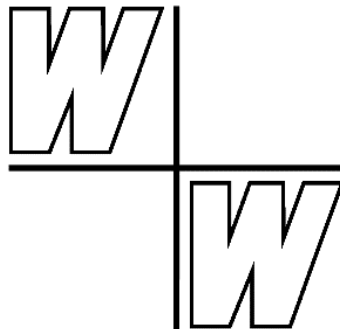


Data Collection on Intergeneric Hybrids and Basic Types: **MAMMALIA**

mammals = Säugetiere

Herfried Kutzelnigg & Benjamin Scholl
version 2 15.09.2026



Studiengemeinschaft Wort und Wissen
<https://www.wort-und-wissen.org/artikel/data-collection-basic-types/>

CLASS MAMMALIA

27 orders, 161 families, 1250: 6600

Systematics after en.wikipedia 2025, arranged by orders.
Not all families are listed.

3 subgroups:

Monotremata.

Marsupialia.

Placentalia.

Summary:

135 intergeneric hybrids (incl. IT + ISF), in 21 families.

32 preliminary basic types as for extant taxa (species number ranging from 1 to 79, average species number per basic type: $1086 / 32 = 34$ species).

Basic type level: < family 10, families 22, > 1 family 0.

Balaenopteridae 3: 10. **1 IG**

Bovidae Alcelaphinae 4: 6. **1 IG**

Bovidae Bovinae tribe Bovini 5: 23. **2 IG**

Bovidae Caprinae 14: 37. **7 IG**

Camelidae 2: 7. **1 IG**

Canidae 12: 34. **4 IG (incl. 1 IG)**

Castoridae 1: 2. – **(1 IS)**

Cercopithecidae subfamily Cercopithecinae 13: 79. **20 IG (incl. 3 IT)**

Cercopithecidae Colobinae tribe Presbytini 7: 45. **4 IG**

Cervidae 20: 69. **9 IG (incl. 3 ISF)**

Dasypodidae 1: 8. – **(0 IS)**

Delphinidae 18: 40. **14 IG (incl. 7 ISF)**

Elephantidae* 2: 3. **1 IG (order Proboscidea)**

Equidae 1: 8. – **(5 IS)**

Felidae 14: 38. **13 IG (incl. 2 ISF)**

Giraffidae 2: 2. **0 IG**

Hippopotamidae 2: 2. **0 IG**

Hominidae *Homo* 1: 1. –

Hylobatidae 4: 15. **3 IG**

Macropodidae subfamily Macropodinae 10: 67. **6 IG**

Microbiotheriidae* (*Dromicops*) 1: 1-2. – (order Microbiotheria)

Manidae* 3: 8. **0 IG (order Pholidota)**

Monodontidae 2: 2. **1 IG**

Muridae subfamily Murinae 140: 519. **3 IG**
 Orycteropodidae* 1: 1. – (order Tubulidentata)
 Otariidae 7: 16. **6 IG**
 Phocidae Phocinae 5: 10. **2 IG**
 Phocoenidae 3: 7. **1 IG**
 Suidae subfamily Suinae 6: 18. **2 IG/IT**
 Tapiridae 1: 4. – (**1 IS**)
 Tayassuidae 3: 3. **1 IG**
 Ursidae subfamilies Ursinae + Tremarctinae 5: 8. **4 IG (incl. 1 ISF)**

Abbreviations:

° = taxa actually not accepted in the rank of a genus, e.g. *Cerasus*° (= *Prunus* p.p.)

10: 50 etc. The numbers behind the names of families etc. refer to extant genera and species

IS = interspecific hybrid. **IG** = intergeneric hybrid. **IST** = intersubtribal hybrid.

IT = intertribal hybrid. **ISF** = intersubfamilial hybrid. **IF** = interfamilial hybrid

EC = embryo culture or ovule culture

SO = somatic hybrid by cell fusion; normally these hybrids are asymmetric

AS = asymmetric hybrids, they do not equally express maternal and paternal features

HY = assumed intergeneric hybridogeneous origin of a taxon

nat. hyb. = natural hybrid **art. hyb.** = artificial hybrid

Colors within the crosses:

Red letters: intergeneric hybrids (incl. former IG).

Gray letters: hybridity unconfirmed or erroneous.

Green letters: notes on tribes, subfamilies etc. involved in the hybridization.

Yellow shaded: Notes concerning basic types.

General references on mammalian hybrids:

Ackerman K (1898) Thierbastarde. Zusammenstellung der bisherigen Beobachtungen über Bastardierung im Thierreiche nebst Literaturhinweisen. II. Theil: Die Wirbelthiere. Kassel: Weber und Weidemeyer.

Antonius O (1951) Über Artbastarde bei Säugetieren. Verh. Zool.-Bot. Ges. Wien 92, 106–115.

Gray AP (1972) Mammalian hybrids. A check-list with bibliography. Second edition. Commonwealth Agriculture Bureau, Slough, England. Edinburgh. **Often cited, but unfortunately not very critical**

Hartwell S see “Messybeast”

McCarthy EM (2015) Mammalian Hybrids. www.macroevolution.net/mammalian-hybrids.html With much valuable information, but unfortunately not all data are critically evaluated or even sometimes a kind of fake.

McCarthy EM (2018) Mammalian Hybridization – Bibliography. A list of works relevant to mammalian hybridization. Preprint Research Gate. doi: 10.13140/RG.2.2.16039.60326 2300 references on mammalian hybrids, without critical remarks!

“Messybeast” <http://www.messybeast.com/genetics/hybrid-cats.htm> Information on hybrids of mainly felids, but also bears, bovines, marsupials etc., compiled by Sarah Hartwell

Lightner J (2012) Mammalian Ark Kinds. Answers Research Journal 5, 151–204. <https://answersresearchjournal.org/mammalian-ark-kinds/>.

Shurtliff QR (2011) Mammalian hybrid zones: a review. Mammals Review 43, 1–21. <https://doi.org/10.1111/j.1365-2907.2011.00205.x> Interspecific hybrids

Simpson GG (1945) The principles of classification and a classification of mammals. Bull. Amer. Mus. Nat. Hist. 85, 1–350.

Simpson GG (1961) Principles of animal taxonomy. New York: Columbia Univ. Press.

Van Gelder RG (1977) Mammalian hybrids and generic limits. New York: American Museum Novitates 2635, 1–25. Data on intergeneric hybrids are mainly based on Gray 1972, and therefore some of them are unreliable!

Wilson AC, Maxson LR & Sarich VM (1974) Two types of molecular evolution: evidence from studies of interspecific hybridization. Proc. Natl. Acad. Sci. USA 71, 2843–2847. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC388568/pdf/pnas00060-0257.pdf>

Zoochat

<https://www.zoochat.com/community/search/9707769/?q=hybrid&o=relevance>
Interesting website with many photos of zoo animal hybrids

Artiodactyla 4 suborders, 10 families, 85: 270 + many extinct families.

even-toed ungulates = Paarhufer

4 suborders:

Ancodonta 1 family Hippopotamidae 1: 2.

Ruminantia 6 families: Antilocapridae 1: 1, Bovidae 50: 140, Cervidae 20: 69,

Giraffidae 2: 2, Moschidae 1: 7, Tragulidae 3: 10.

Suida 2 families Suidae 2: 17, Tayassuidae 3: 3.

Tylopoda 1 family Camelidae 2: 7.

