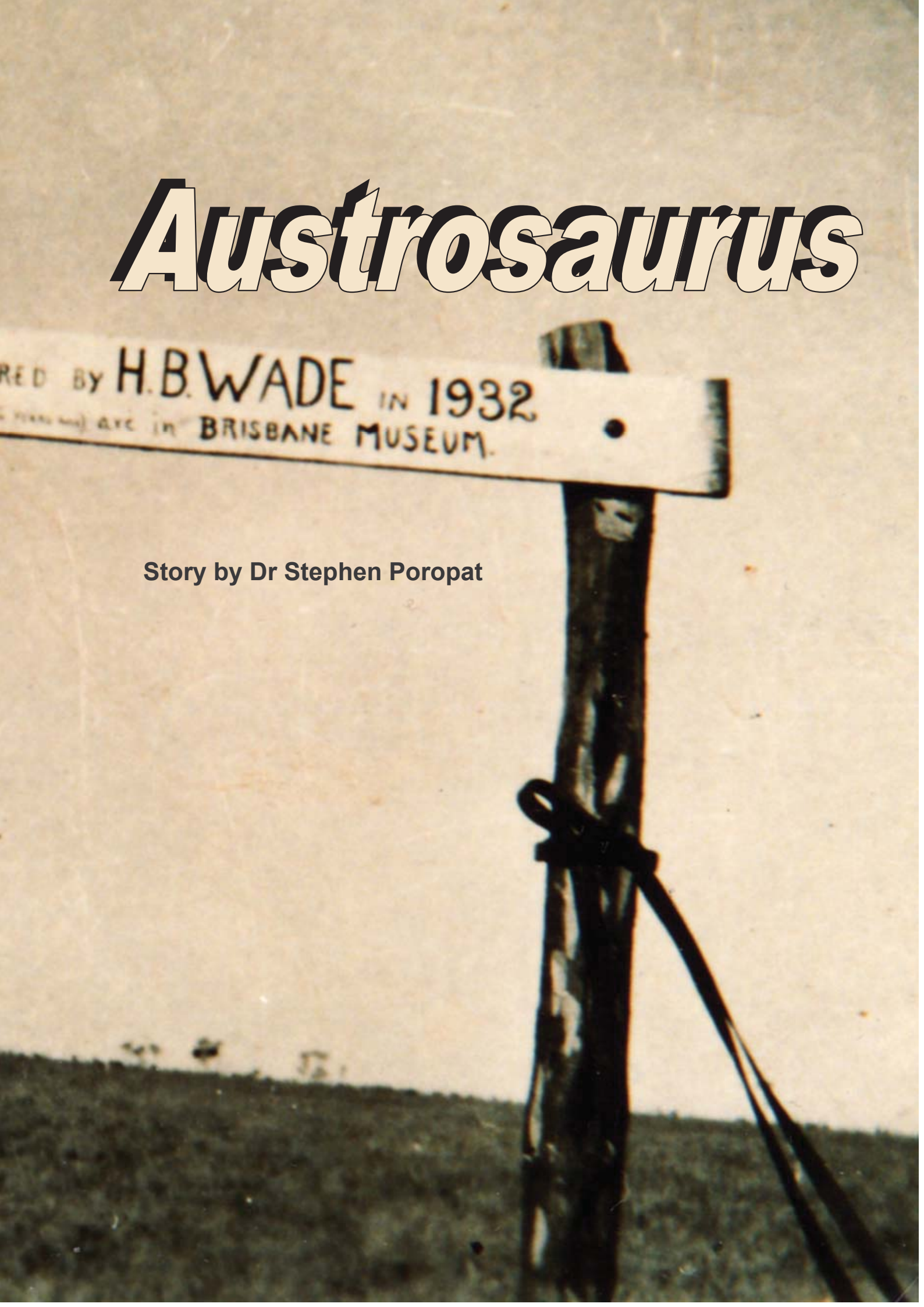
Eight Decades of

The discovery and rediscovery of Queensland's first Cretaceous dinosaur

In 1932, Henry Burgoyne (Goyne) Wade discovered the fossilised remains of Australia's first known Cretaceous sauropod dinosaur on Clutha Station, north-west of Richmond. This sign was erected at the site of his discovery in 1933, shortly before the sale of Clutha and Wade's subsequent departure from the station. Although the sign has long since gone, the hardy gidgee posts remained at the site eighty years later. The reins of Wade's horse can be seen tied to the post on the right. Photo H. B. Wade, courtesy Peter Wade

Austrosaurus



Story by Dr Stephen Poropat

One hundred and two million years ago, at a time when much of Australia was covered by water, a bloated sauropod carcass floated down a watercourse and out to sea. As the corpse putrefied, a portion of the body broke away and sank to the seafloor where it was soon buried by mud. Over a period of several million years, the incoming sediments of rivers and streams deposited hundreds of metres of silt above the buried remains, forcing the sea to recede to the north. The seafloor was replaced by a floodplain, the mud encasing the bones became mudstone and the bones were fossilised. When the deposition of sediments ceased, the slow process of weathering began. Over tens of millions of years, the vast depth of sediment gradually eroded away, until the mudstone layers deposited on the seafloor over 100 million years ago were once again at the mercy of the elements. It was only a matter of time before the bony treasure within them would follow!

Fast forward to 1932. A young Donald Bradman had scored an unbeaten 299 runs at the Adelaide Oval against South Africa in January. After eight years' construction, the Sydney Harbour Bridge was finally opened in March and the legendary racehorse Phar Lap, who provided so much joy for Australians affected by the Great Depression, had passed away in San Francisco in April. And on a fine August afternoon, on a property in north-west Queensland, a flock of sheep had just passed through a gate between two paddocks in a disorderly fashion.

You might wonder why a mob of woolly ruminants would ever be mentioned in the same breath as such national icons as Bradman, the Harbour Bridge and Phar Lap, but it was not the sheep or their movement that was significant. It was the fact that they were being mustered by the Station Overseer, Mr Henry Burgoyne "Goyne" Wade.

Wade had recently celebrated his 30th birthday, and was probably enjoying the current spell of cool weather as he counted the sheep through the gate into Whitewood Paddock on Clutha Station, 80 km north-west of the town of Richmond. Whitewood Paddock's terrain, and that of the surrounding paddocks, was fairly typical for north-west Queensland: black soil plains sparsely covered by tussocks of Mitchell grass, with small whitewood trees scattered along the ridgelines. With the last of the sheep through the gate, Wade set off across the open country for home but he hadn't ridden far when a small mound of rocks caught his eye. With no other rocks anywhere around, the mound sparked his curiosity and, dismounting from his horse, Wade was amazed to discover that they were large pieces of fossilised bone.

