Details for fossil data hand-cleaning based on authors’ expertise.

—

Lucas Buffan1,2, Fabien L. Condamine2, Laurent Marivaux2, François Pujos3,4 and Pierre-Olivier Antoine2

—

1Département de Biologie, École Normale Supérieure de Lyon, Université Claude Bernard Lyon 1, 69342 Lyon Cedex 07, France.

2CNRS, UMR 5554 Institut des Sciences de l’Évolution de Montpellier, Place Eugène Bataillon, 34095 Montpellier, France.

3Consejo Nacional de Investigaciones Científicas y T ́ecnicas (CONICET), Argentina

4Instituto Argentino de Nivología, Glaciología y Ciencias Ambientales (IANIGLA), CCT-CONICET-Mendoza, Av. Ruiz Leal s/n, ParqueGral, San Martín 5500, Mendoza, Argentina

—

**Corresponding author:** Lucas.L.Buffan@gmail.com

# Artiodactyla

*Palaeolama sp.* (coll. nb. 213138, [1]), *Lama castelnaudi* (coll. nb. 213136, [1]) and *Palaeolama weddeli* (coll. nb. 213136, [1]) age ranges were set to Early Pleistocene, according to [2].  
All *Bos taurus* and *Ovis* occurrences were removed, as representatives were introduced by humans.  
*Antifer crassus* (coll. nb. 53926, [3]) time range was set to Pleistocene according to [4]. *Platygonus narinoensis* (coll. nb. 133585, [5]) was renamed *Platygonus cf. marplatensis* according to [6].  
All occurrences of *Cervus gouazoubira* were renamed *Mazama gouazoubira*.

# Astrapotheria

*Grypolophodon imperfectus* (coll. nb. 176290, [7]) was removed as nomen dubium.  
*Parastrapotherium holmbergi* (coll. nb. 176290, [8]) formation was set to Sarmiento, stage to Deseadan-Colehuehuappian, and age range to 20-29 Ma.  
*Xenastrapotherium sp.* (coll. nb. 55602, [9]) and *Xenastrapotherium amazonense* (coll. nb. 55602, [10]) were reassigned to Laventan stage (11.8-13.8 Ma) according [11].  
*Notorhinus denticulatus* (coll. nb. 176290, [8]) removed as nomen dubium. *Astrapotherium* (coll. nb. 50074, [12]) re-assigned to Santacrucian.

# Carnivora

Removed *Felis domesticus* (coll. nb. 190846, [13]) as introduced by humans.

# Cetacea

# Cingulata

Cleaning was made based on the expertise of F. Pujos, and details of the procedure are available in the ./data\_2023/cleaning\_Xenarthra/Xenarthra\_FP\_2.0.xlsx table, sheet *Cingulata*. Rows highlighted in red (n=261) have been further removed for the rest of the study. Taxon names, ages, localities and formations were updated in red when needed.

# Chiroptera

# Didelphimorphia

# Litopterna

*Archaeohyracotherium mediale* (*Didolodontidae*, coll. nb. 176164, [7]) was synonymised with *Asmithwoodwardia subtrigona* (*Protolipternidae*) by Gelfo (2006)[14].  
*Argyrolambda conidens* was synonymised with *Didolodus multicuspis* [14].  
*Didolodus sp.* (coll. nb. 199563, [15]) was removed as associated to “unidentified *Didolontidae*” in the paper. *Enneoconus parvidens* (coll. nb 176164, [16]) was synonymised with *Ernestokokenia nitida* by Gelfo (2006)[14].