Artiodactyla: Bovidae 50: 140 + 300 extinct species. (13 IG)
(suborder Ruminantia)

bovids = Rinder, Hornträger

10 subfamilies:

Aepycerotinae 1: 1 *Aepyceros melampus*.

Alcelaphinae 4: 23.

Antilopinae 15: 37.

Bovinae 12: 35.

Caprinae 14: 37.

Cephalophinae 3: 20 *Cephalophus*, *Philantomba*, *Sylvicapra*.

Hippotraginae 3: 8.

Nesotraginae 1 *Nesotragus*.

Oreotraginae 1 *Oreotragus*.

Pantholopinae 1 *Pantholops*.

Reduncinae 3: 9 *Kobus*, *Pelea*, *Redunca*.

Alcelaphinae 4: 6 + many extinct taxa. 1 IG

wildebeest and relatives = Kuhantilopen

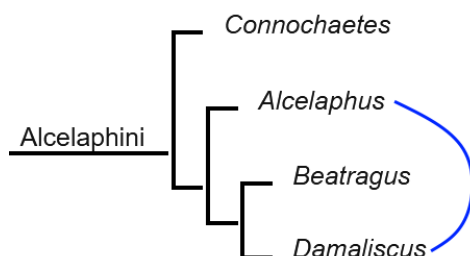
Alcelaphus 7 e.g. *buselaphus*, *lichtensteinii*, *Beatragus* 1 *hunteri*, *Connochaetes* 5,
Damaliscus 10.

Possibly **basic type family Bovidae subfamily Alcelaphinae (4: 23)**, due to the hybrid connection, see the figure below.

Alcelaphus buselaphus × *Damaliscus pygargus* (“*Dorcas*”), *lunatus* (viable; presumed)
Gray 1972, Van Gelder 1977, McCarthy 2015 (nat. hyb.), Van Wyk et al. 2024
(sterile)

Alcelaphus buselaphus × *Alcelaphus* (= *Sigmoceros*^o) *lichtensteinii* IS (nat. hyb.) McCarthy
2015 (capt. hyb., nat. hyb.)

Connochaetes gnou × *Gorgon*^o (= *Connochaetes*) *taurinus* IS Gray 1972, Van Gelder 1977,
McCarthy 2015 (capt. hyb., nat. hyb.)



Bovidae subfamily Alcelaphinae: hybridization in the phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Zurano JP et al. (2019) (“Alcelaphini” sensu Alcelaphinae as listed above).
<https://doi.org/10.1016/j.ympev.2018.12.015>).

Antilopinae 14: 38 + extinct genera. 1 IG

gazelles and relatives = Gazellenartige

Attention: “*Antilope*” is a genus within tribe Antilopinae, and must not be confused with the word “Antilope” which means members of various Bovidae tribes.

3 tribes:

Antilopini 8: 27 *Ammodorcas* 1, *Antidorcas* 1, *Antilope* 1 *cervicapra*, *Eudorcas* 5, *Gazella* 12, *Litocranius* 1, *Nanger* 3, *Procapra* 3.

Neotragini 5: 10 *Dorcatragus* 1, *Madoqua* 4, *Neotragus* 1, *Ourebia* 1, *Raphicerus* 3.

Saigini 1: 1 *Saiga* 1.

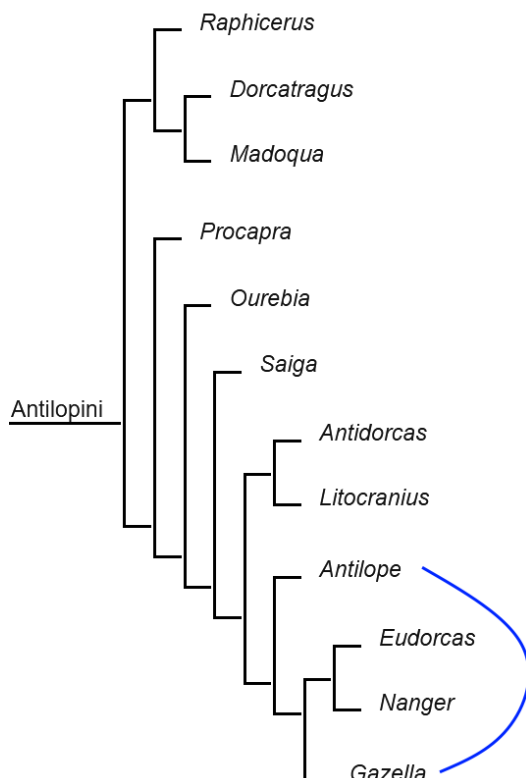
In Bovidae subfamily Antilopinae at least 4 genera and 19 species belong to the same basic type via *Antilope* × *Gazella*, see the figure below.

Antilope cervicapra × *Gazella dorcas* Antilopini

http://scienceblogs.com/tetrapodzoology/2009/03/408_post-1993_mammal_species.php, McCarthy 2015 (capt. hyb.; *A. cervicapra* × *G. dorcas*, *subgutturosa*, *thomsonii*)

Eudorcas × *Nanger* Antilopini

http://scienceblogs.com/tetrapodzoology/2009/03/408_post-1993_mammal_species.php undocumented



Bovidae subfamily Antilopinae: hybridization in the phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Zurano JP et al. 2019 (“Antilopini” here sensu Antilopinae as listed above).

<https://doi.org/10.1016/j.ympev.2018.12.015>; see also: Bärman EV 2014 Fig. 1. <https://epub.ub.uni-muenchen.de/22395/>).

Bovinae 12: 35 + extinct taxa. **2 IG**

cattle, bisons etc. = Rinderartige

3 tribes:

Bovini 5: 23 *Bison* 6, *Bos* (incl. *Bibos*°, *Poephagus*°) 10, *Bubalus* 5, *Pseudoryx* 1, *Syncerus* 4.

Boselaphini 2: 2 *Boselaphus* 1, *Tetracerus* 1.

Tragelaphini 2: 10 *Taurotragus* 2 *derbianus*, *oryx*, *Tragelaphus* 17 (often incl. *Ammelaphus*°, *Boocercus*°, *Nyala*° *angassii*, *Strepsiceros*°)

In family **Bovidae** subfamily **Bovinae** probably at least the members of **subtribe Bovina** belong to the same basic type, containing the genus *Bos* with subgenera (incl. *Bison* and *Bibos*) with at least 16 extant and 19 extinct species (cf. de.wikipedia 2025. [https://en.wikipedia.org/wiki/Bovina_\(subtribe\)#The_Fossil_Record](https://en.wikipedia.org/wiki/Bovina_(subtribe)#The_Fossil_Record)). According to the cladogram below (Martínez-Navarro et al. 2007, Fig. 4) the fossil genera *Leptobos* and *Pelorovis* (7+5 species) are included. There are at least 6 additional fossil species of different genera in Bovina. Consequently, 53 or more species belong to this basic type, especially if fossil taxa are included.

Probably at least **tribe Tragelaphini** forms another basic type.

Bibos° (= *Bos* p.p.) × *Bos* **IS Bovini** Van Gelder 1977. The hybridization was one of the reasons to unite the formerly distinct genera!

