

XIII ENCUENTRO
DE JÓVENES INVESTIGADORES
EN PALEONTOLOGÍA
CERCEDILLA, 2015



Current trends in Paleontology and Evolution

XIII EJIP · CONFERENCE PROCEEDINGS



Current Trends in Paleontology and Evolution

Libro de resúmenes / Conference proceedings

XIII Encuentro en Jóvenes Investigadores en Paleontología (XIII EJP)

XIII Meeting of Early-Stage Researchers in Paleontology (XIII EJP)

Cercedilla, 15 - 18 de Abril de 2015

Laura Domingo, M. Soledad Domingo, Omid Fesharaki, Blanca García Yelo, Ana Rosa Gómez Cano, Verónica Hernández-Ballarín, Daniel Hontecillas, Juan L. Cantalapiedra, Paloma López Guerrero, Adriana Oliver, Jonathan Pelegrín, Miriam Pérez de los Ríos, María Ríos, Óscar Sanisidro & Alberto Valenciano (Editors)

Designed by Juan L. Cantalapiedra and Óscar Sanisidro

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ISBN 978-84-606-7282-1

Superficial similarity vs. synapomorphic similarity: the case of the Palaeomerycidae and the Dromomerycidae (Cetartiodactyla, Ruminantia, Pecora)

Semejanza externa vs. semejanza sinapomórfica: el caso de Palaeomerycidae y Dromomerycidae (Cetartiodactyla, Ruminantia, Pecora)

Israel M. Sánchez^{1*}, María Ríos¹, Juan L. Cantalapiedra², Victoria Quiralte¹ y Jorge Morales¹

Palabras Clave: Apéndices craneales, Dromomerycidae, Filogenia, Palaeomerycidae, Ruminantia.

Keywords: Cranial appendages, Dromomerycidae, Palaeomerycidae, Phylogeny, Ruminantia.

The Palaeomerycidae comprised a group of strange-looking three-horned Miocene pecorans that inhabited Eurasia from the latest lower to the upper Miocene (Gentry et al. 1999; Prothero and Litter, 2007). Most of them had the approximate size of a modern common deer. Palaeomerycids displayed a pair of unbranched non-decidual frontal appendages and a usually forked occipital appendage. The frontal ossicones ranged in the different species from cylindrical to flattish in cross-section. The females were apparently hornless and the males sported large sabre-like upper canines. They were first described in the middle Miocene locality of Georgensmünd, Germany (genus *Palaeomeryx*) and also they have been found in Asia (*Palaeomeryx* *tricornis* from China). They were particularly abundant in the middle Miocene of the Iberian Peninsula, displaying a good diversity of forms that were a common component of the Iberian mammalian continental faunas. The phylogenetic affinities of the Palaeomerycidae within the Pecora are not clear, and neither are their definition and diagnosis, highly variable depending on the authors. In this work we accept the diagnosis of palaeomerycids as pecoran ruminants with presence of giraffe-like supra-orbital (frontal) ossicones and a single occipital appendage of apophyseal origin. On the other hand, during the Miocene and the earliest Pliocene another group of deer-sized pecorans also developed a pair of supra-orbital appendages and an elongated supraoccipital area: the North American Dromomerycidae (see Janis and Manning, 1998). Dromomerycids also had their peak diversity during the middle Miocene, and most of them developed a true (and in some cases enormous) occipital appendage. However, contrary to palaeomerycids the occipital appendage of dromomerycids was never forked but simple instead. Also, the supra-orbital appendages, round or oval in cross section, appear to be apophyseal in nature (outgrowths of the frontal bone as e.g. the

