Kool

P252697 Large ornithopod tooth

Image courtesy of Museums Victoria

RESEARCH REPORT

BY TOM RICH

Until the last few days, the February 2017 excavation at Eric the Red West was, for the most part (with the addition of a bit more rain than usual) quite reminiscent of the previous ones. Work was focused at the eastern end of the area that has been excavated since 2006.

The eastern end of Alan's #3 hole, where the 2016 dig had finished, was dug out from under the sand and excavation continued to form Alan's #3 East, which required the usual backbreaking maintenance against infill by sand, seawater and seepage from the dunes.

At the same time, the western end of Alan's #3 hole was reopened and the overburden jackhammered back to allow removal of more of the fossiliferous layers, until a high tide filled it with sand, when excavation shifted to the 'under the weeds' area.

The whole of Alan's #3 hole was not dug out this year, just the ends, because the generally high tides during the dig had a dispiriting habit of returning sand to the hole overnight, but between the two excavations, an accessible trough-shaped lens above the main fossil layers rewarded Nick van Klaveren with several bones.

As excavation progressed in Alan's #3 East, the separate fossil layers coalesced and became richer in fossils to the extent that rocksawing to remove one bone would cut other bones, and it became simpler to saw the layer into blocks for removal.

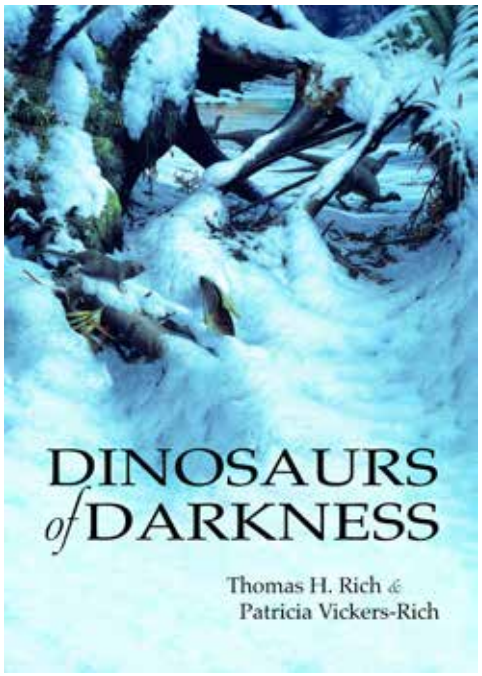
In the final days of the dig, three blocks of the fossil layer were removed that contained numerous small bones, including a claw. In the field it was not certain whether this represented a disarticulated skeleton of one individual dinosaur. In the time remaining it was not possible to establish whether this concentration of bone extended further east.

To evaluate these concentrations, they were first scanned at St Vincent's hospital by Shelley O'Hara. This was done, not only to try to determine the nature of the half exposed bones, but also to see whether there were more fossils in the blocks not visible on the surface.

The resulting scans revealed no additional fossils. The blocks were then given to Lesley who prepared the fossils. Bones of both theropod and ornithopod dinosaurs were present, along with a fragment of turtle. Clearly this was not an accumulation of the bones of one individual dinosaur.

An accumulation like this, of small bones of different individuals, makes it particularly desirable to return to Eric the Red West at some point. It can then be determined if this tantalising concentration continues. Nothing quite like it has been previously encountered at the Eric the Red West site. The closest thing to it was the occurrence of fossils around the partial dinosaur skeleton found by George Casper in 2005 that led to all the subsequent effort there. If this concentration is determined to be quite extensive, there will be a strong case to have a major effort there at some future time.

Holly Woodward has been analysing the histology of 17 limb bones from Victorian small ornithopods. She has concluded that all of the specimens except the largest one, a partial femur, are virtually identical in their growth strategy: a rapid phase from birth until the age of three years and then a slower phase to approach maximum size. All 17 specimens she examined would have reached maturity at three years except that largest one (at seven). From the point of view of growth strategy, these could be a single species and genus, although they have been referred previously to four different taxa. Elsewhere, different species of small ornithopods exhibited different growth strategies.



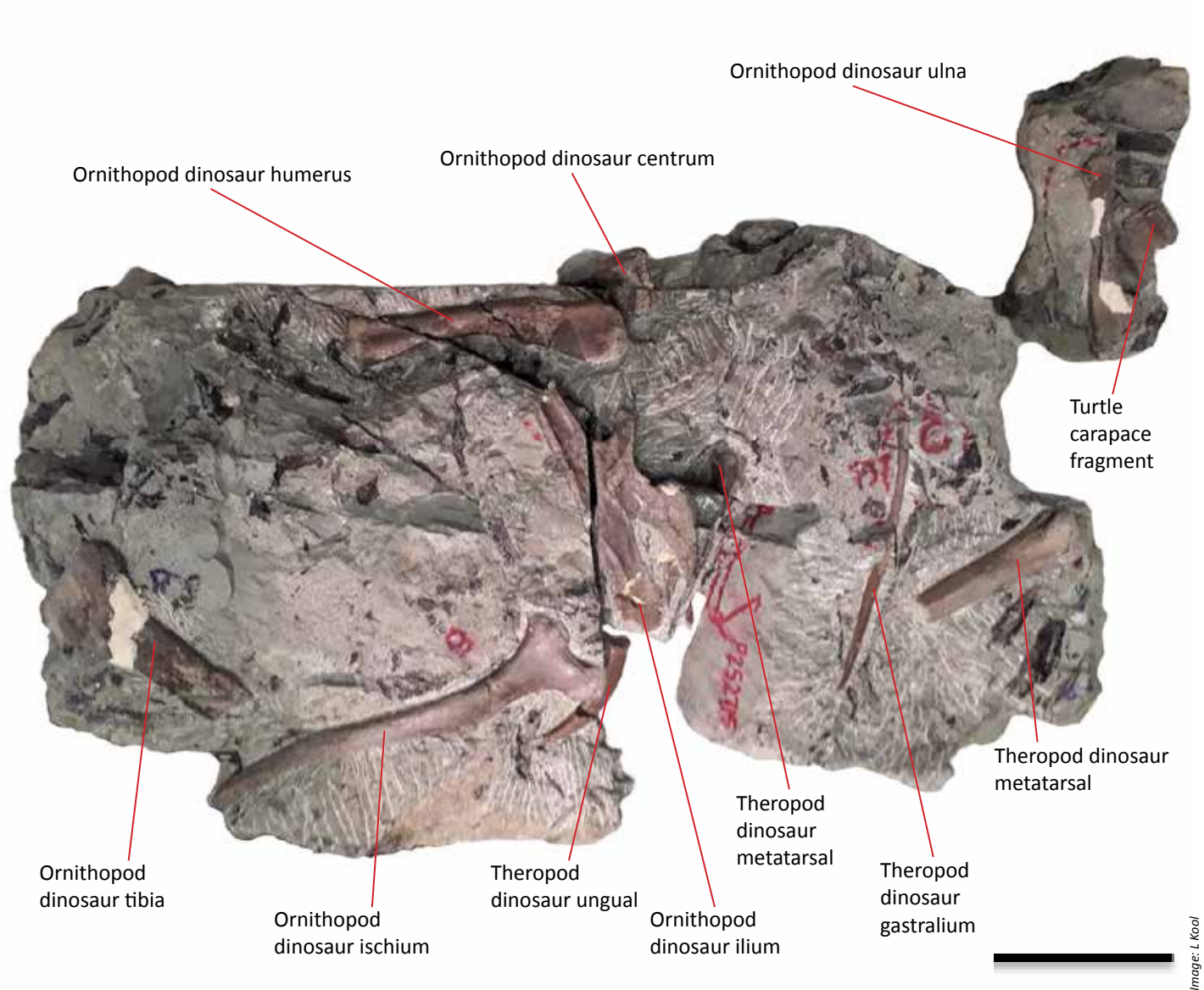
Front cover of the new edition of Dinosaurs of Darkness

Image courtesy of T Rich, Museums Victoria

Alistair Evans, Greg Wilson and Brian Davis are assessing the likelihood that the two heavily worn and badly broken upper molars found at Eric the Red West by Alanna Maguire in 2009 belong to the mammal *Bishops,* which is otherwise known only from lower dentitions. *Bishops* occurs both at Eric the Red West and Flat Rocks. If these upper molars are indeed *Bishops*, it gives us a first hint of what some other part of this mammal looks like. It may help to resolve where the ausktribosphenids fit in the mammalian family tree.

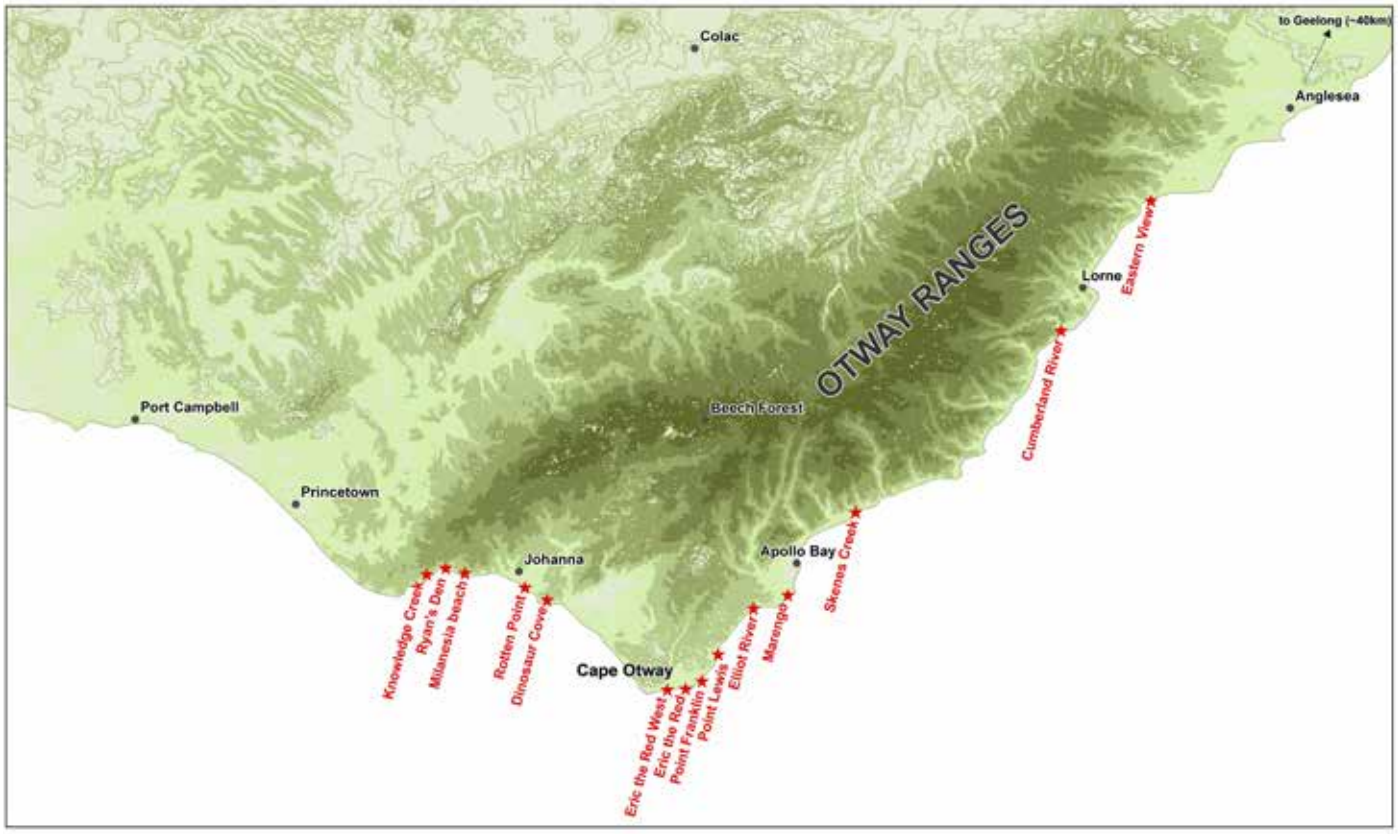
I started to write a manuscript on the three fragmentary mammal jaws collected more than a decade ago (collectively referred to informally as Gerry's Jaw because the first of them was found by Gerry Kool at Flat Rocks in 2002), and found that one of them is, in fact, *Bishops*. The other two specimens belong to the same new species and genus that will be named in honour of Gerry. It is much smaller than *Ausktribosphenos* and *Bishops* (see front cover) and rivals in size what may be the smallest mammal that ever lived, known from the Early Eocene of Wyoming, *Batodonoides vanhouteni*.

