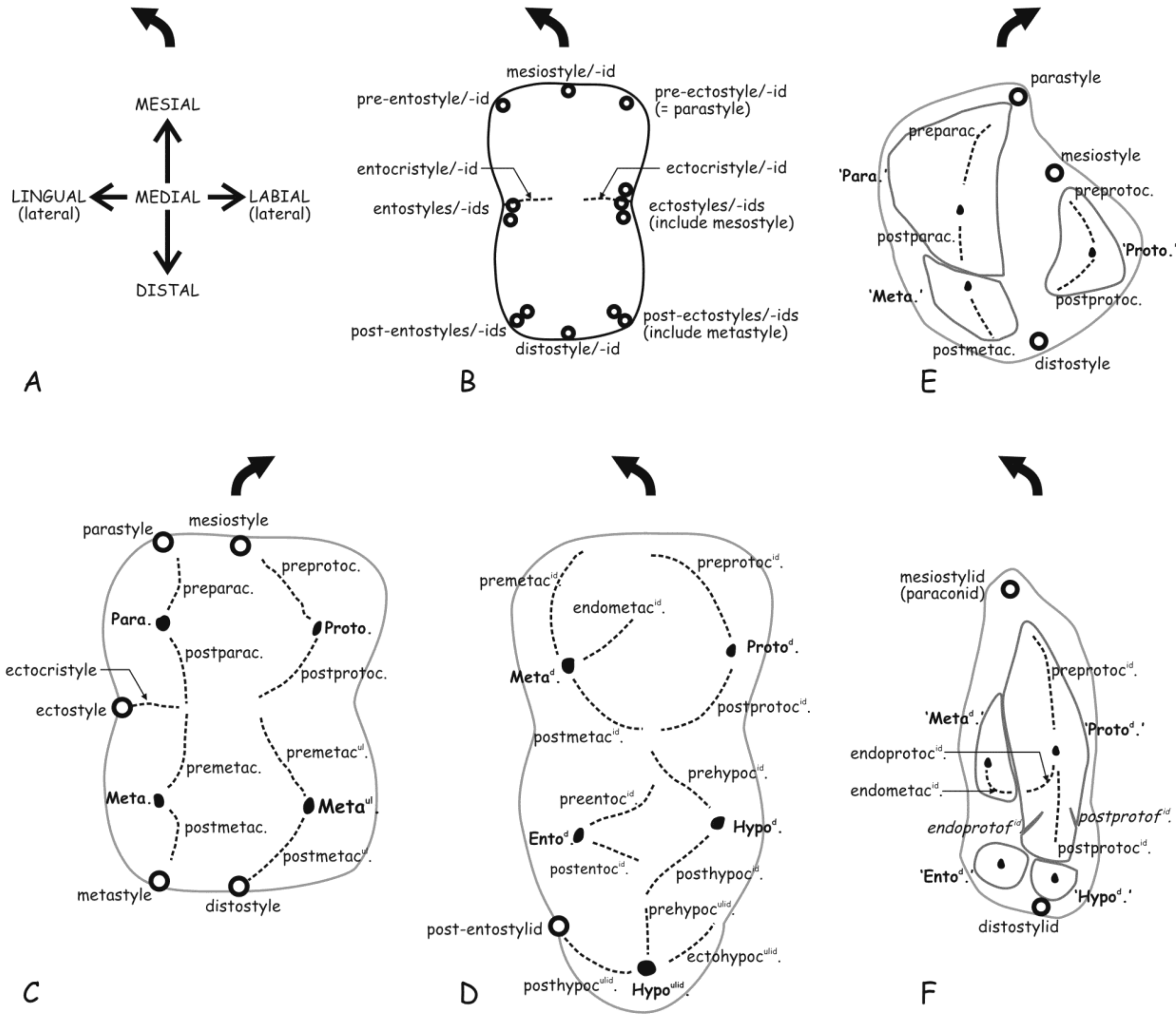
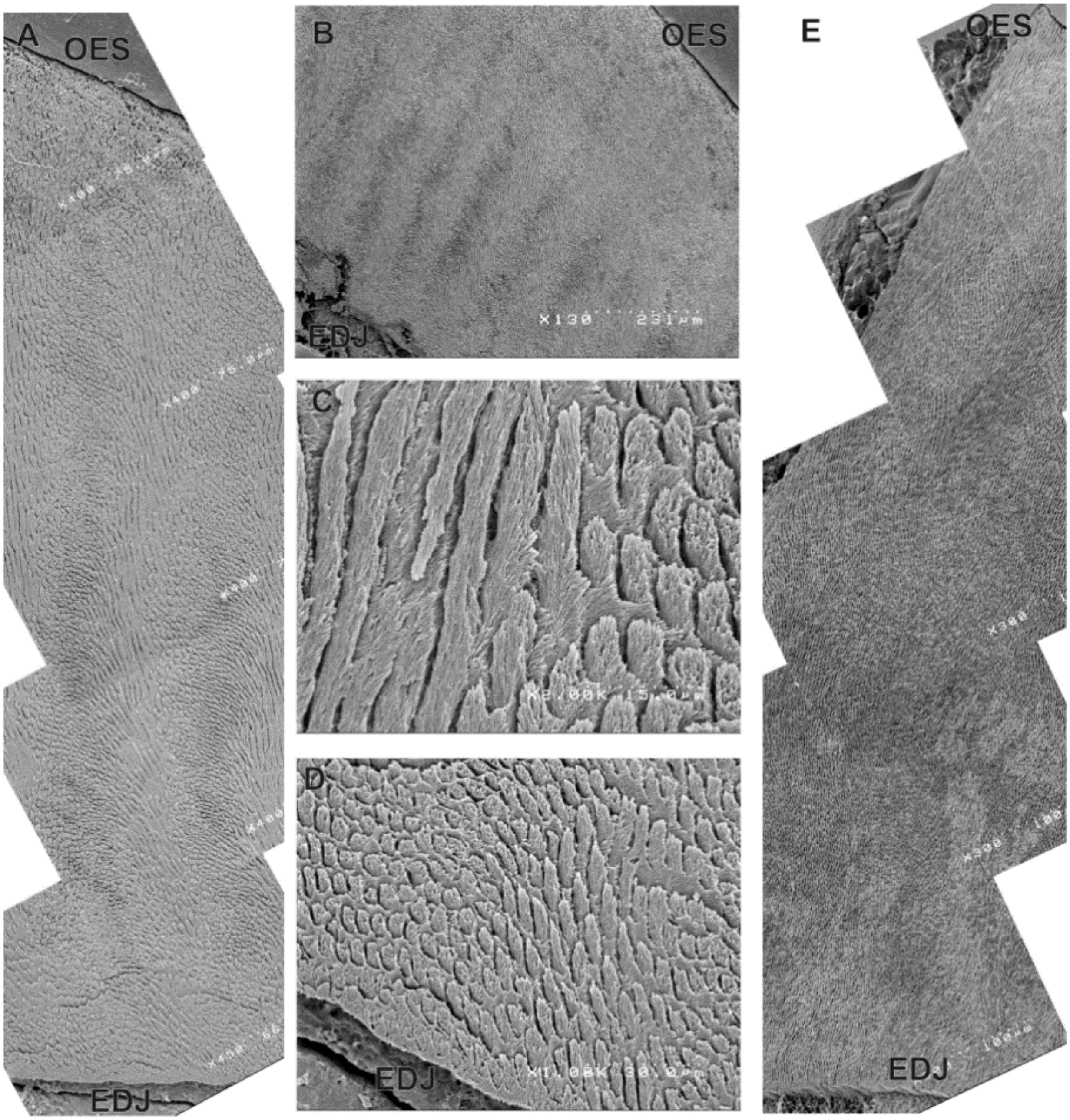
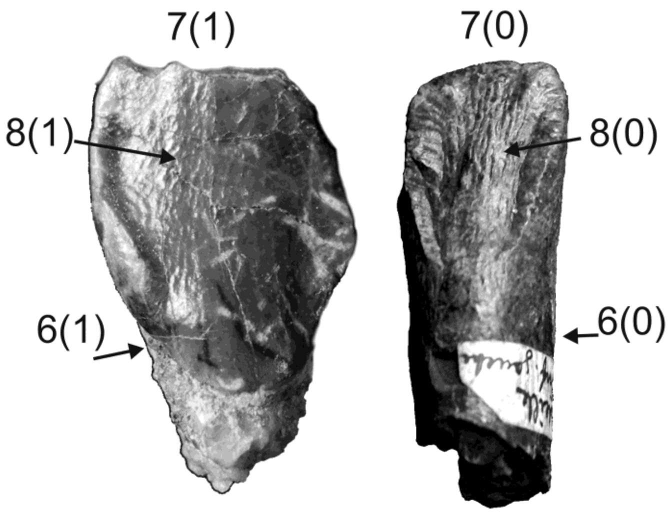
Supplementary Figures



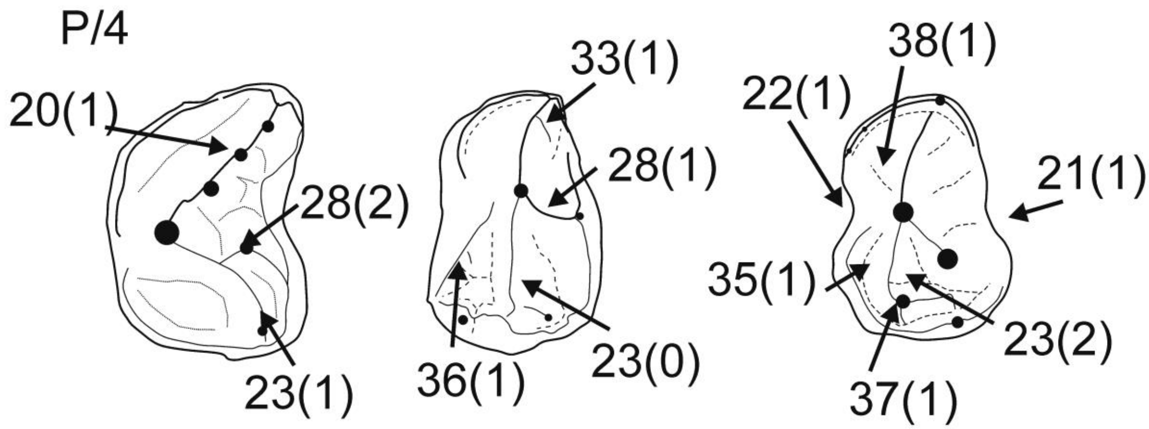
Supplementary Figure 1. Dental Nomenclature. A: tooth orientation; B: stylar structures on molars; C: upper molar; D: lower molar; E: fourth upper premolar; F: fourth lower premolar. Figure from 1.