Bison bison, *bonasus* × *Bos taurus* **Bovini** (→ “Beefalo”, “Zubron”) Gray 1972, Van Gelder 1977, Vasil'ev 2002 a, b, McCarthy 2015 (capt. hyb., *Bison bison* × *Bos frontalis*, *taurus*, *grunniens*; *Bison bonasus* × *Bos taurus*)

Bison bison × *Bubalus* Gray 1972 (“unsuccessful”), Owiny et al. 2009 (“not authenticated”)

Bison bison × *Syncerus caffer* **Bovini** Owiny et al. 2009 (only up to the morula or blastula stage)

Bos taurus × *Bubalus bubalis* **Bovini** Gray 1972 (mating occurs, but no progeny or only doubtful reports), Kochhar et al. 2002, Patil & Totey 2003 (in laboratory experiments, the embryos fail around the 8-cell stage)

Bos × *Capra* **ISF Bovinae × Caprinae erroneous**, see Mohr 1930

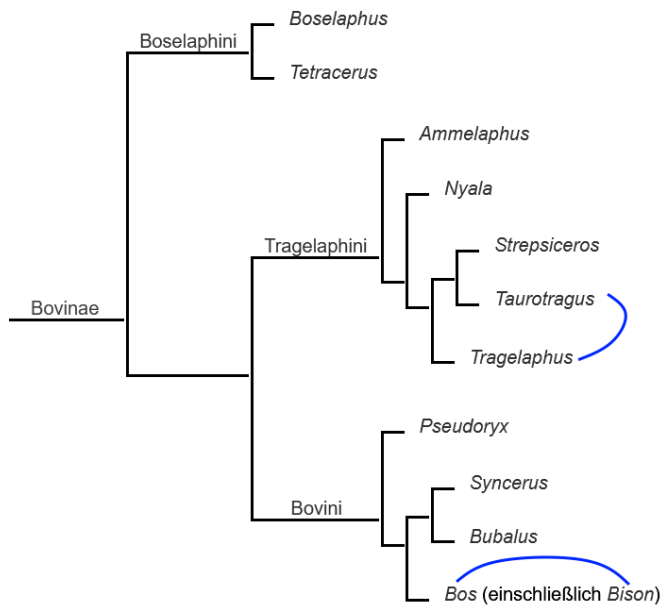
Bos taurus × *Ovis aries* **ISF Bovinae × Caprinae questionable**, see McCarthy 2015 (capt. hyb.)

Bos taurus × *Poephagus*° (= *Bos*) *grunniens* = *mutus* **IS Bovini** (→ “Dzo”) Petzsch 1957 a, Gray 1972 (viable), Van Gelder 1977, <http://en.wikipedia.org/wiki/Dzo> 2008 (*cattle* × *yak*), McCarthy 2015 (capt. hyb.)

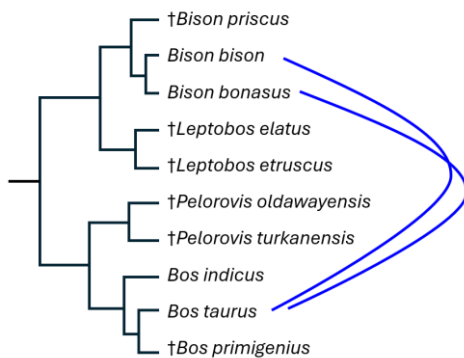
Bos taurus × *Taurotragus oryx* **IT Bovini × Tragelaphini** (capt. hyb.) McCarthy 2015, **not well documented**

Taurotragus oryx × *Tragelaphus* (*Strepsiceros*°) *strepsiceros* **Tragelaphini** Gray 1972 (presumed), Jorge et al. 1976, Van Gelder 1977, <http://www.messybeast.com/genetics/hybrid-deer-antelope.htm> 20252, McCarthy 2015 (capt. hyb.)

Tragelaphus (*Boocercus*°) *eurycerus* × *Tragelaphus spekei* **IS Tragelaphini** Gray 1972 (capt. hyb., viable), McCarthy 2015



Bovidae subfamily Bovinae: hybridization in the phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Zurano JP et al. 2019. <https://doi.org/10.1016/j.ympev.2018.12.015>).



Bovidae subfamily Bovinae tribe Bovini subtribe Bovina: hybridization within the phylogeny according to Martínez-Navarro et al. (2007, Fig. 4. doi:10.1016/j.yqres.2007.06.002) including extinct species.

Caprinae 14: 37. 7 IG

sheep and goats = Böcke

3 tribes:

Caprini 10: 25 *Ammotragus* 1, *Arabitragus* 1, *Budorcas* 1, *Capra* 10, *Hemitragus* 1, *Nilgiritragus* 1, *Oreamnus* 1, *Ovis* 7, *Pseudois* 1, *Rupicapra* 1

Pantholopini 1: 1 *Pantholops* 1

Ovibonini 3: 11 *Capricornis* 6, *Nemorhaedus* 4, *Ovibos* 1

Probably **basic type family Bovidae subfamily Caprinae** (14: 37): Klöckner 1998 (unpubl., Fachtagung Biologie Wort und Wissen). 6 of the 10 genera are linked in tribe Caprini (10: 25) by hybridization, see the figure below, so that all genera belong to the same basic type if compared with the molecular data of Zurano et al. 2019.

– No intergeneric hybrids are known as yet within or with the 2 other tribes, but all genera have much in common anatomically.

Ammotragus lervia × *Capra hircus* **Caprini** Petzsch 1957b, Gray 1972 (viable), Moore et al. 1981, Klöckner 1998 (often only fetuses), McCarthy 2015 (capt. hyb.)

Ammotragus lervia × *Ovis aries* **Caprini** Gray 1972 (unsuccessful), Moore et al. 1981, Klöckner 1998 (often only fetuses), McCarthy 2015 (art. hyb., fertile embryos, but none developed)

Capra: Ropiquet & Hassanin 2006 suggest a hybridogeneous origin of the Pliocene ancestor of goats (*Capra*) **HY**

Capra hircus × *Hemitragus* **Caprini** Gray 1972 (abortions), Klöckner 1998 (often only fetuses)

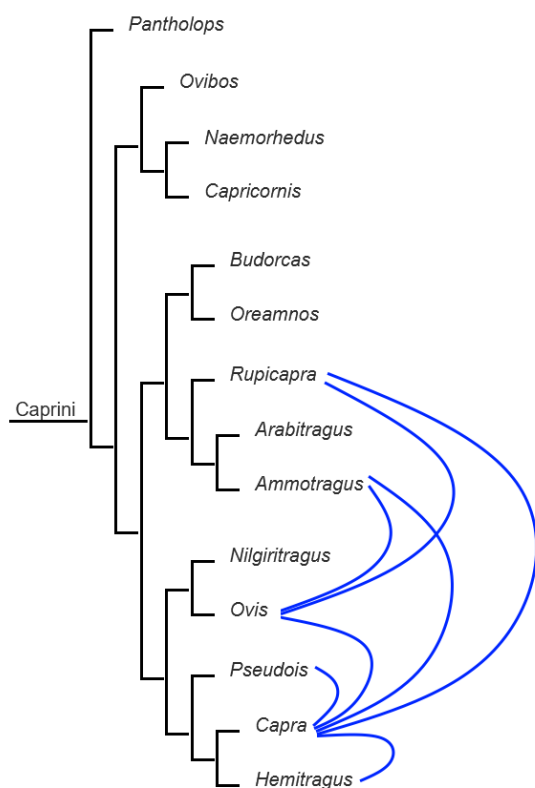
Capra hircus × *Ovis aries* **Caprini** Gray 1972 (capt. hyb.; questioned), Brunner 1988 Klöckner 1998 (often only fetuses), McCarthy 2015 (capt. hyb.), Pauciullo et al. 2016

Capra aegagrus × *Pseudois nayaur* **Caprini** McCarthy 2015 (capt. hyb.)

