

A description of the hindlimb of *Miracinonyx trumani* with implications for its ecological niche

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Miracinonyx trumani was a species of felid that lived during the late Pleistocene across North America. It has been called the 'American Cheetah' due to its morphological similarities with the African cheetah *Acinonyx jubatus*, and because of those similarities it has been thought to be primarily a cursorial animal. Previous studies of *M. trumani* have described the cranium and the forelimb or have described the skeleton of juveniles; no studies have yet described the hindlimb in adults. We completed this study to better understand the ecological role of the American cheetah in the Pleistocene ecosystem.

We analyzed the hindlimb of *M. trumani*, *Puma concolor*, and *Acinonyx jubatus* using 3D models made from CT scans. Our results indicate *M. trumani* hindlimbs have several adaptations for a cursorial lifestyle that it shares with the African cheetah. These include an innominate with a well-defined ischial tuberosity, a curved tibia, and a pronounced neck of the femur. It also has some traits that more closely resemble the scansorial *Puma*, including the distal articular surface of the femur with a matching tibial plateau, however, some of these characters were modified secondarily for speed, such as an enlarged tibial crest as in the cheetah, which would increase the lever arm of the quads. Additional characters not optimal for cursoriality include a shallower malleolar mortise with less well-defined articular surfaces for the trochlea of the astragalus. This mix of traits means that *M. trumani* was more adapted to a cursorial lifestyle than its sister species *Puma concolor*, but was not likely to be as cursorial as the *A. jubatus*.