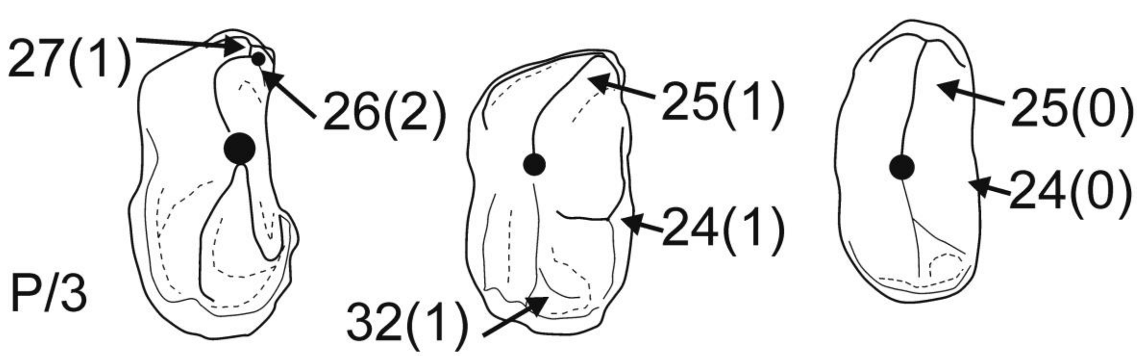
Supplementary Figure 2. Sem images of Enamel Microstructure of a molar of *Epirigenys lokonensis* nov gen nov sp. A. Vertical section composed of five images, scale bar = 70 µm. B. Vertical section from EDJ to OES in one image, scale bar = 231 µm. C details of prisms and interprismatic matrix in HSB area, scale bar = 15 µm. D details of prisms and interprismatic matrix at the EDJ, scale bar = 30 µm. E, Horizontal section composed of five images, scale bar = 100 µm.



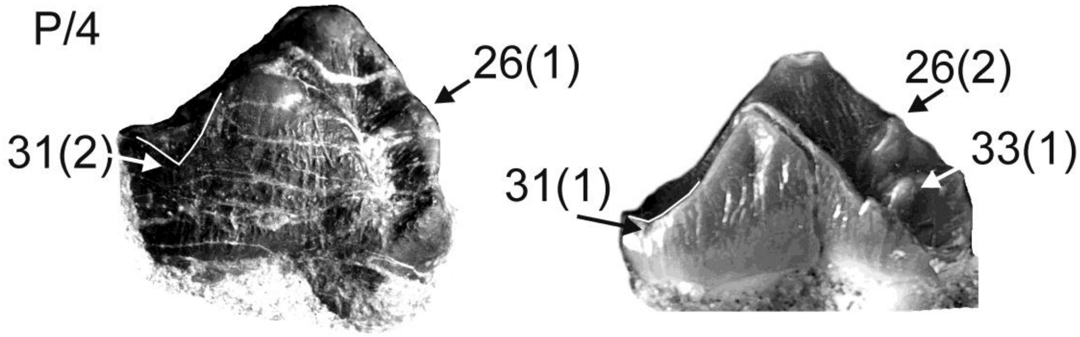
Supplementary Figure 3 . Lower central incisor in lingual view. Right I/1 of *Epirigenys lokonensis* (left) and left I/1 of *Anthracotherium magnum* (right).



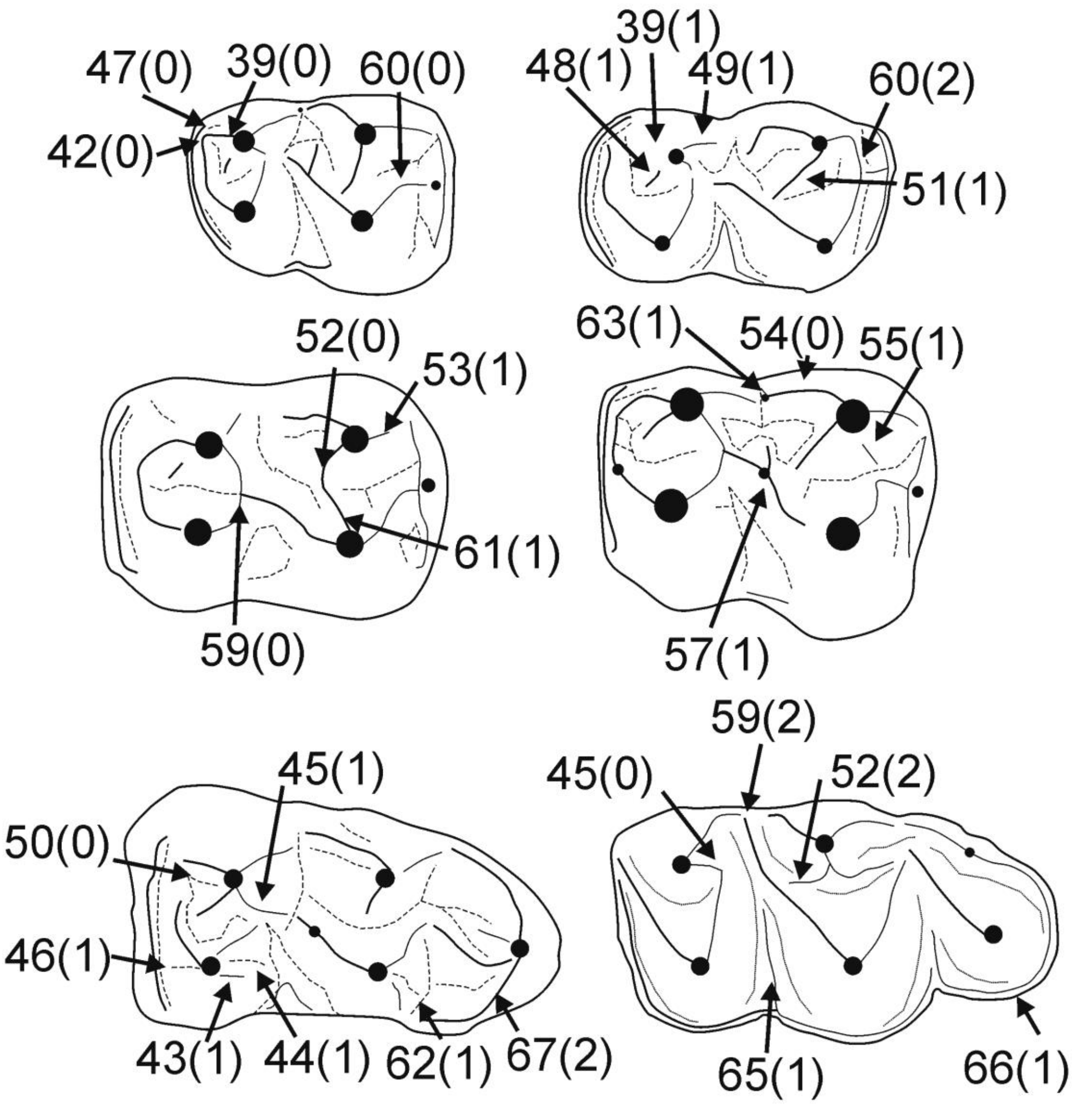
Supplementary Figure 4. Dental occlusal patterns of left P/4. *L. bahri* (left), *E. lokonensis* (central) and *K.coryndonae* (right).



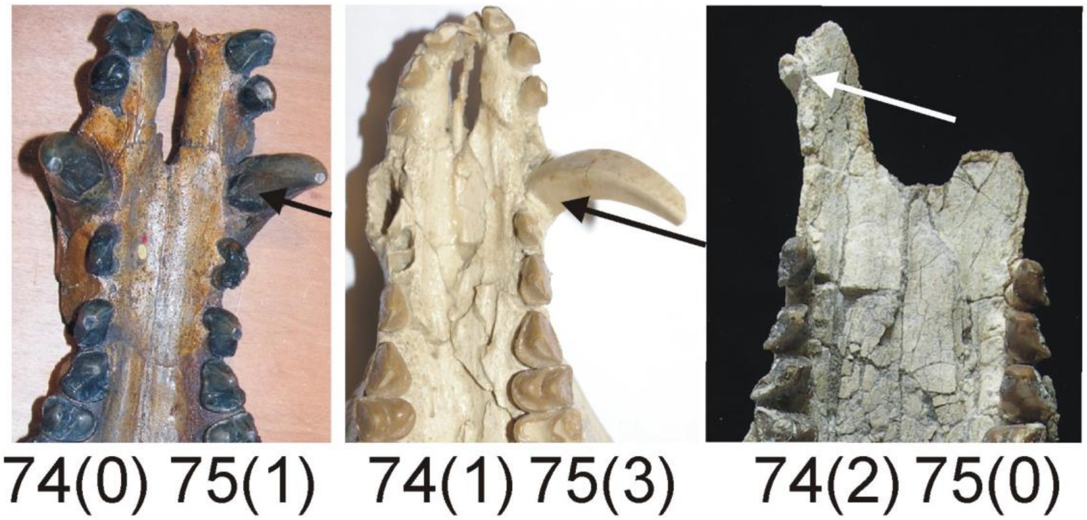
Supplementary Figure 5. Dental occlusal patterns of left P/3. *B.orientalis* (left), *E. lokonensis* (central) and *A. magnum* (right).



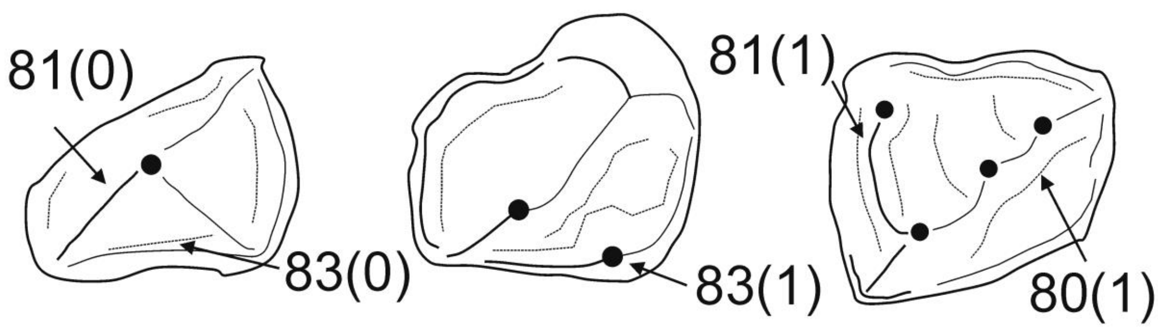
Supplementary Figure 6. Pictures of left P/4 in lingual views. *E. lokonensis* (left) and *B. gorringei* (right).



