



## 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



The flea *Tarwinia australis* holotype NMV P26202

Image: S Poropat, Museums Victoria



Image: S Parapat, 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.

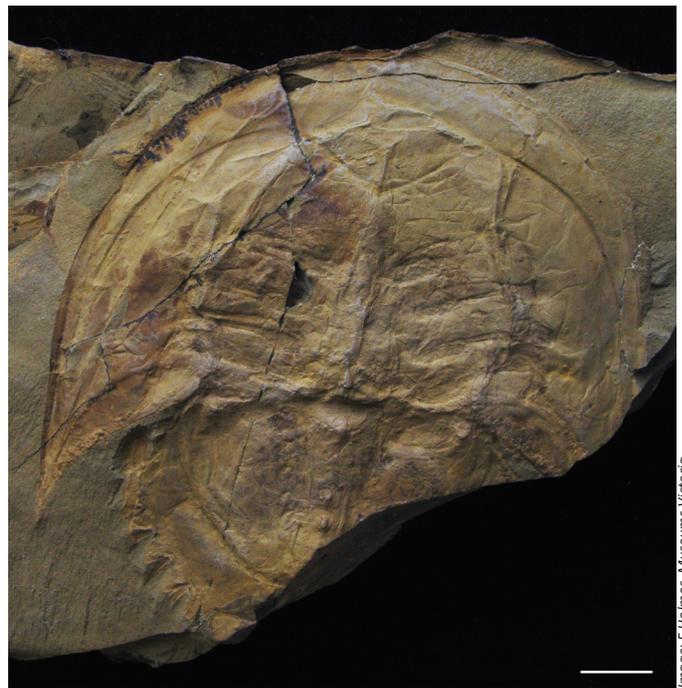


Image: F Holmes, Museums Victoria

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