antlers of cervids) with no suture visible between the appendage and the skull, contrary to the case of giraffids and palaeomerycids (Bubenik, 1990; IMS obs. pers.). Despite the existence of these differences, there is a continued debate on the subject of dromomerycids being part (or not) of the palaeomerycid lineage (more information about this in Janis and Manning, 1998; Gentry et al. 1999; Prothero and Litter, 2007), mainly due to characters such as the presence in both groups of lacrimal fossa (which is absent in dromomerycids as *Cranioceras*) the purported doubled lacrimal orifice (which in fact is simple in the known palaeomerycids) and their three-horned aspect. Our personal examination of dromomerycid material curated at the American Museum of Natural History (New York) revealed big differences both in the morphological construction of the occipital appendage and in key characters of the postcranial skeleton in this group compared to palaeomerycids. Hence, the hypothesis of a close relationship between the two groups was severely questioned by our data. We are currently finishing a work that deals with the description of a new palaeomerycid from the middle Miocene of Spain and the relationships between the Palaeomerycidae and the Dromomerycidae. In this communication we advance some our results regarding the position of Palaeomerycids and Dromomerycids within the Pecora after testing our hypothesis of a non-direct relationship between the two groups.

We performed a cladistic analysis to test the aforementioned hypothesis, using the TNT software. We chose the tragulid *Hyemoschus* as the outgroup. The matrix was a modified morphological data set from Sánchez et al. (2011) including cranial, dental and postcranial characters. As we intended to test the close relationship postulated between dromomerycids and palaeomerycids we accordingly selected as the ingroup several taxa useful for the test: three palaeomerycids (*Ampelomeryx*,

¹Departamento de Paleobiología, Museo Nacional de Ciencias Naturales-CSIC, C/ José Gutiérrez Abascal, 2, 28006-Madrid (Spain). *Email: micromeryx@gmail.com

²Leibniz-Institut für Evolutions und Biodiversitätsforschung, Museum für Naturkunde, Invalidenstrasse 43, 10115 Berlin, Germany.

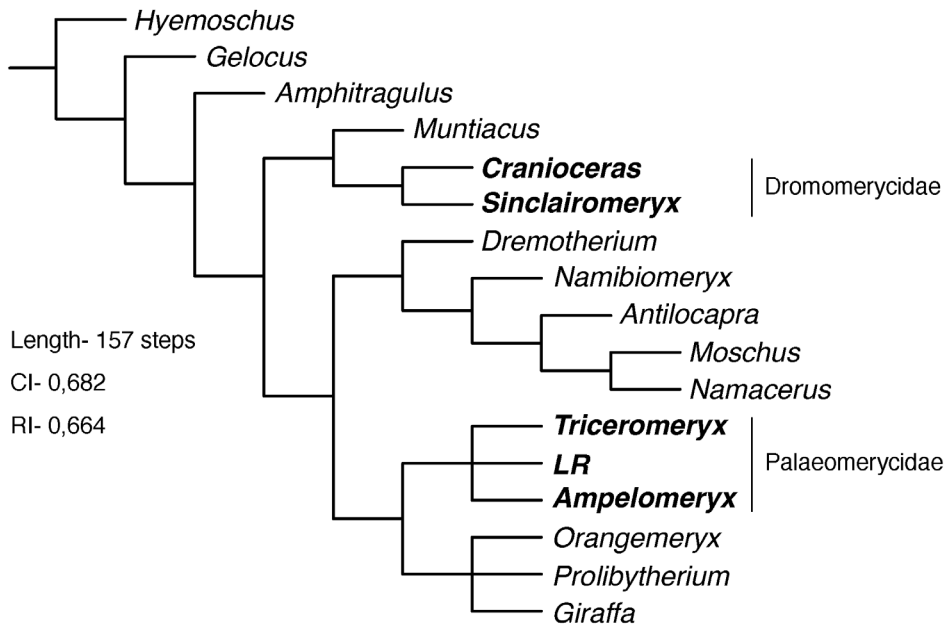


Figure 1. MPT showing the phylogenetic position of palaeomerycids and dromomerycids within the Pecora.