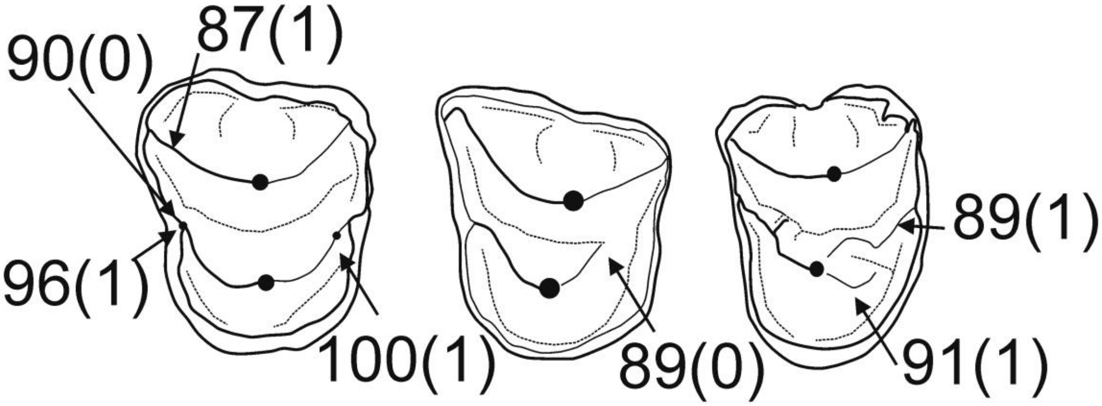
Supplementary Figure 7. Dental occlusal patterns of left lower molars. Left M/2: *E. lokonensis* (Top left), *B. gorringei* (top right), *S. krabiense* (middle left), *A. magnum* (middle right). Left M/3: *M. ugandensis* (bottom left) and *L. bahri* (bottom right)



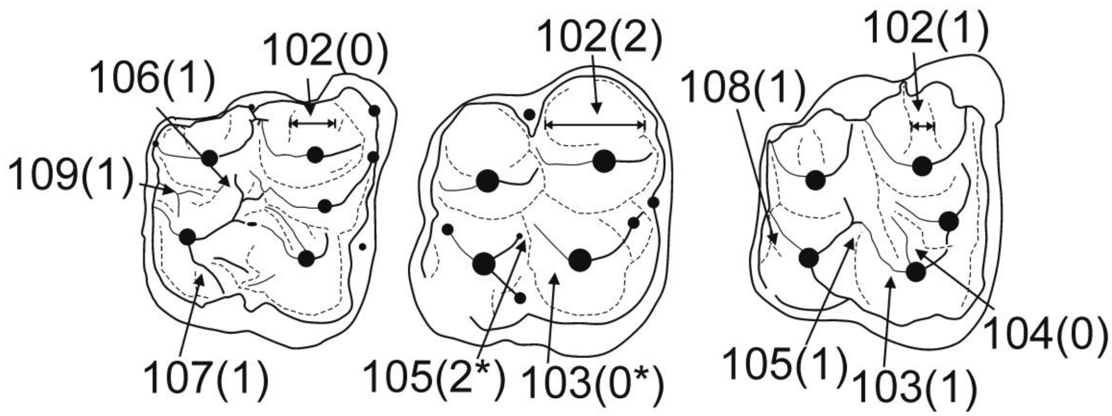
Supplementary Figure 8. Upper canine in palatal views. *Anthracotherium* sp. (left), *M. minimum* (center), *B. fraasi* (right).



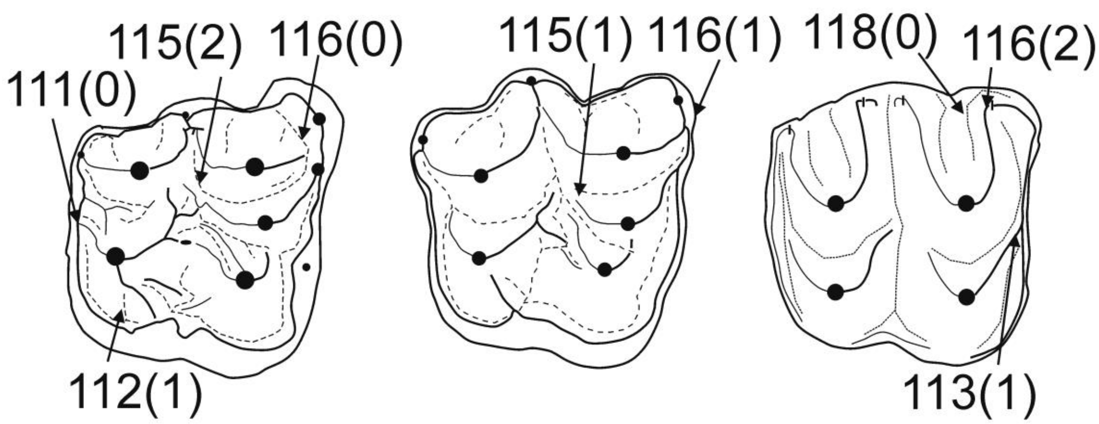
Supplementary Figure 9. Dental occlusal patterns of left P3/. *M. minimum* (left), *Anthracotherium* sp. (center), *M. nanus* (right).



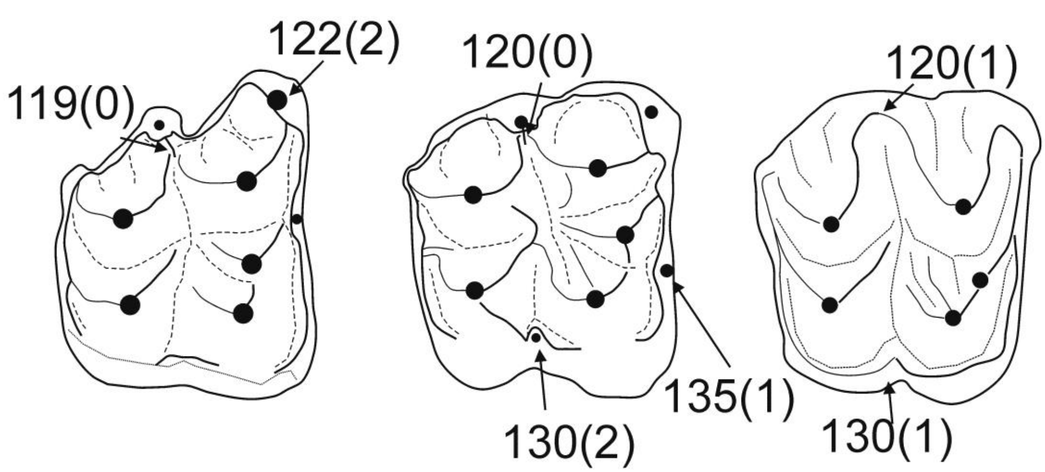
Supplementary Figure 10. Dental occlusal patterns of left P4/. *E. lokonensis* (left), *B. gorringei* (center), *Anthracotherium* sp. (right).



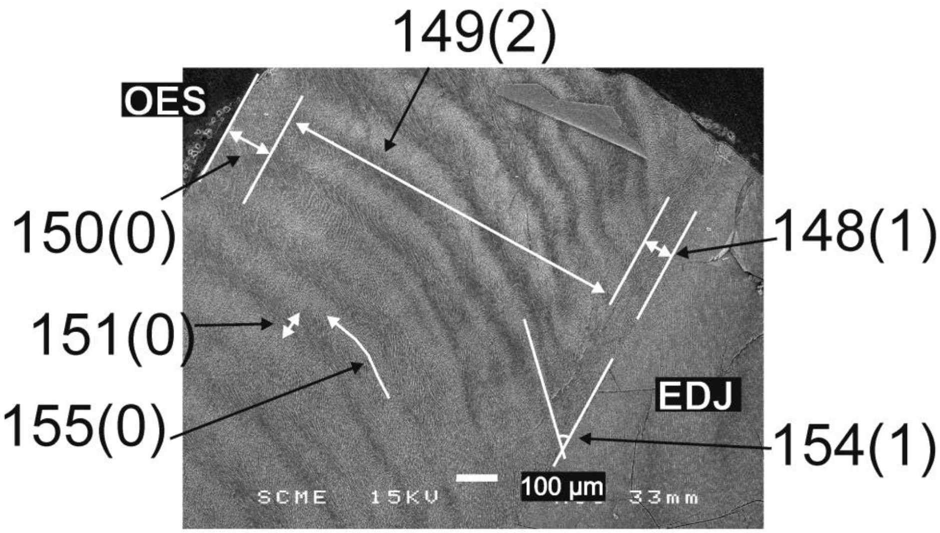
Supplementary Figure 11. Dental occlusal patterns of right M2/. *E. lokonensis* (left), *K. coryndonae* (center), *E. crispus* (right).
* character states used in the cladistic analysis but crest homologies are discussed in the manuscript.



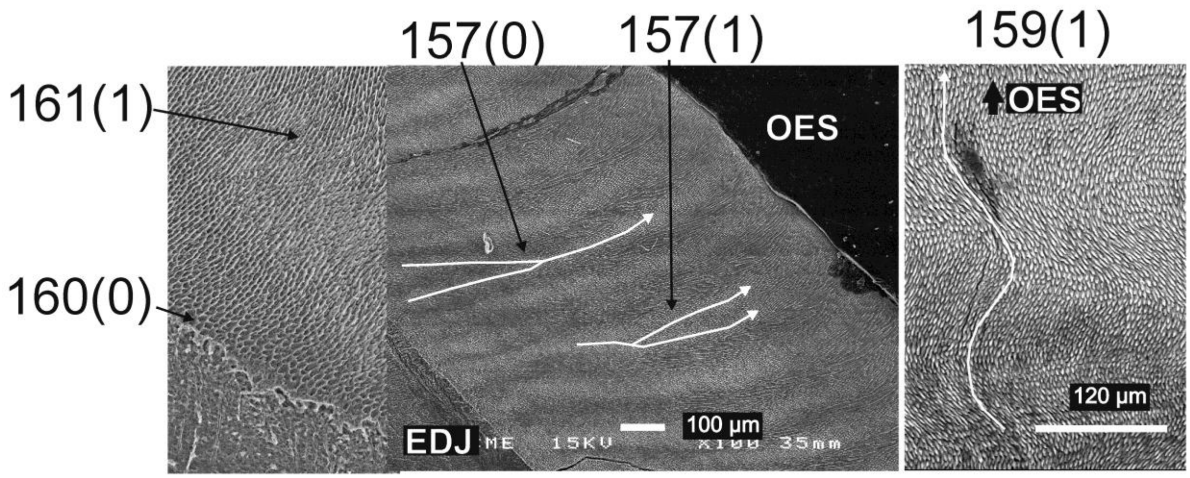
Supplementary Figure 12. Dental occlusal patterns of right M2/ in occlusal views. *E. lokonensis* (left), *B. gorringei* (center), *M. dissimilis* (right).