Indiana University Press will publish a second edition of Dinosaurs of Darkness. The book will be an update of the 2000 edition, carrying the story forward to the beginning of this year.



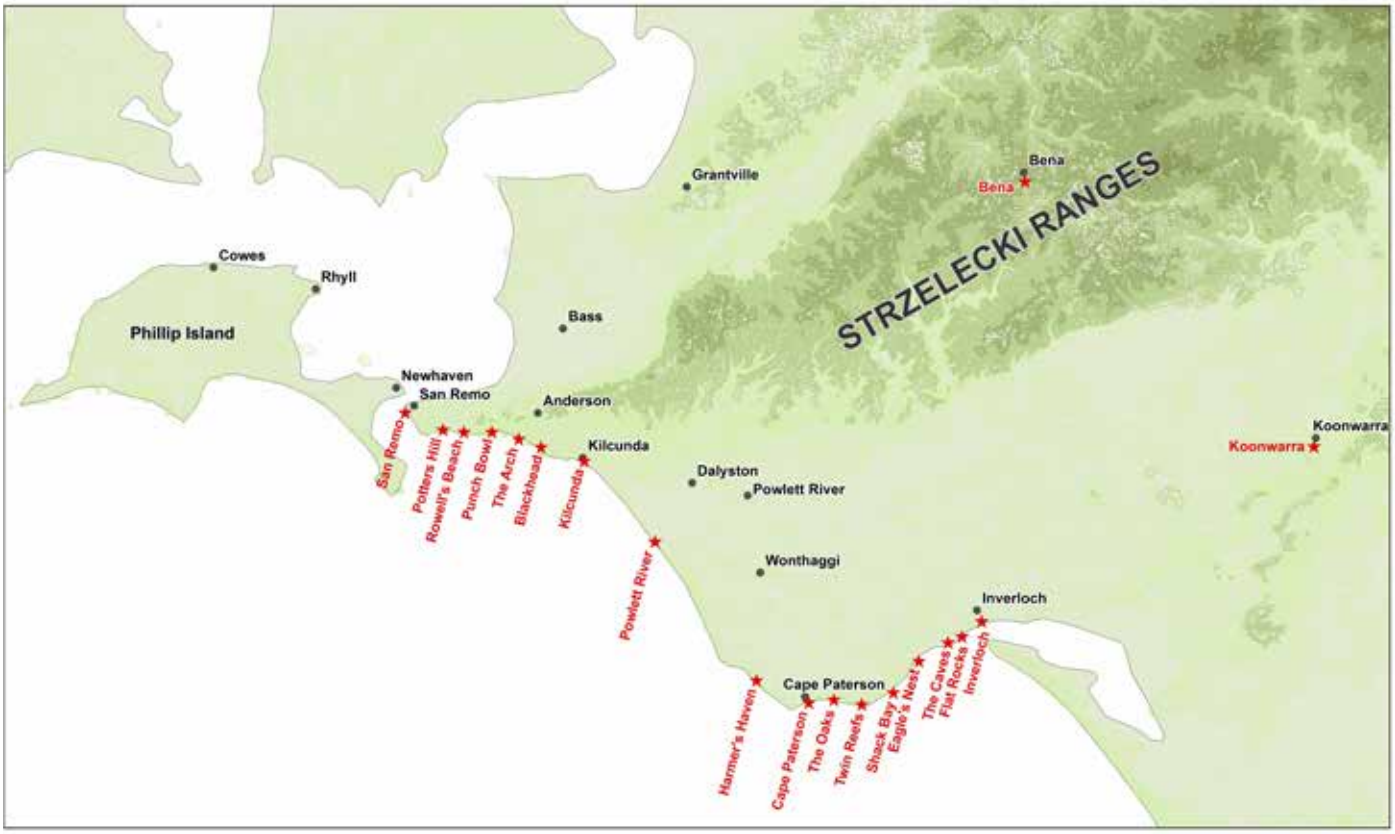
The block found in the last few days of the 2017 ETRW dig — after preparation and with annotation by Lesley Kool. Scale 10 cm

FOSSIL LOCALITIES IN THE OTWAYS



TAXA	Knowledge Creek	Ryan's Den	Milanesia Beach	Rotten Point	Dinosaur Cove	Eric the Red West	Eric the Red	Point Franklin	Point Lewis	Elliott River	Marengo	Skenes Creek	Cumberland River	Eastern View
Mammalia:														
Tribosphenic (Unidentified)						X								
Bishops sp.						X								
Monotremata (Unidentified)						X								
Kryoryctes cadburyi					X									
Dinosauria:														
Dinosaur (Unidentified)		X		X	X	X	X	X	X	X	X			X
Ornithopoda (Unidentified)		X		X	X	X		X	X	X	X			
Atlascopcosaurus loadsi					X				X					
Fulgurotherium australe					X									
Leaellynasaura amicagraphica					X									
Ankylosaurs/nodosaurs					X									
Neoceratopsian					X									
Theropoda (Unidentified)					X	X		X						
Spinosaurid						X								
Oviraptorosaur					X									
Ornithomimid					X									
Tyrannosauroid					X									
Neovenatorid					X									
cf. *Australovenator*						X								
Other Vertebrates:														
Plesiosauria (aquatic reptiles)					X	X							X	
Crocodylia (crocodiles)					X									
Pterosauria (flying reptiles)					X	X								
Testudines (turtles)		X			X	X	X	X	X					
Otwayemys cunicularius					X									
Dipnoi (lungfish)					X	X			X					
Neoceratodus nargun					X				X					
Actinopterygii (ray finned fish)					X	X								
Invertebrates:														
Freshwater crustaceans														
Palaeoechinastacus australianus					X									
Bivalves (Unidentified)					X	X								
Megalovirgus flemingi					X									
Trace Fossils:														
Dinosaur footprints	X		X		X							X		
Bird footprints					X							X		
Dinosaur Burrows	X													
Crustacean Burrows: Parastacid	X				X						X	X		

FOSSIL LOCALITIES IN SOUTH GIPPSLAND



TAXA	San Remo	Potters Hill	Rowell's Beach	Punch Bowl	The Arch	Blackhead	Kilcunda	Powlett River	Harmer's Haven	Cape Paterson	The Oaks	Twin Reefs	Shack Bay	Eagle's Nest	The Caves	Flat Rocks	Inverloch	Bena	Koonwarra
Mammalia:																			
Tribosphenic (Unidentified)																X			
Ausktribosphenos nyktos																X			
Ausktribosphenos sp.																X			
Bishops whitmorei																X			
Monotremata (Unidentified)																X			
Teinolophos trusleri																X			
Multituberculata (Unidentified)																			
Corriebaatar marywaltersae																X			
Dinosauria:																			
Dinosaur (Unidentified)	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	
Ornithopoda (Unidentified)	X	X		X	X	X	X	X						X	X	X			
Fulgurotherium australe					X									X					
Qantassaurus intrepidus																X			
Ankylosaurs/nodosaurs					X				X							X	X		
Neoceratopsidae (Unidentified)																			
Serendipaceratops arthurcclarkei					X														
Theropoda (Unidentified)	X			X	X	X	X	X					X	X		X			
Ornithomimid	X					X										X			
Megaraptoran					X									X					
Ceratosaur	X																		
Other Vertebrates:																			
Plesiosauria (aquatic reptiles)	X		X					X						X		X	X		
Pterosauria (flying reptiles)														X		X			
Testudines (turtles)						X		X		X				X	X	X	X	X	
Aves (birds)																X			X
Temnospondyli (amphibians)				X													X		
Koalasuchus cleelandi	X	X	X	X															
Dipnoi (lungfish)	X			X			X	X					X	X		X	X		X
Neoceratodus nargun				X										X		X			
Archaeoceratodus avus														X					
Actinopterygii (ray finned fish)					X	X		X						X		X		X	X
Waldmanichthys koonwarri																			X
Koonwarria manifrons																			X
Wadeichthys oxyops																			X
Coccolepis woodwardi																			X
Psilichthys sp.																			X
Invertebrates:																			
Bivalves					X											X			
Megalovirgus flemingi					X											X			
Insecta (Insects)																			X
Trace Fossils:																			
Dinosaur footprints																X			
Crustacean Burrows: Parastacid											X	X		X	X	X			

THE MAMMALS OF VICTORIA'S CRETACEOUS

As long-time Dinosaur Dreaming diggers can attest, the tiny fragments of Cretaceous mammals that we find are celebrated and prized. But mammal jaw (and other element) finders don't always get to find out what became of their precious scrap. So here is a list of all confirmed mammal fossils from the Victorian Cretaceous, with their Museum catalogue numbers, notes and taxa.

Reg #	Taxonomy	Collector	Field Number	Year	Preparator	Notes
P208090	*Ausktribosphenos nyktos*	N. Barton	#1111	1997	L.Kool	HOLOTYPE. Right. P6, M1-3
P208094	*Kryoryctes cadburyi*		Dinosaur Cove	1993	L.Kool	HOLOTYPE. Right humerus. Slippery Rock Pillar, Dinosaur Cove
P208228	*Bishops* sp.		#329	1995	L.Kool	600my Exhibition display. Right. P4-M2
P208230	*Ausktribosphenos* ?			1995	L.Kool	Edentulous jaw fragment
P208231	*Teinolophos trusleri*		Mentors trip	Nov. 1993	L.Kool	HOLOTYPE. M3 or M4
P208383	Monotremata		Dinosaur Cove	1993	L.Kool	Premolar. Slippery Rock Pillar, Dinosaur Cove
P208482	*Ausktribosphenos nyktos*	N. Gardiner	#150	1999	L.Kool	Right. M2-3, badly crushed. Found in rock from DD1998
P208483	Ausktribosphenidae ?	N. van Klaveren	#140	1999	L.Kool	Probably Left. x1 premolar & partial tooth
P208484	*Bishops whitmorei*	K. Bacheller	#450	1999	L.Kool	Right. M2
P208526	*Teinolophos trusleri*		#560	1994	L.Kool	Right. Edentulous
P208580	Mammalia	A. Maguire	#200	2000	L.Kool	Jaw fragment. (unprepared)
P208582	Ausktribosphenidae	L. Irvine	#500	2000	L.Kool	Right. M3
P209975	*Bishops whitmorei*	R. Close ?	#387	2000	L.Kool	Right. Roots M1, worn M2. OK M3
P210030	*Teinolophos trusleri*			2000	L.Kool	Right. Edentulous
P210070	*Bishops whitmorei*		Rookies day	03.12.2000	L.Kool	Right. Badly broken M1, M2 and x6 Premolars
P210075	*Bishops whitmorei*		Rookies day	03.12.2000	L.Kool	HOLOTYPE. 600my Exhibition display. Left. P2-6, M1-3. (P1 lost since initial preparation)
P210086	Ausktribosphenidae ?	J. Wilkins	#250	2001	L.Kool	Right. Root fragment
P210087	*?*	G. Kool	#620	2001	L.Kool	Right. Rear half M1, M2-3
P212785	Mammalia	M. Anderson	Rookies day	03.12.2000	L.Kool	Fragment only
P212810	*Bishops whitmorei*		#300	2002	L.Kool	Left. M2-3
P212811	*Teinolophos trusleri*	D. Sanderson	#187	2002	L.Kool	Right. Edentulous
P212925	Mammalia ?		#222	1996	D.Pickering	Edentulous
P212933	*Teinolophos trusleri*		#179	2001	L.Kool	Left. Edentulous. (Plus associated molar)
P212940	*?*	W. White	#171	2003	D.Pickering	Left. M1, M2-3
P212950	*Bishops whitmorei*	C. Ennis	#292	2003	L.Kool	Left. P6, M1-3
P216575	*Teinolophos trusleri*	N. Gardiner	#180	2004	D.Pickering	Left. x2 molars. Probably M2-3
P216576	Mammalia	A. Musser	#500	2004	L.Kool	Isolated tooth
P216578	*Bishops whitmorei*	A. Leorke	#600	2004	D.Pickering	Left. M1-3
P216579	*Teinolophos trusleri*	N.van Klaveren	#635	2004	L.Kool	Edentulous jaw
P216580	*Bishops whitmorei*	G. Kool	#800	2004	D.Pickering	Right. P6, M1-3
P216590	*Teinolophos trusleri*	J. Wilkins	#447	2004	D.Pickering	Posterior part of right edentulous jaw
P216610	*Teinolophos trusleri*		#557	2004	L.Kool	Left. Edentulous
P216655	*Corriebataar marywaltersae*	M. Walters	#142	2004	L.Kool	HOLOTYPE. Multituberculata. Left. P4
P216670	*Ausktribosphenos nyktos*		#184	1999	L.Kool	Left. M2-3
P216680	*Teinolophos trusleri*	R. Long	#132	2004	L.Kool	Right. Fragment
P216720	*Teinolophos trusleri*		#648	2002	L.Kool	Right. Edentulous
P216750	*Teinolophos trusleri*	R. Long	#162	2005	D.Pickering	Right. Edentulous
P221043	*Bishops whitmorei*	A. Leorke	#100	2005	D.Pickering	Right. M1-2?
P221044	Ausktribosphenidae	C. Ennis	#300	2005	D.Pickering	Left. M2
P221045	*Teinolophos trusleri*	J. Wilkins	#395	2005	D.Pickering	Right. Edentulous
P221046	Mammalia	H. Wilson	#480	2005	L.Kool	Isolated tooth
P221150	*Teinolophos trusleri*	J. Swinkels	#340	2006	D.Pickering	600my Exhibition display. Right. x2 molars. Probably M2-3
P221156	Ausktribosphenidae	N. van Klaveren	#360	2006	D.Pickering	Right. M2 (requires preparation to confirm)
P221157	*Bishops whitmorei*	M. Walters	#585	2006	D.Pickering	Right. Edentulous with alveolae for P6, M1-3
P221158	*Bishops whitmorei*	R. Close	#200	2006	D.Pickering	Right. P5-6, half M plus M2-3
P228432	Ausktribosphenidae		scrap rock	2009	L.Kool	Right. Molar talonid
P228848	*Bishops* sp.	M. Walters	ETRW, Otways	10.12.2006	D.Pickering	Left. P6, M1, partial M2
P229037	*Teinolophos trusleri*	M. Cleeland	#91	2008	D.Pickering	Right. Edentulous with alveolae for x4 molars and ultimate premolar
P229194	Mammalia	N. Barton	#770	07.03.2007	D.Pickering	Isolated upper Premolar
P229408	*Teinolophos trusleri*	M. Walters	#300	14.02.2008	D.Pickering	Left. Ultimate premolar, M1-4
P229409	Ausktribosphenidae	N. Evered	#180	07.02.2007	D.Pickering	Possibly *Bishops whitmorei* . Left. P5-6, M1-3
P229410	*Teinolophos trusleri*	C. Ennis	#90	2008	D.Pickering	Right. ?M1 plus M3
P229649	*Bishops whitmorei*	J. Tumney	#330	2009	D.Pickering	Right. P2-3,5-6, M1-3
P231328	Mammalia	A. Maguire	ETRW, Otways	29.11.2009	D.Pickering	Maxilla fragment with x2 molars
P232567	*Ausktribosphenos* sp.	M. Walters & J. Wilkins	#270	26.02.2012	D.Pickering	Right. Broken premolars. M1-3
P232892	*Bishops* sp.	Astrid Werner		16.02.2013	D.Pickering	Left. ?M2
P252052	Monotremata	T. Ziegler	ETRW #626	20.02.2015	D.Pickering	Upper premolar
P252207	*Bishops* sp.	O. Campbell	ETRW #200	07.02.2015	D.Pickering	Posterior part of right mandible w x1 molar

