

Specialized knee joints in some extinct, endemic, South American herbivores

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Distal femora of some extinct, endemic, South American herbivores are shown to have modifications related to knee extension. *Toxodon* (Order Notoungulata) had an enlarged medial trochlear ridge (MTR) similar to those seen in horses. The MTR of horses serves to "lock" the patella and ligaments in the proximal position and it likely function the same for *Toxodon*. The patella of *Toxodon* has a medial process that would have locked by wrapping around the MTR. Macraucheniid and proterotheriid litopterns may also have had knee locks, but with a different mechanism. The femora of these litopterns have deep suprapatellar fossae in which the patellae could have become lodged. Indeed, the distal end of the patella of cf. *Eoauchenia* (Proterotheriidae) conforms to and is supported within the suprapatellar fossa. Several glyptodontids (Order Xenarthra) have conical MTRs that would have impeded the medial patellar ligaments during the initiation of extension. This would have caused patellar rotation and resulted in a complex knee extension. These glyptodonts also had suprapatellar fossae, suggesting that the ligaments slid over the MTR and "locked" during hyperextension. Locking knees in these diverse animals implies that they stood for long periods of time and did not engage in intermittent, "bout feeding" as seen in modern ruminants.

Key words: Herbivores, Notoungulata, Litopterna, Glyptodontoidea, knee, passive stay.

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