Upon returning to the station homestead, Wade told the Station Manager, Mr Harley McKillop, about his find. McKillop knew that his younger brother, Dr Martin Joseph "Joe" McKillop who lived in Brisbane, would be extremely interested in the fossil discovery, so when Dr McKillop visited Clutha soon after, they wasted no time in persuading Wade to take them to the site. Their visit revealed a large number of bone fragments exposed over a relatively small area and it was obvious that some of these pieces belonged to very large bones. Raking and digging through the hard-crusted black soil and Mitchell grass tussocks, Wade and the McKillops retrieved more fragments from just below the surface and, with the ground becoming too hard to dig any deeper, they gathered the fossils and took them back to the homestead.

Dr McKillop's interest in the bones intensified once he had inspected them, inspiring him to illustrate several of the fragments. One of his sketches was duly sent to the Director of the Queensland Museum, Heber Longman, in Brisbane. Upon seeing the sketches Longman's interest was similarly aroused, prompting him to ask Dr McKillop whether it might be possible for the bones to be delivered to Brisbane. Fortunately it was possible and Wade packed the specimens into two wooden crates, which then made the long trip to Brisbane by train. Whilst the specimens were in transit, Harley McKillop sent a letter to Longman stating, "We dug up what was showing on the surface, but did not dig down very far, so it would appear that the balance of the skeleton is some distance under the ground." He also

Clutha Station as it looked in the early 1930s (above). The bare, open horizon beyond the buildings is typical of north-west Queensland's black soil downs, and fossilised remains of creatures from an inland sea that covered this area around 102 million years ago are relatively common. The discovery of dinosaur fossils in this marine deposit by Goyne Wade (left) in 1932 was the first of its kind in the area and was enthusiastically embraced by Dr Joe McKillop (right), younger brother of Clutha's Manager Harley McKillop. Dr McKillop, who visited the station in August 1932, sketched the fossils and brought them to the attention of the Queensland Museum later that year.

Photos above courtesy Peter and Richard Wade

Photo right courtesy Elizabeth Cleary

MARCH 15, 1933. THE BRISBANE COURIER.

FOSSIL OF NEW TYPE OF GIANT DINOSAUR DISCOVERED IN QUEENSLAND.

On the left is a map of a portion of Clutha Station, showing the spot, marked by an X, in Whitewood paddock where the remains were found of six immense vertebrae of a new type of giant Dinosaur, which Mr. Heber Longman (Director of the Queensland Museum) has named Austrosaurus mckillopi. In the centre is shown a fragment of the vertebrae, with a vertebrae of a modern crocodile alongside for comparison. On the right is a reproduction of a painting in the Queensland Museum, by Douglas Annand, representing Giant Herbivorous Quadrupedal. Dinosaur Austrosaurus mckillopi was of this type.

Source: www.trove.nla.gov.au

On 14 March 1933, Queensland Museum Director Heber Longman (left) published his description of the sauropod bones from Clutha, naming the new species Austrosaurus mckillopi in recognition of Dr McKillop. The announcement was well received by the press, and included an article (above) published in the Brisbane Courier the following day. A 1982 restoration by Mark Hallett for The New Dinosaur Dictionary, depicts Austrosaurus as a brachiosaur (below). However, Austrosaurus' placement on the sauropod family tree is unclear - all that can be said with any certainty is that it is a titanosauriform. Whether or not it was closely related to Wintonotitan or Diamantinasaurus, both of which are also titanosauriforms, remains unknown.

Photo courtesy Queensland Museum

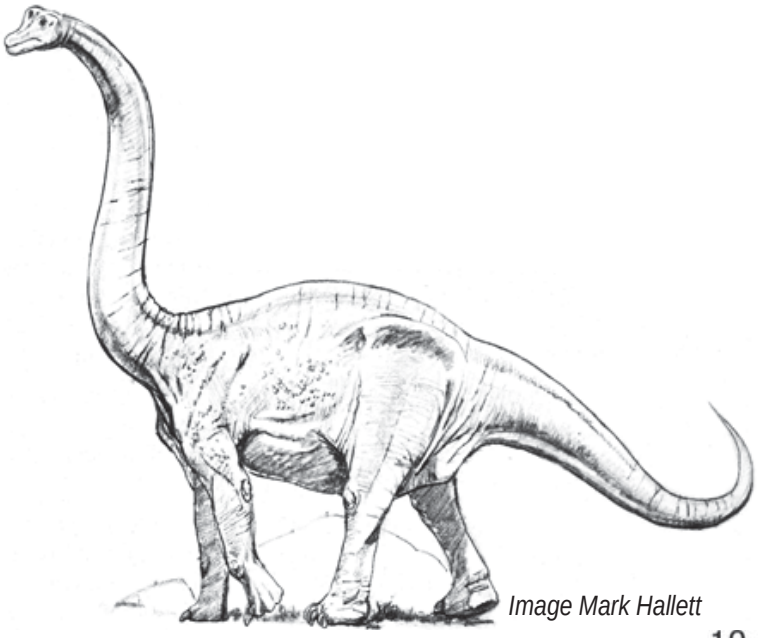
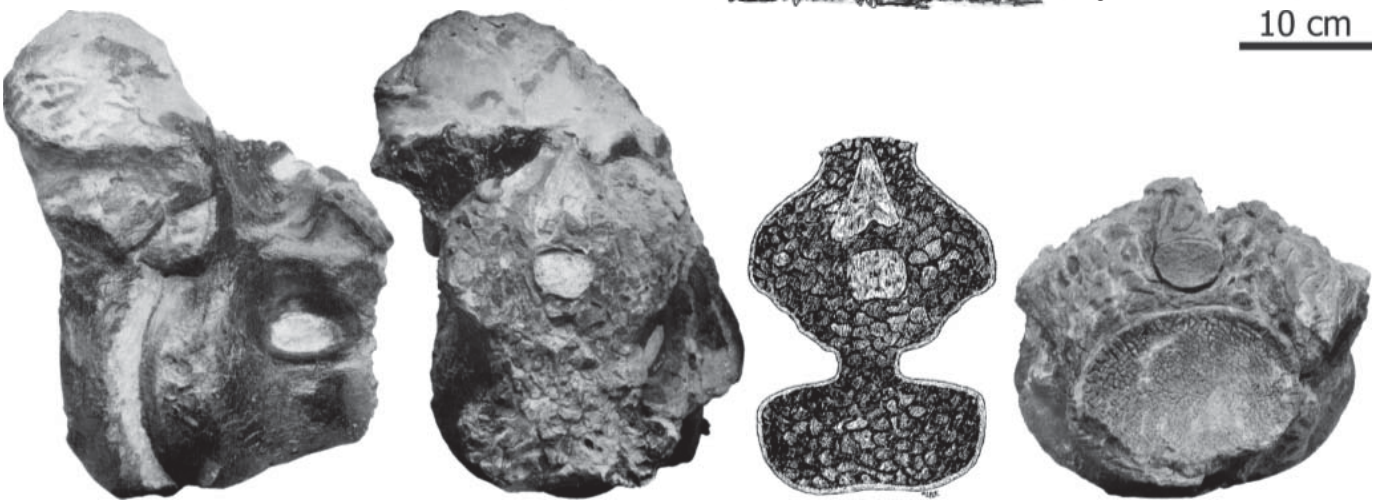