FOURTEEN (AND A HALF) YEARS LATER

BY WENDY WHITE

I found my first and, until very recently, only mammal jaw in February 2003, on my second Dinosaur Dreaming dig. My story of finding that fossil is in the 2003 Field Report, where I describe how Lesley Kool (who is always cautious in her diagnosis), originally told me it was probably fish, but worth a microscope check. It did not win "bone of the day", since it was probably fish. It was not until the next morning, when we were breaking rock in the back yard at the Laverton Street house, that Lesley decided it was actually a tiny mammal jaw.

For 14 more Field Seasons (about a year of my life if you add it all up), I broke rock. I found some dinosaur, marine reptile and flying reptile fossils, which were exciting enough to keep me returning, but nothing else mammalian.

Because we are unlikely to have an Eric the Red West or Flat Rocks dig next year, a small number of the most experienced Dinosaur Dreamers (whom I dubbed rock breaking tragics) gathered in Lesley Kool's driveway on 11 November, 2017.

Tom Rich was, at that time, somewhere in remote Namibia.

Nick van Klaveren had been thinking about where the fossil-bearing layers might be at Flat Rocks, so he and

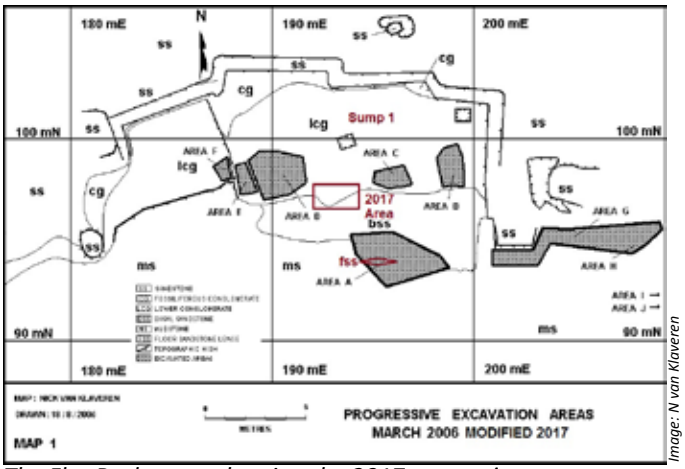


Image: N van Klaveren

The Flat Rocks map showing the 2017 excavation area

Image: F Karakitsos

The rock breaking tragics in Lesley Kool's driveway

John Wilkins had led a tiny crew to remove several buckets of promising rock on 14 October, before our permit expired.

During our rock-breaking day, I found a jaw, which Lesley decided was likely ornithopod. We all concurred, partly because Lesley is usually right, and partly because the single visible tooth had that graceful curve that we have come to associate with the non-fan-shaped side of our little dinosaur's teeth. I drew a big circle around my fossil. I inadvertently drew over a second fossil that I was too excited to see. Fortunately (from the point of view of it being drawn on), that second fossil turned out to be unrelated, scrappy and non-diagnostic.

We had promised to show my find to Nicole Evered, so the following morning, Lesley decided to tease a few sand grains away to partially expose it. As I walked up Lesley's driveway, I was greeted with news that it was not an ornithopod jaw... I had found my second mammal jaw!

If that news was not exciting enough, the visible tooth bore a (at least passing) resemblance to the weird multituberculate *Corriebataar marywaltersae* found at Flat Rocks in 2004.

Tom does not return from overseas until just after this report goes to press, so has not yet seen my beautiful little jaw. I can hardly wait for him to get back and figure out exactly what this new find is, and what the animal that owned it (more than a hundred million years ago) was like when it was alive.

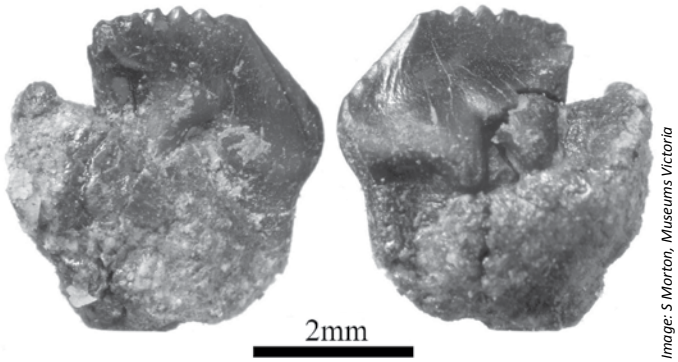


Image: S Morton, Museums Victoria

P216655 Corriebataar marywaltersae *found in 2004*

I FOUND A FOSSIL!

Nothing compares with the absolute excitement of finding a really good fossil. It's the one time I find that the crew is happy to stop what they are doing and strike a particularly cheesy pose. Here are some of my favourite photos of happy smiling fossil finders of 2017.

BY WENDY WHITE

Kevin Orman-Rossiter

Bridget Firth and Mary Walters

Ross and Karina Bradley

Genevieve Cini

Ashley Butler

Mary Walters

Eily Schultz

Elaine Anderson

Victoria Kaloudis

Ross Bradley

John Swinkels

Mellisa Boehm

Mary Walters

Darren Bellingham

Sharon Madder

Timothy Hain

Tess Devine-Hercus

Eve Eidelson

Miklos Lipcsey

Astrid Dunkley

Claire Garrick

Amber Craig

Image: J Koekoe

Karina Bradley

Robert Duck


Megan Campbell


James Fife


Ali Calvey


Sharon Orman-Rossiter


Astrid Dunkley


Fotini Karakitsos


Jade Koekoe


Tash Pace


Dean Wright


Jess Bruce


Bridget Firth


Nova Taylor


Evan Leed


Allan Smith


Gemma Reid


Ellie Urrutia-Bernard


Dani Measday


Wendy Turner and Stephen Poropat


Melanie Mackenzie


Image: F Karakitsos
Wendy White


Image courtesy of C Simpson
Callum Simpson


Christina Boundy


Astrid Werner


Genevieve Cini


Mike Cleeland

Ben Francischelli


Kylie McGanniskin

PROSPECTING REPORT

BY MIKE CLEELAND

Several prospecting sites were visited over the last year with mixed results.

During the January holiday period, known localities at San Remo and at Black Head were searched without success.

During the February dig season, an interesting thin walled bone presumed to be a rib was recovered from Point Franklin, to the east of the Eric the Red West site, as well as two small bones from erratics on the nearby boulder-rich beach.

Also during February, a party visited Melanesia Beach in order to collect a block of rock showing several small three toed prints. The block was successfully retrieved and several more (mostly partial) footprints were found, some of which are still on site. These finds, together with earlier discoveries, indicate that Melanesia Beach is perhaps Victoria's pre-eminent Cretaceous footprint site. An abundance of fine grained rock, derived from tall cliffs at the eastern end of the beach, has favoured the preservation of prints (rather than bones) at this site.

Image: M Cleeland

Thin-walled bone from Point Franklin (geopick for scale)

Image: M Cleeland

Possible footprint that may have been found by Jack Horner

Visits were also made to Brown's Creek, Johnson's Track and Elliott River to collect samples for palynology, although no new vertebrate fossils were recovered.

On the east coast, holiday groups visited Eagle's Nest and searched rockfalls near the site of Ferguson's original discovery (without success).

During March 2016, Jack Horner visited Australia from his home in the USA, as part of his involvement with the Jurassic World exhibition in Melbourne. On a visit to the Inverloch area with Tom and Pat Rich, Jack took the opportunity to peruse the shore platform in the vicinity of the dig site. He returned to announce that he had identified a three-toed footprint, similar to the known Flat Rocks specimen, raised and similarly aligned. His recollection was that it was not far from the prominent dolerite dyke that crosses the shore platform to the north of the dig site. We have not re-established the location of the print with certainty, but a picture is included of a structure which may have been what he saw.

Several plant fossils, including *Taeniopteris*, were recovered from a new site at Townsend Bluff, east of Inverloch township and more were gathered from a farm track cutting on Clematis Road, Bass.

All prospecting in the Victorian Cretaceous was carried out under National Parks Permit No. 10007336.

FABULOUS FOSSIL FINDS

Image: L Kool

P252698 Ornithopod tooth

Image: L Kool

P252702 Ornithopod astragalus

Image: L Kool

P252701 Ornithopod basisphenoid

Image: D Bellingham

P253701 Theropod astragalus

Image: D Bellingham

P253699 Ornithopod centrum

Image: D Bellingham

P253700 Ornithopod toe

Image: L Kool

P252696 Slender tooth

Image: D Bellingham

P253685 Ornithopod tibia

Image: D Bellingham

P253684 Dinosaur rib

Image: D Bellingham

P253688 Dinosaur caudal (tail) vertebra

How I found my one and only bone

By Claire Garrick

It was the second last day of my week at the Dinosaur Dig Site, and after breaking apart countless rocks into the smallest pieces imaginable, I was still without a fossil. Although I had served my time in the hole and helped to recover some wonderful specimens, I was yet to break open a rock and gain the sweet satisfaction of finding a bone that I could claim as all my own. While the disappointment I felt at my personal fossil tally was lessened by the enjoyment of observing bones that had never before seen the light of day, it was hard not to start losing hope.