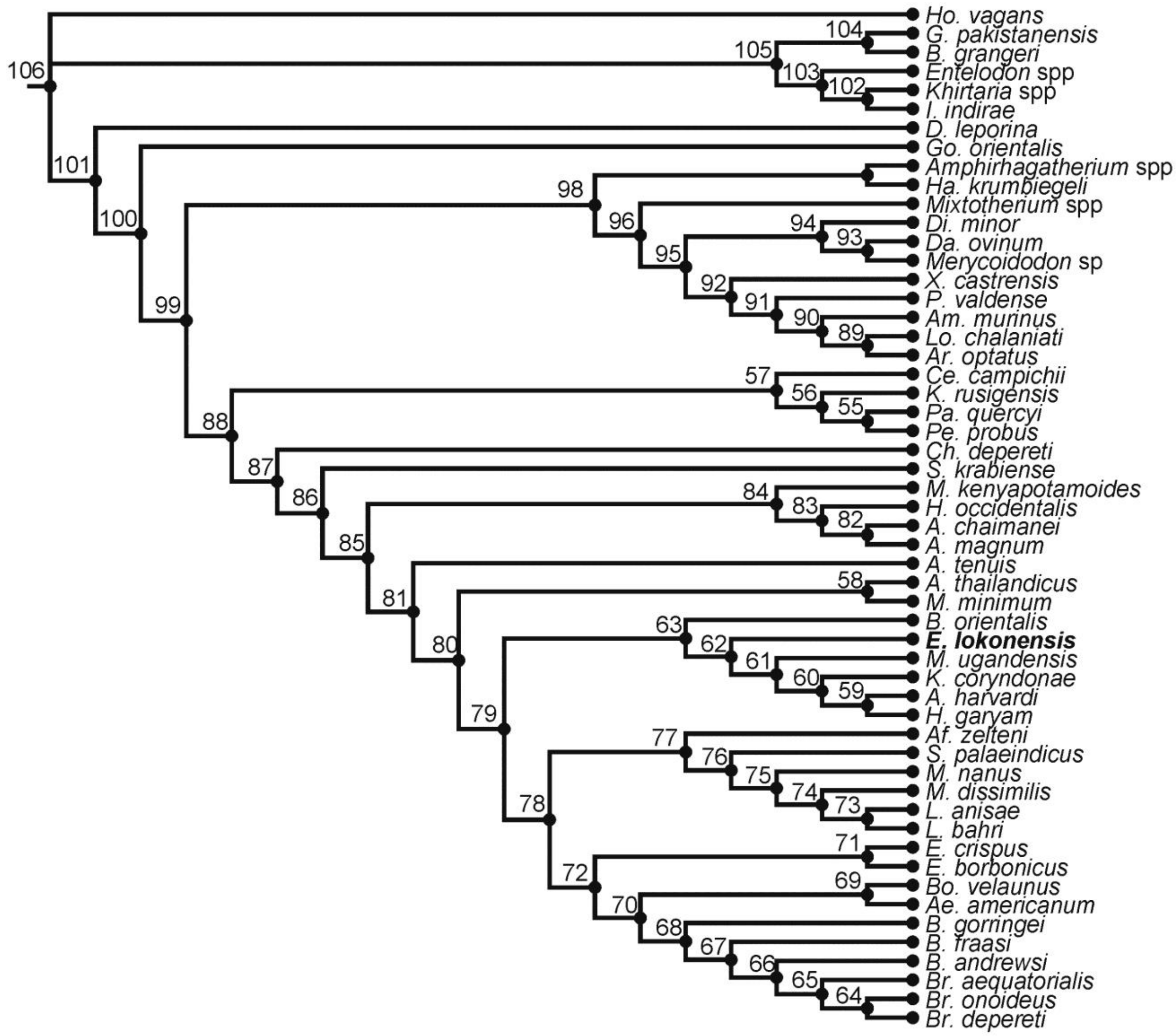
Supplementary Figure 13. Dental occlusal patterns of right M2/ in occlusal views. *B. aequatorialis* (left), *A. magnum* (center), *B. velaunus* (right).



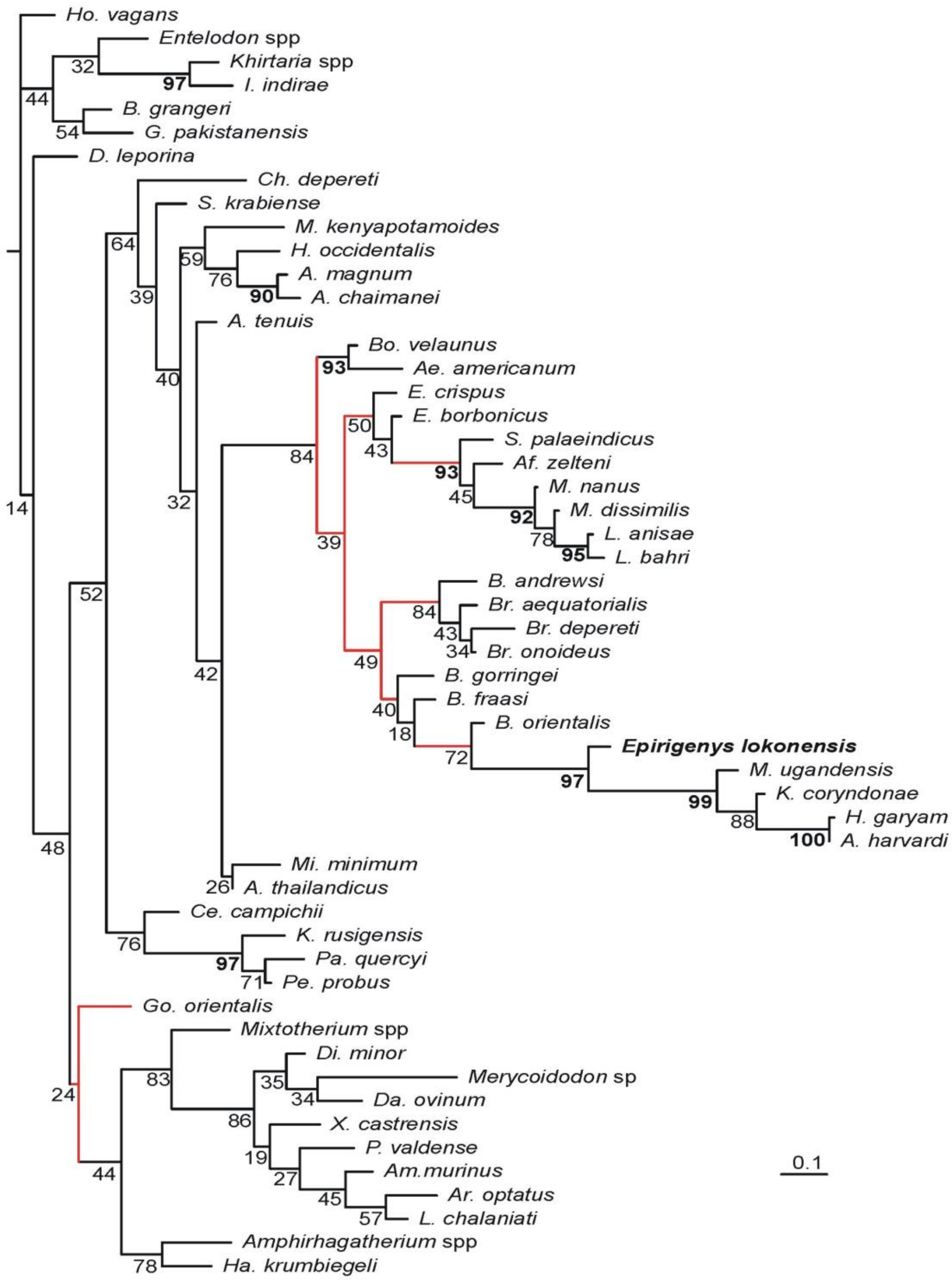
Supplementary Figure 14. Vertical section of molar enamel of *E. borbonicus* (adapted from 2)



Supplementary Figure 15. Left : Detail of vertical section of molar enamel of *B. onoideus* near the EDJ (adapted from 2); center: vertical section of molar of *Doliochoerus quercyi*; right: horizontal section of *Tayassu pecari*



Supplementary Figure 16. Tree 2 obtained by heuristic analysis processed with Paup 4.0 (Tree length = 980, Consistency index (CI) = 0.22, Retention index (RI) = 0.61). Character changes at node are identified in supplementary data 2.



Supplementary Figure 17. Maximum likelihood phylogenetic hypothesis obtained using RaxML8.02. RaxML runs with 1000 bootstraps followed by a maximum-likelihood search. The command used was : raxmlHPC-SSE3 -s EpirigenysML.txt -n EpirigenysML.out -f a -m MULTIGAMMA -K MK -#1000 -p $RANDOM -x $RANDOM. (Shell command to generate a random number). Bootstrap values are given at the node of the tree. Branch lengths are expressed as mean number character state changes per character. The branches in red correspond to differences with the topology resulting from the parcimony analysis. Theses differences are not well supported by the bootstrap analysis or by the bremer analysis on the parcimony trees.

Supplementary Tables

Supplementary Table 1. Dental measurements of teeth of *Epirigenys lokonensis* in mm. Lmd: mesio-distal length; Lll1: labio-lingual length of mesial lobe; Lll2: labio-lingual length of distal lobe.

Specimens	tooth	Lmd	Lll1	Lll2
KNM-LH 58510	M2/	20.2	-	20.8
KNM-LH11650	M3/	22.3	-	-
KNM-LH11633	M2/	18	-	-
KNM-LH11633	M3/	23	-	-
KNM-LH10298	P4/	11	13.6	-
KNM-LH11645	M/1	18	11.8	-
KNM-LH11645	M/2	18.7	-	-
KNM-LH11645	P/4	16.1	12.2	-
KNM-LH47847	M/2	-	11.7	-
KNM-LH30375	M/1	16.1	10.4	11.3
KNM-LH30375	M/2	18.4	11.7	13.5
KNM-LH30375	P/4	15.1	10.3	-
KNM-LH30375	P/3	14.1	7.9	-
KNM-LH11646	M/3	-	-	15.5
KNM-LH11604	M/3	-	17.4	18.5
KNM-LH51633	I/1	7.5	5.8	-

Supplementary Table 2. Compared mean and SD (given when n≥3) of tooth measurement of African Paleogene anthracotheres in mm. Lmd: mesio-distal length; Lll: maximal labio-lingual length. *Bothriogenys* measurements from (3).

Teeth	Measures	*E. lokonensis*	*Bo. gorringei*	*Bo. fraasi*	*Bo. rugulosus*	*Bo. andrewsi*
P4/	Lmd	11	12.1	16.1±0.2	12.4±0.6	
	Lll	13.6	15.8	19.7±0.6	14.8±0.9	
M2/	Lmd	19.1	20.9±0.8	27.2±1.7	20.2±2	29.5
	Lll		23.7±1.5	28.5±1	21.1±1.9	30.8
M3/	Lmd	22.6	23.5	30.9±0.5	22.6±3	
	Lll		25.2	33.1±0.8	22.8±2.5	
P/3	Lmd	14.1	16.7±1.3	17.2	12.5	
	Lll	7.9	9.4±1.8	10.2	7.8	
P/4	Lmd	15.6	17.3±1.4	21.2	14.6	
	Lll	11.2	10.3±1.4	11.6	8.4	
M/1	Lmd	17	17.2±1.2	18.3±1.3	11.3	
	Lll	11.3	10.8±1	11.1±1.3		
M/2	Lmd	18.5	20.1±1.6	22.4±0.9	16.7±1.1	
	Lll	13.5	13.2±1.4	14.5±0.9	11.3±0.7	

Supplementary Table 3. Weight estimation in kg from M/1 measurements based on regression equation of ungulates in (4).

Methods	*E. lokonensis*	*Bo. gorringei*	*Bo. fraasi*	*Bo. rugulosus*
All ungulates M/1 area	97.7	102.2±24	111.6±22.4	
log Mass = 1.5(log M/1 area) + 1.6	(n=1)	(n=10)	(n=4)	
Non selenodont M/1 length	73.4-104.5	91.4±19.8	111.4±27.2	23.9
log Mass = 3.17(log M/1 lenght) + 1.04	(n=2)	(n=13)	(n=5)	(n=1)
Non selenodont M/1 area	71.2	74.5±18.1	81.4±16.4	
log Mass = 1.51(log M/1 area) + 1.44	(n=1)	(n=10)	(n=4)	

Supplementary Note 1

Dental nomenclature, from Boisserie et al. 2010, Zool. J. Linn. Soc. (1).

