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

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# 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

#No order *Wirunodon chanku* (coll. nb. 149523, [17]) age range was set to Early Oligocene (28.7-33.9 Ma). The three occurrences of the *Rumiodon* genus were attributed to Early Oligocene (28.7-33.9 Ma) All occurrences of the *Protodidelphis* genus were attributed to Late Palaeocene-Early Eocene (47.8-59.2 Ma), just like all occurrences from the *Carolopaulacoutoia* and *Didelphopsis* genera.

# Paucituberculata

# Perissodactyla

*Equus sp.* (coll. nb. 142016, [18]) was set to *Equus (Amerhippus)*. Together with *Equus sp.* (coll. nb. 71275, [19]; coll. nb. 70673, [20]; coll. nb. 92814, [21]), *Equus (Amerhippus)* (coll. nb. 70673, [22]) and *Hippidion sp.* (coll. nb. 70673, [22]), their upper time boundary were set to 0.99 Ma, according to MacFadden (2013) [23].  
*Equus sp.* (coll. nb. 142158 and 142160, [24]) were both set to *Equus (Amerhippus)*.  
*Equus asinus* (coll. nb. 190844, [13]) was removed as introduced by humans.  
*Equus caballus* (coll. nb. 63337, [25]) was set *Equus (Amerhippus) neogeus* by Alberdi and Prado (1992) [26].  
*Equus caballus* (coll. nb. 70704, [22]) time range was set to Holocene.  
*Equus caballus* (coll. nb. 142016, [18]) was set to *Equus (Amerhippus) insulatus*.  
*Equus caballus* (coll. nb. 73842, [27]) time range was set to Pleistocene by [28].  
*Equus santaeelenae* (coll. nb. 144922, 145506, [29]) time ranges were adjusted to Late Pleistocene.  
*Hippidium (Plagiohippus)* (coll. nb. 71304, [30]) name was set to *Hippidion* [26].  
*Hypohippidium humahuaquense* (coll. nb. 210722, [31]) was synonymised with *Hippidion devillei* by [26] *Hippidion sp.* (coll. nb. 73842, [27]; coll. nb. 199157, [32]; 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, [33]) species name was removed as doubtful [34], occurrence therefore renamed *Tapirus*. *Tapirus tarijensis* (coll. nb. 70673, [22]) 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.

# Polydolopimorphia

*Chulpasia sp.* (coll. nb. 132938, [35]) was removed as only one record of *Chulpasia* (species *mattaueri*) has been found in Peru. *Groeberia minoprioi* (coll. nb. 92669, [36]) age range was set to Late Eocene-Early Oligocene (27.82-37.71 Ma). *Marmosopsis sp.* (coll. nb. 133039, [37]) age range was set to Late Palaeocene-Early Eocene (47.8-59.2 Ma). *Patagonia peregrina* (coll. nb. 27311, [38]) age range was set to Chattian (23.03-27.82 Ma).

# Primates

# Proboscidea

*Mastotherium hyodon* (coll. nb. 142016, [18] and 145181, [39]) genus named was set to *Cuvieronius*.  
*Stegomastodon sp.* (coll. nb. 211646, [40]) was synonymised with *Notiomastodon platensis*.  
All mentions of *Mammut* were removed. *Notiomastodon platensis* (coll. nb. 144515, [41]), formerly described as *Amahuacatherium peruvianum* was removed as its age was questioned in [42].

# Rodentia

## Added Occurrences

*Ricardomys longidens*, Laventan age, San Martín department, Peru [43].  
*Microscleromys sp.* (two occurrences), *Microscleromys cribriphilus*, *Microscleromys paradoxalis*, *Microsteiromys jacobsi*, *Nuyuyomys chinqaska*, *Scleromys*, Laventan age, San Martín department, Peru [43].  
*Balsayacuy sp.*, Rupelian age (restricted to the 27.82-31.1 Ma interval), Departamento de Ucayali, Santa Rosa locality, Peru [44]. 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 [45].  
*Eoincamys valverdei* and *Tarapotomys subandinus*, Early Oligocene of resp. TAR-72 and TAR-22, San Martín, Peru [46].

## Corrections

*Cachiyacuy contamanensis* (coll. nb. 149523, [47]) 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, [48]) were set to Priabonian (33.9-37.2 Ma). Same for *Cachiyacuy cf. kummeli*, *Eoespina* and *cf. Eoespina* (coll. nb. 207062, 207062 and 207065, [48]) Remaning occurrences of the genus *Cachiyacuy* (four in total) were set to Late Eocene (33.9-41.2 Ma).  
*Canaanimys maquiensis* (coll. nb. 149523, [47]) was renamed *Canaanimys sp.* as taxonomic assignation under debate.

Time boundaries of four *Cachiyacuy kummeli* occurrences (coll. nb. 144474, [49]; 176136, [50], 207067 and 207062 [48]) were set to Bartonian-Priabonian (33.9-41.2 Ma). Same for *Eobranisamys sp.* (coll. nb. 176151, [50]) and for all occurrences from the 144474 collection, including one *Chachapoyamys cf. kathetos* [43], one *Eoespina sp.* [49], one *Canaanimys maquiensis* [49] and one *Eobranisamys javierpardoi* [50].  
Ages of all occurrences from the collection 149523 were restricted to Rupelian. These included two *cf. Cachiyacuy kummeli* occurrences [47], one *Canaanimys sp.* [47], 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* [51], one *Pozomys sp.*, two *Pozomys ucayalensis* [47], one *Eodelphomys almeidacomposi*, one *Eopululo wigmorei* [51].  
Ages of two *Sallamys pascuali* occurrences (coll. nb. 95688, [52]; 133539, [53]), three *Branisamys luribayensis* (coll. nb. 95688 [52]; 95688 [54]; 133539 [53]) were sharpened to the 25-26 Ma interval.  
Ages of one *Pozomys ucayalensis* (coll. nb. 176129, [50]) were set to Bartonian-Priabonian (33.9-41.2 Ma). Ages of two *Eoespina sp.* occurrences (coll. nb. 176140, [50]) was restricted to Late Eocene.  
Ages of one *Eoespina* and one *cf. Eoespina* occurrence (coll. nb. 207062 and 207065, [48]) were set to Rupelian.  
*Eoincamys pascuali* (coll. nb. 207064, [48]) 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 [43].  
Names of all *Eumysops chapalmalensis* occurrences were set to *Eumysops chapadmalensis*.

## Removed occurrences

*Cachiyacuy kummeli* (coll. nb. 207067, [48]), renamed *C. cf. kummeli* (doublon) according to [43].  
*Canaanimys sp.* (coll. nb. 176136, [55]), taxonomic revision [43].  
*Canaanimys maquiensis* (two occurrences, coll. nb. 207066 and 207067, [48]), taxonomic revision [43].  
*Chachapoyamys kathetos* (coll. nb. 207067, [43]), re-assigned to *C. cf. kathetos* (doublon) [43].  
Four Brazilian occurrences of the genera *Eobranisamys* (two) and *Eoincamys* (two) with absurd ages (coll. nb. 57989, [56]; coll. nb. 217834, [57]).  
*Tarapotomys sp.* (2 occurrences) (coll. nb. 199560, [46]; coll. nb. 199563, [15]), respectively re-described as *aff. Tarapotomys sp.* and *Tarapotomys subandinus* in [43].  
*Incamys bolivianus* (coll. nb. 95688, [52]), doulon.  
*Asteromys bolivianus* (coll. nb. 133591, [58]), doublon.  
All *Rattus rattus* occurrences, as introduced by humans.

# Sparassodonta

# Xenungulata

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