# Microbiotheria

# Notoungulata

# Paucituberculata

# Perissodactyla

*Equus sp.* (coll. nb. 142016, [17]) was set to *Equus (Amerhippus)*. Together with *Equus sp.* (coll. nb. 71275, [18]; coll. nb. 70673, [19]; coll. nb. 92814, [20]), *Equus (Amerhippus)* (coll. nb. 70673, [21]) and *Hippidion sp.* (coll. nb. 70673, [21]), their upper time boundary were set to 0.99 Ma, according to MacFadden (2013) [22].  
*Equus sp.* (coll. nb. 142158 and 142160, [23]) were both set to *Equus (Amerhippus)*.  
*Equus asinus* (coll. nb. 190844, [13]) was removed as introduced by humans.  
*Equus caballus* (coll. nb. 63337, [24]) was set *Equus (Amerhippus) neogeus* by Alberdi and Prado (1992) [25].  
*Equus caballus* (coll. nb. 70704, [21]) time range was set to Holocene.  
*Equus caballus* (coll. nb. 142016, [17]) was set to *Equus (Amerhippus) insulatus*.  
*Equus caballus* (coll. nb. 73842, [26]) time range was set to Pleistocene by [27].  
*Equus santaeelenae* (coll. nb. 144922, 145506, [28]) time ranges were adjusted to Late Pleistocene.  
*Hippidium (Plagiohippus)* (coll. nb. 71304, [29]) name was set to *Hippidion* [25].  
*Hypohippidium humahuaquense* (coll. nb. 210722, [30]) was synonymised with *Hippidion devillei* by [25] *Hippidion sp.* (coll. nb. 73842, [26]; coll. nb. 199157, [31]; coll. nb. 53926, [3], 2 occurrences) time ranges were adjusted to Pleistocene.  
*Tapirus (Tapilarum)* (coll. nb. 53928, [3]) name was shortened to *Tapirus*, and age set to Early Pleistocene.  
*Tapirus oliverasi* (coll. nb. 146534, [32]) species name was removed as doubtful [33], occurrence therefore renamed *Tapirus*. *Tapirus tarijensis* (coll. nb. 70673, [21]) lower age boundary was set to 1.06 Ma.

# Pilosa

Cleaning was made based on the expertise of F. Pujos, and details of the procedure are available in the ./data\_2023/cleaning\_Xenarthra/Xenarthra\_FP\_2.0.xlsx table, sheet *Pilosa*. Rows highlighted in red (n=180) have been further removed for the rest of the study. Taxon names, ages, localities and formations were updated in red when needed.

# Primates

# Proboscidea

*Mastotherium hyodon* (coll. nb. 142016, [17] and 145181, [34]) genus named was set to *Cuvieronius*.  
*Stegomastodon sp.* (coll. nb. 211646, [35]) was synonymised with *Notiomastodon platensis*.  
All mentions of *Mammut* were removed.  
*Notiomastodon platensis* (coll. nb. 144515, [36]), formerly described as *Amahuacatherium peruvianum* was removed as its age was questioned in [37].

# Rodentia

## Added Occurrences

*Ricardomys longidens*, Laventan age, San Martín department, Peru [38].  
*Microscleromys sp.* (two occurrences), *Microscleromys cribriphilus*, *Microscleromys paradoxalis*, *Microsteiromys jacobsi*, *Nuyuyomys chinqaska*, *Scleromys*, Laventan age, San Martín department, Peru [38].  
*Balsayacuy sp.*, Rupelian age (restricted to the 27.82-31.1 Ma interval), Departamento de Ucayali, Santa Rosa locality, Peru [39]. Described as an occurrence of *Balsayacuy huallagaensis*, but species attribution doubtful. Hence, restricted to genus level. From the same paper (same locality and same age), we also add one occurrence of *Shapajamys minor*, one of *Ucayalimys amahuacensis* and one of *Vucetichimys pterilophodonica*.  
*Erethizon sp.*, Vorohuean (Marplatan) age, Uquía formation, Quebrada de Humahuaca locality, Jujuy state, Argentina [40].  
*Eoincamys valverdei* and *Tarapotomys subandinus*, Early Oligocene of resp. TAR-72 and TAR-22, San Martín, Peru [41].