Image Mark Hallett



Longman only described three large portions of vertebra in his 1933 Austrosaurus paper, two of which are depicted in the series (above). The hand-drawn sketch (second from right) is an original sketch by Dr McKillop and depicts the specimen (second from left), also shown in lateral view (far left). The small, granular shapes in McKillop's sketch detail the hollow, cancellous texture of sauropod vertebrae, in this case infilled with crystalline calcite. Images courtesy Queensland Museum

Station Overseer Goyne Wade feeds the poddy lambs at Clutha Station (right). An inquisitive nature and a strong interest in natural history led to the young bushman's discovery of huge fossil bones when mustering sheep at Clutha in 1932. The bone fragments, which represented several articulated vertebrae, were later packed and shipped to the Queensland Museum.
Photo courtesy Peter and Richard Wade

made a request of Longman: "If the discovery is of any importance it could be associated with both names – Wade & McKillop."

Science and the Bush

The discovery of fossils in the Richmond Shire was not unprecedented. Many fossils of marine organisms, such as ammonites, bivalves, fish and even bones from marine reptiles, had been found since the middle of the nineteenth century. However, fossil reptile discoveries in north-west Queensland at that time were limited to fragmentary turtle, ichthyosaur and plesiosaur remains, including the famous marine reptile *Kronosaurus* - formally described in 1924 on a single fragment of jawbone containing six teeth. The rarity of fossil reptile remains from Australia therefore imbued each and every discovery with incredible significance, and the bone fragments that Wade had found were huge and heavy. They appeared to have come from an enormous reptile!

The bones from Clutha arrived at Queensland Museum on 9 January 1933 and, three days after receiving the specimens, Longman wrote back to Harley McKillop stating that he was "certain that they represent an entirely new type of Cretaceous reptile for Australia"! Prior to receiving the bones Longman had expected them to have come from a marine reptile since other fossils from near Richmond provided clear evidence of past submergence by an inland sea. However, within two weeks, Longman had correctly determined that the bones derived not from a marine reptile, but a terrestrial dinosaur. On 14 March 1933, Longman published his description of the specimens in *Memoirs of the Queensland Museum* and named the new dinosaur *Austrosaurus mckillopi* - 'Dr McKillop's southern reptile'. He also made sure to relate the nature of the discovery of the specimens by acknowledging Goyne Wade and Harley McKillop, as the latter had requested. The discovery was reported in several newspapers across Australia, with an article in the *Brisbane Courier* showing a map of Clutha Station, a photograph of one of the vertebrae (compared with one from a crocodile) and a life restoration of a sauropod that had been modelled on the North American *Camarasaurus*.

Despite the best efforts of Wade and the McKillops, Longman had very little material of *Austrosaurus* to work with. Longman only ever described three large portions of vertebra but the March 1933 *Brisbane Courier* article mentions six, suggesting that more specimens than were described by Longman had already reached Brisbane by the time his scientific analysis had been published. Despite the fragmentary state of the material, Longman determined that *Austrosaurus* was more specialised than the only other Australian sauropod known at the time, the Jurassic *Rhoetosaurus brownei*, which he had named in 1926. On the basis of the specimens at hand, Longman calculated that *Austrosaurus* must have been approximately 15 metres long, an estimate still considered to be quite accurate.

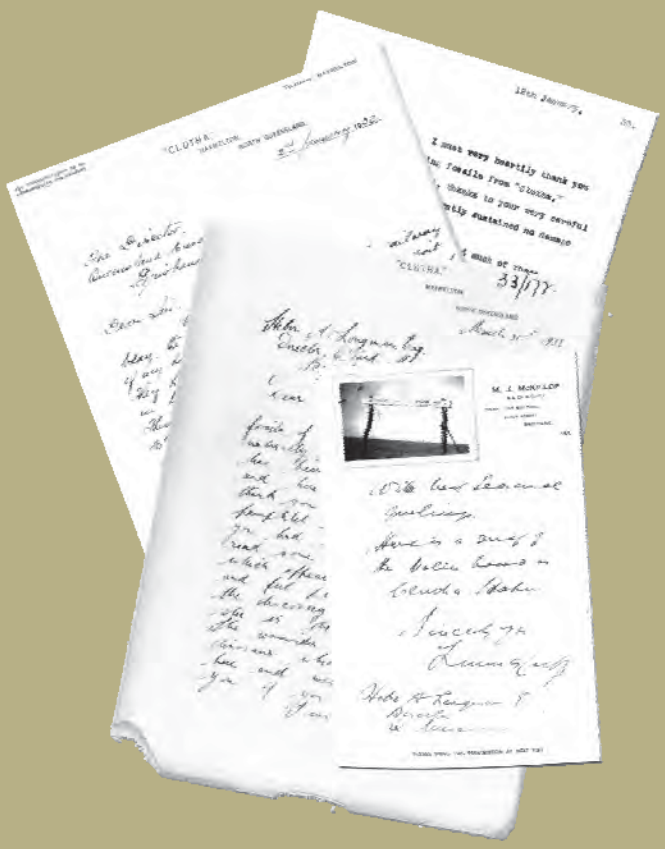
In May 1933, Harley McKillop informed Longman that two petrol cases of additional specimens were packed ready to send, and these duly arrived at the Queensland Museum the following month. A few days prior to the arrival of the cases, Longman had written to Harley McKillop stating, "I have just heard from a German scientist who urges me to have the whole area excavated." This can only be a reference to Friedrich von Huene, one of the foremost palaeontologists at the time and a man with whom Longman frequently corresponded. Indeed, in a 1950 article in *The Courier Mail*, Longman stated that a "distinguished scientist from Tübingen" (von Huene's place of residence) had found *Austrosaurus* to be "of the highest interest". Von Huene's interest in the specimen was understandable: he had published detailed descriptions of Cretaceous sauropods from both Argentina and India and was intensely interested in reptile palaeontology and evolution.