Triceromeryx and the new form from La Retama, dubbed as LR hereafter), two dromomerycids representative of two previously postulated clades within the family (*Sinclairomeryx* and *Cranioceras*; see Janis and Manning, 1998), two basal pecorans (*Gelocus* and *Amphitragulus*), the extant cervid *Muntiacus*, the hornless pecoran *Dremotherium*, the moschid *Moschus*, the basal bovid *Namacerus*, the climacoceratid *Orangemeryx*, the extant giraffid *Giraffa*, the putative giraffoid *Prolibytherium* and the extant antilocaprid *Antilocapra*. In this communication we will only show and discuss the final Most Parsimonious Tree (MPT) and the key characters regarding the main results of the analysis. We performed a run using a traditional search with 1000 replicates and TBR that recovered a MPT of 159 steps (CI=0,686; RI= 0,826) in which dromomerycids cluster as sister group of the Cervidae (represented by *Muntiacus*) whereas palaeomerycids group with giraffoids forming a clade that clusters as the sister group of the monophyletic grouping that contains bovids and antilocaprids (among others).

Our MPT supports our hypothesis of palaeomerycids and dromomerycids not being closely related. In fact, although the complete phylogeny of the Pecora is far from being resolved, it appears from our results that the Cervoida (cervids and pecorans more related to them than to bovids and giraffids) stems as a very particular clade of pecorans well separated from the large monophyletic group that contains bovids and their more related groups for one part, and giraffoids + palaeomerycids for the other. The list of characters that separate apart dromomerycids and cervids from palaeomerycids is extensive, and includes mainly cranial and postcranial features, e.g. presence in non-cervoids of a circular opening between the mastoid and occipital and of a well-marked crest in the lateral margin of the infratemporal fossa, among others; presence in giraffoids + palaeomerycids of several derived cranial features and important

postcranial synapomorphies such as the presence of a well-developed crest in the plantar face of the navicular-cuboid. Also, the Palaeomerycidae are well characterized by the morphology of the occipital appendage and the presence of unique cranial traits in the occipital region. On the other hand, dromomerycids present the synapomorphies typical of cervoids (the cervid-type canal for the common artery in the metatarsal III-IV and the presence of well developed plantar metatarsal tuberosity) and a set of derived features that include a unique type of both frontal and occipital appendages. In fact, one of the main differential features between palaeomerycids and dromomerycids is the origin and morphology of the occipital appendage. Whereas in the former the occipital appendage is formed by the elongation of the nuchal plane, including a deep reconstruction in nuchal morphology that departs extensively from the typical pecoran plan, in the latter the occipital appendage is supraoccipital in origin and does not involve a nuchal reorganization.

Although considered closely related by a number of authors through the years, palaeomerycids and dromomerycids are not closely related, and probably do not pertain even in the same part of the pecoran evolutionary tree. The Eurasian Palaeomerycidae are more closely related with giraffoids, whereas the North American Dromomerycidae are very close to cervids. Thus, their similarities are by far superficial and not synapomorphic.

References

- Bubenik AB (1990) Epigenetical, Morphological, Physiological, and Behavioral Aspects of Evolution of Horns, Pronghorns, and Antlers, in: Bubenik GA and Bubenik AB (Eds.), *Horns, Pronghorns and Antlers*. Springer-Verlag, New York, 3-113.
- Janis CM and Manning E (1998) *Dromomerycidae*, in: Janis CM, Scott KM and Jacobs LL (Eds.), *Evolution of Tertiary Mammals of North America. Volume 1: Terrestrial*

Carnivores, Ungulates and Ungulatelike Mammals.
Cambridge University Press, Cambridge, 477-490.

Gentry AW, Rössner GE, Heizmann EPJ. *Suborder Ruminantia*,
*in: Rössner GE and Heissig K (Eds.), The Miocene Land
Mammals of Europe*. Verlag Dr. Friedrich Pfeil, München,
225-258.

Prothero DR and Lister MR (2007) *Family Palaeomerycidae*,
*in: Prothero DR and Foss SE (Eds.), The Evolution
of Artiodactyls*. The Johns Hopkins University Press,
Baltimore, 241-248.

Sánchez IM, DeMiguel D, Quiralte V and Morales J (2011) The
first known Asian *Hispanomeryx* (Mammalia, Ruminantia,
Pecora). *Journal of Vertebrate Paleontology* 31: 1397-1403.



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