## Corrections

*Cachiyacuy contamanensis* (coll. nb. 149523, [42]) was renamed *Cachiyacuy sp.* as taxonomic assignation under debate. Two *Cachiyacuy contamanensis* occurrences from the same collection, same paper, were renamed *cf. Cachiyacuy contamanensis*, for the same reason.  
*Kichkasteiromys raimondii*: age range set to 34-35 Ma.  
Time boundaries of *Cachiyacuy cf. contamanensis* and *Cachiyacuy contamanensis* (coll. nbs. 207061 and 207062, [43]) were set to Priabonian (33.9-37.2 Ma). Same for *Cachiyacuy cf. kummeli*, *Eoespina* and *cf. Eoespina* (coll. nb. 207062, 207062 and 207065, [43]) Remaning occurrences of the genus *Cachiyacuy* (four in total) were set to Late Eocene (33.9-41.2 Ma).  
*Canaanimys maquiensis* (coll. nb. 149523, [42]) was renamed *Canaanimys sp.* as taxonomic assignation under debate.

Time boundaries of four *Cachiyacuy kummeli* occurrences (coll. nb. 144474, [44]; 176136, [45], 207067 and 207062 [43]) were set to Bartonian-Priabonian (33.9-41.2 Ma). Same for *Eobranisamys sp.* (coll. nb. 176151, [45]) and for all occurrences from the 144474 collection, including one *Chachapoyamys cf. kathetos* [38], one *Eoespina sp.* [44], one *Canaanimys maquiensis* [44] and one *Eobranisamys javierpardoi* [45].  
Ages of all occurrences from the collection 149523 were restricted to Rupelian. These included two *cf. Cachiyacuy kummeli* occurrences [42], one *Canaanimys sp.* [42], one *Eobranisamys riverai*, one *Eobranisamys romeropittmanae*, one *Eoespina woodi*, one *Eoincamys ameghinoi*, one *Eoincamys pascuali*, one *Eopicure kraglievichi*, one *Eosachacui lavocati*, one *Eosallamys paulacoutoi*, one *Eosallamys simpsoni* [46], one *Pozomys sp.*, two *Pozomys ucayalensis* [42], one *Eodelphomys almeidacomposi*, one *Eopululo wigmorei* [46].  
Ages of two *Sallamys pascuali* occurrences (coll. nb. 95688, [47]; 133539, [48]), three *Branisamys luribayensis* (coll. nb. 95688 [47]; 95688 [49]; 133539 [48]) were sharpened to the 25-26 Ma interval.  
Ages of one *Pozomys ucayalensis* (coll. nb. 176129, [45]) were set to Bartonian-Priabonian (33.9-41.2 Ma). Ages of two *Eoespina sp.* occurrences (coll. nb. 176140, [45]) was restricted to Late Eocene.  
Ages of one *Eoespina* and one *cf. Eoespina* occurrence (coll. nb. 207062 and 207065, [43]) were set to Rupelian.  
*Eoincamys pascuali* (coll. nb. 207064, [43]) was renamed *Eonincamys sp.*. Age range of all Late Oligocene occurrences from the Salla formation, La Paz, Bolivia, was set to 24.5-26 Ma. *Eopululo wigmorei* (coll. nb. 225588, [15]) species name was set to *Eopululo sp.* according to [38].  
Names of all *Eumysops chapalmalensis* occurrences were set to *Eumysops chapadmalensis*.

## Removed occurrences

*Cachiyacuy kummeli* (coll. nb. 207067, [43]), renamed *C. cf. kummeli* (doublon) according to [38].  
*Canaanimys sp.* (coll. nb. 176136, [50]), taxonomic revision [38].  
*Canaanimys maquiensis* (two occurrences, coll. nb. 207066 and 207067, [43]), taxonomic revision [38].  
*Chachapoyamys kathetos* (coll. nb. 207067, [38]), re-assigned to *C. cf. kathetos* (doublon) [38].  
Four Brazilian occurrences of the genera *Eobranisamys* (two) and *Eoincamys* (two) with absurd ages (coll. nb. 57989, [51]; coll. nb. 217834, [52]).  
*Tarapotomys sp.* (2 occurrences) (coll. nb. 199560, [41]; coll. nb. 199563, [15]), respectively re-described as *aff. Tarapotomys sp.* and *Tarapotomys subandinus* in [38].  
*Incamys bolivianus* (coll. nb. 95688, [47]), doulon.  
*Asteromys bolivianus* (coll. nb. 133591, [53]), doublon.  
All *Rattus rattus* occurrences, as introduced by humans.