In June 1933, Clutha Station was sold, effectively terminating the employment of McKillop and Wade and eliminating any opportunity for them to excavate the site further. Unfortunately, this turn of events also dashed Longman's hopes of visiting Clutha whilst they were still working

The Men Behind the Discovery

Henry Burgoyne "Goyne" Wade (26/6/1902–29/7/1970), Overseer of Clutha Station and discoverer of *Austrosaurus mckillopi*. Wade was born in Sydney and raised by his maternal grandparents. From 1919, Wade worked on Yanborra Station (west-northwest of Richmond, Queensland) for his father until the sale of the property in 1926. Harley McKillop offered Wade a job as overseer of Clutha Station in 1926, and Wade worked there until 1933 when it too was sold. In 1934, McKillop informed Wade that two properties, both situated southeast of Saint George, Queensland, were up for sale. Wade purchased one of these, named Cheriton Station, and lived there until his death in 1970. He married Rita Enid Trubody in 1936 and had four children (John, Richard, Peter and Julie-Anne). He was a happy, outgoing and inquisitive man, an accomplished poet, an excellent shot, and a talented singer and dancer.
Image courtesy Peter and Richard Wade

Harley John "Bones" McKillop (1888–4/7/1967), manager of Clutha Station. Harley was born in Dubbo, the third eldest of six children born to Lachlan Peter McKillop and Mary Florence McKillop. Harley worked on Buddah Station near Narromine (New South Wales), and Strathdarr Station near Longreach before enlisting as a private with the Fifth Light Horse Regiment in 1916. After the War he returned to Australia, moving to Clutha Station in 1920. He married Euphrosyne Mary Grieve in the 1920s, and they lived together on Clutha until the sale of the property in June 1933. In November that year they purchased Carinya Station in the Gradule district, where they lived and worked before retiring to Brisbane. Harley enjoyed the races and always retained an interest in rural issues. He was a true Australian "bushie" in every respect.
Image courtesy Elizabeth Cleary



Dr Martin Joseph "Joe" McKillop (9/8/1893–21/10/1980), the man after whom *Austrosaurus mckillopi* was named by Heber Longman in 1933. Joe was born in Bathurst but later moved with his parents and siblings to Sydney, where he studied medicine. Joe and his older brother, Dr Lachlan Martin McKillop, had a joint practice in Brisbane for many years. During World War II Joe and Lachlan both served as medical officers, with the rank of Major, at Greenslopes Hospital, Brisbane. This was a newly created facility set up to treat the influx of wounded soldiers airlifted to Brisbane from conflicts in New Guinea and the Coral Sea. Joe married Alice Mary Scanlan in 1944, and they had four daughters: Kathryn, Elizabeth, and Julia and Margaret (twins who died soon after birth). After Lachlan's death in 1955, Joe continued in practice until his retirement in 1970, having served his profession honourably for fifty years. Outside his profession, Joe had many interests, including automobiles and electronics, and was talented as an artist having had published, as a young man, several sketches in *The Bulletin* magazine.
Image courtesy Elizabeth Cleary

Dear Sir,
We intend delivering at the railway today the fossils dug up here during the visit of my brother, Dr M. J. McKillop in August last. They have been carefully packed and are in two cases. These petrified bones were first discovered by Mr H. B. Wade, who is overseer here, about two years ago, and when my brother was here, we dug up what was showing on the surface, but did not dig down very far, so it would appear that the balance of the skeleton is some distance under the ground – My wife and I have been associated with the recovery of the bones, but any credit for the find belongs to Mr Wade. They appear to belong to a very large animal, and we are all most interested, and feel that they are really something out of the box.
"Clutha" is all open downs country and is north of the Flinders River and the homestead is 34 miles from Maxwelton Q.N.R. There are many outcrops of sandstone scattered about the downs and the country is all black soil without much natural shade other than Coolibah along the creeks. We have found other fossilised remains here but they appear to have belonged to the fish family.
I hope that the two cases arrive in good order and will prove to be of some value to the Museum, and if the discovery is of any importance it could be associated with both names – Wade & McKillop.

Yours faithfully
H. J. McKillop

Following relocation of the Austrosaurus site, Dr Timothy Holland and Dr Stephen Poropat, along with a small team of volunteers, carried out a surface dig in July 2014 to establish the exact position of Wade's 1932 discovery (top right). The following month, the team returned to the site with a Dingo mini-digger operated by Richmond Shire Council workers (bottom right) to see if further fossil material could be located at depth. Eight rib segments representing three different ribs were found within the black soil profile during the three day dig proving that a comprehensive excavation of the site would be necessary the following year. Fragile bone fragments were covered with a plaster cap and the site filled back in.

Photo Dr Stephen Poropat

Photo Kathrine Thompson

there and no subsequent correspondence with the new owners appears to have ever been made. When Wade left Clutha in 1933, the only evidence of his discovery was a sign, supported by two gidgee (*Acacia*) posts, bearing the words "*Austrosaurus mckillopi* discovered by H. B. Wade in 1932; fossils of the giant marine animal (which lived from 100–200 million years ago) are in Brisbane Museum."

In the thirty years following the discovery of *Austrosaurus*, little additional evidence of Australian dinosaurs was found. Triassic and Jurassic footprints were discovered in collieries near Brisbane, Jurassic footprints were identified in a mine near Mount Morgan and Cretaceous footprints were reported from near Broome in Western Australia, but it was not until the 1950s that additional dinosaur skeletal remains were recovered in Australia. Longman's successor at the Queensland Museum, Dr Alan Bartholomai, was responsible for collecting several specimens in a short period of time including bones from a sauropod just west of Winton in 1959, an ornithopod near Muttaburra in 1963 (later named *Muttaburrasaurus langdoni*) and an ankylosaur near Roma in 1964 (later named *Minmi paravertebra*). These discoveries appear to have reinvigorated interest in Australian dinosaurs and a number of expeditions to central Queensland were mounted by palaeontologists in the 1970s. Dr Mary Wade of the Queensland Museum (no relation to Goyne Wade) collected surface material belonging to several sauropod specimens from the Winton area in 1972 and 1974. These were all tentatively referred to *Austrosaurus* in 1981, although all but one are now considered to represent indeterminate sauropods. The exception, affectionately dubbed "Clancy", is formally known as *Wintonotitan wattsi*.

