Paleobiologists make intriguing new discoveries about dinosaur ancestors

June 1 2017

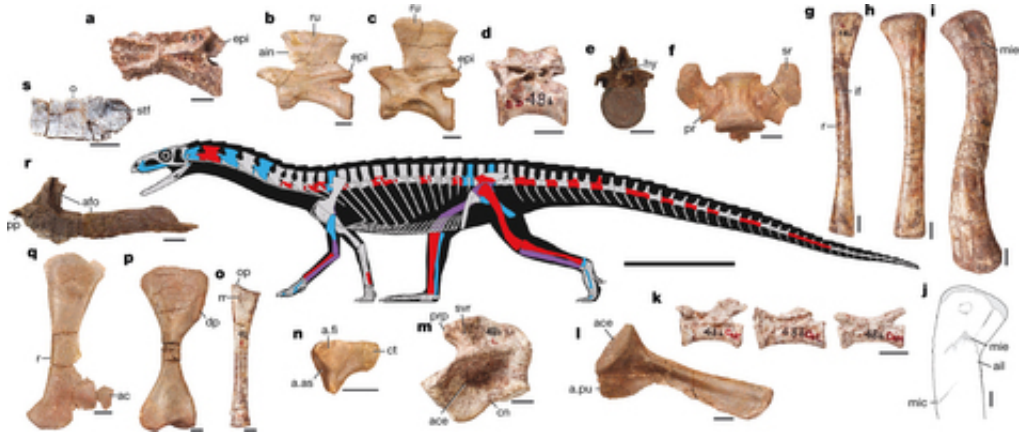
Credit: Kazan Federal University

An international group of researchers has discovered that the most ancient dinosaurs' ancestors were quadrupedal.

Dinosaurs emerged in Triassic, a geological period of the Mesozoic era which started 252 Mya. It was then that archosaurs split into two evolutionary branches—bird-like and crocodile-like. Dinosaurs' closest ancestors were at the base of the bird branch. Many scientists have pictured them in as somewhat chicken-like, bipedal, quite quick and agile in comparison with crocodiles. By slowly evolving their forelimbs

into wings, they finally became birds. However, this logical construct was recently upended by the research group, which found a new candidate for an early dinosaur predecessor: Teleocrater rhadinus, whose bone fragments were discovered in Tanzania in the 1930s.

Teleocrater was for a long time in a systematic limbo because researchers couldn't exactly place it on the ancient reptilians' evolutionary tree. Eighty-two years later, though, new fossils were found. In particular, fragments of tibiotarsus, which shed light on Teleocrater's anatomical features—both those of bird-like archosaurs and crocodilians. It was approximately three meters long, with long neck and tail, and moved on four crocodile-like limbs, contradicting the earlier hypotheses of paleontologists.



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Sterling Nesbitt, assistant professor at Virginia Tech, said that this discovery dramatically changed the current picture of early dinosaur evolution. Judith Skog, program director at the National Science Foundation, added that the research makes everyone rethink their ideas about dinosaur ancestry. The work first appeared in *Nature*.

One of the Stratigraphy Lab's main areas of expertise is paleoclimatology and paleobiology, the latter being Dr. Andrey G. Sennikov's field of study. He says that early archosaurs have been his primary focus for some time, "During the 1980s I discussed similarities between different Eastern European thecodonts, such as Dongusuchus, and Eastern African ones, including Teleocrater, with Dr. Alan J. Charig of the Natural History Museum. He was the first to describe Teleocrater. In 1994, I personally studied Teleocrater materials in the British Museum and was convinced that those are two very close taxons. Based on this, I pointed at this relationship in my monograph by putting Teleocrater and Dongusuchus in a separate group."

Dr. Sennikov's work on Dongusuchus is still underway. Recently, he published an internationally co-authored paper about the extinct archosaur's systematic position and relative links. This and other materials were used to prepare the latest publication in *Nature*.

New anatomy analysis allowed the scientists to separate a new group of archosaurs under the name Aphanosauria. The group is placed on the evolutionary tree right after the split into birds and crocodiles at the very root of the former class.

Sennikov added that this research showed the more complex diversity of early archosaurs than had previously been considered. Paleontologists plan a new trip to Tanzania soon to find more remains of Teleocrater and construct its full skeleton.

More information: Sterling J. Nesbitt et al, The earliest bird-line archosaurs and the assembly of the dinosaur body plan, *Nature* (2017). DOI: 10.1038/nature22037