# Sparassodonta

# Xenungulata

# References

1. Rusconi C. 1949 El puelchense de buenos aires y su fauna (plioceno medio) segunda parte.

2. Pascual R, Ortega Hinojosa EJ, Gondar D, Tonni E, *et al.* 1965 Las edades del cenozoico mamalı́fero de la argentina, con especial atención a aquellas del territorio bonaerense. In *Anales de la comisión de investigaciones cientı́ficas de la provincia de buenos aires*, pp. 165–193.

3. Rusconi C. 1934 Tercera noticia sobre los vertebrados fósiles de las arenas puelchenses de villa ballester. In *Anales de la sociedad cientı́fica argentina*, pp. 19–37.

4. Croitor R. 2022 Paleobiogeography of crown deer. *Earth* **3**, 1138–1160.

5. Stirton R *et al.* 1947 A rodent and a peccary from the cenozoic of colombia. *Compilación de estudios geológicos oficiales en Colombia* **7**, 317–324.

6. Gasparini GM, Moreno-Mancilla OF, Cómbita JL. 2021 Selenogonus narinoensis stirton, 1947 (tayassuidae, cetartiodactyla, mammalia): Taxonomic status and paleobiogeographic implications. *Fossil Record* **24**, 65–75.

7. Simpson GG. 1967 The beginning of the age of mammals in south america. Part 2, systematics: Notoungulata, concluded (typotheria, hegetotheria, toxodonta, notoungulata incertae sedis), astrapotheria, trigonostylopoidea, pyrotheria, xenungulata, mammalia incertae sedis. Bulletin of the AMNH; v. 137.

8. Roth S. 1904 Noticias preliminares sobre nuevos mamı́feros fósiles del cretáceo superior y terciario inferior de la patagonia. *Revista del Museo de la Plata* **11**, 135–158.

9. Frailey CD. 1986 Late miocene and holocene mammals, exclusive of the notoungulata, of the rio acre region, western amazonia.

10. Ribeiro AM. 2013 Mamı́feros fósiles y biocronologı́a en el suroeste de la amazonia, brasil. *Publicación Electrónica de la Asociación Paleontológica Argentina* **14**.

11. Goillot C, Antoine P-O, Tejada J, Pujos F, Gismondi RS. 2011 Middle miocene uruguaytheriinae (mammalia, astrapotheria) from peruvian amazonia and a review of the astrapotheriid fossil record in northern south america. *Geodiversitas* **33**, 331–345.

12. Tournouër A. 1903 *Note sur la géologie et la paléontologie de la patagonie*.

13. Steadman DW. 1986 Holocene vertebrate fossils from isla floreana, galápagos.

14. Gelfo JN. 2006 Los didolodontidae (mammalia: Ungulatomorpha) del terciario sudamericano. Sistemática, origen y evolución. *Mastozoologı́a Neotropical* **13**, 275–277.

15. Antoine P-O *et al.* 2021 Biotic community and landscape changes around the eocene–oligocene transition at shapaja, peruvian amazonia: Regional or global drivers? *Global and Planetary Change* **202**, 103512.

16. Simpson G. 1948 The beginning of the age of mammals in south america. Part i introduction. Edentata, condrylarthra, liptoterna, and notioprotogonia. *Bulletin of the American Museum of Natural History* **91**, 1–232.

17. Boule M, Thevenin A. 1920 Mammifères fossiles de tarija. Imprimerie nationale, mission scientifique g. De créqui-monfort et f.

18. Rolim J. 1974 Calcário secundário com restos fósseis de mamı́feros pleistocênicos em pernambuco. *Anais Academia Brasileira de Ciências* **46**, 417–422.