In 1976 and 1977, Mary Wade and Dr Tony Thulborn of the University of Queensland famously spearheaded excavation of the dinosaur stampede at Lark Quarry. Immediately prior to their first Lark Quarry excavation in June 1976, Mary and Tony visited the *Austrosaurus* site with the aim of discovering more bones. Unfortunately, in Tony's own words, "[we] went on a quixotic quest for dinosaurs and scratched around at the *Austrosaurus* site without success, before we gave up in despair…"

Following the announcement of the dinosaur stampede at Lark Quarry in 1979, interest in Australian dinosaurs appears to have intensified further, probably also spurred on by the "Dinosaur Renaissance" of the 1970s

The introduction of a backhoe (left) led to the rapid removal of blacksoil overburden at the Austrosaurus site when the Kronosaurus Korner dig team returned in late-July 2015. A large area was soon cleared to reveal the plaster cap from 2014, with further excavation exposing several large rib bones below (right). Some of these had migrated apart due to the uplifting action of Clutha's blacksoil - an intensely satisfying experience for the team was finding that many of the rib pieces found the previous year were a snap fit back onto these specimens (below)

and 1980s. New Australian dinosaurs, including *Muttaburrasaurus*, *Minmi* and *Leaellynasaura*, were unveiled in the 1980s, and activity both in the field and in Australian museums increased. Regular digs were taking place at Dinosaur Cove in Victoria, and Queensland-based palaeontologists were visiting properties every year to follow up on reports of fossil finds by outback property owners. In the 1990s, a team including Queensland Museum Curator Dr Ralph Molnar visited the *Austrosaurus* site but, like Wade and Thulborn previously, Molnar and his compatriots failed to find any further remains of this sauropod. The *Austrosaurus* site was tentatively considered lost and no further expeditions were mounted.

In the final years of the twentieth century and the early years of the twenty-first century, *Austrosaurus* was discussed only briefly in technical publications by palaeontologists and rarely in popular books on Australian palaeontology. Like Longman before them, palaeontologists who took the time to work on *Austrosaurus* were frustrated by the fragmentary nature of the specimens which prevented the identification of features unique to the animal and therefore precluded rigorous comparison with other sauropod specimens. In the popular book *The Antipodean Ark* (1987), *Austrosaurus* was dubbed an "enigmatic brontosaur" by Tony Thulborn, since it was based only on incomplete bones which yielded little information about its position on the sauropod family tree. In the 1990s, John Long, in his popular books on dinosaurs, devoted more lines of text to the discovery of the *Austrosaurus* specimen than to the nature of the beast. In 2009, the name *Austrosaurus mckillopi* was officially declared a "*nomen dubium*" – a name that could not be used in a meaningful way by palaeontologists. Like the specimens themselves, the name *Austrosaurus* appeared destined to languish in obscurity.

Observations and inspirations!

I have been fascinated by sauropod dinosaurs for as long as I can remember. They embody the public image of what a dinosaur should be: they are huge, ponderous and extinct. Given that sauropod specimens are relatively rare in Australia, it is perhaps unsurprising that *Austrosaurus* was of great interest to me. Its importance lies mainly in its age: it is one of very few Early Cretaceous sauropods ever found in the whole country. In 2002, the Queensland Museum spearheaded palaeontological exploration around the Queensland town of Winton and digs held by the Australian Age of Dinosaurs (AAOD) Museum over the following decade turned up a number of partial sauropod skeletons. However, all of these derived from the Upper Cretaceous Winton Formation making them several million years younger than *Austrosaurus*! This prompted me to wonder, was *Austrosaurus* the ancestor of any of the Winton sauropods, or was it completely unrelated? I knew that the only chance I would ever have of answering questions such as these would depend upon one thing. Finding more specimens of *Austrosaurus* was imperative!

Imagine my delight when, in late 2011, I was employed as a postdoctoral research fellow at Uppsala University in Sweden to conduct research on Australian Cretaceous sauropod dinosaurs. This posting included a Research Associate position with the AAOD Museum, and I soon became closely involved with the dinosaurs of western Queensland. In August 2011, I participated on an AAOD Museum dig for the first time and, as I helped the team uncover a huge sauropod (nicknamed "Dixie"), it became clear that dinosaur digs in the Queensland outback were very different to those that I was used to on Victorian beaches! Foremost among the many differences in excavation styles was the use of heavy earth-moving machinery. The biggest tool used on Victorian digs was a

jackhammer - minuscule in comparison to a front-end loader! The reason for the employment of such machinery became clear to me when I saw how jealously the black soil plains guarded their fossilised treasures from prying screwdrivers and chisels. By dig's end, I couldn't help but wonder where else in Queensland this method could be applied with similar effect.

Relocating a legend

The *Austrosaurus* specimens in the Queensland Museum collection at Hendra are tucked away on a low shelf in the holotype room, practically out of sight beneath shelves bearing more spectacular specimens like skulls of the ornithopod *Muttaburrasaurus* and the ichthyosaur *Platypterygius*. In 2012, I observed these specimens in the flesh (so to speak) for the first time. I pulled out the *Austrosaurus* specimens, one by one, and soon realised (as had several palaeontologists previously) that the fossil vertebrae must once have formed an articulated series - that is, they must have been fossilised in life position. This is apparent in the preservation of the specimens as most blocks from the *Austrosaurus* site contain fragments of not one, but two vertebrae. In many cases, the back half of the vertebral base (known as the centrum or corpus) adjoins the front half of the next vertebral base, and is separated only by a small amount of mudstone which must have infilled the space once occupied by cartilage. In effect, all of the vertebrae had been preserved in the same order and position as in the living animal. The prospect of unearthing an articulated sauropod skeleton in Australia was too tantalising to ignore. I knew then that I had to locate the site where *Austrosaurus* had been discovered.