Capra hircus × *Rupicapra rupicapra* **Caprini** Gray 1972 (capt. hyb., doubtful), McCarthy 2015 (nat. hyb.)

Ovis ammon × *Ovis aries* **IS** DOI:[10.15389/agrobiology.2020.6.1139eng](https://doi.org/10.15389/agrobiology.2020.6.1139eng)

Ovis × *Rupicapra* **Caprini** Gray 1972 (hybrid embryos died), Klöckner 1998 (often only fetuses)



Bovidae subfamily Caprinae: hybridization in the phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Zurano JP et al. 2019 (“Caprini” here sensu “Caprinae” as listed above).

<https://doi.org/10.1016/j.ympev.2018.12.015>)

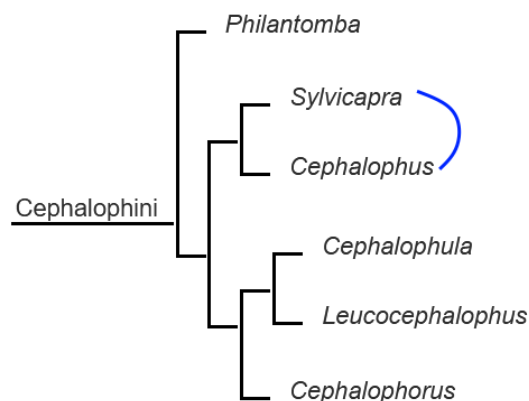
Cephalophinae 3: 22 + extinct taxa. 1 IG

duikers = Ducker

Cephalophus 18 (incl. *Cephalophula* 1 zebra, *Leucocephalophus* 1 adersi), *Philantomba* 3, *Sylvicapra* 1

IS: For interspecific hybrids see <http://messybeast.com/genetics/hybrid-deer-antelope.htm> 2025

Cephalophus natalensis × *Sylvicapra grimmia* Bigalke 1932, Gray 1972 (some viable, capt. hyb.), <http://messybeast.com/genetics/hybrid-deer-antelope.htm> 2025



Bovidae subfamily Cephalophinae: hybridization in the phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Zurano JP et al. 2019. <https://doi.org/10.1016/j.ympev.2018.12.015>)

Hippotraginae 3: 8. 1 IG

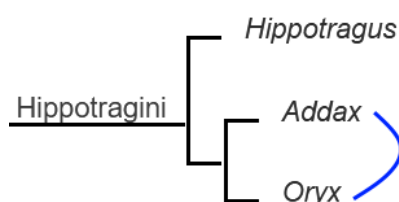
antelopes p.p.= Antilopen z. T., Pferdeböcke

Addax 1, *Hippotragus* 1, *Oryx* 6.

For interspecific hybrids see <http://messybeast.com/genetics/hybrid-deer-antelope.htm> 2025

Addax nasomaculatus × *Oryx dammah* <http://messybeast.com/genetics/hybrid-deer-antelope.htm> 2025

Addax nasomaculatus × *Oryx gazella* ("Gemsbock") **unconfirmed, but possible**
<https://www.flickr.com/photos/trebaruna/albums/72157719435107859/>



Bovidae subfamily Hippotraginae: hybridization within the phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Zurano JP et al. 2019. <https://doi.org/10.1016/j.ympev.2018.12.015>)

Reduncinae 3: 10

Antelopes p.p. = Ried- und Wasserböcke

Kobus 6 (incl. *Adenota*°, *Onotragus*°), *Pelea*, *Redunca*.

Adenota° (= *Kobus* p.p.) × *Kobus* IS Van Gelder 1977 (fertile)

Adenota° (= *Kobus* p.p.) × *Kobus* × *Onotragus*° (= *Kobus*) *leche* IS Van Gelder 1977

Kobus × *Onotragus*° (= *Kobus* p.p.) IS Van Gelder 1977

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- Brunner RM (1988) Vergleichende Studien an Chromosomen von Schaf, Ziege und einem Schaf-Ziege-Bastard unter Einbeziehung einer computergestützten Karyotopanalyse. Microreproduction: 3 Microfiches. Dissertation Univ. Rostock. en.wikipedia.org/wiki/Bovid_hybrid. [useful information](#)
- Jorge W, Butler S & Benirschke K (1976) Studies on a male eland × kudu hybrid. J. Reproduction and Fertility 46, 13–16. [Taurotragus](#) × [Tragelaphus](#).
- Klößner P (1998, unpubl.) Caprinae = Böcke – ein Grundtyp. Fachtagung Biologie Wort und Wissen.
- Kochhar HPS et al. (2002) In vitro production of cattle-water buffalo (*Bos taurus* - *Bubalus bubalis*) hybrid embryos. Zygote 10 (2), 155–162.
- Lightner JK (2006) Identification of species within the sheep-goat kind (Tsoan monobaramin). Journal of Creation 20 (3), 61–65. [Caprinae](#)
- Lightner JK (2007) Identification of species within the cattle monobaramin (kind). Journal of Creation 21, 119–122. [Bovinae](#)
- Mohr E (1930) Der angebliche Schaf-Rind-Bastard („Schafochse“) von Husum. Zool. Garten (Leipzig) 3 (1/3), 35–39. [History and description of the animal, evidently not a hybrid, but an under-sized bull](#)
- Moore NW et al. (1981) Studies on hybridisation between Barbary ram (*Ammotragus lervia*) and domestic ewes (*Ovis aries*) and Nanny goats (*Capra hircus*). J. Reproduction and Fertility 61, 79–82.
- Owiny OD et al. (2009) In vitro production of cattle × buffalo hybrid embryos using cattle oocytes and African buffalo (*Syncerus caffer caffer*) epididymal sperm. Theriogenology 71, 884–894. [Bison bison](#) × [Syncerus caffer](#), only up to the blastula stage
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- Pauciuolo A et al. (2016) Characterization of a very rare case of living ewe-buck hybrid using classical and molecular cytogenetics. Nature. Scientific reports.

<https://www.nature.com/articles/srep34781> *Ovis aries* ♀ × *Capra hircus* ♂.

- Petzsch H (1957a) Ein bemerkenswerter Bastard ♂ aus Hausyak ♂ × Hausrind ♀. Säugetierkundl. Mitt. 1957, 76–77. *Bison* × *Bos*.
- Petzsch H (1957b) Lebender ♀ Bastard aus *Ammotragus lervia* Pall. × *Capra hircus* L. ♀ im Berg-Zoo Halle-S. geboren. Zool. Anz. 1957, 285–290.
- Ropiquet A & Hassanin A (2006) Hybrid origin of the Pliocene ancestor of wild goats. Mol. Phylogen. Evol. 41 (2), 395–404.
- Takeda K et al. (2012) Influence of intergeneric/interspecies mitochondrial injection; parthenogenetic development of Bovine oocytes after injection of mitochondria derived from somatic cells. J. Reprod. Development 58 (3), 323–329.
- Van Wyk AM et al. (2024) Hybridization in an isolated population of blesbok and red hartebeest. Ecol. Evol. 14 (4):e111194. doi: 10.1002/ece3.11194 *Alcephalus* × *Damaliscus*
- Vasil'ev VA, Steklenev EP & Morozova EV (2002a) DNA fingerprinting of individual species and intergeneric and interspecific hybrids of the genera *Bos* and *Bison*, subfamily Bovinae. Genetika 38, 515–520.
- Vasil'ev VA, Steklenev EP, Morozova EV & Semyenova SK (2002b) DNA fingerprinting of individual species and intergeneric and interspecific hybrids of the genera *Bos* and *Bison*, subfamily Bovinae. Russian J. Genetics 38 (4), 415–420.