19. Oliveira A, Becker-Kerber B, Cordeiro LM, Borghezan R, Avilla LS, Pacheco M, Santos CMD. 2017 Quaternary mammals from central brazil (serra da bodoquena, mato grosso do sul) and comments on paleobiogeography and paleoenvironments. *Revista Brasileira de Paleontologia* **20**, 31–44.

20. Salles LO. 2006 *Quarternary mammals from serra da bodoquena, mato grosso do sul, brazil*. Oficina Gráfica da Univ. do Brasil.

21. Marshall LG, Sempere T, *et al.* 1991 The eocene to pleistocene vertebrates of bolivia and their stratigraphic context: A review. *Fósiles y facies de Bolivia* **1**, 631–652.

22. MacFadden BJ. 2013 Dispersal of pleistocene equus (family equidae) into south america and calibration of GABI 3 based on evidence from tarija, bolivia. *PloS one* **8**, e59277.

23. Coltorti M *et al.* 2007 Last glacial mammals in south america: A new scenario from the tarija basin (bolivia). *Naturwissenschaften* **94**, 288–299.

24. Deschamps CM. 2005 Late cenozoic mammal bio-chronostratigraphy in southwestern buenos aires province, argentina. *Ameghiniana* **42**, 733–750.

25. Alberdi MT, Prado JL. 1992 El registro de hippidion owen, 1869 y equus (amerhippus) hoffstetter, 1950 (mammalia, perissodactyla) en américa del sur. *Ameghiniana* **29**, 265–284.

26. Oliver-Schneider C. 1935 Mamı́feros fósiles de chile (adiciones y correcciones a la lista preliminar). *Revista Chilena de Historia Natural* **39**, 297–304.

27. Canto J, Yáñez J, Rovira J. 2010 Estado actual del conocimiento de los mamı́feros fósiles de chile. *Estudios Geológicos* **66**, 255–284.

28. Pujos F, Salas R. 2004 A new species of megatherium (mammalia: Xenarthra: Megatheriidae) from the pleistocene of sacaco and tres ventanas, peru. *Palaeontology* **47**, 579–604.

29. Reig OA. 1957 Un mustélido del género galictis del eocuartario de la provincia de buenos aires. *Ameghiniana* **1**, 33–47.

30. Alvarez EF de. 1957 Hypohippidium humahuaquense nov. sp. *Ameghiniana* **1**, 85–95.

31. Cione AL, Tonni EP. 1996 Reassesment of the pliocene-pleistocene continental time scale of southern south america. Correlation of the type chapadmalalan with bolivian sections. *Journal of South American Earth Sciences* **9**, 221–236.

32. Ubilla M. 1983 Sobre la presencia de tapires fosiles en el uruguay (mammalia, perissodactyla, tapiridae). *Revista de la Facultad de Humanidades y Ciencias* **1**, 85–104.

33. Holanda EC, Rincón AD. 2012 Tapirs from the pleistocene of venezuela. *Acta Palaeontologica Polonica* **57**.

34. Schneider CO. 1927 Contribucion a la paleontologfa chilena. El mastodonte de carahue (dibelodon andium, CUV.). *Revista Chilena de Historia Natural* **31**, 272–276.

35. Ubilla M, Perea D, Rinderknecht A, Corona A. 2009 Pleistocene mammals from uruguay: Biostratigraphic, biogeographic and environmental connotations. *Quaternário do Rio Grande do Sul*, 217–230.

36. Campbell KE, Frailey CD, Romero Pittman L. 2000 The late miocene gomphothere amahuacatherium peruvium (proboscidea: Gomphotheriidae) from amazonian peru: Implications for the great american faunal interchange-[boletı́n d 23].

37. Negri FR, Bocquentin-Villanueva J, Ferigolo J, Antoine P-O. 2009 A review of tertiary mammal faunas and birds from western amazonia. *Amazonia: Landscape and Species Evolution: A look into the past*, 243–258.