Initially, it seemed to me that relocating the *Austrosaurus* site would be a cakewalk. In Longman's 1933 paper, a map of Clutha Station had been published, complete with an "X" to mark the spot where the dinosaur had been found! Additionally, in the 1960s, geologists from the Bureau of Mineral Resources (BMR) had thoroughly mapped the geology of the Richmond area, including each and every homestead which allowed the location of Clutha to be pinpointed precisely. This map, published in 1970, also demonstrated that *Austrosaurus* had been found in the Allaru Mudstone, the second youngest marine formation in the Eromanga Basin. The final piece of the puzzle was provided by Google Earth, a computer program in which satellite photos of the entire globe have been compiled. I overlaid Longman's 1933 map and the 1970s BMR map onto the Google Earth satellite photos and, thanks to the fact that the fences on Clutha had not moved since Wade and McKillop were there in the 1930s, I found that I could pinpoint the *Austrosaurus* site exactly! Nevertheless, finding the site on an electronic program was only the first step. The site would still have to be located on the ground and it was with this request that I approached Richmond's resident palaeontologist and Curator of Kronosaurus Korner (KK), Dr Timothy Holland, for assistance.

Although there had been previous talk of relocating the site of *Austrosaurus* and holding a dig, nothing had eventuated, so when I contacted Tim in February 2014 to suggest that we might have a good chance of finding more of the animal he was very keen to be involved. A short time later, Tim contacted Richmond Mayor (and former Clutha owner) John Wharton, who subsequently obtained permission from current owners Eric and Lynne Slacksmith for a small team from KK to visit Clutha and search for the site. John had grown up on Clutha and had known about the gidgee posts (only one of which was still standing by that stage) in Whitewood Paddock for many years. While living at Clutha, John had been visited by Richard Wade, one of Goyne Wade's sons, who showed him a photo of the sign that the posts once supported. Only then did John understand the true significance of the posts.

In late May 2014, John, Tim and KK volunteer Gary Flewelling made the bumpy ride across the paddocks of Clutha towards Whitewood Paddock. John remembered roughly where the posts had been, but by 2014 neither post remained standing which made relocating them very difficult. After several hours of searching, it appeared that the trio's bumpy trip was going to be in vain due to fading light. John, however, had a secret weapon – a helicopter – so while he searched from his higher vantage point, Tim and Gary searched on foot for anything of interest amongst the mudstone outcrops littering the property. In a short space of time they had amassed a respectable quantity of ammonite shells and giant squid gladii, but their cephalopod fossils paled in comparison to what John held aloft on his return!

From the air, John had spotted the elusive posts lying on the ground and, directing the chopper to land, he quickly disembarked and surveyed the site. In next to no time he had picked up two large chunks of bone embedded in mudstone. When Tim and Gary spied these fossiliferous

mudstone lumps they could barely believe their eyes. Along with John, they were the first people to see any new material from the *Austrosaurus* type individual in more than 80 years!

Oblivious to the exciting turn of events unfolding at Clutha, I was helping the AAOD Museum excavate a dinosaur site about 60 km west of Winton when I received an email from Tim simply entitled "*Austrosaurus*". I could barely contain my excitement when I saw a photo of the two mudstone chunks preserving fragmentary pieces of fossilised bone. A week later, the KK team returned to Clutha and located the site at ground level without needing the help of the helicopter. This led to the discovery of more pieces of fossilised bone that were dispersed over a relatively small area, indicating that a thorough search at depth would be well worthwhile. Back in Richmond, Tim wasted no time in setting the wheels in motion and a return visit to the site was soon arranged for a few weeks' time to start digging in earnest.

Dinosaur paydirt

On 1 July 2014, I joined Tim, Gary and a small team of volunteers at Clutha for a test excavation of the *Austrosaurus* site. In the relative warmth of a 23°C winter day, our team sifted through the black soil with rakes and hammers and found several fragments of bone, many of which

Food for crustaceans and fossils for the future! A section of ribs and vertebrae from *Austrosaurus mckillopi* ***provide a feast for the sub-tidal crab*** *Lignihomola etheridgei****, having dropped from a bloated, rotting carcass floating on the surface (above). The ribs, lying on their left side on a Cretaceous seafloor, are depicted in the position they were found in over 100 million years later.***

Image by Laurie Beirne

Photo Patricia Woodgate

were parts of sauropod vertebrae or ribs. These discoveries galvanised our desire to excavate the site using heavy machinery, and easily convinced me to delay my return to Sweden so that I could participate in a more comprehensive excavation the following month!

In August our team returned to the *Austrosaurus* site, but this time we were aided by a 'Dingo' mini-digger which was operated by Richmond Shire Council workers. Several rib fragments were soon uncovered near the surface, but it wasn't until a vertebra fragment was found deeper below that we knew we were directly above the site. We were delighted and by the end of the three-day dig, eight rib fragments had been found representing at least three separate ribs. Unfortunately some of the specimens proved to be too fragile to remove easily and time was running out: the members of our team needed to return to their respective commitments. Covering the fragile ribs with a protective plaster cap, we left them in their positions and re-buried them, ready for a future excavation.

The final expedition to the *Austrosaurus* site took place almost a year later. Tim secured the services of a backhoe and operator from the ever-supportive Richmond Shire Council for the week commencing 27 July 2015 and advertised the dig to members of the public as *CSI: Cretaceous Sauropod Investigation.* Ten volunteers signed up, including three of the 2014 diggers. Although the advertisement for the dig stated that the target fossil was a sauropod, no further information was given until the first morning of the dig. When the new participants were informed that they were helping to excavate a site that had been discovered more than eighty years ago, the looks on their faces were priceless!

Being much more powerful than the mini-digger used in 2014, the backhoe was able to shift large volumes of black soil from the surface of the site with consummate ease. By lunchtime on the first day, the plaster cap protecting bones left behind in 2014 had been exposed and, after its removal, the site looked exactly as we had left it. By the end of the day, one 30 centimetre-long rib fragment from 2014 had grown to become a 1.1 metre-long partial rib! Despite this positive turn of events, the first day ended on a sour note when one of the cars blew a tyre on the way home and was later involved in a collision with another car just outside Richmond. Thankfully, no-one was hurt.

