

## ENCEPHALIZATION QUOTIENT (EQ) OF A MIDDLE MIOCENE SPARASSODONT (METATHERIA) FROM BOLIVIA

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Metatheria is the clade including marsupials and their fossil relatives. During the Cenozoic, metatherians underwent a vast adaptive radiation, especially in South America, where nearly 30 families (most extinct) representing at least five orders have been identified. One well-known extinct metatherian group is Sparassodonta, a diverse clade of predatory mammals that has been the subject of many paleobiological studies. In contrast, knowledge of sparassodont paleoneurology is very limited. At present, endocasts of only two species have been described in the literature: the early Miocene borhyaenid *Borhyaena tuberata* and the Pliocene thylacosmiline proborhyaenid *Thylacosmilus*. In addition, a virtual cranial endocast (i.e., one constructed using computed tomography/ $\mu$ CT) of the early Miocene hathliacynid *Sipalocyon externus* was recently reported in a conference abstract. Here, we describe a virtual cranial endocast from a Miocene sparassodont from Bolivia, representing only the second virtual endocast generated for the group, and analyze its encephalization quotient (EQ), the ratio between expected and observed brain size relative to body mass. The specimen (UATF-V-001984) was collected at the early middle Miocene (Langhian) locality of Cerdas, southern Bolivia, and was provisionally identified as a new genus and species of borhyaenoid similar in size to the hathliacynid *Cladosictis patagonica*. It was scanned using the Inveon-PET-CT scanner at the Case Center for Imaging Research, and a 3D model of the cranium (including a virtual endocast) was constructed using Slicermorph. We calculated the endocranial volume at 12.65 cc, resulting in EQs of 0.23 and 0.45 using Jerison's equation and body mass (BM) estimates of 11 kg (based on lower molar row length/LMRL) and 4 kg (based on occipital condyle width/OCW), respectively. These EQ values span the range of EQs reported for *Borhyaena* and *Sipalocyon* (0.39 and 0.32-0.41, respectively) but suggest that BM is overestimated by LMRL. For *Thylacosmilus*, EQ values of 0.66-0.73 have been reported (for two endocasts), but these were based on BM values that

are likely underestimates. We recalculated *Thylacosmilus* EQ values based on more recent BM estimates of 48-117 kg, resulting in new EQ values of 0.16-0.35, more similar to other sparassodonts (particularly higher values). Further study of this and other endocasts should provide insights into the paleobiology and phylogenetic relationships of sparassodonts.

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Regular Poster Session 4 (Saturday, October 21, 2023, 4:30 - 6:30 PM)

## DINO JOHN DOE: UTILIZING OSTEOHISTOLOGY AND MORPHOMETRICS IN SPECIES IDENTIFICATION OF AN ISOLATED ORNITHISCHIAN TIBIA FROM THE LATE CRETACEOUS

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Non-avian dinosaur species identification often relies heavily on gross morphological characters of cranial material. Ontogenetic changes and family-level conservation of post-cranial morphology limit the utility of the appendicular skeleton in species determination, particularly among Ornithopoda. However, appendicular bone microstructure preserves annually formed cyclical growth marks (CGM), which can be used to assess individual ontogenetic status and growth trends. Here, we utilize gross morphological measurements and cortical CGMs to investigate the taxonomic status of an isolated ornithischian tibia from late Cretaceous deposits in Montana.

A partial tibia was collected from the Campanian Two Medicine Formation at the Willow Creek Anticline locality in Teton County, MT. The Willow Creek Anticline locality is famous for the discovery and continued excavation of *Maiasaura* nesting and monodominant bonebed horizons. The partial tibia was found higher in section than the aforementioned horizons, and its pale coloration suggests it underwent different diagenetic processes than those fossils in the *Maiasaura* bonebed which appear dark brown or black. Osteohistological analysis of a mid-diaphyseal cross-section revealed five visible CGMs and age at death is estimated to be six years. Spacing