Researchers discover longest-necked dinosaur in China

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Only a few fossil fragments of Mamenchisaurus sinocanadorum have so far been found, such as this lower jaw. Credit: Paul Barrett

A sauropod from China may have had the longest neck of any known dinosaur.

The discovery was made three decades after the species was first

uncovered as scientists try to understand more about how sauropods evolved in what is now eastern Asia.

Around 160 million years ago, towards the later part of the Jurassic Period, a peculiar type of dinosaur roamed the landscape of China.

Sauropods are well-known for their long necks, but Mamenchisaurus sinocanadorum towered above the landscape with an abnormally long neck measuring up to 15 meters.

Despite this record-breaking feature, Mamenchisaurus sinocanadorum is far from being the largest dinosaur ever discovered due to its relatively small tail and body.

Scientists are attempting to understand why this dinosaur may have had such an exceptionally long neck.

Professor Paul Barrett, a dinosaur expert at the Museum and an author of the study, says, "It looks like these necks were probably to do with enhanced feeding like in other sauropods, but it could have had more than one role."

"It could have also been to do with sexual display or used for neck-butting contests between males fighting over mates and territory, similar to how giraffes behave today. But we can't say for sure. At this point, it's pure speculation as to why they evolved necks of this length."

The study has been published in the *Journal of Systematic Palaeontology*.

Why the long neck?

Sauropods are a group of very large, herbivorous dinosaurs well-known for their exceptionally long necks and tails.

Notable members of this group include the Diplodocus, Brachiosaurus and the colossal Patagotitan, one of the largest animals to have ever lived.

Scientists believe sauropods evolved long necks as part of their feeding strategy, allowing them to consume a lot of food in the immediate area around them without spending too much energy moving about.

These two vertebrae from Mamenchisaurus sinocanadorum were used to estimate their overall neck length. Credit: Paul Barrett

Questions remain about how Mamenchisaurus sinocanadorum's bizarre proportions allowed it to function daily.

"We really have no idea how that animal would have worked

mechanically." says Paul.

"It would require a lot of muscles to hold up a neck that size, and then there's the question of how it gets air down to the lungs and back up again."

"This could support the theory that these necks were a sexually selected feature where only the strongest and fittest dinosaurs that were able to hold up these giant necks in impressive displays were able to mate."

Only one specimen of Mamenchisauridae sinocanadorum has ever been found. It is an incomplete skeleton consisting of the front end of the neck, including an impressive rib and a few skull bones, including a lower jaw.

The lack of a complete skeleton made it difficult for scientists to get an idea of this dinosaur's overall size, and they required another better-preserved sauropod skeleton for comparison.

In 2012, a new type of giant sauropod from China was discovered called Xinjiangtitan, which had a complete neck. Researchers compared the incomplete Mamenchisauridae sinocanadorum fossils with sauropods like Xinjiangtitan to work out what the neck length would likely have been.

"We achieved this with just an elementary bit of maths," explains Paul.

"We simply looked at the proportions of the individual vertebrae within a complete neck used that as a guide for scaling up the entire neck of the incomplete Mamenchisauridae sinocanadorum."

"So we measured the vertebrae in one dinosaur and the corresponding bone in the other and worked out the difference. We then multiplied the

length of each vertebra that would have been present in a complete neck by that factor to get an estimate of the neck length in Mamenchisauridae sinocanadorum."

The ancient megafauna of China

The Mamenchisauridae sinocanadorum fossils were discovered in August 1987 when the broken end of an enormous neck rib was uncovered at a site in the Shishugou Formation in northwestern China.

The site is located in Xinjiang and is a rich deposit of vertebrate fossils, including dinosaurs, pterosaurs and crocodile-like animals dated from the Middle to Late Jurassic. To date, four additional sauropods have been named from this formation.

Mamenchisaurs were a group of unusually long-necked dinosaurs known mainly from China first discovered in the 1950s. Since then, scientists have unearthed other similar specimens, prompting a reassessment of the group to determine how its many different species are related.

"Sauropods were widely distributed in China during the Late Jurassic." says Paul.

We are trying to uncover exactly how many different types of sauropods were wandering around during this time and how they were related to other sauropods from elsewhere in the world."

"There are suggestions that mamenchisaurs were found only in China, which was a large, isolated island continent during the Jurassic. It's also been suggested that the evolution of sauropods happened slightly differently in China than in the rest of the world."

"We are working alongside colleagues in China to revisit these

specimens and, using modern methods and new knowledge about sauropods, learn more about these dinosaurs and how they traveled the globe."

More information: Paul M. Barrett et al, Re-assessment of the Late Jurassic eusauropod Mamenchisaurus sinocanadorum Russell and Zheng, 1993, and the evolution of exceptionally long necks in mamenchisaurids. *Journal of Systematic Palaeontology*. DOI: 10.1080/14772019.2023.2171818