On our second day, the rib fragments

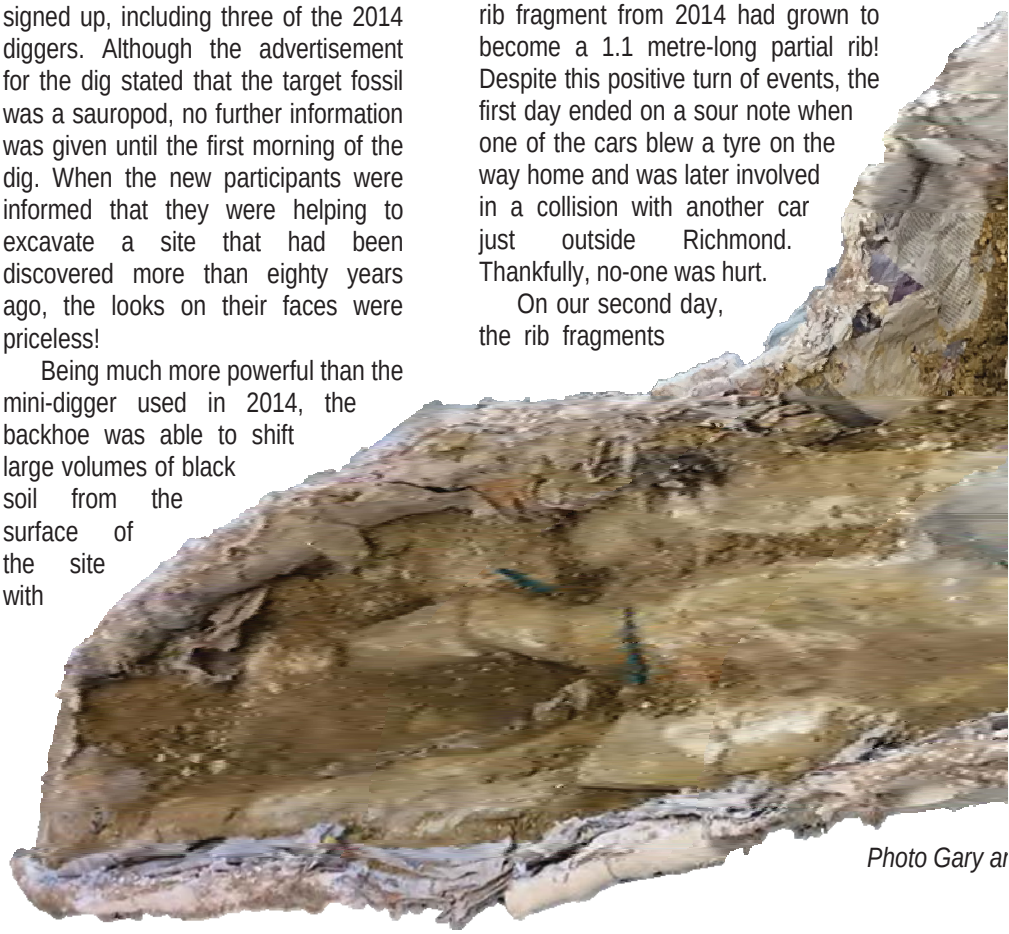


Photo Gary ar

The 2015 dig team pose with the overturned plaster jacket containing the ribs of Austrosaurus (left). The posts being held in this image are the weathered same old gidgee posts that were erected at the site eight decades earlier by Goyne Wade.

Tim Holland and Steve Poropat unload the huge jacket back at the Kronosaurus Korner lab (right). The image (bottom) shows the jacket with its base cut away and excess soil removed. As with most fossil bones that have been in close contact with blacksoil, the underside of the ribs were in a much better state of preservation than the top.

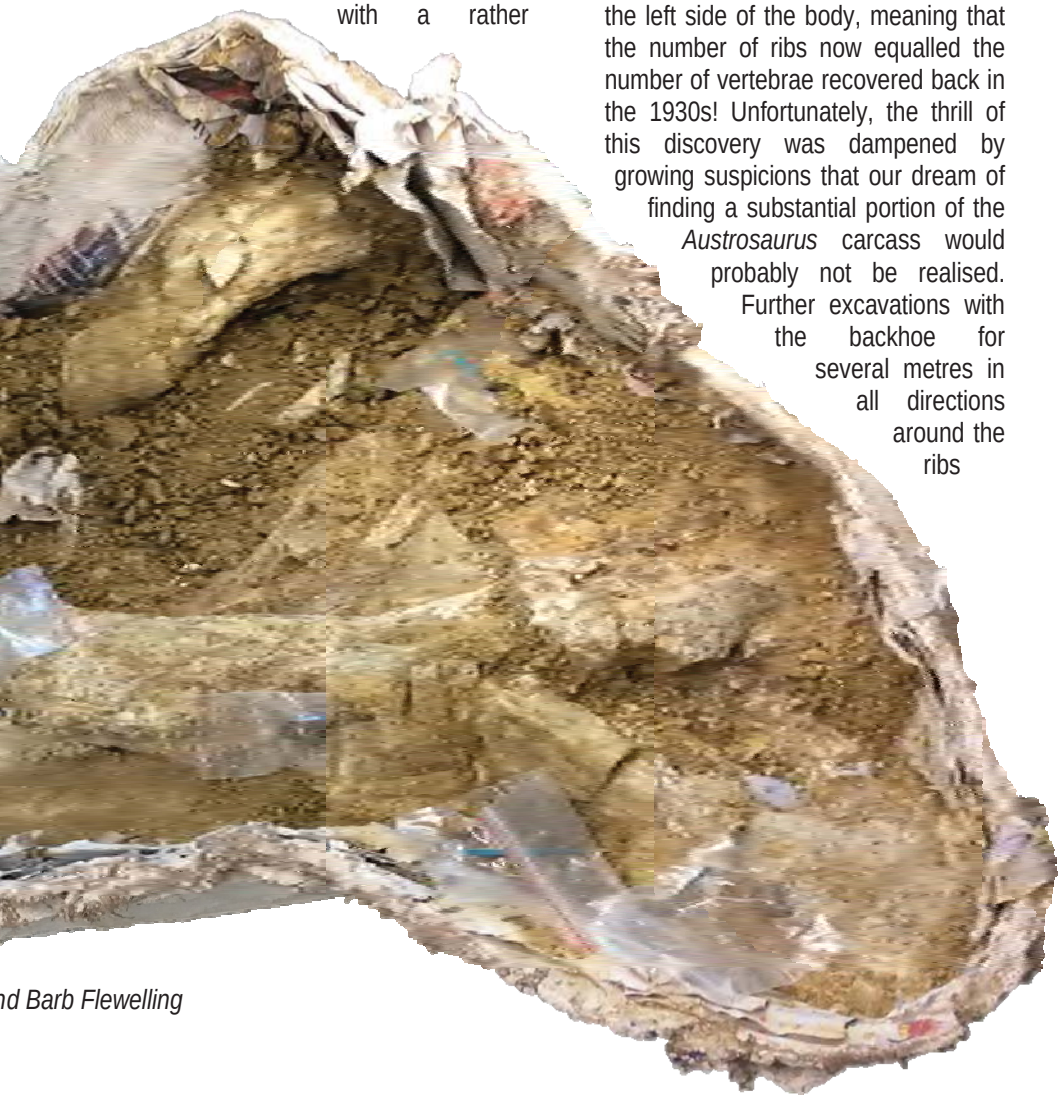

Photo John Jenkins

recovered in 2014 were brought back to the site and reassembled in the approximate position of their discovery. To our delight, the points of connection between most of the rib fragments were snap-fits, demonstrating that accurate reassembly of each rib would be possible. Everyone left the site at the end of the day happy with their work and, in contrast to the drive home the evening before, a close encounter with a rather aggravated black-headed python was an undoubted highlight!