The nomenclature used here was built on classical dental serial homologies. The work of Hershkovitz (5) was a major source for defining homologous structures and naming them, but other sources were also considered (6-10). These works emphasized dental structures that are expressed as reliefs on tooth crowns. Structures expressed as depressions, in particular groove systems, were also demonstrated to be important features of tooth morphology (see notably Hünermann and Orliac works on suoids (11-13)). Grooves are often more resistant to wear than salient structures, and the presence of grooves is not dependent on that of crests (and vice versa). Therefore, both systems (relief- and depression-based) are viewed here as fully complementary and were integrated in the proposed nomenclature. On this ground, two steps were necessary to establish a congruent terminology: 1) naming and defining the common structures appearing on all tooth crowns; 2) naming and defining particular cusps/-ids and their elements. Tooth orientation terminology used in this work (Supplementary figure 1) follows recommendations formulated by Smith & Dodson (14).

Definitions

Terminology for basic structures

Ambiguity appears at a first level in dental nomenclature: that of basic crown structures. Cusps/-ids and cingula/-ids have a universal meaning and do not need particular definitions, but this is not the case for other structures including accessory cusps/-ids, crests, lobes, grooves, valleys, and basins. They have been used differently for different groups, and there was a need to adopt clear definitions.

Style/-id. A marked eminence of the cingulum/-id, sometimes developed as a distinct 'cusplet' (for exaggerated development, see parastyles of the anthracotheriid *Brachyodus*). Supplementary figure 1 illustrates the usual positions and names of styles/-ids.

Cristyles/-ids. Elongated invaginations of the cingula/-ids extending in the transverse valley (ectocristyle/-id on labial side, ectocristyle/-id on lingual side; Supplementary figure 1).

Valleys. On molars, the sagittal valley separates lingual and labial cusps/-ids, whereas the transverse valley separates mesial and distal cusps/-ids. When they are particularly wide, they can be called "basins".

Crista/-id. An elongated structure of approximate apico-basal direction on cusps/ids. When unworn, cristae/-ids can be marked by a salient ridge (*e.g.*, in Hippopotaminae) or smooth with no ridge at all, (*e.g.*, in Suidae). Smooth cristae/-ids are often termed as 'lobes', a name which is avoided here, as it is often not possible to differentiate a salient ridge from a lobe on worn teeth. Cristae/-ids that appear on cusps/-ids but that are not identifiable to a major crista, are particularly reduced and/or not directed toward the apex are referred to as "accessory cristae/-ids".

Conule/-id. A cusp/-id secondarily developed on a crista/-id.

Fossa/-id. An elongated groove of approximate apico-basal direction on cusps/-ids. Fossae/-ids can be wide or narrow, deep or shallow (*e.g.*, wide and deep in hippopotamids; narrow and deep in suids; shallow and narrow in paleochoeres). Fossae/-ids can emphasize smooth cristae/-ids. The fossae/-ids that partially isolate a conule/-id from its cusp/-id are called accessory fossae/-ids (they are not directed toward the cusp/-id apex). When these accessory fossae/-ids coalesce and completely isolate the conule/-id, the resulting fossa/-id is termed "transverse fossa/-id".

Remark 1. A crista/-id can be identified without fossa/-id if it: (1) is marked by a salient ridge; (2) constitutes a clear elongation of the cusp (but in that case, wide and shallow fossae/-ids often accompany the elongation). Similarly, a fossa/id can appear without clear association to a salient ridge or to a distinct cusp elongation – this is notably seen in suoids. For these reasons, both networks of fossae/-ids and cristae/-ids need to be considered when describing teeth.

Remark 2. Salient ridges can appear on the side of fossae/-ids, especially on upper molars (*e.g.*, lingually to a postprotofossa, see protocone on Fig. I of online supplementary material) without being central to a 'lobe'. These ridges, sometimes termed as 'ribs', if salient, are considered as cristae/ids not immediately followed by another fossa/id.

Definitions for molar cusps/-ids and their structures

Cusp/-id nomenclature used here (see Supplementary figure 1) mainly follows the Cope-Osbornian theory for homology of mammalian teeth as reviewed and revised by Hershkovitz (2). In the families studied here, the four main molar cusps/-ids are: paracone, protocone, metacone, and metaconule on upper molars (there is no true hypocone, which is defined as a cusp originating from the cingulum and not part of the trigon); protoconid, metaconid, hypoconid, and entoconid on lower molars. The fifth distal cusp appearing on M^3 received various names (*e.g.*, 'distal median cusp', 'talon', 'terminal pillar', 'pentacone'). It originates from the cingulum and is most likely homologous to the distostyle (2). When it is strongly developed, as in many suids, we propose to name it "distocone". A similar cuspid on M_3, present in all studied families, is also of cingular origin and homologous to the distostylid, but the name hypoconulid is preferred to distoconid because it has been extensively used in literature.

The proposed definitions of cusp/-id primary structures were first based on homology as indicated by Hershkovitz (2). Homologies were tentatively identified by using the principle of connexion and historical criteria for features with well-known evolution within families. They principally concern pre- and postcristae/-ids (and their conules/-ids), styles/stylids, and cingulum/-ids (see Supplementary figure 1). Because they may be applied to structures of quite different shape and relations between different groups (especially when not all structures are present or recognizable, such as reduced styles/stylids), homologies have sometimes been difficult to recognize. In these cases, most parsimonious interpretations were systematically favoured.

Additional structures, often more variable and considered as secondarily evolved, were identified following their position relatively to the primary structures. These secondary structures are not a priori smaller and/or less extended than primary ones. The homology of secondary structures is essentially based on topographic and parsimony criteria.

Preprotocrista. Crista of the protocone that joins the mesiostyle on the mesial cingulum. The mesiostyle can be absent or indistinguishable from the parastyle, so the junction to the mesial cingulum remains the principal criterion to define the preprotocrista.

Postprotocrista. Crista of the protocone that reaches the center of the tooth (disto-labial orientation) and often extends towards the premetacristule.

Paraconule. Conule developed on the preprotocrista. This term is preferred to that of 'preprotoconule' because of its generalized use in literature. The paraconule may develop its own network of cristae and fossae: the preparacristule joins the cingulum; the posparacristule is directed medially; the ectoparacristule joins the protocone (preprotocrista).

Premetacristule. Crista of the metaconule that reaches the center of the tooth (mesio-labial orientation) and often extends towards the postprotocrista.

Postmetacristule. Crista of the metaconule that joins the distostyle of the distal cingulum. The distostyle can be absent or indistinguishable from the metastyle, so the junction to the distal cingulum remains the principal criterion to define the postmetacristule.

Preparacrista. Crista of the paracone that joins the parastyle on the mesial cingulum (see preprotocrista for comments).

Postparacrista. Crista of the paracone that joins the premetacrista and may extends toward the ectostyle (mesostyle).

Premetacrista. Crista of the metacone that joins the postparacrista and may extends toward the ectostyle (mesostyle). The conule sometimes developed on the premetacrista is called centroconule in order to avoid confusion with that of the premetacristule.

Postmetacrista. Crista of the metacone that joins the metastyle (see postmetacristule for comments).

Preprotocristid. Cristid of the protoconid that is directed lingually and parallel to the mesial cingulid. It can join the cingulid or the premetacristid.

Postprotocristid. Cristid of the protoconid that is directed disto-lingually and joins the postmetacristid.

Premetacristid. Cristid of the metaconid directed toward the lingual extremity of the mesial cingulid. It can extend labially to join the preprotocristid.

Endometacristid. Cristid of the metaconid directed labially toward the preprotocristid. The endometacristid generally joins the preprotocristid on its lingual wall.

Postmetacristid. Cristid of the metaconid that is directed disto-labially and joins the postprotocristid.

Preentocristid. Cristid of the entoconid that is directed mesio-labially and joins the lingual wall of the prehypocristid or the endohypocristid.

Postentocristid. Cristid of the entoconid that is directed disto-labially and joins the posthypocristid on its lingual wall or in convergence toward the distostylid.

Prehypocristid. Cristid of the hypoconid that is directed mesio-lingually and generally joining the postmeta- and/or postprotocristids. A conulid may develop on this cristid. It is named mesoconulid instead of prehypoconulid, the latter being used for the M_3 prehypocristulid (=distoconid) only.

Posthypocristid. Cristid of the hypoconid that joins the distostylid (the prehypocristulid on M_3s).

Prehypocristulid. Cristid of the M_3 hypoconulid that joins the posthypocristid. A prehypoconulid may develop on the prehypocristulid.

Posthypocristulid. Cristid of the M_3 hypoconulid that joins the lingual cingulid and, if present, the postentostylids.

Ectohypocristulid. Cristid of the M_3 hypoconulid that develops on the lingual wall. It can join the apex or the prehypocristulid lingually, and probably originates labially from the postectostylids.

Ectocristae/-ids. Cristae/-ids lateral to the precrista/-id and positioned in the mesial half of the cusp/-id.

Postectocristae/-ids. Cristae/-ids lateral to the postcrista/-id and positioned in the distal half of the cusp/-id.

Endocristae/-ids. Cristae/-ids on the median wall, between the precrista/-id and the postcrista/-id.

Fossae/-ids. They adopt the name of the crista/-id placed immediately mesio-medially to it.

Definitions for premolar cusps/-ids and their structures

The same cusp/-id terminology was used for premolars. However, it must be stressed that premolar and molar cusps/-ids bearing the same name are not necessarily homologous. Terms used to designate premolar cusps/-ids are here essentially attributed on the base of general position on the tooth (e.g., the “protocone” on P^3). Principal identifiable structures are illustrated on Supplementary figure 1.

Supplementary Note 2

Isolated dental remains assignement to *Epirigenys lokonensis* nov gen nov sp

As noted in the material list we identified in Lokone localities two lower jaws with partial dental row that allow us to be confident in the allocation of lower premolars and lower molars to a single taxon (size and unusual morphology for a bothriodontine). Then we referred isolated upper molars to this taxon on the basis of their size compatibility (notably occlusion) and the equivalent presence of short crests, thick enamel, compatible wear facets and a general bulbous and massive aspect. We then added an upper P4/ to this hypodygm due to the same criterions. A lower incisor is highly compatible with this taxon if we refer to what is known in other African Paleogene anthracotheres.

When several species of anthracotheres are present in a single locality, we always observed a lack of size overlapping and clear occlusal pattern differences, which is not the case in Lokone fossiliferous localities.

