

Appendix 3. List of characters used in the phylogenetic analysis.

1. Styloid process: slightly nasally oriented (0); strongly nasal orientation (1)
2. Styloid process: contacts with the paroccipital process (0); does not contact with the paroccipital process due to the intrusion of the tympanic bulla (1).
3. Paroccipital process: nuchally oriented (0); dorso-ventrally oriented (1).
4. Tympanic bulla: hollow (0); cancellous (1).
5. Sagittal crest: nuchal end well developed, with triangular profile (0); nuchal end slightly developed with rounded profile (1).
6. Occipital profile in lateral view: straight (0); curved (1).
7. Metaconule cingulum: absent (0); present (1); very weak (2).
8. Protoconal cingulum: absent (0); present (1).
9. Development of the protoconal cingulum: well developed (0); poorly developed (1).
10. Buccal rib on metacone: strong (0); weak (1); absent (2).
11. Development of the cristae: poorly developed in extension and height (0); well developed in extension and height (1).
12. Development of the post-protocrista: poorly developed (0); well developed, making a well-marked half-moon profile in the protocone (1); absent (2).
13. Morphology of the buccal ribs: short and with a broad base (0); elongated and more column-like (1).
14. p1: present (0); absent (1).
15. Morphology of cuspids: bunoid with rounded base (0); flattish base and walls, more trenchant cuspids (1).
16. Development of cristids: low and poorly extended (0); moderately high and extended (1); well extended, *Tragulus*-like.

17. Premetacristid: absent (0); present (1).
18. Interlobular bridge: absent (0); present (1).
19. Morphology of the central valley: narrow (0); enlarged and wide (1).
20. Mesial closing of the lower molars: almost non-existent pre-metacristid, with long pre-protocristid that turns lingually and contacts with the pre-metacristid forming a rounded *Dorcatherium* platform (0); presence of a developed pre-metacristid, smaller than the pre-protocristid and absence of true *Dorcatherium* platform (1); well developed and straight pre-metacristid and pre-protocristid that contact parasagittally and form a mesial triangular shape (2).
21. Post-entoconid groove: present (0); absent (1).
22. 'M-structure': present (0); absent (1); extremely reduced (2).
23. Development of *Dorcatherium*-fold: as long or almost as long as the post-metacristid (0); not reaching the mid-length of the post-metacristid (1); very poorly developed, almost non-existent (2).
24. Development of the *Tragulus*-fold: fully developed (0); small (1); absent (2).
25. Extension of post-hypocristid: reaching the postero-lingual corner of the m1-m2 (0); not reaching the lingual side of the teeth behind the post-entocristid (1).
26. Hypoconulid in m1-m2: present (0); absent (1).
27. Relative position of lobes: mesial and distal lobes contact in the center of the teeth (0); mesial and distal lobes separated due to the elongation of the molars (1).
28. Opening of the distal lobe: lingually open (0); lingually closed (1).
29. Development of the mesial cingulid: well developed (0); moderately developed (1); poorly developed or absent (2).
30. Number of cuspids in the p2: bi-cuspid p2 (0); three-cuspid p2 (1).
31. Occlusal morphology of the p4: lingual and buccal distal cristids originate from the central conid (0); lingual and buccal distal cristids originate from a single cristid that departs from the central conid (1).

32. Development of the post-entocristid: short post-entocristid (0); long post-entocristid (1).
33. Paraconid: well developed (0); rudimentary (1); absent (2).
34. Trigonid: lingually open (0); closed (1).
35. Zhailimeryx-Fold: present (0); absent (1); rudimentary (2).
36. Morphology of the metatarsal(s) III-IV: fused, long, narrow, conforming a true, pecoran-like, metatarsal III-IV, with square cross-section at mid-shaft (0); fused, long, narrow, conforming a true cannon bone with dorso-ventrally flat cross-section at mid-shaft (1); fused but short and flat, with clearly distinguishable metatarsal III and metatarsal IV not united into a true, pecoran-like, cannon bone (2).
37. Malleolar bone: fused with the tibia (0); free from the tibia (1).
38. Morphology of the palmar border of the medial epicondyle in the humerus: presence of a slight convexity over the articular area (0); non-convex straight border (1).
39. Morphology of the dorsal border of the medial epicondyle in the humerus: curved (0); straight (1).
40. Morphology of the acetabular cavity in the pelvis: presence of dorsal constriction ('three-lobed' morphology) (0); absence of dorsal constriction (circular morphology) (1).
41. Morphology of the cavity located caudal to the acetabular notch in the pelvis: elliptic and wide (0); narrow and slit-like (1).
42. Trochanteric pit in the femur: wide (0); narrow (1).
43. Plantar border of the sustentaculum in the calcaneum: concave (0); straight (1).
44. Dorsal border of the sustentaculum in the calcaneum: concave and perpendicular to the corpus (0); straight and perpendicular to the corpus (1); straight and oblique to the corpus (2).
45. Inter-metacarpal locking mechanism: non-existent, intermetacarpal articulation mainly ligamentous with the exception of the proximal facets (0); complex locking system comprising

(from proximal to distal) the proximal facets, a pit-and-process locking structure and a distal ligamentous articulation (1).

46. Navicular-cuboid and ectomesocuneiform: fused together (0); not fused (1).

47. Fusion of metacarpals III and IV: fused, forming a cannon bone (0); unfused (1).

48. Morphology of the plantar surface of the metatarsal III-IV: presence of two individualized flattish plantar surfaces (0); presence of a single narrow V-shaped groove (1); presence of a single flattish surface (2).

49. Condition of metatarsals II and V: unfused to the central metatarsals (0); fused to the central metatarsals (1).

50. Morphology of the disto-lateral furrow in the navicular-cuboid for the tendon of the long fibular muscle: short, deep, and triangular, not reaching the lateral facet for the calcaneum (0); forming a parallel-sided canal that contacts with the lateral side of the lateral facet for the calcaneum (1); forming a parallel-sided canal that contacts with the dorsal end of the lateral facet for the calcaneum, opening in front of it (2).

51. Morphology of the planto-distal lateral process in the navicular-cuboid: short and blunt, not surpassing the distal border of the bone (0); long and pointed, clearly surpassing the border of the bone (1); long and blunt (2).

52. Morphology of the planto-medial surface of the navicular-cuboid: presence of a strong Y-shaped structure for ligament attachment (0); absence of such strong structure (1); presence of two parallel ridges as a ligamentary attachment (2).

53. Morphology of the articulation surface for the malleolar in the calcaneum: sub-triangular and concave (0); elongated and convex (1); triangular and flat (2); elongated and concave-convex (3).

