

NICHOLAS M. GARDNER, Mary F. Shipper Library, West Virginia University-Potomac State College, Keyser, WV, 26726, and NATHAN E. VAN VRANKEN, STEM Division, West Virginia University-Potomac State College, Keyser, WV, 26726. The Permian diapsid reptiles *Acerosodontosaurus* and *Claudiosaurus* are not stem-turtles: Morphological and fossil phylogenetic analyses must take a cautious, holistic approach toward turtle origins.

Turtle origins remains a debated topic in evolutionary biology. Molecular data uniformly supports a turtle-archosaur clade; morphological data has supported multiple hypotheses including a turtle-lepidosaur clade, turtles as the sister to a archosaur-lepidosaur clade (within or outside of Diapsida), and rarely, a turtle-archosaur clade as in molecular studies. Several recent analyses have revealed heterodox hypotheses concerning tetrapod relationships, chiefly regarding the arrangement of fossil taxa (paradoxically, some of these hypotheses may help resolve the molecular-morphological conflict). Examining different morphological data sets has revealed common problems that undermine confidence in the analytical results: 1) character construction (no character ordering, multiple homologies within a single character series, vaguely constructed characters), 2) insufficient character sampling, and 3) insufficient taxon sampling.

A recent analysis addressing turtle origins provides a textbook example of these problems. The analysis recovered the following novel results: the diapsid reptile *Acerosodontosaurus* (Late Permian, Madagascar) as a sister to the contemporaneous and sympatric *Claudiosaurus*, recovered both species as early fossil relatives of turtles, and supported Testudines(Archosauria+Lepidosauria). Careful and detailed examination of that data set reveals all of the above issues are present. Further, re-running that data set, without correcting these issues, revealed that none of their findings were replicable. Additionally, results from a re-analysis of the data set correcting these issues revealed no support for their hypothesized relationships.

Solving the origin of turtles using morphological data will require a cautious and thoughtful approach toward character construction and a more holistic sampling of characters and taxa throughout the tetrapod tree.