Supplementary Note 3

Description of enamel microstructure (supplementary figure 2)

On the measured vertical section, enamel is 862-934 µm thick. The Schmelzmuster can be regarded as bi-zonal due to the very little development of inner radial enamel (4.6 %) as in *Brachyodus* and *Kenyapotamus* (Alloing-Séguier *et al.*, 2014). Therefore the Schmelzmuster is almost exclusively represented by HSB zone (~86.6 %) and little outer radial enamel (8.8%) a condition similar to *Elomeryx*, *Brachyodus* and *Kenyapotamus*. Most of the bands appear thin (near 50 µm) and of regular aspect which is an early bothriodontine condition. They are slightly bent in the inner third of the enamel thickness, rising at an angle of 65-70°with the EDJ, a pattern shared by *Bothriogenys* and *Kenyapotamus*. On horizontal sections, there is only radial enamel with three synchronous prism undulations in the inner two third of enamel thickness, which is a condition more similar to that of *Brachyodus* and *Kenyapotamus* than to other Bothriodontinae. Prisms angle with EDJ at ~45 ° which is a characteristic of bothriodontines and hippopotamids. IPM forms inter-row sheets in the HSB zone as in most bothriodontines and hippopotamids. They lack IS in the inner portion of enamel thickness for which we only observed closed coats. This pattern differs from that of *Kenyapotamus* and recalls that of *Bothriogenys*.

Supplementary Methods

I List of Taxa included in the phylogenetic analysis.

Abbreviations for repository institutions

AMNH	American Museum of Natural History, New York, USA
CNAR	Centre National d'Appui à la Recherche, Ndjamena, Chad
CROZ	Musée Crozatier, Le Puy-en-Velay, France
DMR	Department of Mineral Resources, Bangkok, Thailand
FSL	Collection de la Faculté de Sciences de Lyon
GSP	Geological Survey of Pakistan, Museum of Natural History in Islamabad, Pakistan
MNHN	Muséum National d'Histoire Naturelle, Paris, France
NHM	Natural History Museum, London, UK
NMK	National Museums of Kenya, Nairobi, Kenya
PMH	Peabody Museum, Harvard University, USA
UM2	Université de Montpellier 2, Montpellier, France
UNM	Uganda National Museum, Uganda
SMNS	Staatliches Museum für Naturkunde Stuttgart
YU	Yangon University, Department of Geology

HIPPOPOTAMOIDEA Gray, 1821 sensu Gentry & Hooker (7)

Hippopotamidae Gray, 1821

Kenyapotamus coryndonae Pickford, 1983

- Temporal and geographical distribution
  Late Miocene; eastern Africa
- Origin of examined material
  - Nakali Formation, Kenya (NMK)
  - Namurumgule Formation, Samburu Hills, Kenya (NMK)
  - Ngeringerowa, Ngorora Formation, Kenya (NMK)
- References: (1, 15-18)

Archaeopotamus harvardi (Coryndon, 1977)

- Temporal and geographical distribution
  Late Miocene; eastern Africa
- Origin of examined material
  - Nawata Formation, Lothagam, Kenya (NMK)
- References: (19-20)

Hexaprotodon garyam Boisserie *et al.*, 2005

- Temporal and geographical distribution
  Late Miocene; central Africa
- Origin of examined material
  - Anthracotheriid Unit, Toros-Ménalla, Chad (CNAR)
- References: (21)

Morotochoerus ugandensis Pickford, 1998

- Temporal and geographical distribution
  Early Miocene; eastern Africa
- Origin of examined material
  - Moroto, Uganda (UNM)
- References: (22-24)

"Anthracotheriidae" Leidy, 1869

Siamotherium krabiense Suteethorn *et al.*, 1988

- Temporal and geographical distribution
  Late middle and late Eocene; southeastern Asia
- Origin of examined material
  - Krabi Basin, Thailand (DMR, cast at UM2)
- References: (25-27)

Heptacodon occidentalis (Osborn and Wortman, 1894)

- Temporal and geographical distribution
  early Oligocene, North America
- Origin of examined material
  - South Dakota, USA (AMNH)
- References: (28-29)

Anthracotherium chaimanei Ducrocq 1999

- Temporal and geographical distribution
  Late Eocene, southeastern Asia
- Origin of examined material
  - Krabi Basin, Thailand (DMR, cast in UM2)
- References: (27)

Anthracotherium magnum Cuvier, 1822

- Temporal and geographical distribution

Early late Oligocene, Europe

- Origin of examined material
  - Cadibona, Italy (NHM)
  - Digoin, France (cast at UM2)
  - Moissac, France (cast at UM2)
  - Phosphorites du Quercy, France (MNHN, cast at UM2)
- References: (30-32)

Myaingtherium kenyapotamoides Tsubamoto et al. 2011

- Temporal and geographical distribution
  Late middle Eocene, Asia
- Origin of examined material
  - Pondaung formation, Myanmar (YU)
- References: (33)

Anthracokeryx tenuis Pilgrim and Cotter, 1916

- Temporal and geographical distribution
  Late middle Eocene, Asia
- Origin of examined material
  - Pondaung formation, Myanmar (AMNH)
- References: (32, 34)

Anthracokeryx thailandicus Ducrocq, 1999

- Temporal and geographical distribution
  Late Eocene, southeastern Asia
- Origin of examined material
  - Krabi Basin, Thailand (DMR, cast at UM2)
- References: (27, 35)

Microbunodon minimum Cuvier, 1822

- Temporal and geographical distribution
  Late Oligocene, Europe
- Origin of examined material
  - La Milloque, France (cast at UM2)
- References: References: (35-36)

Bothriogenys orientalis Ducrocq, 1997

- Temporal and geographical distribution
  Late Eocene, southeastern Asia
- Origin of examined material
  - Krabi Basin, Thailand (DMR, cast at UM2)
- References: (3, 27)

Bothriogenys fraasi (Schmidt, 1913)

- Temporal and geographical distribution
  Early Oligocene, northern Africa
- Origin of examined material
  - Jebel Quatrani fm., Fayum, Egypt (SMNS, NHM)
- References: (3, 37-38)

Bothriogenys andrewsi (Schmidt, 1913)

- Temporal and geographical distribution
  Early Oligocene, northern Africa
- Origin of examined material
  - Jebel Quatrani fm., Fayum, Egypt (SMNS, NHM)
- References: (3, 37-38)

Bothriogenys gorringei (Andrews and Beadnell, 1902)
- Temporal and geographical distribution
  Early Oligocene, northern Africa
- Origin of examined material
  - Jebel Quatrani fm., Fayum, Egypt (AMNH, SMNS, NHM)
- References: (3, 37-38)

Brachyodus aequatorialis Mc Innes 1951
- Temporal and geographical distribution
  Early Miocene, Eastern Africa
- Origin of examined material
  - Rusinga, Kenya (NMK)
- References: (38-40)

Brachyodus onoideus (Gervais, 1859)
- Temporal and geographical distribution
  Early Miocene, Western Europe
- Origin of examined material
  - Chilleur au bois, France (NHM, MHN, UM2)
- References: (40)

Brachyodus depereti (Fourteau, 1918)
- Temporal and geographical distribution
  Early Miocene, Northern Africa
- Origin of examined material
  - Moghara, Egypt (cast in NHM)
- References: (40-41)

Bothriodon velaunus (Von Meyer, 1832)
- Temporal and geographical distribution
  Early Oligocene, Western Europe
- Origin of examined material
  - Ronzon, France (CROZ, NHM, UM2)
- References: (32)

Aepinacodon americanum (Leidy, 1856)
- Temporal and geographical distribution
  Late Eocene-early Oligocene, Northern America
- Origin of examined material
  - South Dakota, USA (AMNH)
- References: (29, 32)

Elomeryx crispus (Gervais, 1849)
- Temporal and geographical distribution
  Late Eocene-early Oligocene, Europe
- Origin of examined material
  - Detan Dverce, Czech Republic (cast at UM2)
- References: (32, 42-43)

Elomeryx borbonicus (Geais, 1934)
- Temporal and geographical distribution
  Late Oligocene and early Miocene, Western Europe
- Origin of examined material
  - Saint Henri, France (AMNH, NHM, FSL, UM2)
- References: (42-45).

Afromeryx zelteni Pickford, 1991
- Temporal and geographical distribution
  Early Miocene, Africa
- Origin of examined material
  - Gebel Zelten, Libya (NHM)
  - Baragoï, Buluk, Ombo, Nabwal Hill (NMK)
- References: (41)

Sivameryx palaeindicus (Lydekker, 1877)
- Temporal and geographical distribution
  Early Miocene, Indian subcontinent
- Origin of examined material
  - Sind, Pakistan (PMH, GSP)
  - Kamlial fm. Potwar plateau, Pakistan (PMH, GSP)
  - Bugti, Pakistan (NHM, AMNH)

- References: (46)

Merycopotamus nanus Falconer, 1868
- Temporal and geographical distribution
  Middle Miocene; Indian subcontinent
- Origin of examined material
  - Potwar plateau, Chinji formation, Pakistan (HPM, NHM, AMNH)
- References: (47)

Merycopotamus dissimilis (Falconer and Cautley, 1837)
- Temporal and geographical distribution
  Late Miocene-Pliocene; Indian subcontinent
- Origin of examined material
  - Pakistan, India, Myanmar, Nepal, Indonesia (AMNH, PMH, GSP, NHM)
- References: (47)

Libycosaurus anisae (Black, 1972)
- Temporal and geographical distribution
  Late Miocene; central and northern Africa
- Origin of examined material
  - Beglia formation, Bled Douarah (ONM)
- References: (41, 48-50)

Libycosaurus bahri Lihoreau et al. 2014
- Temporal and geographical distribution
  Late Miocene; central and northern Africa
- Origin of examined material
  - Anthracotheriid Unit, Toros-Ménalla (CNAR)
- References: (38, 41, 50-52)

SUOIDEA Gray, 1821

Palaeochoeridae Matthew, 1924

Palaeochoerus quercyi (Filhol, 1882) (=*Doliochoerus quercyi*)
- Temporal and geographical distribution
  Late Oligocene; western Europe
- Origin of examined material
  - Pech Desse, Quercy, France (UM2)
  - Pech de Fraysse, Quercy, France (UM2)

• References: (53-54)

Tayassuidae Palmer, 18971
Perchoerus probus Leidy, 1869
• Temporal and geographical distribution
Late Eocene-Early Miocene – North America
References: (55-56)

Suidae Gray, 1821
*Kenyasus rusingensis*Pickford 1986
• Temporal and geographical distribution
Early Miocene - Africa
• Origin of examined material
- Rusinga, Kenya (NMK)
• References: (55-56)

RUMINANTIA
Lophiomerycidae Janis, 1987
Lophiomeryx chalaniati Pomel, 1854
• Temporal and geographical distribution
Oligocene; Europe
• Origin of examined material
- Garouillas, France (UM2)
• References: (57)

Archeomerycidae Simpson, 1945
Archeomeryx optatus Matthew and Granger, 1925
• Temporal and geographical distribution
Middle Late Eocene; Mongolia and China
• Origin of examined material
- Ula Usu, china (cast UM2)
• References: (58)

DICHOBUNOIDEA Gill, 1872
Diacodexiidae Gazin, 1955
Gujaratia pakistanensis (Thewissen et al. 1983)
• Temporal and geographical distribution
Early or Middle Eocene; Pakistan
• Origin of examined material
- Barbora banda, Pakistan (casts UM2)
• References: (59)

Bunophorus grangeri Sinclair, 1914
• Temporal and geographical distribution
Early Eocene; North america
• Origin of examined material
- Big Horn basin, Wyoming, USA (casts UM2)
• References: (60)

Dichobunidae Turner, 1849
Dichobune leporina Cuvier, 1822
• Temporal and geographical distribution
Late Eocene; Europe
• Origin of examined material
- Escamps, Rosières and Aubrelong, France (UM2)
• References: (60-61)

