Fossil footprint site captures the diversity of life millions of years ago

The Australian Age of Dinosaurs Museum today announced the publication of the Snake Creek tracksite from Central West Queensland, Australia. The fossilised tracksite, which is 54 metres long and estimated to weigh 300 tonnes, was relocated to the Museum from a cattle station northwest of Winton, Queensland. The footprints are preserved in rocks from the Winton Formation, a geological deposit that is approximately 100–94 million years old.

The paper describing the Snake Creek tracksite, available at https://peerj.com/articles/11544, was published on Thursday 17 October at 12am UTC (Thursday 17 October at 10am AEST) in *PeerJ* – an open-access online journal. Research on the Snake Creek tracksite was led by Dr Stephen Poropat, Australian Age of Dinosaurs Museum palaeontologist and adjunct researcher at Swinburne University of Technology. According to Dr Poropat, the Snake Creek tracksite is one of the most important fossil footprint sites from the Age of Dinosaurs (Mesozoic Era) ever found in Australia.

The tracksite was discovered on Karoola Station by grazier Mike Elliott after it became partially exposed by floodwaters in 2000. However, it was not until 2016 that the tracksite was brought to the attention of the Museum. Dr Poropat, the first palaeontologist to see the site, said that he recognised the significance of the huge footprints immediately. “The site contained some of the best-preserved sauropod tracks found in Australia and, around them, were tracks made by smaller animals. It was mind-blowing!” he said. Two years later, in April 2018, excavations at the site uncovered further footprints and revealed sauropod trackways extending for nearly 50m.

The decision to relocate the tracksite to the Museum was made as flood events and exposure had begun to severely deteriorate the tracks. The fossilised tracksite was dismantled along existing cracks and transported to the Museum using a two-tonne trailer where it was repositioned in its original orientation. This work was conducted by a small group of Museum employees and volunteers under the direction of David and Judy Elliott, founders of the Museum. The tracksite took nearly three years to relocate during which time a specially designed building was erected to protect it for posterity.

The tracksite, which was formed around 95 million years ago, is interpreted by Dr Poropat and colleagues as a muddy flat between a billabong and a meandering river. The footprints are preserved in siltstone but, according to Dr Poropat, they were not all made at the same time. “The earliest sauropod footprints were made when the silt was too sloppy to hold their shape but the majority were made after the silt had been exposed to the air and become pliable,” he said. “Remarkably, most, if not all, of the smallest tracks and traces were made after the sauropod footprints, when the silt was back underwater.”

The most obvious footprints are those made by titanosaurs (a group of plant-eating sauropod dinosaurs), two of which left trackways that extend nearly the entire length of the tracksite. A third, very short trackway, was made by a sauropod that performed a tight 180° turn, a manoeuvre that supports the theory that titanosaurs were more agile than other sauropods. The sauropod footprints at the tracksite also show that at least one sauropod species from northeast Australia had thumb claws – a feature previously interpreted for *Diamantinasaurus* based on fossilised bones. The largest sauropod footprints were made by an individual at least 3.5 metres tall at the hips and moving at around 5 km/hour (walking pace). The presence of the two near-parallel sauropod trackways, and a sauropod ‘trample zone’, at the tracksite suggest that at least some sauropods moved in groups or herds.

The tracksite also preserves footprints of at least three types of smaller dinosaurs. A single three-toed footprint, preserved within one of the sauropod footprints, appears to have been made by a medium-sized, meating-eating theropod similar to *Australovenator*, bones of which were found on neighbouring Elderslie Station. Other dinosaur footprints include those of chicken-sized theropods and emu-sized ornithopods. These small footprints are almost identical to footprints from Dinosaur Stampede National Monument at Lark Quarry Conservation Park, respectively named *Skartopus australis* and *Wintonopus latomorum*.

Some of the three-toed footprints at the Snake Creek tracksite were originally identified as belonging to small dinosaurs. However, unlike bipedal dinosaurs that have a long middle toe, the outer toes in these footprints get progressively longer. According to Dr Poropat, these footprints were made by crocodyliforms (ancient relatives of modern crocodiles) and are the first fossil crocodyliform tracks reported from Australia. Very few front-foot tracks were identified in the crocodyliform trackways and all lack drag marks from the belly or tail, indicating that they were made by animals swimming in shallow water and pushing off the riverbed with their back feet. Other tracks and traces at the Snake Creek tracksite are also firsts for Australia. These include footprints made by swimming turtles and horseshoe-shaped feeding traces made by bottom-feeding lungfish similar to those living in Queensland's Mary River today.

The Snake Creek tracksite joins several significant fossil specimens at the Australian Age of Dinosaurs Museum. These include the theropod *Australovenator wintonensis* (Australia's most-complete carnivorous dinosaur), the large sauropods *Savannasaurus elliottorum* and *Diamantinasaurus matildae* and Australia's most complete pterosaur, *Ferrodraco lentoni*. Executive Chairman of the Australian Age of Dinosaurs Museum, David Elliott, described the new discovery as one of the Museum's most exciting so far. "The Winton area was already renowned for hosting the most famous dinosaur tracksite in Australia. To be able to add another amazing tracksite to the record, along with all the dinosaur bones and skeletons we have already found, is sensational. It is a huge bonus for palaeontology, science, education and regional tourism," he said.

The relocated Snake Creek tracksite is now permanently housed and on display in the *March of the Titanosaurs* exhibition, at the Australian Age of Dinosaurs Museum, 25km from Winton in Central West Queensland. The tracksite opened to the public on 8 May 2021.