

## New remains and paleoecology of uruguaytheriine astrapotheres (Mammalia) from the Middle Miocene of Bolivia

Julia Van Orman, Oscar E. Wilson, Angeline Catena, Smruthi Maganti, Federico Anaya, and Darin A. Croft

*Acta Palaeontologica Polonica* 70 (3), 2025: 581-605 doi:10.4202/app.01235.2024

Astrapotheres (Astrapotheria) are an order of South American native ungulates (SANUs), and the geologically youngest astrapotheres belong to the subfamily Uruguaytheriinae (Astrapotheriidae). In this study, we: (i) analyze uruguaytheriine remains from the late Middle Miocene Quebrada Honda Basin (QHB) of southern Bolivia; and (ii) discuss paleoecology of Bolivian astrapotheres based on new dental mesowear angle data and enamel stable carbon isotope ( $\delta^{13}\text{C}$ ) data from these and other specimens. New material consists of a partial left maxilla preserving DP2–3 and an associated deciduous lower incisor. Two newly described specimens include a mostly complete m3 and a partial palate preserving left and right DP2–4. The QHB deciduous premolars are the first described for a uruguaytheriine and among the few described for astrapotheres. We conclude that the QHB specimens represent a new but unnamed species that likely does not pertain to any presently recognized genus. It differs from other uruguaytheriines in its intermediate size, relatively high-crowned teeth, presence of a lingually open M3 central valley, and absence of m3 hypoflexid, among other features. Astrapotheres mesowear angle data from the QHB and slightly older Bolivian sites (Cerdas and Nazareno) suggest that Middle Miocene astrapotheres were browsers, perhaps resembling the extant black rhino (*Diceros bicornis*). New and updated enamel stable carbon isotope data suggest that QHB astrapotheres and toxodontid notoungulates fed on isotopically similar vegetation slightly more enriched ( $\sim 1\%$ ) than vegetation consumed by proterotheriid litopterns (*Olisanophus* spp.) and the notoungulate *Hemihegetotherium trilobus*. These data support paleopedology- and paleoichnology-based habitat reconstructions for the QHB that suggest it was more densely vegetated than Cerdas. Relatively enriched  $\delta^{13}\text{C}$  samples ( $> -7.0\%$ ) from Cerdas and Quehua (Late Miocene) suggest that some Bolivian notoungulates were grazing on C4 vegetation, which casts doubt on the proposal that the southern Central Andean Plateau experienced significant uplift prior to  $\sim 9$  Ma.

**Key words:** Mammalia, Astrapotheria, carbon isotopes, mesowear, paleoelevation, Quebrada Honda Basin, Neogene, Neotropics, South America.

Julia Van Orman [[jvanorma@macalester.edu](mailto:jvanorma@macalester.edu); ORCID: <https://orcid.org/0009-0007-6828-7254>], Department of Biology, Macalester College, 1600 Grand Ave., Saint Paul,

Minnesota, 55105, USA. Oscar E. Wilson [[oscar.wilson@helsinki.fi](mailto:oscar.wilson@helsinki.fi)]; ORCID: <https://orcid.org/0000-0002-4046-3128>], Department of Geosciences and Geography, University of Helsinki, P.O. Box 64 (Gustaf Hällströmin katu 2), 00014 Helsinki, Finland. Angeline Catena [[angeline.catena@case.edu](mailto:angeline.catena@case.edu)]; ORCID: <https://orcid.org/0000-0003-0699-5726>], Department of Physical Science, Diablo Valley Community College, Pleasant Hill, CA 94523, USA. Smruthi Maganti [[ssm103@case.edu](mailto:ssm103@case.edu)]; ORCID: <https://orcid.org/0009-0007-9515-7295>], Cleveland Clinic, 9500 Euclid Avenue, Cleveland, Ohio 44195, USA. Federico Anaya [[fedanaya@hotmail.com](mailto:fedanaya@hotmail.com)]; ORCID: <https://orcid.org/0009-0006-2821-9938>], Facultad de Ingeniería Geológica, Universidad Autónoma “Tomás Frías”, Av. del Maestro s/n, Potosí, Bolivia. Darin A. Croft [[dcroft@case.edu](mailto:dcroft@case.edu)]; ORCID: <https://orcid.org/0000-0002-6514-2187>], Department of Anatomy, School of Medicine, Case Western Reserve University, 10900 Euclid Ave., Cleveland, Ohio, 44106-4930, USA.

This is an open-access article distributed under the terms of the Creative Commons Attribution License (for details please see [creativecommons.org](https://creativecommons.org)), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

 [Full text \(1,270.6 kB\)](#) |

 [Supplementary file \(771.3 kB\)](#)