Homacodontidae Marsh, 1874

Homacodon vagans Marsh, 1872

- Temporal and geographical distribution
  Early-middle Eocene; North America
- Origin of examined material
  - Cast of specimens from the Twin Buttes, USA (UM2)
- References: (60)

Helohyidae Marsh, 1877

Gobiohyus orientalis Matthew and Granger, 1925

- Temporal and geographical distribution
  Middle Eocene; central and southern Asia
- Origin of examined material
  - Irdin Manha, Ulan Shireh, Mongolia (AMNH)

- References: *The attribution of* G. orientalis *to the Helohyidae follows (62-63) and (64). It is recognized that (65), notably, proposed a different interpretation, excluding Asian forms from the Helohyidae.*

Raoellidae Sahni et al., 1981

Khirtharia spp corresponds to the three following species :

Khirtharia dayi Pilgrim, 1940

- Temporal and geographical distribution
  Late Eocene; Indian subcontinent
- Origin of examined material
  - Chorlakki, Pakistan (casts UM2)
- References: (66)

Khirtharia inflata (Ranga Rao, 1972)

- Temporal and geographical distribution
  Late Eocene; Indian subcontinent
- Origin of examined material
  - Subattu formation, India (casts UM2)
- References: (67)

Khirtharia aurea Thewissen *et al*. 2001

- Temporal and geographical distribution
  Middle Eocene; Indian subcontinent
- Origin of examined material
  - Chorgali formation, Pakistan (casts UM2)
- References: (68-69)

Indohyus indirae Ranga Rao, 1971

- Temporal and geographical distribution
  Late Eocene; Indian subcontinent
- References: (67)

Other early cetartiodactyl families

Cebochoeridae Lydekker, 1883

Cebochoerus campichii Pictet 1855-57

- Temporal and geographical distribution
  Middle Eocene; western Europe
- Origin of examined material
  - Robiac, France (UM2)
- References: (61, 70)

Choeropotamidae Owen, 1845

Choeropotamus depereti Stehlin 1908

- Temporal and geographical distribution
  Middle Eocene; Europe
- Origin of examined material
  - Euzet, France (UM2)
- References: (61, 70-71)

Hallebune krumbiegeli Erfurt and Sudre, 1995

- Temporal and geographical distribution
  Middle Eocene; Europe
- Origin of examined material
  - Geiseltal, Germany (cast UM2)
- References: (61, 70-71)

Amphirhagatherium spp corresponds to the two following species :
Amphirhagatherium neumarkensis Erfurt and Haubold 1989

- Temporal and geographical distribution
  Middle-Late Eocene; Europe
- Origin of examined material
  - Geiseltal, Germany (Cast UM2)
- References: (61, 70-71)

Amphirhagatherium weigelti (Heller, 1934)

- Temporal and geographical distribution
  Middle-Late Eocene; Europe
- Origin of examined material
  - Geiseltal, Germany (Cast UM2)
- References: (61, 70-71)

Mixtotheriidae Pearson, 1927

Mixtotherium spp. corresponds to the following species:
Mixtotherium gresslyi Rutimeyer, 1891

- Temporal and geographical distribution
  Middle-Late Eocene; Europe
- Origin of examined material
  - Egerkingen, Switzerland and La Defense, France (casts UM2)
- References: (70)

Mixtotherium lavergnensis (Sudre, 1977)

- Temporal and geographical distribution
  Middle-Late Eocene; Europe
- Origin of examined material
  - Lavergne, France and Eclepens-gare, Switzerland
- References: (72)

Amphimerycidae Pearson, 1927

Amphimeryx murinus (Cuvier, 1822)

- Temporal and geographical distribution
  Late Eocene; Europe
- Origin of examined material
  - Escamps, Rosières 2 and St Néboule, France (casts UM2)
- References: (61, 70, 72)

Anoplotheriidae Bonaparte, 1850

Diplobune minor (Filhol, 1877)

- Temporal and geographical distribution
  Late Eocene-early Oligocene; Europe
- Origin of examined material
  - Itardies, France (UM2)
- References: (73)

Dacrytherium ovinum Owen, 1857
- Temporal and geographical distribution
  Late Eocene; Europe
- Origin of examined material
  - Fons and Euzet, France (UM2)
- References: (70, 72)

Xiphodontidae Flower, 1884
Xiphodon castrensis Kowalesky, 1873
- Temporal and geographical distribution
  Late Eocene; Europe
- Origin of examined material
  - Robiac and Le Bretou, France (UM2)
- References: (70, 72)

Cainotheriidae Camp and Van der Hoof, 1940
Paroxacron valdense (Stehlin, 1906)
- Temporal and geographical distribution
  Late Eocene-Early Oligocene; Europe
- Origin of examined material
  - Escamps, France (UM2)
- References: (70, 72)

Entelodontidae Lydekker, 1883
Entelodon spp corresponds to the two following species :
Entelodon deguilhemi Repelin, 1919
- Temporal and geographical distribution
  Early Oligocene; Europe
- Origin of examined material
  - Villebramar and Quercy, France (cast UM2)
- References: (74)

Entelodon magnum (Aymard, 1846)
- Temporal and geographical distribution
  Early Oligocene; Europe
- Origin of examined material
  - Ronzon and Quercy, France
- References: (74)

Merycoidodontidae Lydekker, 1883
Merycoidodon sp
- Temporal and geographical distribution
  Oligocene; North America
- Origin of examined material
  - Big Badland, South Dakota, USA (UM2)
- References: (75)

II List of characters used in the cladistic analysis

<u>Lower anterior teeth (supplementary figure 3)</u>

1. Number of lower incisors: char1 (32)
- 0. three
- 1. two
- 2. one

2. Lower incisor morphology: char3 (32)
- 0. not caniniform
- 1. at least one caniniform lower incisor

3. Relative dimensions of lower incisors: char4 (32)
- 0. all of equal size
- 1. one or two more developed

4. Most developped incisor:
- 0. I/2
- 1. I/3
- 2. I/1

5. Transverse section of lower incisors crowns: char3 (24)
- 0. strongly irregular
- 1. almost rounded

6. Lower incisor cervix morphology : char4 (24)
- 0. no deep indentation
- 1. indented cervix, indentation as long as the root diameter on the cervix
- 2. deep identation longer than the root diameter at cervix

7. Crown of lower I1:
- 0. straight
- 1. spatulate (with convex mesial and distal border)

8. Presence of a median lingual pillar (lingual rib) on lower i1:
- 0. yes
- 1. no

9. Lower canine cross section at cervix:
- 0. subcircular
- 1. elliptical

10. Cristids on lower canine enamel caps:
- 0. none
- 1. one distal
- 2. two, one mesial and one distal
- 3. one mesial

11. Wear on lower canine: char5 (32)
- 0. distal wear facet contact with canine
- 1. mesial wear facet contact with I3

12. Groove on labial side of lower canine : char14 (1)
- 0. no
- 1. yes

13. Groove on lingual side of lower canine:
0. no
1. yes

14. Lower canine in male:
0. fang-like
1. premolariform
2. incisiform

15. Crown of lower canine in male: char7 (32)
0. small near premolar size
1. at least twice the premolar size
2. prolonged growth to ever-growing

<u>**Lower premolars (supplementary figures 4-6)**</u>

16. P/1 roots: char13 (32)
0. one
1. two

17. Paraconid on lower premolars:
0. no
1. yes

18. Elongated p/3: modified char103 (76)
0. no (shorter or equal than M/1 length)
1. yes (longer than M/1 length)

19. Three lobed P/3:
0. no
1. yes

20. Accessory cusp on the preprotocristid of lower premolars: char9 (32)
0. none
1. one or more

21. Lingual contour at cervix of P/4 in occlusal view: modified char52 (24)
0. convex to straight
1. concave

22. Labial wall on P/3 or P/4:
0. convex
1. concave

23. Orientation of postprotocristid on P/3:
0. distal
1. distolingual
2. distolabial

24. High cingulid on labial face of P/3:
0. no
1. yes

25. Preprotocristid mesiolingualy curved on P/3:
0. no
1. yes

26. **Mesial accessory cusp on preprotocristid of P/3:**
0. no
1. Shoulder-like structure on lateral view of preprotocristid of lower premolars
2. complete accessory cusp

27. **Change in the orientation of the preprotocristid mesialy to the junction of accessory mesiolingual crest on lower premolars:**
0. no
1. yes

28. **Orientation of the endoprotocristid on P/4:**
0. absent
1. separated from postprotocristid at the protoconid apex and then strait and distolingual
2. fused with postprotocristid in part and then curved mesiolingually

29. **Entoconid on P/3: char51 (24)**
0. never
1. at least on some specimen

30. **P/3 hypoconid:**
0. no
1. yes

31. **Distolingual cingulid on P/4 in lingual view:**
0. forms a continuous wall lingually to the distostylid
1. reaches the level of the distal basin and remains shallow all the way to the distostylid
2. reaches the level of distal basin and then becomes high when joigning the distostylid (distolingual notch of cingulid)

32. **Presence of a preentocristid on P/3 and/or on P/4:**
0. no
1. yes

33. **Mesiolingual secondary cristid on P/4 (cristid connecting lingual margin and preprotocristid):**
0. no
1. yes

34. **Labial cingulid form a V (indentated) on P/4 before to reach the distal cingulid:**
0. no
1. yes

35. **Marked postprotofossid on P/4: char59 (1)**
0. absent
1. present

36. **Postectoprotocristid on P/4:**
0. no
1. yes

37. **Hypoconid on P/4:**
0. no
1. yes (even incipient)

38. **Ectoprotofossid on p/4: char54 (24)**
0. absent

1. frequent

<u>**Lower molars (supplementary figure 7)**</u>

39. Premetacristid on lower molars: char69 (1)
0. strong
1. reduced or missing

40. Paraconid on lower molars, almost on unworn specimens: char130 (76)
0. yes
1. no

41. Lower molar trigonid: char140 (76)
0. equal in height with talonid
1. higher than talonid

42. Connection between premetacristid and preprotocristid on lower molars:
0. yes
1. no

43. Postectoprotocristid on lower molars: char67 (1)
0. absent
1. reduced in the valley to fully developed at least on M/1

44. Postprotofossid on lower molars at least on m/3:
0. no
1. yes

45. Postmetacristid on M1-2: char72 (1)
0. curving toward postprotocristid forming a transverse bridge with it
1. orientated toward the centre of the tooth
2. forming a rounded postmetaconulid not preferentially orientated
3. joins prehypocristid

46. Ectoprotofossid on lower molars: char66 (1)
0. absent
1. present

47. Ectometafossid on lower molars:
0. yes
1. no

48. Endometacristid on lower molars:
0. no or slightly expressed much more like an enamel fold
1. present

49. Postectometacristid on lower molars: char71 (1)
0. lightly marked to absent
1. always present and well-marked

50. Premetafossid on lower molars: char70 (24)
0. present
1. absent

51. Preentocristid:
0. absent
1. present

52. Preentocristid connects:
0. endohypocristid
1. prehypocristid toward the cuspid apex
2. prehypocristid toward its mesial extremity