Artiodactyla: Camelidae 2: 7 + extinct taxa 1 IG/IT (suborder Tylopoda)

camels = Kamelartige

1 extant subfamily Camelinae with 2 tribes:

Camelini 1: 3 *Camelus bactrianus*, *dromedarius*, *ferus*, *Lama* 4 (incl. *Vicugna*° 2)

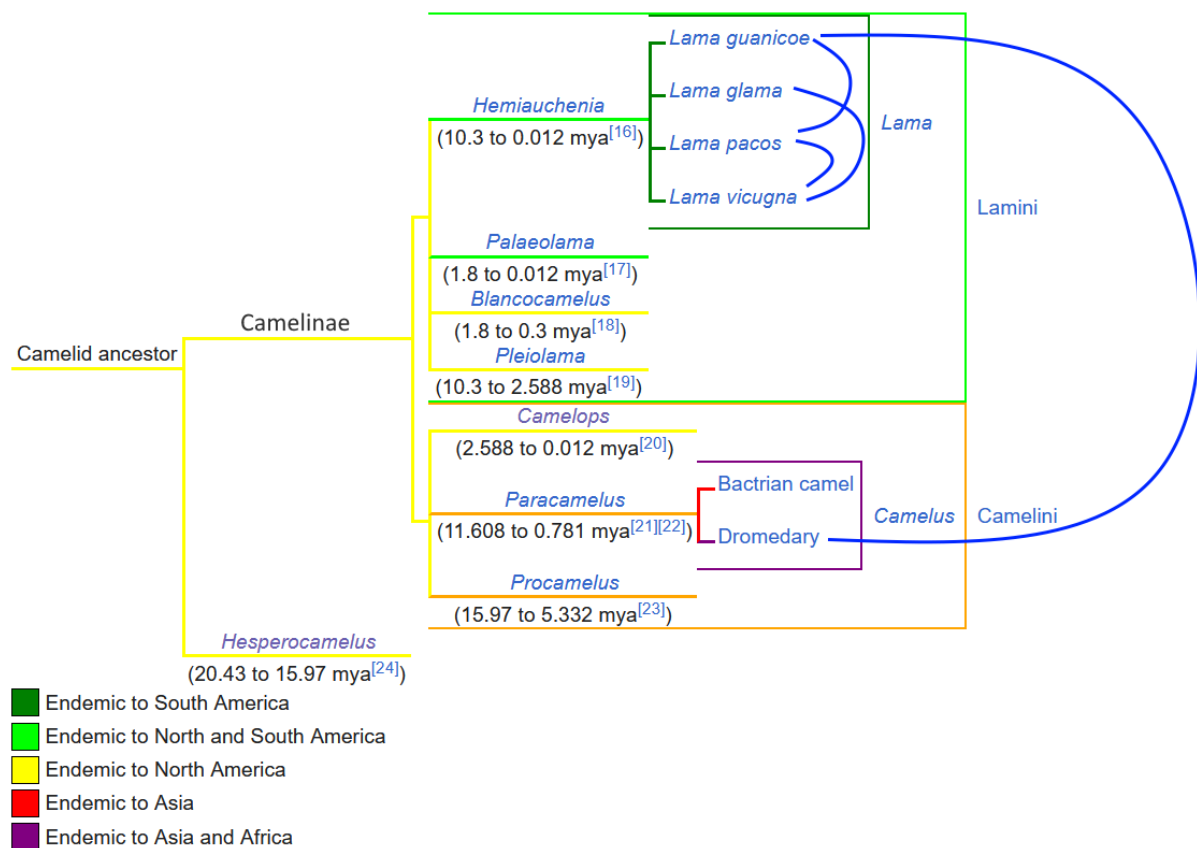
Lamini 1: 4 *Lama glama*, *guanicoe*, *pacos* (= *Vicugna*° *pacos*), *vicugna* (= *Vicugna*° *vicugna*)

Basic type family Camelidae (2: 7): Junker 2000, at least for the extant genera. The two extant genera are connected by hybridization. Probably all fossil members of subfamily Camelinae are also included in this basic type (see below and cf. Heintzman et al. (2015. doi:10.1093/molbev/msv128): 2 extant and 6 extinct genera with 7 extant and at least 22 extinct species (cf. en.wikipedia 2025); cf. Lynch S et al. (2020, Fig. 12. <https://doi.org/10.1186/s13358-020-00208-6>): all fossil Camelinae included except *Alforjay taylori*.

Camelus dromedarius × *Lama guanicoe* IT *Camelini* × *Lamini* Skidmore et al. 1999, McCarthy 2015, called “Cama”

Lama glama × *Vicugna*° (= *Lama*) *pacos*, *vicugna* IS *Lamini* (→ <http://en.wikipedia.org/wiki/Huarizo>, McCarthy 2015, called „Huarizo” (male llama and a female alpaca) or „Alpama”

Lama guanicoe × *Vicugna*° (= *Lama*) *pacos* IS *Lamini* Gray 1972 (art. hyb., viable), McCarthy 2015



Camelidae subfamily Camelinae: Hybridization within the phylogeny according to en.wikipedia 2025, CC BY 4.0 <https://en.wikipedia.org/w/index.php?title=Camelidae&oldid=1299394541>

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Artiodactyla: Cervidae 20: 69 + many extinct taxa. 9 IG (incl. 3 ISF) (suborder Ruminantia)
 deer = Hirschartige

2 subfamilies:

Capreolinae 11: 40 *Alces* 1, *Blastocerus* 1, *Capreolus* 2, *Hippocamelus* 2, *Hydropotes* 1, *Mazama* 23, *Odocoileus* 3, *Ozotoceros* 1, *Pudella* 2, *Pudu* 1, *Rangifer* 1

Cervinae 9: 29 *Axis* 4 (incl. *Hyelaphus*^o *porcinus*), *Cervus* 5, *Dama* 2, *Elaphodus* 1, *Elaphurus* 1, *Muntiacus* 12, *Rucervus* 2 *duvaucelii*, *eldii* (= *Panolia eldii*), *Rusa* 4.

Probably **basic type family Cervidae** (20: 69), at least for the extant species: The two subfamilies are connected by three hybrid combinations. It seems worthwhile to examine the fossil deer as well, cf.

https://en.wikipedia.org/wiki/Category:Prehistoric_deer.

Alces alces × *Cervus (elaphus) canadensis* **Capreolinae × Cervinae** ISF Gray 1972 (presumed), McCarthy 2015 (questionable, but possible)

Axis axis × *Cervus nippon, elaphus* **Cervinae** Gray 1972 (viable, fertile), Asher et al. 1999, Lightner 2006, <http://www.messybeast.com/genetics/hybrid-deer-antelope.htm> 2012, McCarthy 2015

Axis axis × *Cervus* × *Rucervus* **Cervinae** trigenetic hybrid http://scienceblogs.com/tetrapodzoology/2009/03/408_post-1993_mammal_species.php

Axis axis × *Hemitragus jemlahicus* **Cervidae Cervinae × Bovidae Caprinae** IF (nat. hyb.) McCarthy 2015 (questionable)

Axis axis × *Hyelaphus*^o (= *Axis*) *porcinus* **IS Cervinae** (art. hyb., fertile) Gray 1972, McCarthy 2015 (capt. hyb.)