38. Boivin M *et al.* 2021 Late middle miocene caviomorph rodents from tarapoto, peruvian amazonia. *PLoS One* **16**, e0258455.

39. Arnal M, Pérez ME, Tejada Medina LM, Campbell Jr KE. 2022 The high taxonomic diversity of the palaeogene hystricognath rodents (caviomorpha) from santa rosa (peru, south america) framed within a new geochronological context. *Historical Biology* **34**, 2350–2373.

40. Reguero M, Candela A, Alonso R. 2007 Biochronology and biostratigraphy of the uquı́a formation (pliocene–early pleistocene, NW argentina) and its significance in the great american biotic interchange. *Journal of South American Earth Sciences* **23**, 1–16.

41. Boivin M, Marivaux L, Pujos F, Salas-Gismondi R, Tejada-Lara J, Varas-Malca RM, Antoine P-O. 2018 Early oligocene caviomorph rodents from shapaja, peruvian amazonia. *Palaeontographica A* **311**, 87–156.

42. Arnal M, Kramarz AG, Vucetich MG, Frailey CD, Campbell Jr KE. 2020 New palaeogene caviomorphs (rodentia, hystricognathi) from santa rosa, peru: Systematics, biochronology, biogeography and early evolutionary trends. *Papers in Palaeontology* **6**, 193–216.

43. Assemat A *et al.* 2019 Restes inédits de rongeurs caviomorphes du paléogène de la région de juanjui (amazonie péruvienne): Systématique, implications macro-évolutives et biostratigraphiques. *Geodiversitas* **41**, 699–730.

44. Antoine P-O *et al.* 2012 Middle eocene rodents from peruvian amazonia reveal the pattern and timing of caviomorph origins and biogeography. *Proceedings of the Royal Society B: Biological Sciences* **279**, 1319–1326.

45. Boivin M, Marivaux L, Candela AM, Orliac MJ, Pujos F, Salas-Gismondi R, Tejada-Lara JV, Antoine P-O. 2017 Late oligocene caviomorph rodents from contamana, peruvian amazonia. *Papers in Palaeontology* **3**, 69–109.

46. Frailey CD, Campbell KE. 2004 Paleogene rodents from amazonian peru: The santa rosa local fauna. *The Paleogene Mammalian Fauna of Santa Rosa, Amazonian Peru* **40**, 71–130.

47. Lavocat R. 1976 RONGEURS CAVIOMORPHES DE l’OLIGOCENE DE BOLIVIE. II. RONGEURS DU BASSIN DESEADIEN DE SALLA-LURIBAY.(COLLECTION HOFFSTETTER).

48. Patterson B, Wood AE. 1982 *Rodents from the deseadan oligocene of bolivia and the relationships of the caviomorpha*. Museum of Comparative Zoology, Harvard University.

49. Hartenberger J. 1975 Nouvelles découvertes de rongeurs dans le déseadien (oligocène inférieur) de salla luribay (bolivie).

50. Antoine P-O *et al.* 2016 A 60-million-year cenozoic history of western amazonian ecosystems in contamana, eastern peru. *Gondwana Research* **31**, 30–59.

51. Kerber L. 2017 Imigrantes em um continente perdido: O registro fossilı́fero de roedores caviomorpha (mammalia: Rodentia: Ctenohystrica) do cenozoico do brasil. *Terrae Didática* **13**, 185–211.

52. Lacerda M, Romano PS, Bandeira KL, SOUZA LG. 2021 Georeferencing fossiliferous localities from solimões and acre basins (brazil)-what we know so far about solimões formation and future perspectives. *Anais da Academia Brasileira de Ciências* **93**.

53. Pérez ME, Arnal M, Boivin M, Vucetich MG, Candela A, Busker F, Quispe BM. 2019 New caviomorph rodents from the late oligocene of salla, bolivia: Taxonomic, chronological, and biogeographic implications for the deseadan faunas of south america. *Journal of Systematic Palaeontology* **17**, 821–847.