On the very first day, I had been sitting right next to Robert Duck at the moment that he cracked open a rock and found a beautifully preserved vertebra, with a neural canal clearly visible in the cross section. “Wow!” I thought, “Surely I will find something this wonderful soon!” But after days of breaking open big rocks, small rocks, grey rocks, brown rocks, and everything in between, I could only lay claim to a few pieces of mud, wood, and a total of three beetle bums (very nice beetle bums I might add).

As the deadline to my departure was fast approaching, I began the day with an increasing desire to get my picture into the Dinosaur Dreaming Field Report with the others who had found bone. After the daily routine of bailing out water from the holes, I sat down at my rocky shelf where I had been breaking rocks all week and got down to business. The march flies were particularly dreadful, and seemed to be immune to our multiple layers of insect repellent. By the end of the day I had managed to kill four with my hammer, which would have been my proudest achievement if I hadn’t cracked into my third rock and saw, finally, a tiny piece of bone!

After confirmation by Mary Walters, I raced over to Wendy White and proudly showed off my small, scrappy fossil. My picture was taken and my bone was wrapped up by Wendy, and I could now officially call myself a fossil finder. With renewed enthusiasm I returned to my rocks, but it was not until the next day that I found bone again.

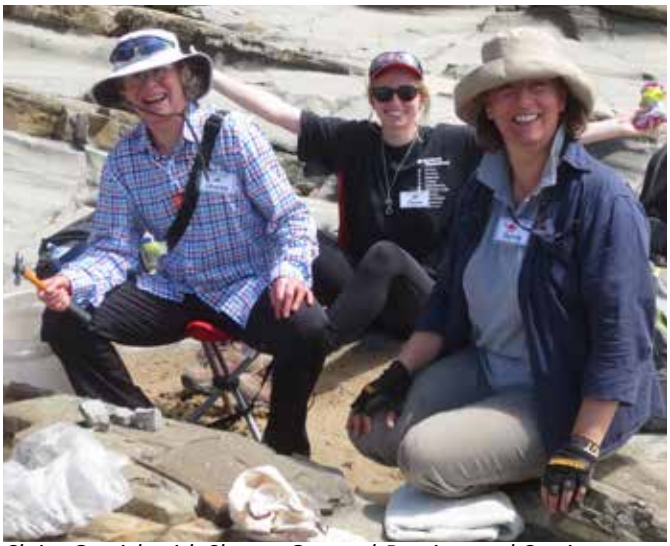
Claire Garrick celebrates her fossil find at ETRW

I went through the same process, only to discover as the rock dried that it was not bone, but a lovely piece of ‘something’. So, while I had been excited for a brief period to have a tally of two whole fossils, it was not to be.

Nevertheless, my week at Dinosaur Dreaming was one of enjoyment — full of early mornings, bonfires, good food, ocean swims, and great people. Thank you to everyone involved for giving me the chance to be the proud owner of three beetle bums and that unknown piece of something, which now are sitting proudly on my desk. I had a wonderful experience with you all, and am looking forward to doing it all over again in the future.

Best Regards,

Claire (Fossil Finder)



Claire Garrick with Sharon Ormand-Rossiter and Corrie Williams on Rookies’ Day

THE PERILOUS ADVENTURES OF PIPPY PUREHEART

BY SHARYN MADDER

THE PERILOUS ADVENTURES OF PIPPY PUREHEART

The treacherous and heroic descent from Oven Mt. to Dinner Plain.


Image courtesy of R Carland

HISTORY IN THE FIELD

BY BEC CARLAND

For years I have wanted to interview Tom Rich with a focus on Victorian Dinosaurs, in particular the Dinosaur Dreaming project. So I jumped at the chance to accompany him on this year's dig. However, as I researched and planned the trip, it became apparent that the story that I needed to capture was the story of the volunteers. So after a brief filmed interview with Tom, my main focus shifted to the volunteers, their motivation, their passion and their experience of hitting rocks with a hammer for eight hours a day.

Over a three-day visit, accompanied by Museums Victoria cinematographers Rob Zugaro and Stephen Dixon, I conducted 16 short oral history interviews. The interviews, now registered into the State Heritage Collection, represent a cross section of the volunteer community, a diverse mix of ages, genders, backgrounds and experience — from the long-termers who had been coming back year after year, to newbies who were just learning the ropes.

The ambient sound of the ocean and the continual tap, tap, tap of hammers against rock, interspersed with friendly banter and lots of laughter, evocatively transports the listener to the site. The interviews capture various techniques for breaking the rock into sugar cube sized pieces, in the quest for Tom's tiny mammal jaws. They also document the participants, the material being extracted, the care that goes into looking after the country the dig is on (culturally and environmentally), as well as the OHS and other practical implications of running the site.


Image: R Carland, Museums Victoria

Interviewing Tom Rich

Participants talk about the routines of the camp and the dig site and the rituals that follow the ebb and flow of the day and keep people sane – morning and afternoon tea, swim o'clock on a hot day, the morning quiz, lectures and presentations of an evening and a healthy dose of chocolate and snacks. Each digger shares stories of their most impressive find (even the newbies) and the pride and thrill that comes from that. There is also a lot of discussion about favoured tools, I was particularly taken by newbies Astrid Butler and Tash Pace's matching hammers!

Being the first dig since the passing of dig organiser, Dave Pickering, there are many reflective and emotional moments in the interviews where 'old timers' talk about the absence of their dear friend and leader. They capture Dave's ability to make absolutely everyone on the dig feel special and appreciated and part of something bigger. Their anecdotes paint a picture of a humble, warm, generous and truly funny man whose ability to see the absurdity in life has left a mark on everyone who knew him.

The recordings reveal commonalities across this diverse community; a sense of adventure, and the thrill of the chase and for most, a love of dinosaurs, fossils and all things palaeo (many since childhood). But without exception there was a sense of duty, of contributing to something greater than themselves and an acknowledgment that their work has real value. Wendy White summed it up most succinctly "They are slightly nerdy, don't like a normal holiday, they like to work. Often looking for the sense of community — what this dig is really, really good at, it's like family. Those of us coming back for years treat each other like family, some of them you love and want to sit next to and some of them like the weird old uncle you avoid."

Thanks to all who participated in the interviews and for making the museum crew feel welcome. Your selfless contribution to building the collection and knowledge base at Museums Victoria is an inspiration.

Interviewees:
Astrid Dunkley; James Rule; Stephen Poropat; Wendy Turner; Wendy White; Ali Calvey; Kevin Orrman-Rossiter; Sharon Orman-Rossiter; Karina Bradley; Ross Bradley; Fotini Karakitos; Mary Walters; Tash Pace; Martin Lawrence; Darren Bellingham


Image: R Carland

Filming the crew

DIGITAL DINOSAURS

BY KAJA ANTLEJ AND BEN HORAN

On 15 February 2017, a team of researchers and students from the Design Research Group and CADET VR Lab from the School of Engineering at Deakin University conducted a partial digital documentation of the excavation of fossils at the Eric the Red West site. The main objective of the fieldwork was to collect digital data to be used as the basis for a museum experience about dinosaurs of the Victorian Coast, initially at the National Wool Museum in Geelong.

The digitisation is a part of a larger research project in which Deakin University is working together with palaeontologist Professor Pat Vickers-Rich and her team at Swinburne's PrimeSci!, The National Wool Museum and the City of Greater Geelong to explore engaging ways of interpreting dinosaur heritage (from natural and cultural perspectives) of the Victorian Coast through the use of Mixed Reality, Virtual Reality (VR), Augmented Reality and 3D printing. A small ornithopod *Leaellynasaura amicagraphica* is being used as a case study to investigate interactive, immersive, co-creative and tactile experiences.

Image: K. Antlej

360-degree videography (GoPro 360Heros)

Image: K. Antlej

3D scanning (Artec3D Spider)

To better contextualise dinosaur heritage in time and space and make it more meaningful for museum visitors, palaeontological field-work at the site was digitised through 360-degree videography, conventional 2D photography and video, as well as 3D scanning of fossils and the excavation area. The researchers were focusing both on the fossils and on the dig as a whole. Hence, during the documentation process palaeontologists (volunteers and staff) who were excavating at the site were also recorded. Consent forms were obtained from all of the diggers present enabling public presentation of their important work.

Short 360-degree videos (audio included) of the dig were captured with GoPro 360Heros camera, an instrument on a tripod with 12 GoPro cameras which simultaneously records the space around itself. A 360-degree video can be used not only to document a palaeontological excavation from a scientific point of view, but can create an immersive VR experience to bring a sense of the dig to audiences who don't have the opportunity to participate in it directly.

3D scanning of the fossils and the excavation was achieved through photogrammetry using three different Canon digital cameras, and dedicated 3D scanning based on blue structured light technology using the handheld Artec3D Spider scanner.

ABC News (TV and radio) and the Colac Herald journalists covered the digitisation of the dig. Their stories were later summarised by other Australian and international media, reaching 50 million viewers worldwide — most from India, with 2 million from Australia.

EVERYTHING HAS A BEGINNING

BY AMBER CRAIG

Some things in life seem permanent, like we couldn't imagine life without them. For many of us, dinosaur digging is one of those things. There are moments we will never forget — like finding our first fossil, our first mentor showing us the ropes, or how we discovered Dinosaur Dreaming existed.

These stories are never one and the same but, as you will see, have some similarities — common connections, scientific curiosity and sometimes kismet.

Here are some of those stories...

Lesley Kool (1984)
I have had a lifelong fascination with history and desperately wanted to be an archaeologist before I discovered geology. As a member of the Friends of the Museum (Museums Victoria) I was fortunate enough to be invited by Tom Rich to take part in the first dinosaur dig at Dinosaur Cove. That two week dig resulted in the discovery of over 300 fossil bones and teeth that needed to be prepared so I volunteered to learn preparation and realised that I really enjoyed it. I attended all of the subsequent Dinosaur Cove digs and in 1986 Pat Vickers-Rich offered me a position as research assistant in the palaeo lab at Monash University, where I continued the ongoing preparation of the bones from Dinosaur Cove. During that time I was able to persuade a number of like-minded friends (such as Mary Walters, Nick van Klaveren and Mike Cleeland) to join me in systematically prospecting the Bass Coast, where the first Australian dinosaur bone was found in 1903. That was how we found the Flat Rocks site in 1991, which became the primary excavation site when Dinosaur Cove closed in 1994. During the 20 field seasons that we worked at the Flat Rocks site and the digs that followed at Eric the Red West, I was fortunate enough to meet many enthusiastic and dedicated people who share my passion for fossils, some of whom will remain friends for life. The highlights of those years are too numerous to list, but I feel very privileged to have been a part of this exciting period in the discovery of Victoria's prehistory.

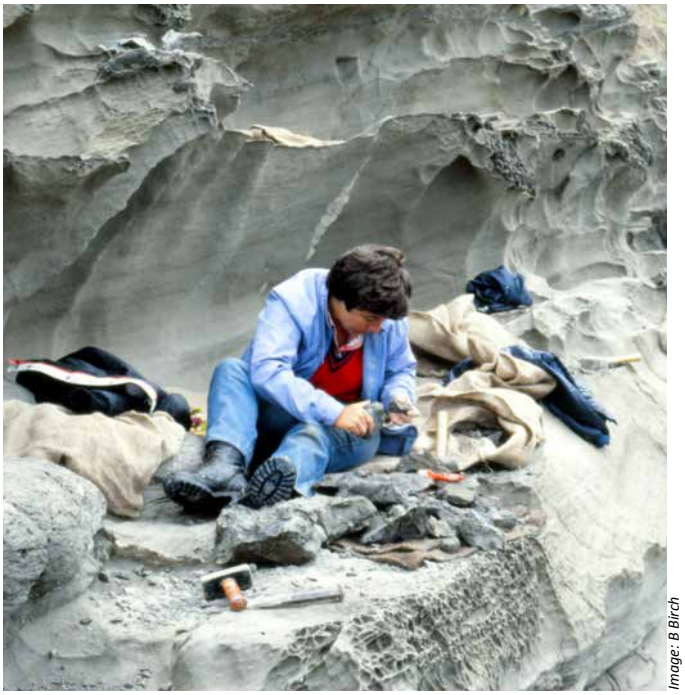


Image: B Birch

Lesley Kool breaking rock at Dinosaur Cove in 1984

Image: P Menzel

Nick van Klaveren at Dinosaur Cove in 1989

Tom Rich (1984)
On 25 December 1953, I read the book *All About Dinosaurs*. At the start of the last chapter entitled "Death of the Dinosaurs" is a picture of two beady-eyed mammals eating dinosaurs eggs. Seeing that, and realising as a 12 year old that we humans had ancestors contemporaneous with dinosaurs, sparked my interest in Mesozoic mammalian fossils which, more than five decades later, led me to Eric the Red West.

