

# **ELONGATE DINOSAUR TRACKS EXPLAINED AS DEEP PENETRATION OF THE FOOT, NOT PLANTIGRADE LOCOMOTION**

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Dinosaur tracks with elongated metatarsal marks constitute a long-standing conundrum. Such tracks are produced by a variety of dinosaurian trackmakers small to large, and are known from numerous examples around the world. Due to their superficially human-like appearance, examples from the Paluxy River of Texas have infamously been claimed to be “man tracks” by creationists. The horizontal orientation of the metatarsal marks is widely believed to be evidence for a facultative plantigrade, or “flat-footed”, mode of locomotion in otherwise digitigrade trackmakers. This hypothesis, however, is at odds with the consistently low anatomical fidelity of such tracks and their long stride lengths that indicate regular locomotion speeds. The long stride lengths have been explained by assuming a highly crouched limb posture, which is incompatible with scaling relationships that predict more columnar limbs at large body sizes. We instead propose that the trackmakers walked in their regular digitigrade fashion with the metatarsus held at an angle to the substrate. In this model, the feet penetrated deeply into soft sediment, with sediment collapsing above the descending foot, leaving a shallow surface track that includes a horizontal metatarsal mark. The length of the metatarsal mark is determined by multiple factors and is not necessarily correlated with the length of the metatarsus.