

**Vinegaroon (Arachnida: Thelyphonida: Thelyphonidae) trackway production  
and morphology: Implications for media and moisture control on trackway  
morphology and a proposal for a novel system of interpreting arthropod  
trace fossils**

Joshua D. Schmerge,<sup>1</sup> David J. Riese,<sup>2</sup> and Stephen T. Hasiotis<sup>1</sup>

<sup>1</sup>*University of Kansas, Department of Geology, 1475 Jayhawk Blvd., room 120, Lindley Hall, Lawrence, Kansas, 66049, USA, [joshschmerge@gmail.com](mailto:joshschmerge@gmail.com), [hasiotis@ku.edu](mailto:hasiotis@ku.edu);*

<sup>2</sup>*Indiana University, Department of Geological Sciences, 1001 East 10th St., Bloomington, Indiana, 47405, USA, [djriese@indiana.edu](mailto:djriese@indiana.edu)*

*\*Corresponding author.*

Keywords: continental, *Hexapodichnus*, *Lithographus*, ichnology, depositional environment

**ABSTRACT**

Neoichnological experiments with vinegaroons (Arachnida: Thelyphonida: Thelyphonidae) were conducted to describe the trackway patterns, evaluate the preservation quality and potential of its trackways in different sediment textures and moisture conditions, and compare them to trackways found in the fossil record. Trackways were produced in nine experimentally controlled variations of sediment size (fine-, medium-, or coarse-grained sand) and moisture added to the sediment surface (0 mL, 5 mL, or 10 mL). Trackways were photographed and video recorded during trackway production, and cast in plaster. Individual tracks were oblong to linear, with the first and third foot on each side producing a track parallel to the direction of motion, and the second foot producing a track perpendicular to the direction of motion. Video evidence indicates that track associations form a triangular pattern with the track of the second foot furthest from the midline of the trackway, rather than a linear pattern as described for most other arthropod trackways. The morphology of vinegaroon trackways is indicative of hexapedal motion. Though similar to some fossil trackways attributed to eurypterids, vinegaroons are not good locomotion analogs for eurypterids. No fossil trackway has been attributed to vinegaroons, so these trackways can serve as a model for assessment of fossil trackways. Trackway expression decreased as a function of increasing moisture content and grain size, with tracks becoming less oblong and more circular before ultimately becoming unexpressed on the surface. These trackways are more similar to the ichnogenus *Hexapodichnus* than to *Lithographus*. We propose a system to distinguish arthropod trackways based on the orientation of the triangular track series.