Nick van Klaveren (1986)
Like most young boys, I had a love of dinosaurs but, unlike most, I never lost my enthusiasm for these prehistoric beasts. At the end of the first year of my Applied Geology degree at RMIT a number of "I need you to dig my bones" posters appeared on notice boards to enlist volunteers to work at Dinosaur Cove. So two friends and I applied, and I was allocated three weeks. Our first day on site at Dinosaur Cove was led by Mick Whitelaw, Tom's right hand man and site supervisor at the time. After an arduous descent down the cliff to the shore platform, we were shown the exposure of the Lake Copco and East sites. Being observant, I spotted a wheelbarrow wheel which had remained wedged under a boulder since the giant storm that destroyed the operation two years previously. Mick graciously allowed me to carry the 6 kilogram wheel and axle back up the 90 metre cliff as a "reward" for my enthusiasm. By the end of my three weeks, I had made myself so useful that Mick invited me back for a further two weeks that season, which led on to 31 years of dinosaur digging.


Image: L Kool
Corrie Williams at Flat Rocks in 1994


Image: L Kool
Mike Cleeland in the back yard at Inverloch in 2001

Corrie Williams (1989)
At the end of my second year at Monash University in 1988 I was awarded an end of year internship in the igneous and palaeo labs. While working with Pat Rich, Lesley Kool and Jenny Monaghan I heard about a fossil dig that was running at Dinosaur Cove. I volunteered for the dig in 1989 and have not looked back since. Where else does a 20 year old get to play with jackhammers, collar for panther drills, run air lines down near vertical cliffs, camp for weeks with yummy food being cooked for you, meet great people – and find world class fossils?!

Mike Cleeland (1989)
I joined the team after reading an article in The Age Good Weekend magazine about Dinosaur Cove. I'd always been a geology junkie — did all the geo and palaeo subjects at uni (mostly because they seemed easy), and spent my spare time trying to find fossils around The Punchbowl without knowing what I was looking for. The newspaper article said they were looking for volunteers, so I asked for directions at the Apollo Bay Pub and eventually arrived at the bush camp. The first person I met was Pat Rich, who gave me a hard hat and a set of steel-capped boots before sending me down the cliff and into the tunnels. With the distinction of being half of the second couple to marry as a result of meeting at the Inverloch dig site, I am still going 28 years later.

Darren Bellingham (1989)
I had a long-term interest in science, geology and fossils but had no formal qualifications in the field. I was aware of the dig because two people I knew (Wendy Moore and Natalie Schroeder) had already been involved from the first dig at Dinosaur Cove. I asked Natalie if I could visit Dinosaur Cove and ended up staying for a single night and day in February 1987. I applied to dig for a week in 1989 and was accepted. I went on to work at Dinosaur Cove in 1991 and 1993. I was aware of the Inverloch digs but a growing family


Image: L Kool

Mary Walters at Flat Rocks in 1994

stopped my involvement for the next decade. In late 2003 I saw an article in The Weekly Times newspaper asking for diggers to work at Inverloch. I applied and was accepted. I have attended all Inverloch and most Eric the Red West digs since.

Mary Walters (1993)
As a young girl, I loved playing in the mud, making mud cakes with my sisters. Forty years ago, when my middle son Grant was eight, he became obsessed with rocks, so together we joined the local gem club. This led me to undertake an Earth Science degree at Monash Uni. Pat Rich and Lesley Kool invited me to volunteer in their palaeo lab, which led to prospecting trips in Gippsland, including the one that found the first surface bones at what we now call Flat Rocks. Once the decision was made to exploit the site that we found, I had to be part of that team.

Doris Seegets-Villiers (1994)
My affiliation with Dinosaur Dreaming started in 1990. I had met my Aussie husband, Paul, and he wanted to visit his family and bring me along. As part of my 'Earth Science' course in Germany, I had to complete work experience. For me it was logical to kill two birds with one stone — meet the family and work. I applied for many work experience positions in Melbourne, but Pat Rich (through Lesley Kool) was the only one willing to take me on. This is how I ended up meeting Lesley, Pat and, a bit later Mary Walters. I worked in the palaeo lab for a few weeks and learnt, amongst other things, how to mould, cast and to do basic preparation. A few years later, when I had finished my degree, Paul was sent to Asia as a field service engineer. Whilst he was working there, I made a trip to Australia and joined the first dig at Flat Rocks. For the next few years, Paul kept on working in Asia. Fortunately, his trips always coincided with the dig season and I could fly to Australia to join in. 20 years ago we moved to Australia, making the annual trip to Inverloch much easier.

Nicole Evered (1994)
For many years I had conducted shell fossicks at Inverloch for the Department of Conservation and Natural Resources (DCNR). Alan and I had been on staff at the Australian Jamboree in Ballarat from 27 December 1991 to 14 January 1992 — we were exhausted and went down to Inverloch to recover. I tottered into the DCNR offices and offered to lead a shell fossick but they had to give me three days to recover. They told me about the excitement with Mike Cleeland and Lesley Kool taking a fossil fossick to The Caves beach to see the ferns and tree fossils. Lesley was explaining what a bone would look like in the rock and a young participant said "like that?" They found about 20 bones exposed on the rock platform on that day. I was so excited I went straight down to Caves Beach – and I have never been so angry. All I found were the cut marks where the bones had been harvested and taken back to Monash University. I went straight back to the DCNR guys and was very rude – "how dare you send me down to see dinosaur bones and they had all been harvested?" (I have since apologised and we are still talking.) "Calm down, the team are still prospecting and are at Kilcunda today". So that afternoon, I turned up at Kilcunda with my sun hat, my sun screen, my afternoon tea and my chair. "Please can I dig?" They looked me up and down and muttered "funny woman". I have been digging with the team ever since. I envy all who have had the opportunity to go to University – a chance I never got. All my knowledge of dinosaurs, bones and teeth I have learnt on the job coached by all you lovely experts. I would not have missed it for the world.


Image: L Kool

Nicole Evered at Flat Rocks in 1994

Image: L Kool

Norman Gardiner at Flat Rocks in 1994

Norman Gardner (1996)
In the nineties, I worked on digs in the US, France and Argentina, some of them run by Earthwatch. Around the turn of the century, I heard of our Dinosaur Dreaming dig and got Mike Cleeland's phone number from an acquaintance. When I rang him he put me on to Lesley Kool. For over fifteen years now. I worked each season (except when medical nuisances made it impossible). When I began, one of the active diggers, Andre Coffa, took pains to help me adapt to the miserable size of our bones. When I began at Inverloch, Nick van Klaveren ran the quarry and John Wilkins had not yet appeared. When Alan Tait moved into my street I recruited him for the dig (you may imagine how difficult a job that was).

John Wilkins (1999)
A young Nick van Klaveren "invited" me to drive him down to his dinosaur dig and help out. I keep coming back to enjoy the hands on work, rock breaking, being in the field, finding fossils and all the people.

Wendy White (2002)
I try to do something for National Science Week each year and in 2001 it was to attend a lecture on dinosaurs by a Dr Tom Rich. At the end of the talk he invited the audience to look at some fossil specimens that were being watched over by Lesley Kool. I overheard her mention that they took volunteers for an annual dinosaur dig. "Can I do that?", I asked. Lesley advised me to email her in October when she would assemble the roster. I went home and wrote a note to myself in my diary. October arrived, but I decided not to send the email on the 1st of October since that seemed way too needy — in fact I held out until the 3rd which was as laid back and as cool as I could manage. I turned up to Rookies' Day and picked Mary as my mentor. The rest, as they say, is history.

Stephen Poropat (2004)
I've been obsessed with dinosaurs, and palaeontology generally since I was a little kid. I attended talks given by Tom Rich and Pat Vickers-Rich during my school years and did work experience at the Monash palaeo lab with Lesley Kool in 1999. As a first year studying earth sciences at Monash in 2003, Marion Anderson informed me that I could participate at the Flat Rocks dinosaur dig the next year, and I've been on six digs since.

John Swinkels (2004)
It was nearly 12 years ago when it all fell into place. I had known a dinosaur dig at Inverloch existed but never thought to seek it out, even though as a kid my brother and I used to camp in the same area where I'd say "dinosaurs must've lived here!" One day I was walking down the stairs at Inverloch, as I had done many times before, and I saw a number of people walking up with equipment. I picked a random guy out, about tenth in the line, and asked what they were doing. He called me by my name, which took me aback as I did not recognise him. It was Gerry Kool, my bank manager, who I had not seen in 5 years! It is because of this chance encounter that I have spent many years enjoying the outdoors and being the lucky first person to ever see some of these fossils.

Fotini Karakitsos (2007)
Like many of the Dinosaur Dreamers, I first heard that there was an operating dig during Marion Anderson's First Year Geology class at Monash University. At that point, the dig had instituted an interview process at the Melbourne Museum Discovery Centre, and I was interviewed by Mary Walters and Doris Seegets-Villiers. They seemed mainly interested in whether I could cook (I told them I could — I lied), whether I was jovial (I am), clean (sort of) and could coexist with 20 people. My first week on the dig was with a group of Monash dudes — it was the week that Tyler Lamb found the footprint that experienced crew had been walking over.

Wendy White in the back yard at Inverloch in 2002

Pip (Wilson) Cleeland (2007)
My name was Pip Wilson when I attended my first digs and I originated from Ayrshire in Scotland. I was fostered, fed and watered by Alan and Nicole Evered, my dear friends, who quickly took me under their wing and marched me out to the dig with them each day. I found rock, sand, beetle bums, odd scraps of bone but the biggest discovery (and still is as of today) was the infamous and, dare I say it, Dinosaur Dreaming Koolasuchus Legend.... Mike Cleeland!

Alan Tait (2007)
I moved from Perth to Melbourne in December 2006, to the same street as Norman Gardiner and found out about Dinosaur Dreaming from him. I was still involved with consulting and teaching in Perth for the first half of 2007, but in September I phoned Dave Pickering and applied to become a digger (or a dreamer?). My first dig was in December 2007 at what Dave called Eric the Crayfish, now Eric the Red West, and my first Flat Rocks dig was in February 2008. For me, Dinosaur Dreaming is a journey of discovery about the rocks and their component materials, including pebbles of course, not to mention the fossils, of which my favourites are plesiosaur remains. The opportunity to wield hammers, chisels and crowbars to remove large pieces of rock is another fascination of the Dinosaur Dreaming project.

Wendy Turner (2009)
I was a new mum when I heard about the dig at Inverloch and not in a position to rush off seeking prehistoric beasties. Years later I applied through the Museum discovery centre and was interviewed by our wonderful Dave Pickering. It was followed up by a compulsory training weekend in the Otways. For me, that involved strategic packing, a six hour car trip, two small energetic boys, a few wrong turns, continual park and snack stops and engaging my parents as handlers for the weekend. I was dreading it. I thought everyone would take one look at my exuberant boys and shudder.

Alan Tait at ETRW in 2009

James Rule at ETRW in 2013

I shouldn't have worried. The dig crew were an amazing and inclusive bunch of people. I was taught the fine art of rock breaking by Gerry Kool and from that weekend I was hooked.

Miklos Lipcsey (2009)
Since childhood, I have always been interested in science and I graduated with a Bachelor of Applied Science. When I returned home from a trip to Europe visiting relatives, I was inspired to research my parents' immigration to Australia. To that end, I spent a few days at the immigration museum and decided to become a museum member. In 2008, the museum advertised tours of the Melbourne Museum's collection areas during their open day — I chose Fish and Palaeontology. It was in the Palaeontology tour that I first met the collections manager, David Pickering. He encouraged interested tour participants to apply for Dinosaur Dreaming digs, via the Museum's Discovery Centre. My application and interview was successful and it has been a great pleasure and privilege to be involved in this wonderful group, both in the museum and on the digs, for the last nine years.

James Rule (2013)
My childhood love of dinosaurs and palaeontology ultimately drove me to join the Dinosaur Dreaming program. I joined the dig in Inverloch after Marion Anderson told us about it during a first year geology lecture. After joining the museum's volunteer program in 2012, I would say this was the first true step towards my career in palaeontology, introducing me to many wonderful friends along the way!

