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Sauropod dinosaur teeth from Australia

Dinosaur dentistry demonstrates diet

- First sauropod dinosaur teeth described from Queensland.
- Sauropod teeth are described from three separate sites, including two sites that have produced *Diamantinasaurus* fossils.
- Microscopic analyses of wear facets on the teeth demonstrate that *Diamantinasaurus* and its relatives fed on plants that grew one to ten metres above ground level.
- Review of worldwide Cretaceous sauropod occurrences demonstrates that sauropod dental diversity declined as the planet experienced extreme warmth ~90 million years ago.

The Australian Age of Dinosaurs Museum (the Museum) today announced the discovery of the first sauropod teeth from Queensland from three sites in the Winton area. As two of the three sites have been found in association with fossils of *Diamantinasaurus matildae*, it is likely the teeth also belong to the medium-sized sauropod. The fossilised teeth were recovered from exposed rocks near the northern extent of the Winton Formation dating to 98–95 million years old.

The paper describing the sauropod teeth belonging to *Diamantinasaurus*, available at https://royalsocietypublishing.org/doi/10.1098/rsos.220381, was published on Wednesday 13 July at 12.01am BST (Wednesday 13 July at 9.01am AEST) in *Royal Society Open Science.*

Between 2019 and 2021 17 sauropod teeth were found at a site north-west of Winton during the Museum's annual dinosaur digs. These discoveries represent the largest number of sauropod teeth from a single locality in Australia and join two partial specimens in the Museum collection. The latter specimens are a sauropod tooth collected north-east of Winton in 2005 and a sauropod tooth and jaw fragment found in 2007 beside the holotype specimen of *Diamantinasaurus matildae*.

Research on the sauropod teeth was led by Museum Research Associate Dr Stephen Poropat. Using 3D models generated by master's student Samantha Rigby, Dr Poropat was able to compare the teeth to others from around the world. These comparisons demonstrated the teeth were nearly identical and belonged to *Diamantinasaurus* or a very close relative.

Dr Poropat and colleagues found that the curved near-conical sauropod teeth from the Winton Formation are significantly different from those of geologically younger titanosaurs found worldwide. From 90 million years ago the only sauropods left worldwide were titanosaurs. From then until their extinction 66 million years ago virtually all titanosaurs had narrow chisel-like teeth. "In the Late Cretaceous Period narrow teeth seem to have been all the rage for sauropods," Dr Poropat said. "However, teeth from *Diamantinasaurus* and its relatives show that much chunkier teeth were being used as recently as 95 million years ago, indicating a rapid change that correlates with a period of extreme global warmth."

Microscopic analyses of the wear facets on some of the teeth, undertaken by PhD student Timothy Frauenfelder, revealed multiple scratches but very few pits or gouges. "The wear patterns on the teeth reveal that *Diamantinasaurus* was putting its long neck to good use," Dr Poropat said. "Given the scarcity of pits and gouges on the recovered teeth, this sauropod probably wasn't ingesting

much grit or dirt. The scratch patterns suggest it was feeding on relatively hardy plants that grew one to ten metres above the ground. Even though these animals didn't chew their food, they certainly wore their teeth down rapidly."

The newly described sauropod teeth join several significant fossil specimens at the Museum including the skeletons of the megaraptorid theropod *Australovenator wintonensis*, the titanosaurian sauropods *Diamantinasaurus matildae* and S*avannasaurus elliottorum*, the ornithocheirid pterosaur *Ferrodraco lentoni,* the crocodyliform *Confractosuchus sauroktonos*, and the 54m-long Snake Creek sauropod tracksite housed in the *March of the Titanosaurs* exhibition.

Co-founder of the Museum, David Elliott OAM, describes the discovery as a significant advance in palaeontology that greatly increases scientific understanding of the Australian continent during the Cretaceous Period. "Understanding how our sauropods lived and what they ate is imperative if we are to grasp how ecosystems worked in the Winton district 98–95 million years ago," he said. "Our rocks preserve a wide range of plant fossils and it is interesting, but not surprising, that not all of them would have been on the menu for sauropods."

The fossilised sauropod teeth are now on display at the Museum, which is located 24km from Winton township in western Queensland.