53. Postectoentocristid on lower molars: modified char77 (1)
0. absent
1. present but more like a keel on cusp
2. present and well individualized from the cusp

54. Ectoentocristid:
0. present
1. absent

55. Postentocristid on lower molars: modified char78 (1)
0. absent
1. present

56. Prehypocristid dividing in two mesial arms on lower molars:
0. yes
1. no

57. Prehypocristid inflated (not sallient when unworn) in transverse valley of lower molars:
0. no
1. yes (even to form a conulid)

58. Prehypocristid reaches:
0. median part of transverse valley
1. lingual part of transverse valley
2. labial part of the transverse valley

59. Main arm of prehypocristid connects:
0. trigonid distal walls (junction between cristids from metaconid and protoconid)
1. postmetafossid
2. lingual margin of transverse valley
3. postmetacristid

60. Posthypocristid joins:
0. nothing or distostyle
1. postentocristid
2. postectoentocristid

61. Endohypocristid on lower molars: char75 (24)
0. absent
1. present

62. Posthypofossid on lower molars: char77 (24)
0. absent
1. present

63. Entostylid on lower molars that could sometimes be linked to an entocrystilid:
0. never
1. frequently present

64. Ectostylid on lower molars:

0. no cingulid
1. a shallow and constant cingulid in front of the transverse valley
2. frequently developped cingulid in a /some stylid at least on m1

65. Ectocrystilid on lower molars:

0. no
1. yes even if variable

66. Cingulid surrounding m/3 hypoconulid: char79 (1)

0. no specimen exhibiting such extension
1. occasionally bordering the labial wall

67. Ectohypocristulid on M/3: char80 (1)

0. absent
1. not complete
2. present joigning the summit of hypoconulid

68. Distostylid on M/1-M/2:

0. median
1. lingual
2. none

69. Mesial part of loop-like hypoconulid: char29 (32)

0. open
1. pinched

70. Entoconulid: char33 (7)

0. no
1. yes

<u>Upper anterior teeth (supplementary figure 8)</u>

71. Number of upper incisors:

0. 3
1. 2

72. Central upper incisor:

0. morphologically similar to I2/I3
1. peg-like, morphologically different from others
2. caniniform

73. I3/ reduced in size compared to I1/:

0. no
1. yes

74. Upper canine morphology: char6 (32)

0. strong with circular or elliptic cross section
1. strong and laterally compressed (blade-like)
2. premolariform

75. Canine size root:

0. equivalent to slightly longer than the crown
1. at least twice the size of the crown
2. prolonged to continuous growth of root
3. prolonged and continuous growth of crown

76. Dimorphic upper canine:

0. no
1. yes

Upper premolars (supplementary figures 9-10)

77. Diastem C-P1/:
0. yes
1. no

78. Diastem P1/-P2/:
0. no
1. yes

79. Number of upper premolar: char10 (32)
0. 4
1. 5

80. Distolabial crests of upper premolars: char11 (32)
0. simple
1. with a maximum of two accessory cusps
2. with more than two accessory cusps at least on one premolar

81. Number of mesial crests on P1-3: char14 (32)
0. one
1. two

82. Disto-lingual basin in P2: char12 (24)
0. yes
1. no

83. Accessory cusp on disto-lingual cingulum of P3/: char16 (32)
0. none
1. one cingular style
2. protocone (surrounded by a cingulum)

84. Metacone on P3/:
0. no
1. yes

85. P3 root pattern: modified char102 (76)
0. one mesial root, two distal root not fused
1. one mesial root and fused distal ones

86. P4 paracone:
0. simple with crest
1. complex with fossae
2. very complex with more fossae

87. Orientation of preparacrista on P4/: char20 (24)
0. mesial
1. labial

88. Postprotocrista on P4/:
0. absent
1. present

89. Postprotocrista on P4/ joins:

0. base of paracone
1. distostyle
2. metastyle

90. Preprotocrista on P4/ joins¤:

0. mesiostyle
1. base of the paracone then mesiostyle
2. parastyle

91. Postectoprotocrista on P4/:

0. absent
1. present

92. P4 protocone :

0. rounded
1. crescentic

93. In lingual view protocone of P4/ is:

0. displaced mesially
1. median

94. P4/ mesial margin:

0. concave
1. convexe

95. Strong development of distostyle on P4/:

0. no
1. yes

96. Mesial accessory cusp on P4/ that can be linked to mesiostyle:

0. no
1. yes

97. P4 metacone: char109 (76)

0. absence
1. presence

98. P4 paracone higher than the protocone: char32 (69)

0. slightly higher than protocone
1. much higher than protocone

99. P4 endoparacrista: char31 (69)

0. absence
1. presence

100. Distal accessory cusp on postprotocrista of P4/ that can be linked to distostyle:

0. no
1. yes

Upper molars (supplementary figures 11-13)

101. Height of lingual cingulum compared to unworn protocone height on upper molars:

0. one third
1. half
2. no cingulum

102. Mesio-distal ribs development of labial cusps of upper molars:

0. almost half the molar lenght
1. pinched (inferior to one third of molar lenght)
2. enlarged (superior to half the molar lenght)

103. Postectoprotocrista:
0. absent
1. présent

104. Postprotocrista:
0. present
1. absent

105. Protocone and metaconule junction on upper molars:
0. none
1. premetaconule-postectoprotocrista
2. premetaconule-postprotocrista
3. postprotocrista-lingual part of metaconule

106. Premetacristule divided in two mesial arms:
0. no
1. yes

107. Ectometacristule on upper molars: modified char48 (1)
0. absent
1. present at least on M1
2. not frequent and only on M2 or M3

108. Postmetafossule:
0. absent
1. present

109. Secondary cristule labial to metaconule eventually an endometacristule or enamel knob:
0. no
1. yes

110. Distostyle on upper molar:
0. yes
1. no

111. Distostyle position on upper molars levels:
0. metaconule
1. metacone

112. Secondary ectometafossule lingual to ectometacristule: modified char47 (1)
0. absent or very light
1. present mesially at least on M1 linked to ectometacristule

113. Paraconule on upper molars: modified char122 (76)
0. present
1. absent

114. M2/ paraconule when present: modified char15 (7)
0. similar in size with protocone
1. smaller than protocone

115. Postparacristule extends to connect: modified char17 (7)

0. none
1. base of the paracone
2. transverse valley

116. Preparacrista connects the parastyle:
0. no, separated by a groove
1. yes lingually
2. yes labially

117. Endoparacrista on upper molars: char21 (69)
0. absence
1. presence

118. Ectoparafossa on upper molars:
0. yes
1. no

119. Ectocristyle:
0. frequently present
1. absent

120. Premetacrista and postparacrista connect:
0. no connection or via an intercaled ectocristyle
1. yes (can form a centrocrista, a V-shaped mesostyle or a loop-like mesostyle)

121. Endometacrista and endometacristule forming a transverse crest:
0. absence
1. presence

122. Parastyle development: modified char11 (7)
0. enamel knob
1. smaller or equal than mesostyle
2. larger than mesostyle

123. Premetacristule invades labial part of the transverse valley:
0. no
1. yes

124. Position of metaconule on upper molar: char27 (69)
0. labial side of the protocone
1. distal side of the protocone

125. M2/ metaconule: modified char23 (7)
0. similar in size with protocone
1. smaller than protocone

126. Mesostyle on upper molars:
0. no
1. yes

127. Mesostyle:
0. enamel knob
1. half the size of labial cusp
2. larger than labial cusp

128. Metastyle:
0. reduced to enamel knob or absent

1. fully developed

129. Root fusion on upper molars:
0. four roots with occasional fusion close to cervix the apices always remaining free
1. fully fused lingual roots

130. Lingual cingulum on upper molars:
0. no
1. yes
2. developed in entostyle

131. Hypocone on upper molars (at least on M2/): modified char124 (76)
0. yes
1. no

132. Shape of M1/:
0. triangular
1. quadrate

133. Shape of M3/:
0. triangular
1. quadrate

134. M3/ size: modified char114 (76)
0. Larger than M2/
1. equal in size with M2/
2. reduced (less than 60%)

135. Mesiolingual style on upper molar mesial cingulum: char19 (32)
0. no
1. yes

<u>Mandible</u>

136. Symphysis morphology in sagittal section: char38 (32)
0. elliptic
1. dorsally concave
2. ventrally concave

137. Diastem C-P/1: char34 (32)
0. absent
1. present

138. Bone fusion at symphysis in adult specimens: char37 (32)
0. no
1. yes

139. Maximal thickness of the symphysis in sagittal section: char39 (32)
0. in the middle part
1. in the rostral part
2. in the nuchal part

140. Symphysis extension:
0. extends nuchally between C and P/1
1. extends nuchally between P/1 and P/3
2. extends nuchally to P/3

141. **Number and position of main external foramen: char40 (32)**
- 0. numerous
- 1. only one below the anterior part of the premolar row
- 2. two, one below the anterior part and the other below the posterior

142. **Transverse constriction of mandible at C-p/1 diastema: char33 (32)**
- 0. no
- 1. yes

143. **P/1-P/2 diastema: char35 (32)**
- 0. absent
- 1. present

144. **P/2-P/3 diastema: char6 (1)**
- 0. yes
- 1. no

Cranium

145. **Opening of internal choanes: char51 (32)**
- 0. at M3/
- 1. nuchal to M3/

Enamel (supplementary figures 14-15)

146. **Enamel ornementation:**
- 0. no
- 1. yes

147. **Schmelzmuster composed of: char1 (2)**
- 0. two layers
- 1. three layers
- 2. one layer

148. **Inner radial enamel: char2 (2)**
- 0. absent
- 1. present

149. **HSB percent of Schmelzmuster: char3 (2)**
- 0. absent
- 1. less than 75%
- 2. more than 76%

150. **Outer radial enamel: char4 (2)**
- 0. less or equal to 20%
- 1. more than 20%

151. **Hsb zone: char5 (2)**
- 0. thin with bands always less than 100µm
- 1. large (equal or more than 100µm)

152. **Regular aspect (constant width): char6 (2)**
- 0. yes
- 1. no

153. **HSB variable (SD>20): char7 (2)**
- 0. no
- 1. yes

154. HSB angle with EDJ: char8 (2)

0. >70°
1. <70°

155. Orientation of HSB: char9 (2)

0. straight
1. bent

156. HSB definition (decussation angle and size of transition zone): char10 (2)

0. clear
1. blurry

157. Division of HSB: char11 (2)

0. anastomosis
1. bifurcation
2. no division

158. HSB configuration: char12 (2)

0. curved
1. transverse

159. Synchronous prism undulation on horizontal section: char13 (2)

0. no
1. yes but few
2. yes but more or equal to 4

160. IPM in inner portion: char14 (2)

0. closed sheath
1. Inter row sheets

161. IPM in middle portion: char15 (2)

0. closed sheath
1. Inter row sheets
2. no IPM

162. IPM in outer portion: char16 (2)

0. closed sheath
1. no IPM

163. Prism angle with EDJ : char17 (2)

0. equal or more than 60°
1. less than 60 °
2. tend to decrease in the inner part

164. Prism diameter: char18 (2)

0. mean between 3 and 3.9 µm
1. small diameter mean below 3 µm
2. large diameter mean above or equal to 4

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