Amber Craig (2014)
When I came to the dig I was still coming to terms with my decision of changing my major from weather and climate systems to geology. At the end of my second year, Barbara Wagstaff excitedly announced to our class that University of Melbourne students were formally invited to Dinosaur Dreaming for the first time (yes!). I thought I would use this as a test to see if I was in fact over my high school aversion to the outdoors so I could decide if I was more suited to being a field geologist or a lab rat. Considering I can't resist coming back each year, it's safe to say I have made up my mind.

Melanie Mackenzie (2014)
Working alongside Dave Pickering on the museum relocation from Russell Street in the late nineties it was impossible not to be fascinated by fossils. I remember scoring myself an old crate that used to house a *Diprotodon* skull – the best addition to a student room ever! Dave's enthusiasm for fossils led me on many a prospecting trip for dinosaurs, megafauna, and megalodons. I lived overseas for a number of years, but when I returned to Australia and to work at the museum, Dave encouraged me to join the Dinosaur Dreaming team, and I've been lucky enough to make it down to Eric the Red West on a number of trips since. The fossils, occasional sunshine and people always make me want to return. And yeah… I'm still a sucker for Jurassic Park.

Jade Koekoe (2015)
I had been complaining once again, to a fellow volunteer at Melbourne Museum, about universities refusing to take non-student volunteers on their digs, when that volunteer told me about a group of dinosaur diggers currently gathering in one of the museum's meeting rooms. Making my way to the meeting, the 2014 field report day, I located the person in charge of volunteers for the dig. Though she told me applications had closed for new volunteers, I must have been persuasive because in November 2014 I went on my first ever dig (but not my last!). Childhood achievement complete.

Amber Craig at ETRW in 2014

Mel Mackenzie at ETRW in 2014

Ben Francischelli (2015)
I wanted to be like Alan Grant in Jurassic Park.

Ali Calvey (2016)
How to put in to a brief sentence your lifelong interest taking shape in reality? As a dinosaur tragic and new Aussie, how exciting to be involved in the cutting edge of Australian palaeontology, meeting such enthusiastic and devoted like-minded people. It is an absolute privilege, thank you!

Timothy Hain (2017)
It is my life's ambition to be a palaeontologist — that is why when Monash University's Marion Anderson informed me of the dig I immediately applied. After one week and 10 fossils later, I am hooked and very much looking forward to next year's dig.

Krystal Kunig (2017)
I wanted to join the Dinosaur Dreaming team this year after presenting many *Dinosaurs and Fossils* education programs to children all over Victoria. It was time to experience first-hand what it takes to find a fossil and I hoped to be able to tell future children that I found one.

Evan Leed (2017)
I heard about the opportunity to go on a palaeontology dig mentioned very briefly in a lecture at uni, and decided to follow through. I was particularly interested in the scientific experience that I could draw on and share if I were to become a teacher. The dig re-sparked my childhood interest in dinosaurs and I also wanted to be able to tell people that I've technically been a palaeontologist!

STATE OF THE LAB

BY TIM ZIEGLER

In April this year, I was privileged to take up the role of Collection Manager, Vertebrate Palaeontology for Museums Victoria. It is an opportunity for which I feel enduring gratitude to many among Victorian palaeo community. Most of all, I am grateful to David Pickering. I am inspired most of all by Dave's generosity of spirit. Like many Dinosaur Dreamers, my first real conversation with a palaeontologist was with him. And it characterises Dave Pickering as a man, scientist and mentor that he offered a conversation between equals. He assembled inestimable skills and knowledge over decades of dedication and effort. In the privileged position I now hold, I'll try to share with others the opportunities and discoveries held in the collection. In this way I hope to fulfil Dave's example and carry on his legacy.

Image: T Ziegler, Museums Victoria

Museums Victoria fieldwork on the Torquay coast is producing exciting, if very heavy, whale fossils. (L to R: David Hocking, Matt McCurry, Erich Fitzgerald, Ben Francischelli, Travis Park, William Parker).

Collection additions

Since April this year, nearly 1000 new vertebrate and plant specimens have been registered in the collection. This includes over 100 vertebrate fossils from the Victorian Cretaceous, around 50 from the Beaumaris marine fossil beds, and over 100 collected or donated from Batesford Quarry near Geelong. One of the most exciting discoveries was made near Torquay, where local surfer and prospector (and now Museums Victoria volunteer) Yestin Griffiths first identified fossil bone exposed in the Miocene limestone shore platform. In an area of only a few hundred metres, a concentration of multiple fossil cetaceans — including dolphins and baleen whales — has been identified. Fieldwork at the site in May this year recovered two more partial baleen whale skulls, one large and one small. Volunteers and museum staff are currently exposing the Point Impossible whales using a combination of mechanical tools and acetic acid. Some pieces of these specimens, still in matrix, weigh well over 100 kilograms — to deal with this we have recently installed a one-tonne-rated chain hoist and pulley to manage this new scale of preparation.

New projects

In the collection, I have chosen to revisit a group of exceptional Quaternary kangaroo specimens collected from the Morwell open cut mine in the 1970s by Drs Tom Darragh and Tom Rich, among others. These are well-preserved, frequently articulated specimens of two species of *Macropus* and the giant wallaby *Protemnodon*, deposited in brackish anoxic ponds. The surrounding black clays have dried, shrunk and cracked since collection, and produced damaging sulphur minerals on bone surfaces. It is critical to document, repair and conserve this increasingly fragile assemblage, which includes the only examples of the species *Macropus mundjabus*, as well as skin impressions, gut contents and preserved hair. This will involve removing peeling glues, repairing damage from storage conditions, photographing or 3D scanning specimens, and digitising archived material about the original excavations.

Another development for the collection is Victoria's growing record of fossilised tree amber. Australia has historically been considered an area of low potential for amber collecting. However, recent finds in Queensland, Tasmania and Victoria have produced abundant material, including the southernmost amber in Gondwana. In the last year, near Torquay, local collectors have discovered high-quality amber preserved in Oligocene-aged cliffs. The Jan Juc Marl that makes up these cliffs is a marine deposit,

suggesting that the amber was already fossilised before washing into southern oceans around 25 million years ago. Where did it come from? Specimens donated to Museums Victoria are undergoing chemical analysis, to clarify the amber's possible age, and learn the nature of the trees from which it was originally produced. Similar grades of amber overseas have produced fossil insects, plants and even small vertebrates.

Student contributions

Several collections-based student research projects were undertaken this year. Honours student William Parker carried out a first-ever study of post-natal development of extinct marsupials by sampling chemical signatures in the teeth of *Macropus titan, Diprotodon*, and living wallabies. In particular, he investigated whether life stages like suckling or weaning can be detected for extinct marsupials. Steff Ho completed an Honours thesis taking the first look at the whale fossil record of Flinders Island, Tasmania, including further evidence of the killer sperm whale *Livyatan* in Australia following its discovery at Beaumaris in 2015. Tamara Camilleri's Masters research into Palaeozoic ostracods has progressed into a full doctorate, and she presented her research at the 2017 International Symposium on Ostracoda. James Rule has commenced a PhD thesis on the fossil record of seals in the Southern Hemisphere, including preparing exquisite fossils on loan from the University of Otago. Hazel Richards has also begun a PhD thesis at Monash University, after previously teaching at the University of Western Australia. Hazel aims to provide the first functional analysis of the cryptic and captivating giant marsupial *Palorchestes*, to construct a modern view of its post-cranial skeleton and body shape. Her initial results were awarded Best Poster at CAVEPS 2017 in Otago, New Zealand.

Image D Hocking, Museums Victoria

Tim Ziegler in the Vertebrate Palaeontology Lab with the skull of 'Alfred', a toothed ancestor to baleen whales

Image: T Ziegler, Museums Victoria

The holotype skull of Macropus mundjabus *Flannery 1980 (NMV P39102). This species has only been identified from the Morwell Firehole deposits.*

Staff

Drs Travis Park and Matthew McCurry completed their PhD studies, followed by too-brief stints as a Postdoctoral Fellow and Laboratory Technician at the museum before they respectively achieved a Marie Curie Research Fellowship at the Natural History Museum in London, and appointment as the Australian Museum's first Curator of Vertebrate Palaeontology in over a decade. Dr David Hocking had also been employed as a Laboratory Technician until Matt's appointment, at which time he moved into the postdoctoral position. The subsequent opening in the technician role will be filled by Ben Francischelli until at least 2018.


Image: Melbourne University

DATING DINOSAURS

BY BARBARA WAGSTAFF

She comes and goes and what does she do? A question many hard working dinosaur diggers probably ask about me. The fact that I have actually been doing this off and on since 1984 means it is probably about time I explained myself.

I first became involved with the vertebrate fossils along the Victorian coast in the summer after I completed my honours. Having researched the sedimentology and palynology of a cliff section at Kilcunda in Gippsland, it seemed I had something to offer Pat and Tom, as palynology was really the only practical way to date the rocks in which they and their students had been finding dinosaur bones. So the summer of 1983-1984 began with a memorable trip to numerous Otway sites over several days with Tom, where the combination of the Great Ocean Road and Tom's driving resulted in me getting car sick for the first and only time in my adult life. After the heady days at the beginning of the Dinosaur Cove Dig with many FIFO visits by me to grab samples from the site, and one terrifying trip to the Punchbowl in Gippsland with Tom, the publication of Wagstaff and McEwen Mason (1989) ended my constant association with dinosaurs. From then, on my occasional forays into the palynology


Image: M Norvick

Milanesia Beach, Otway Basin. One of my favourite localities as there is a lot of lovely mudstone to sample.

along the coast related to my association with various student projects. The arrival of PhD student, Andrew Constantine, at Monash University in 1991 saw my friend Jenny McEwen Mason and me accompanying him on a trip that summer to collect samples along the Gippsland coast. He was looking to sort out the stratigraphic relationship of the sites. The samples and data that I collected for Andrew still provide me with the groundwork for my work on the Gippsland coast. My next involvement was as co-supervisor of Doris Seegets-Villiers as she tried to sort out the palynology at the Dinosaur Dreaming fossil locality, a site that I did not date for Andrew. I was still making forays into the Gippsland and Otway coasts with honours and masters students from Melbourne University. The whole thing was getting a bit out of hand as it seemed that I had random boxes of slides done by me and by various


Image: B Wagstaff

Mike Cleeland and Stephen Broady wade out to sample the mouth of the Powlett River site.


Image: M Cleeland

Gil Hollins collecting rock samples at Elliot River

Image: B Wagstaff

Phimopollenites pannosus *pollen from Devils Kitchen, Otway Basin. This is a more evolved flowering plant pollen that is also an age indicator of the youngest Cretaceous rocks on the Victorian coast.*
Scale bar is 10 μm

students with no real overall plan. It was Tom Rich who suggested that perhaps a grant application would allow me to finally do it properly and go to all the new bone sites that had been found over the last 30+ years. So the arrival of a timely National Geographic grant finally made it a serious prospect. In the last two years, I have visited and sampled bone localities assisted by numerous people, with the most consistent help coming from Mike Cleeland, who has helped me get to 36 localities along the Gippsland and Otway coasts.

Fieldwork is the part of what I do that is the most visible to other palaeontologists, and it must appear easy as I just rush in, grab mudstone samples that relate to the bone deposits, make some notes and head off to the next spot. The next step for me is processing the lithified mudstones to remove my tiny fossils. This involves many hours in the laboratory and unfortunately some rather unpleasant chemicals. I must confess that I now send the rocks to a commercial laboratory in Canada for processing, as I really want to keep my fingers and preserve what is left of my lungs. Then it is hours alone with my thoughts (well, listening to music) at the microscope.

So how do pollen and spores date the rocks? I am afraid it is a very indirect path back to the geological timescale. There are a number of Cretaceous spore-pollen biostratigraphies for Australia, but all of them recognise reliable first appearance events that are continent-wide. These events are tied to Australian marine basins (such as the Eromanga Basin) by marine fossils such as ammonites or foraminifera that are globally used as age indicators.

So what have I found? Well, that awaits publication. But I can let you know that some of my ideas of the past are no longer held and that my findings in Gippsland have been a revelation to me. Plus, most exciting of all, I have found the pollen of the earliest flowering plants on a much more regular basis than I ever expected.

I would like to thank all those that have helped me in various ways with fieldwork but particularly Pip and Mike Cleeland, Stephen Gallagher, Mike Hall, Gil Hollins, Tom Rich and Alan Tait.