Axis axis × *Odocoileus virginianus* **ISF Cervinae × Capreolinae** Gray 1972 (viable, art. hyb.), doubted by Van Gelder 1977, see McCarthy 2015

Axis axis × *Rucervus duvaucelii* **Cervinae** Gray 1972 (art. hyb., viable), McCarthy 2015 (capt. hyb.)

Capreolus pygargus × *Cervus elaphus* **ISF Capreolinae × Cervinae** McCarthy 2015

Capreolus capreolus × *Hyelaphus*^o (= *Axis*) *porcinus* **ISF Capreolinae × Cervinae** Gray 1972 (art. hyb., viable), doubted by Van Gelder 1977, McCarthy 2015

Cervus elaphus × *Dama dama* **Cervinae** Gray 1972 (doubtful)

Cervus canadensis × *Odocoileus hemionus* **ISF Cervinae × Capreolinae** Gray 1972 (capt. hyb., viable), McCarthy 2015 (*C.* × *O. virginianus*)

Cervus elaphus × *Elaphurus davidianus* **Cervinae** Gray 1972 (viable, fertile), Maqbool et al. 2007, Lightner 2006, McCarthy 2015

Cervus elaphus × *Panolia* (= *Rucervus*) *eldii* → *Elaphurus* **Cervinae** possibly hybridogeneous origin = HY Meijaard & Groves 2004, McCarthy 2015 (citing Pitra et al. 2004)

Cervus elaphus × *Rangifer tarandus* **ISF Cervinae × Capreolinae** Gray 1972 (unsuccessful)

Cervus elaphus × *Rusa* (= *Cervus*) *unicolor* **Cervinae** Mi et al. 2014

Dama dama × *Hyelaphus*^o (= *Axis*) *porcinus* **Cervinae** Gray 1972 (viable), Lightner 2006, McCarthy 2015

Dama dama × *Odocoileus hemionus* ISF Cervinae × Capreolinae Gray 1972
(unsuccessful)

Mazama americana = *rufa* × *Pudu* (= *Cervus*) *puda* Capreolinae McCarthy 2015



Cervidae: hybridization within the phylogeny according to en.wikipedia 2025, CC BY 4.0 (cf. Heckeberg NS 2020. doi:10.7717/peerj.8114).

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<https://doi.org/10.1016/j.ympev.2018.12.015>.

Artiodactyla: Giraffidae 2: 2 + many extinct taxa (suborder Ruminantia)

giraffe + okapi = Giraffen

Giraffa 1, *Okapi* 1.

Probably **basic type family Giraffidae** (2: 2), at least for the extant taxa: Binder 2017. Well-defined group, the two genera differ genetically from all other mammals. Hybrids are unknown, so far. For extinct taxa see Lönnig 2012.

Okapi as a possible *Giraffa* hybrid HY see <http://www.macroevolution.net/giraffe-zebra-hybrid.html> uncertain

References:

Binder H (2017) Giraffenartige – Genom und Körperbau. Studium Integrale J. 24, 40–42.

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Artiodactyla: Hippopotamidae 2: 2 + extinct taxa (suborder Whippomorpha)

hippomotamids = Flusspferde

Hippopotamus amphibius, *Choeropsis liberiensis*.

Probably **basic type family Hippopotamidae** (2: 2) as a well-defined group, though hybrids are unknown.

Artiodactyla: Suidae 6: 18 + >30 extinct genera. 2 IG/IT (suborder Suina)

pigs, hogs, swines = Echte Schweine

1 extant subfamily Suinae, 4 tribes (+ 1 extinct tribe):

Suini 2: 9 (+ extinct genera) *Porcula* 1, *Sus* 8

Babyrousini 1: 4 *Babyrousa* 4

Phacochoerini 1: 2 *Phacochoerus* 2

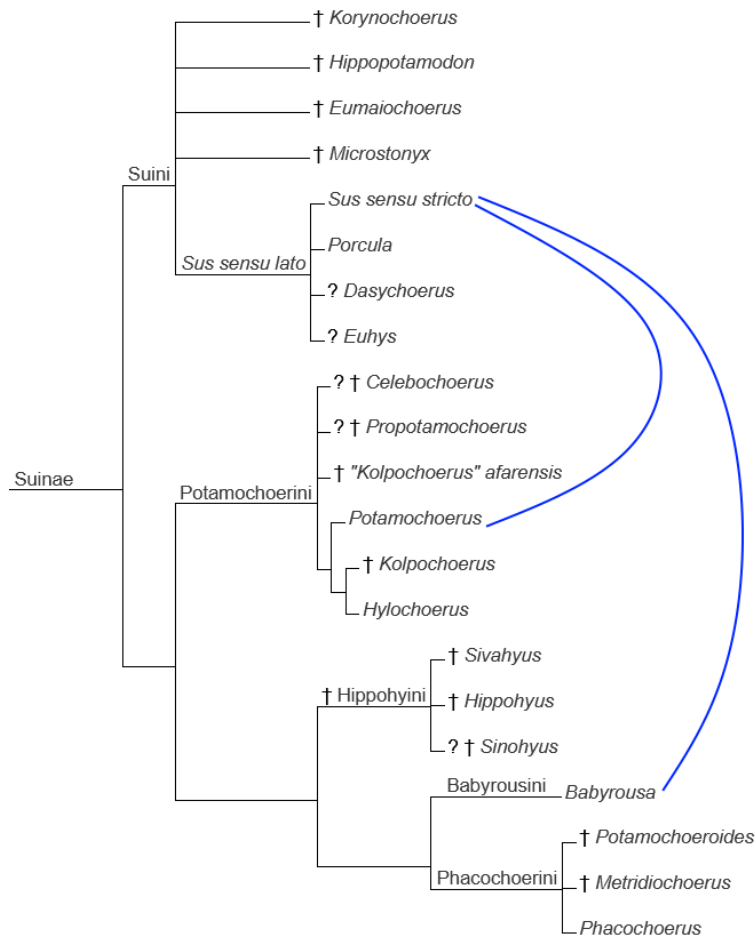
Potamochoerini 2: 3 (+ extinct genera) *Hylochaerus* 1, *Potamochoerus* 2

Basic type family Suidae subfamily Suinae: The known hybridizations connect 3 of the 4 extant tribes, thereby not only including all extant tribes (6: 18), but also all extinct genera (ca. 14) of the subfamily.

Babyrousa babyrussa × *Sus scrofa* **IT** Babyrousini × Suini

http://en.wikipedia.org/wiki/North_Sulawesi_babirusa 2012 (capt. hyb., Zoo Copenhagen), McCarthy 2025, messybeast 2025, Thomsen et al. 2011

Potamochoerus porcus, larvatus × *Sus scrofa* **IT** Potamochoerini × Suini McCarthy 2015



Suidae subfamily Suinae: Hybridization within the phylogeny according to en.wikipedia 2025, CC BY 4.0 (cf. Mikko's Phylogeny Archive (based on McKenna & Bell, 1997, Liu 2003, Harris & Liu, 2007) <https://www.mv.helsinki.fi/home/mhaaramo/metazoa/deuterostoma/chordata/synapsida/eutheria/artiodactyla/suina/suidae.html>

References:

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Artiodactyla: Tayassuidae 3: 3 + 14 extinct genera. 1 IG
(suborder Suina)

peccaries = Pekaris, Nabelschweine

Catagonus 1 wagneri, *Dicotyles 1 tajacu* (incl. *Pecari*^o), *Tayassu 1 pecari*.