On the third day we finished excavating around our 1.1 metre-long partial rib to find that, not only was it practically complete, but it was over 1.5 metres long. Excitingly, immediately beside it were two more ribs of similar size. We now had enough evidence to confirm the presence of at least six ribs, all from the left side of the body, meaning that the number of ribs now equalled the number of vertebrae recovered back in the 1930s! Unfortunately, the thrill of this discovery was dampened by growing suspicions that our dream of finding a substantial portion of the *Austrosaurus* carcass would probably not be realised. Further excavations with the backhoe for several metres in all directions around the ribs produced nothing further except for the fragmented shells of inoceramid bivalves.

Early the next morning the last loose-rib pieces were removed from the black soil, leaving only the three long ribs remaining in the pit. These were then pedestaled as a group and by lunchtime the team had encased them in a plaster jacket that was so large it needed to be reinforced with star pickets and planks of wood. While this work was underway, the pit was extended ever-further outwards and downwards with the backhoe, but to no avail. By the time our plaster had set, it was obvious that this cluster of fossilised ribs was all we were going to find. Flipping the jacket, it was removed from the pit and the excavation filled back in.

On the last day of the dig, the plaster jacket was capped and the *Austrosaurus* site marked once more – not with gidgee posts and sign this time, but with a star picket. The ancient gidgee posts were taken back to Kronosaurus Korner for incorporation into a replica sign being made for public exhibition by Gary. After loading the jacket onto the back of a truck and sending it on its way, we decided to prospect along the fence-line of Whitewood Paddock before heading for home. Less than 100 metres from the *Austrosaurus* site, Annie, one of the volunteers, found a piece of bone and I could not help but wonder: is more of *Austrosaurus* still buried? Is another dinosaur waiting to be excavated on Clutha, or was this merely a fragment relocated from the site we had just excavated?


nd Barb Flewelling

Dr Tim Holland with Gary and Barb Flewelling at Kronosaurus Korner holding a near-complete rib after its removal from the plaster jacket (left). The ribs of Austrosaurus mckillopi are now on display at Kronosaurus Korner in Richmond and, along with a reconstruction of Wade's sign mounted on the original gidgee posts from the site, were unveiled at the Museum's twentieth anniversary on 26 September 2015 (below). The text on the sign is faithful to the original, despite the fact that inaccuracies are present. Austrosaurus was not a marine animal and it lived around 102 million years ago, not 100–200 million years ago.
Photos Patricia Woodgate

Unfortunately, we had neither the time nor the funds to excavate and find out. With the sun plummeting towards the horizon once more, our team left Clutha satisfied that we had successfully excavated additional remains of *Austrosaurus*, a dinosaur discovered before any of us had even been born!

Mission accomplished!

Following the dig, the fossilised bones collected from the *Austrosaurus* site were immediately prepared at Kronosaurus Korner by Gary and his wife Barb and, on 26 September, the reassembled ribs were put on display for the twentieth anniversary of the Museum's opening. It is now possible for Richmond locals and visitors to view these amazing fossils and hopefully, in the not too distant future, the holotype specimens of *Austrosaurus* held at the Queensland Museum will be loaned to the Richmond Shire so that they too can be displayed at Kronosaurus Korner. Only then will these historic relics, buried for over 100 million years and then divided between Brisbane and Richmond for more than eight decades, be reunited again.

Even with the addition of the ribs and associated fragments found in 2014 and 2015, the *Austrosaurus* type specimen remains frustratingly incomplete. Sauropod ribs seldom bear unique features and, with the neural arches of the vertebrae missing, only

Photo Dr Stephen Poropat

An articulated group of the Austrosaurus mckillopi vertebrae collected by Wade and McKillop in 1932 (above). These specimens, currently housed at the Queensland Museum, are being studied by Dr Poropat and his research colleagues.

limited information can be obtained about *Austrosaurus*' anatomy or position on the sauropod family tree. Thus, despite our best efforts to augment the specimen, it will still be difficult to demonstrate that *Austrosaurus mckillopi* is not just another "dubious name", and it will be virtually impossible to demonstrate that other sauropod specimens found in the Australian Early Cretaceous actually pertain to this species. Nevertheless, I am not one to give in easily and am currently working, in collaboration with Jay Nair from the University of Queensland and other colleagues from Australia and the United Kingdom, on a full reassessment of *Austrosaurus* in the hope that this situation can be remedied. In some respects we have already contributed to this. We were thrilled when, in October 2015, Jay and I were finally able to work out the sequence of the *Austrosaurus* vertebrae at the Queensland Museum and rearticulate them!

Despite the seemingly small scientific impact of the new *Austrosaurus* material, this story has to be viewed from another perspective. In 1933, it was hypothesised by Wade, the McKillops, Longman and von Huene that more of the *Austrosaurus* skeleton would be present at depth in Whitewood Paddock on Clutha Station. By finding the ribs of *Austrosaurus*, our dig team demonstrated that this hypothesis was correct. More importantly, both Tim and I, along with our dig participants, feel that we have rewritten the annals of Australian dinosaur palaeontology, at least in a small way, since we found additional pieces of the original *Austrosaurus* specimen more than eighty years after its initial discovery. We feel we have finally completed the mission that Goyne Wade, Harley McKillop and Dr Joe McKillop first embarked upon in 1932 – to find as much of *Austrosaurus mckillopi* as possible. I like to think that we have honoured the memories of these men, not just by complementing their discovery with our own finds, or by replicating the sign which once stood watch over the *Austrosaurus* site, but by recounting the story of their remarkable discovery and their determination to ensure its place in Australian natural history.

The Author

Dr Stephen Poropat is a research fellow at the Australian Age of Dinosaurs Museum of Natural History. He is currently undertaking research on Australian Cretaceous sauropods in an attempt to determine changes in the fauna through time, and to establish the relationships of Australia's sauropods to those from elsewhere in the world.

Dr Stephen Poropat would like to sincerely thank Dr Timothy Holland, without whose desire to relocate the site and exemplary co-ordination of the Clutha digs, this story would still remain untold.

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