Reference

Wagstaff, B.E. and McEwen Mason, J. 1989. Palynological dating of Lower Cretaceous coastalvertebrate localities, Victoria, Australia. *National Geographic Research* 5(1): 54-63.

Image: B Wagstaff

Clavatipollenites hughesii *pollen from Eagles Nest, Gippsland Basin. This is the most primitive and the oldest pollen of the flowering plants that appears in Victoria.*
Scale bar is 10 μm

Reviewing the Victorian Cretaceous

By Stephen Poropat

At the end of January 2017, Tom and Pat Rich received an email from Ben Kear, Chief Editor of *Alcheringa: An Australasian Journal of Palaeontology*. Ben was writing to enquire about the possibility of them writing a review article on the Early Cretaceous fossil organisms of Victoria, as the first in a series of reviews in honour of trailblazing Australian palaeontologist Nelly Ludbrook.

Tom knew that, since 2015, I had been in the process of assembling a database (currently more than 1,100 pages and more than 330,000 words long) of Australian Mesozoic vertebrates. Concurrently, I had started to assemble similar databases on Mesozoic plants and invertebrates. Given that I had already done much of the required literature trawling, Tom asked me to lead the writing of the review — an opportunity I could not turn down.

While I felt confident that I would be able to summarise the vertebrates (other than fish and mammals) without much assistance, I knew that I would need help from other palaeontologists to adequately overview the other fossil groups. Consequently, we enlisted the help of Anne-Marie Tosolini (University of Melbourne) to summarise the plants, Barbara Wagstaff (University of Melbourne) to assess the palynomorphs, Sarah Martin (Geological Survey of Western Australia) to review the invertebrates, and Lynne Bean (Australian National University) to sum up the ray-finned fish. Tom wrote the mammal section, and I did the rest — with helpful input from Ben Kear in places.

The whole process of writing this paper was a wonderful learning experience. The information that Anne-Marie was able to compile on the fossil plants was a bit of a revelation. Prior to reading her contribution, I had not really been aware of fossil fungi or algae from the Victorian Cretaceous before, nor was I aware how rare (and therefore how significant) the mosses and liverworts from Koonwarra were. Anne-Marie's words conjured up mental images of fern- and conifer-dominated forests, with smatterings of ginkgoes and cycads. She also highlighted the significance of a flower reported from Koonwarra in 1990, which was for several decades the oldest known in the world.

Barbara's summary of the palynomorphs was succinct but built on huge volumes of high-quality previous work. Most importantly, she compiled a table listing all of the different types of pollen and spores known from the Victorian Early Cretaceous, which will be an important resource for many palynomorph researchers down the line. Lynne's summary of the Koonwarra fish was also succinct but excellent (and timely) because it brought the current understanding of these animals to the fore. Tom's summary of the mammals was, as would be expected, comprehensive, covering the important aspects of each species in detail and throwing in a few short paragraphs on some tantalising (and as yet unpublished) new specimens as well. It is my hope that the new multituberculate specimen found by Wendy White on 11 November will be able to be included as well — after all, it is only the second multituberculate specimen ever found in Australia!

However, perhaps the most important contribution to this paper was the summary of Victoria's Early Cretaceous invertebrates conducted by Sarah. Some of you will be aware that the vast majority of these invertebrates were described in a single paper, published in 1986, by Peter Jell and Peter Duncan. However, I had heard from various sources that much of this work needed to be revised. Although I was aware of several revisions that had been conducted by other researchers on various components of the fauna, I was stunned by the quality and scope of Sarah's summaries. She covered each invertebrate group so comprehensively that our paper will no doubt become the first port of call for any future researchers interested in Victoria's Cretaceous invertebrates. Her contribution was, in my eyes, so valuable that I decided that she had been an

Image: S Poropat, Museums Victoria

The flea Tarwinia australis *holotype NMV P26202*

Image: S Poropat, Museums Victoria

Leptolepis crassicauda *Hall 1900 holotype NMV P13475*

equal contributor to the paper. And on a personal note, to be able to write a paper with Sarah was a privilege — I shared an office with her at Monash during the first year of my PhD (the last year of hers), and had always hoped we would be able to write a paper together. This is it! Hopefully there will be more to come…

No article of this nature would be complete without high quality images. From the outset, my intention was to include, at the very least, illustrations of all of the important vertebrate and invertebrate specimens. Anne-Marie and Barbara were able to provide images of the important plant and palynomorph specimens, and Tom encouraged the use of Peter Trusler's magnificent mammal jaw illustrations. Unfortunately, Sarah did not have photos of many of the Cretaceous invertebrates and, given that she is based in Perth, she was not in a position to acquire the photos. In order to turn my intent into a reality, I spent several days at Melbourne Museum, ably aided by Tim Ziegler and Rolf Schmidt, photographing dozens of fossils.

The most amazing specimens that I photographed were the insects, fish and feathers from Koonwarra. I chose to capture images only of the type specimens of the named species, as well as a few important unnamed specimens, because to photograph every specimen in the collection would take months. There are thousands of Koonwarra invertebrates, and hundreds of fish and plants, at Melbourne Museum.

In many ways, it was the historically important specimens that I had read about, yet never seen, that were some of the most awe-inspiring to handle, gaze upon, and photograph. Prominent among these were:

1. The first Mesozoic vertebrate specimen ever found in Victoria — the tail of a fish named *Leptolepis crassicauda*, found near Casterton in 1886;
2. The first Mesozoic vertebrate ever named from Victoria — the bony fish *Psilichthys selwyni*, named in 1900;
3. The first Mesozoic animal fossil ever found in Victoria — a bivalve found near Coleraine by Edmund Dacomb in 1859;
4. The first Mesozoic lungfish fossil ever found in Victoria — William Hamilton Ferguson's *Ceratodus avus* (= *Archaeoceratodus*), discovered near Eagles Nest in 1903; and
5. Two fossils found in drill cores near Kirrak — a lungfish scale found in 1912, and a fish tail.

One specimen I intended to photograph was Australia's only Cretaceous horseshoe crab — *Victalimulus mcqueeni* — but Frank Holmes had already done that. Furthermore, many of the fossil vertebrates that I wanted to photograph were on display, meaning that I could not photograph them. However, almost all had already been photographed by Steve Morton, Jon Augier and Francesco Coffa, and I could not hope to do a better job than them.

Despite the fact that, as I write this, the review is not yet complete, it is certainly taking shape. Collectively we have written over 40,000 words, cited almost 600 scientific (and a few non-technical) publications, and assembled 15 figures depicting all of the most important fossils found in Victorian Cretaceous rocks to date. We hope that this paper will be an indispensable source of information for many years to come.

Finally, we are dedicating this paper to the memory of David Pickering. We can only hope it is an adequate tribute to an amazing man.

Image: F Holmes, Museums Victoria

Victalimulus mcqueeni *holotype NMV P22410–3. Scale 1 cm*


Image courtesy of Museums Victoria

JUST ENOUGH!

BY TOM RICH

About mid 2015, Martin Lawrence of Balwyn, Victoria contacted David Pickering. Accompanied by his colleague Keith Hayton, Martin had been working his way along Milanesia Beach when he spotted a block of rock with some footprints on it and wondered if Dave would be interested. Dave certainly was, for two reasons. Firstly, a block with dinosaur footprints on it had been collected from Milanesia Beach a few years earlier. The footprints had been analysed and described by Tony Martin, of Emory University. Secondly, unlike that first block, two of the four prints on it were not depressions but somewhat raised and, unlike the surrounding rock, red in colour. In these two respects it resembled a single fossil footprint (ichnite) that had been collected on the shore platform at the base of nearby Knowledge Creek in 1980. But in this instance there were four of them, quite likely to have been made in sequence by a single individual. Tony Martin suggested, based on images supplied by Martin Lawrence, that the footprints were those of a theropod (carnivorous) dinosaur. This specimen seemed to be highly desirable as a display item at Museums Victoria — the next thing to do was to collect it.

Initially, that was planned for October 2016, but then the rains came. Unsealed tracks in the Otways, including the one into Milanesia Beach, became impassable.


Image: R Zugaro, Museums Victoria

The block with red footprints of a small dinosaur


Image: R Zugaro, Museums Victoria

Levering out the block with pinch bars

The next opportunity for an attempt to extract the block was 20 February 2017. In the meantime, Gary Summers of the Apollo Bay office of Parks Victoria and I devised a plan to retrieve the block. Fortunately, in addition to Martin Lawrence, Gary had seen the block *in situ*, as had local resident, Morry Schwartz. Together with his neighbour Peter Turnbull, Morry was quite willing to assist our endeavour.

Having been involved in the recovery of the previously collected block (that was subsequently described by Tony), Gary and I planned for contingencies. We decided to include equipment that we not needed for the previous extraction “just in case”, and to invite more people than the planning stage had deemed necessary. We felt that it was better to have more than sufficient than fail to recover the block because something critical was not present.

The day before the planned extraction, Morry Schwartz inspected the block and found it well exposed. Somewhat to our dismay, when we arrived the following day, the block was half buried by large and small rocks, sand and clay. Using a pick, mattock and two pinch bars, it took more than a hour to free the block from the surrounding mullock. Despite ending up on a pedestal, the block still could not be moved. The underside had to be further cleared of mullock and two pinch bars used simultaneously to shift it ever so slightly. Once the block was free from the underlying mullock, it proved much too massive for six people to pick up or even drag. Using a pinch bar with a point at one end and bevelled at the other, Mike Cleeland chipped away the claystone that was adhering to the bottom of the block. While that reduced the mass of the block somewhat, it was still not enough to make it possible for those present to shift it.

At this point, our contingency plan was reluctantly put into effect — splitting the block along a plane about half

Image: R Zugaro, Museums Victoria

Tom Rich drilling holes in the block

way between the base and the surface on which the footprints were present. Because the block was bedded in a series of layers parallel to the surface where the footprints were located, we thought that it was highly likely (but not certain) that such a split would follow a plane parallel to that surface. We knew, however, that hidden vertical cracks might be present in the block, and we were worried that our attempts to split it might cause it to break into multiple pieces along these cracks. We would have preferred to avoid this risk and retrieve it in its entirety, but without any means of lifting the heavy block, we had no choice but to split it.

To do this, we drilled a series of 25 millimetre diameter holes along a bedding plane about half way between the base and the top of the block. Once that was done, we employed a very simple device that has been used for millennia in quarry work — plug-and-feathers. A central wedge of hardened steel is the plug. A piece of soft steel called a feather is placed on each side of the plug. The cross-section of the plug with its two surrounding feathers is circular. As the plug is driven inward between the two feathers, they exert an outward force. Combining ten of these in a row and gradually tightening them by striking successive plugs, moving back and forth across the line of plugs-and-feathers, greater and greater force was applied to the block along a single bedding plane. The sound of each strike of a plug gets higher and higher as the force exerted on the rock increases until suddenly the sound dulls, as the rock splits.

Image: M Cleeland

Tom Rich hammering the plug-and-feathers

Once the split had occurred, we were relieved to see that the block had only failed along the desired plane. The sought-after part at the top was in one piece.

Having reduced the mass by about one half, the rock with the fossil footprints on it could still barely be moved. Gary then showed the others how to pull a rope with their knees rather than their backs. At this point another vital piece of gear came into play. This was a simple steel framework provided by John Wilkins. After much effort, the block was placed on the steel framework. We placed a red coat over the footprints to protect them and lashed the block to the frame with ropes.

Then began the challenge of moving the frame across the boulder field towards the smooth, sandy beach, where a quad bike with a trailer was waiting to receive it.

Gary had the foresight to have with him a number of heavy planks over which the block with its steel frame underneath could be dragged. Progress through the boulder field was a centimetre by centimetre affair. Six people at a time could get access to the ropes to drag the block along. Others picked up the planks already traversed and placed them ahead of the block where they would be needed again.

After reaching the sandy beach, the block was dragged onto the trailer. The quad bike then towed the trailer to a point where a larger vehicle took over.

Contrary to our original expectation, we used every piece of equipment and every person to retrieve this block. But in the end, it was done.

Image: R Zugaro, Museums Victoria

Dragging the block with the footprints on it through a boulder field by passing it over a series of heavy planks.


Image courtesy of Deakin University

SIEVING MUD: LANCEFIELD MEGAFAUNA

BY SANJA VAN HUET

Last November, as part of an ongoing collaboration between Deakin and La Trobe Universities, the Lancefield Megafauna Site north of Melbourne was re-excavated.