Probably **basic type family Tayassuidae** (3: 3). According to the cladogram of Parisi Dutra (2016, Fig. 1. doi:10.1007/s10914-016-9347-8) at least all extant Tayassuidae, belong to the same basic type but possibly several fossil taxa can be included in this basic type, also.

Dicotyles (= *Pecari*^o) *tajacu* × *Tayassu pecari* Gray 1972 (viable, art. hyb.), McCarthy 2015, messybeast 2025

Pecari angulatus × *Sus scrofa* IF **Tayassuidae** × **Suidae** Gray 1972 (unlikely)

References:

Parisi Dutra R et al. (2016) Phylogenetic systematics of peccaries (Tayassuidae: Artiodactyla) and a classification of South American tayassuids. J. Mammal. Evol. 24, 345–358 <https://doi.org/10.1007/s10914-016-9347-8> Phylogeny, monophyletic family!

Carnivora 2 suborders, 17 extant families, 280 species
carnivorans = Raubtiere

2 suborders:

Caniformia 9 extant families: clade Canoidea: Canidae, Ursidae; superfamily Musteloidea: Ailuridae, Mephitidae, Mustelidae, Procyonidae; clade Pinnipedia: Odobentidae, Otariidae, Phocidae → **order Pinnipedia**)

Feliformia 8 families

Carnivora: Canidae 12: 34 + many extinct taxa incl. subfamilies
4 IG (incl. 1 IT) (suborder Caniformia)

canines, dogs = Hunde

The subdivision is still matter of debate

3 tribes:

Canini 8: 18 *Atelocynus* 1, *Canis* (incl. *Thos*) 6, *Cerdocyon* 1, *Chrysocyon* 1, *Cuon* 1, *Lycaon* 1, *Lycalopex* 6, *Speothos* 1.

Vulpini 3: 14, *Vulpes* (incl. *Alopex*^o) 12, *Otocyon* 1, *Nyctereutes* 1

Urocyonini: 1: 2 *Urocyon* 2

Basic type family Canidae seems probable, at least for the extant taxa (12: 34): Crompton 1993, Pendragon 2011, Scholl 2025. Actual molecular data show the connection of very different clades. Recent crossbreedings and the results of molecular studies, which show that crossbreeding connects subgroups that are far apart, confirm the basic type of canines. However, the classification of the Urocyonini (gray fox clade: 9 extant/extinct species) and Vulpini (red fox clade: 19 extant/extinct species), as well as that of some extinct species, have not yet been definitively

clarified, as the data have not yet been confirmed by molecular genetics. At least 18 extant and 25 extinct species (cf. Zrzavý J et al. 2018. doi.org/10.1111/zsc.12293) of Canini belong to this basic type.

Alopex^o (= *Vulpes*) *lagopus* × *Vulpes vulpes* IS *Vulpini* Wipf & Shackelford 1949, Gray 1972 (some offspring are fertile), Zakiyan et al. 1975, Serov et al. 1976, 1977, Van Gelder 1977, Crompton 1993, McCarthy 2015 (capt. hyb.)

Canis × *Cerdocyon* *Canini* Gray 1972 (*Ca. familiaris* × *Ce. thous*, presumed), Crompton 1993, McCarthy 2015 <http://www.macroevolution.net/dog-hybrids.html>

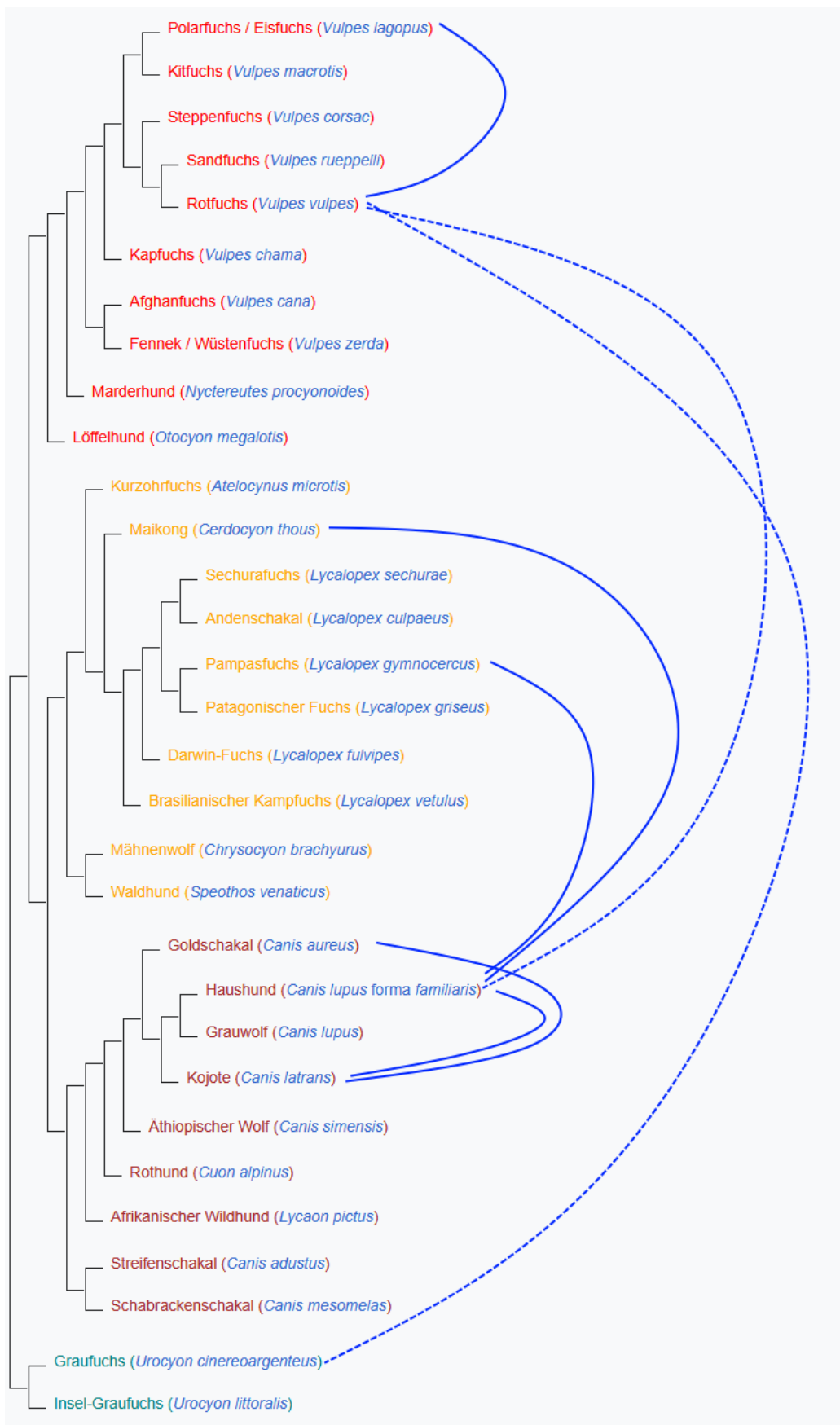
Canis × *Cuon alpinus* *Canini* questioned by Van Gelder 1977 and McCarthy 2015

Canis familiaris × *Lycalopex* (= *Pseudalopex*^o) *gymnocercus* *Canini* McCarthy 2015, en.wikipedia 2025, Szyrwelski BE et al. (2023. <https://doi.org/10.3390/ani13152505>; cf. Scholl 2025)

Canis familiaris, latrans × *Thos*^o (= *Canis*) *aureus* IS *Canini* Gray 1972, Van Gelder 1977 (fertile), http://en.wikipedia.org/wiki/Jackal%E2%80%93dog_hybrid, McCarthy 2015 (capt. hyb.)

