

## DISTINCTIVE FOSSORIAL ADAPTATIONS IN MESOTHERIIDS (MAMMALIA: NOTOUNGULATA)

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Although endemic South American ungulates have long been known to exhibit a broad range of locomotor habits, fossorial (i.e., digging) adaptations have not been widely acknowledged. Our study suggests that digging was a major activity for mesotheriid notoungulates.

We examined two species of mesotheriids: a trachytheriine, *Trachytherus spegazzinanus*, from Salla, Bolivia (late Oligocene), and a mesotheriine, *Plesiotypotherium* sp., from Casira, Bolivia (Mio-Pliocene?). Fossorial adaptations exhibited by both of these taxa include the following: modifications for great strength at the shoulder joint (large and distally extended ridges on the humerus for attachment of the deltoid and pectoral muscles), powerful elbow extension (elongate olecranon process), and powerful flexion-extension of the hand and digits (distally broad humerus with enlarged supinator crest and medially curved olecranon process). Both taxa also possess a large elbow sesamoid bone, though this is probably a plesiomorphic character within Notoungulata since it has also been noted in *Nesodon*, a middle Miocene toxodontid. Both mesotheriids examined have pentadactyl hands, a conserved trait found even in the latest-occurring mesotheriine, the Pleistocene *Mesotherium*.

The *Plesiotypotherium* specimen is unique among ungulates in exhibiting a robust, fused contact between the ischium and sacrum. This condition only occurs in other lineages associated with fossorial habits (e.g., moles and armadillos) and likely served to oppose the force of the forelimb's vigorous activity against the substrate. The ungual phalanges of the hand are bifurcated (as in fossorial pangolins and golden moles) but they lack the dorsal "stops" of many fossorial animals that prevent overextension of the digits while breaking the substrate. Mesotheriids may have instead relied upon their hypertrophied incisors, which could have initially loosened the substrate for subsequent removal by the powerful forelimbs. Such incisor-assisted excavating occurs in many extant fossorial rodents.