Volunteers from as far away as Tasmania (James), Canberra (Jamie) and from a variety of Victorian universities and organisations came to spend a week washing and digging through mud to find the 'goodies' within. Volunteers stayed either in tents or at the basketball stadium near the dig site.

This dig re-established the location of one of the three fossil localities in the area — the Mayne Site. The other sites are the Classic and the South Sites.

Lancefield has a long history of fossil finds. In 1843, James Mayne was digging a well when he discovered the 'fossil bones of a number of animals'. The bones were taken to the Museum in Melbourne (then known as the Mechanics Institute) and identified merely as a large kangaroo.

Further excavation at the time was abandoned due to over-abundant water (not surprising as it was a well).

In 1973, the wonderful Robin Glenie (sadly no longer with us) sunk several auger holes in the swamp, in an area he suspected may have bone. Rob was successful in his search for fossil bone but, as it turned out, his find was not the site of the original well. Rob had found a locality that was different from the original discovery. A team of archaeologists from Sydney and Canberra and Tom Rich from Museums Victoria excavated Rob's site – now referred to as the Classic Site. The findings led to the seminal 1978 paper by Gillespie *et al*. Over 3,000 bones were found from more than 27 species, as well as a hand axe. A C14 date of ~26,000 years led to speculation for the co-existence of humans and megafauna. (This date has now been pushed back to ~60,000 years.)

In 1983, a second site was located during the construction of a dam, and later excavated by Wade Miller from Brigham Young University in Utah, USA. It was called the 'South Site' (although it is east of the Classic Site?!). Many of the specimens that Miller collected are still in the Brigham Young University collection.

In 1991, as part of my Masters research, a third site was rediscovered — the original site located by Mayne in 1843, now called the Mayne Site. It was in this area that the 2016 dig was held.

Under the direction of Archaeologist Jillian Garvey from La Trobe University, volunteers cleared the ground of grass and felt their way through the mud to locate any possible surface cultural material.

It was then up to the palaeontologists to find a site with bone. An excavator removed 30 centimetre layers from five 3x3 metre pits down to a green clay layer at about 1.8 metre depth. This clay marks the bone layer.

One of these pits was dug in an area I excavated in the early 1990s. Bones and teeth from a variety of megafaunal species were brought to the surface and placed in piles (or spits) for volunteers to sort through. Most of the bone was from an extinct giant kangaroo, *Macropus titan*. These bones initiated lots of extra after-


Image: S van Huet

Searching for cultural artefacts


Image: S van Huet

Excavating the spits

Image courtesy of J Fife

James Fife after a hard day's work in the mud

hours digging and sorting. Several crew including Ben Francischelli, Tim Ziegler and Sophie Connor regularly returned after dinner to sort through the mud and wrap any finds in glad wrap (often with a drink in hand).

While the 'archaeos' worked on gathering depositional information from the pit walls, the 'palaeos' washed mud. Syd Green, a local who has been involved with the Lancefield digs since Rob Glenie's time, brought large bathtubs and hoses from the local CFA to pump water from the lake so we could wash the mud from the bones and rock matrix. The washed matrix was bagged for later sorting.

Image: S van Huet

Mud ready to wash

Throughout the dig there was significant media coverage. Newspapers, radio and two television networks reported on the dig and by the end all the volunteers were experts at posing for pictures, chatting with reporters and showing the site to visitors. On the second last open day we had ~800 visitors to the site. Every volunteer was roped in to ensure no one left with unanswered questions (or fell into a pit). Tim Flannery gave a guest talk at the local hall as part of the Lancefield Megafauna Festival. The next day the excavator carefully refilled the pits, spit by spit, and we packed up and left the dig site.

A huge, huge thank you to the Lancefield Park Committee of Management, Syd Green, Rebecca Ballard and Cameron McKenzie (my site managers), Dawn and John Dickinson who catered for my fabulous volunteers, the people who generously donated to the crowd funding appeal, Bob and his excavator, Jillian Garvey and her team from La Trobe University and, most of all, my patient, hard-working volunteers.

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Image: S van Huet

Ben Franceschelli watches Jess Bruce and James Fife wash mud

WILDLIFE OF GONDWANA

Image courtesy of P Vickers-Rich

BY JADE KOEKOE AND PAT VICKERS-RICH

Ever wanted to travel around the world? Well, the Wildlife of Gondwana exhibition certainly has! After 20 years of captivating and educating people about the many millions of years of Australia's unique fauna and flora, this exhibition will find its final home in the Australian Age of Dinosaurs (AAOD) Museum of Natural History in Winton, Queensland.

The exhibition was an original vision of Pat Vickers-Rich and a major section of it features our polar dinosaurs from the Victorian coastline. It also contains more than 300 specimens of fossils, rocks and art works by Peter Trusler that depict the animals in their ancient lost-world environments. As specimens range in age from the Precambrian to the Cainozoic, the exhibition covers much of the history of the southern supercontinent Gondwana.

Most recently the exhibition visited the National Wool Museum in Geelong, where it was on display for over two years. When it was installed, Cr Andy Richards, the City of Greater Geelong's portfolio holder for Arts and Culture, said "Wildlife of Gondwana reveals bizarre, unusual looking dinosaurs virtually unknown to most Australians."

After an exciting life of travel to places like Singapore, Japan, Taiwan, around Australia and the USA, Wildlife of Gondwana now rests in storage. It awaits the construction of its final home in the AAOD Museum. According to their Stage Three Concept Plan "upon completion, [the AAOD Museum] will deliver international quality exhibitions and public visitor experiences of national importance". They also express that the "core principle for the design for every exhibit [in their new Museum] is to ensure that explanations, illustrations and evidence mesh and are scientifically authentic". However, the AAOD admit that they have yet to acquire an adequate collection of fossils representing the diverse geological time periods exposed around Australia. Their commitment

Image courtesy of P Vickers-Rich

Part of the Wildlife of Gondwana exhibit

to expanding current collections, research and scientific interpretation, makes the AAOD Museum the perfect place for Pat Vickers-Rich to donate the Wildlife of Gondwana specimens, where it will become a permanent exhibition.

While Wildlife of Gondwana will no longer travel in its current iteration, parts of it will continue its nomadic tradition. In 2018, a small temporary exhibition featuring Victorian polar dinosaurs may be installed in the Kronosaurus Korner Marine Fossil Museum during their anniversary celebrations. Casts of our Victorian polar dinosaurs may also temporarily end up at the Singapore Science Centre alongside a new set of dinosaurs from Thailand, as well as in a new museum being constructed in Sarawak as a cooperative venture with the Swinburne University of Technology campus in Kuching. Swinburne University has offered Pat a part time position (which will allow her to continue to support the polar dinosaurs project) — this means many of the activities of PrimeSCI! now have a home and funding.

If you are ever in Winton, Queensland, make sure you visit the AAOD Museum to see the Wildlife of Gondwana exhibition in its future permanent home.

Image courtesy of AAOD

AAOD Stage Three Concept

FIELD CREWS

FLAT ROCKS ROOKIES' DAY FIELD CREW
21 NOVEMBER 2016

Rookies
Karina Bradley
Ross Bradley
Ashley Butler
Megan Campbell
Tess Devine-Hercus
Robert Duck
Astrid Dunkley
Claire Garrick
Amy Grimmer
Timothy Hain
Victoria Kaloudis
Krystal Kunig
Evan Leed
Kylie McGanniskin
Kevin Orrman-Rossiter
Sharon Orrman-Rossiter
Tash Pace
Louise Possee
Brittannie Probst
Gemma Reid
Eily Schultz
Allan Smith
Ellie Urrutia-Bernhard

Mentors
Jeremy Baker Smith
Jess Bruce
Ali Calvey
Mike Cleeland
Cate Cousland
Alison Dorman
Eve Eidelson
Alan Evered
Nicole Evered
Gerry Kool
Lesley Kool
Miklos Lipcsey
Sharyn Madder
Harry Osmond
Doris Seegets-Villiers
Callum Simpson
Andrew Stocker
Nova Taylor
Jacqui Tumney
Mary Walters
Wendy White
Corrie Williams
Wendy White
John Wilkins
Dean Wright

ROOKIES' DAY CREW

L-R Standing: John Wilkins, Allan Smith, Callum Simpson, Robert Duck, Jess Bruce, Alison Dorman, Amy Grimmer, Ashley Butler, Nova Taylor, Eve Eidelson, Louise Possee, Jeremy Baker Smith, Sharon Orrman-Rossiter, Tess Devine-Hercus, Claire Garrick, Kevin Orrman-Rossiter, Timothy Hain, Brittannie Probst, Jasmine, Tash Pace, Gemma Reid, Wendy White, Megan Campbell, Victoria Kaloudis, Nicole Evered, Evan Leed, Karina Bradley, Sharyn Madder, Jacqui Tumney, Andrew Stocker, Corrie Williams, Gerry Kool, Alan Evered, Ross Bradley, Dean Wright
Kneeling/Seated: Kylie McGanniskin, Astrid Dunkley, Ali Calvey, Miklos Lipcsey, Ellie Urrutia-Bernhard, Lesley Kool, Mary Walters, Doris Seegets-Villiers

ERIC THE RED WEST DIG FIELD CREW
4 – 25 FEBRUARY 2017

Elaine Anderson
Darren Bellingham
Melissa Boehm
Christina Boundy
Karina Bradley
Ross Bradley
Jess Bruce
Ashley Butler
Ali Calvey
Megan Campbell
Genevieve Cini
Mike Cleeland
Pip Cleeland
Peggy Cole
Cate Cousland
Amber Craig
Tess Devine-Hercus
Robert Duck
Astrid Dunkley
Eve Eidelson
James Fife
Bridget Firth
Ben Francischelli
Claire Garrick
Amy Grimmer
Timothy Hain
Caitlin Jay
Victoria Kaloudis
Fotini Karakitsos
Jade Koekoe
Lesley Kool
Krystal Kunig
Evan Leed
Miklos Lipcsey
Melanie Mackenzie
Kylie McGanniskin
Sharyn Madder
Dani Measday
Lisa Nink
Kevin Orrman-Rossiter
Sharon Orrman-Rossiter
Tash Pace
Stephen Poropat
Gemma Reid
Tom Rich
James Rule
Eily Schultz
Callum Simpson
Allan Smith
John Swinkels
Alan Tait
Nova Taylor
Wendy Turner
Ellie Urrutia-Bernhard
Sanja van Huet
Johanna van Klaveren
Nick van Klaveren
Mary Walters
Astrid Werner
Wendy White
John Wilkins
Corrie Williams
Dean Wright

ERIC THE RED WEST WEEK 1 CREW

L-R Standing: Lisa Nink, Jade Koekoe, Ben Francischelli, Miklos Lipcsey, Callum Simpson
Back Row Seated: Stephen Poropat, Ashley Butler, Eily Schultz, Tess Devine-Hercus, Timothy Hain, Robert Duck
Middle Row Seated: Alan Tait, Nick van Klaveren, Corrie Williams, Genevieve Cini, Caitlin Jay, Amber Craig, Elaine Anderson, Even Leed, Mike Cleeland
L-R Seated: Ali Calvey, Bridget Firth, Eve Eidelson, Claire Garrick, Victoria Kaloudis, Astrid Werner
Front: Mary Walters

ERIC THE RED WEST WEEK 2 CREW

L-R Standing: Nova Taylor, John Swinkels, Mary Walters, Nick van Klaveren, John Wilkins, Stephen Poropat, Wendy White
Back Row Seated: Callum Simpson, Christina Boundy, Amy Grimmer, Jess Bruce, Melanie Mackenzie, Dani Measday, Ali Calvey
Front Row Seated: Ellie Urrutia-Bernard, Corrie Williams, Allan Smith, Kylie McGanniskin, Sharyn Madder, Mike Cleeland

ERIC THE RED WEST WEEK 3 CREW

Image: R Zugaro, Museums Victoria

L-R Standing: Bec Carland, Wendy Turner, Nick van Klaveren, James Fife, Tash Pace, Ali Calvey, Elke Barczak, Gemma Reid, Kevin Orrman-Rossiter, Darren Bellingham, Melissa Boehm, Sharon Orrman-Rossiter, Mike Cleeland, Mary Walters, James Rule, Wendy White, Alan Tait
Seated: Fotini Karakitsos, Stephen Poropat, Astrid Dunkley, Karina Bradley, Ross Bradley