Canis × *Vulpes* IT *Canini* × *Vulpini* Gray 1972 (presumed), Van Gelder 1977 (*C. latrans* × *V. vulpes* 1975: “seems no doubt”), Crompton 1993, McCarthy 2015 (*C. dingo* × *V. vulpes*: unreliable, *C. familiaris* × *V. vulpes* capt. hyb., *C. lupus* × *V. vulpes* unreliable)

Urocyon cinereoargenteus × *Vulpes vulpes* *Vulpini* Gray 1972 (uncertain), Crompton 1993, McCarthy 2015



Canidae: important hybridizations within the phylogeny according to en.wikipedia 2025, CC BY 4.0 (cf. Lindblad-Toh K et al. 2005. <https://doi.org/10.1038/nature04338>). Dotted lines = unconfirmed hybrids.

References:

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Carnivora: Felidae 14: 38 + extinct taxa. 13 IG (incl. 2 ISF) **(suborder Feliformia)**

felines, wild cats = Katzen

2 subfamilies:

Felinae 12: 31 *Acinonyx* 1 *jubatus*, *Caracal* 1 *caracal*, *Catopuma* 2 *badia*, *temminckii*, *Felis* 6 *bieti*, *catus*, *chaus*, *margarita*, *nigripes*, *silvestris*, *Leopardus* 9 *braccatus*, *colocolo*, *geoffroyi*, *guigna*, *jacobitus*, *pajeros*, *pardalis*, *tigrinus*, *wiedii*, *Leptailurus* 1 *serval*, *Lynx* 4 *canadensis*, *lynx*, *pardinus*, *rufus*, *Otocolobus* 1 *manul*, *Pardofelis* *marmorata*, *Prionailurus* 5 *bengalensis*, *itiotensis*, *planiceps*, *rubiginosus*, *viverrinus*, *Profelis* 1 *aurata*, *Puma* 2 *concolor*, *yagouaroundi*

Pantherinae 2: 7 *Neofelis* 2 *nebulosa*, *diardi*, *Panthera* 4 (incl. *Uncia*° *uncia*)

Basic type family Felidae (14: 38), at least for extant taxa: Crompton & Winkler 2006, Pendragon & Winkler 2011: The two subfamilies are linked by hybridization.

For detailed information and the species involved see Crompton 2006, http://en.wikipedia.org/wiki/Felid_hybrid and the internet presentation of Sarah Hartwell: www.messybeast.com/, e.g. her critical comments on alleged hybrids: <http://www.messybeast.com/small-hybrids/false-hybrids.htm>

Caracal caracal × *Felis catus* **Felinae** Crompton 2006, www.messybeast.com 2012, http://en.wikipedia.org/wiki/Felid_hybrid 2012, McCarthy 2015 (capt. hyb.)

Caracal caracal × *Leptailurus serval* **Felinae** www.messybeast.com 2012, McCarthy 2015 (capt. hyb.)

Felis × *Leopardus* **div. spec. Felinae** Crompton 2006, www.messybeast.com 2012, http://en.wikipedia.org/wiki/Felid_hybrid 2012 (attention: *Leopardus* is not the Leopard = *Panthera pardus*!), McCarthy 2015 (capt. hyb., nat. hyb. *F. catus* × *L. geoffroyi*; *F. catus* × *L. tigrinus*; *F. catus* × *L. wiedii*)

Felis × *Leptailurus serval* **Felinae** www.messybeast.com 2012, http://en.wikipedia.org/wiki/Felid_hybrid 2012, McCarthy 2015 (capt. hyb. *F. catus* × *L. serval*; *F. silvestris* × *L. serval*)

Felis × *Lynx* **Felinae** Van Gelder 1977, Crompton 2006, McCarthy 2015 (capt. hyb. *F. catus* × *Lynx lynx*; *F. catus* × *Lynx lynx*; *F. chaus* × *L. rufus*)

Felis catus × *Otocolobus manul* **Felinae** Crompton 2006, McCarthy 2015 (capt. hyb.)

Felis × *Panthera* **ISF Felinae × Pantherinae** Gray 1972, McCarthy 2015 **The question arises as to whether this is even possible given the difference in size.**

Felis × *Prionailurus* ("Felis") **Felinae** McCarthy 2015 (capt. hyb. *F. chaus* × *P. bengalensis*; *F. catus* × *P. viverrinus*)

Felis × *Prionailurus* ("Felis") *bengalensis* **Felinae** Crompton 2006, www.messybeast.com 2012, http://en.wikipedia.org/wiki/Felid_hybrid 2012, McCarthy 2015 (capt. hyb. *F. catus* × *P. bengalensis*; *F. catus* × *P. rubiginosa*)

Felis × *Puma concolor* **Felinae** Crompton 2006, McCarthy 2015

Leopardus × *Lynx* **Felinae** McCarthy 2015 (capt. hyb. *Leopardus pardalis* × *Lynx rufus*)

Leopardus × *Puma concolor* **Felinae** Crompton 2006, McCarthy 2015 (capt. hyb. *L. pardalis* × *P. concolor*)

Lynx rufus × *Prionailurus bengalensis* **Felinae** McCarthy 2015 ("??")

Panthera pardus × *Puma concolor* **ISF Pantherinae × Felinae** (→ "Pumapard")

Hagenbeck ca. 1900, Crompton 2006, <http://www.messybeast.com/genetics/hyb-pumaxleop.htm> 2012, <http://en.wikipedia.org/wiki/Pumapard> 2012, McCarthy 2015 (capt. hyb.)

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www.messybeast.com/genetics/hybrid-cats.htm

Carnivora: Mustelidae 22: 70. 1 IG (suborder Caniformia) **mustelids = Marder**

9 subfamilies.

“There are some documented intrageneric hybridizations in the genus *Mustela*, but alleged intergeneric hybrids seem questionable (Chang 1965; Chang 1968; Gray 1972; Lodé, Guiral, and Peltier 2005, Wu and Chang 1973).” Lightner et al. 2012

“No possibility of crossbreeding between European mink [*Mustela lutreola*] and American mink [*Neogale vison*] ... or Siberian weasel [*Mustela sibirica*] ... was proven. Hybrid embryos of these species obtained in laboratory conditions exhibited pathological characteristics and were resorbed in a short time” Skorupski J (2020. doi:10.3390/genes11111332)

IS: *Martes martes* × *Martes zibellina* **IS** Monakhov VG & Uspenskaya OD (2011. doi: 10.1134/S0012496613010171)

Meles anakuma × *Meles meles* **IS** possible hybrid according to the intermediate morphology. Baryshnikov G et al. (2002. doi: 10.15298/rusjtheriol.01.2.07)

Meles meles × *Meles leucurus* **IS** Kinoshita E et al. (2018. <https://doi.org/10.1016/j.mambio.2018.05.003>)

Mustela erminea × *Mustela putorius* (capt. hyb.) **IS** https://www.zobodat.at/pdf/Jb-Verein-Schutz-Alpenpfl-Tiere_29_1964_0053-0060.pdf

Mustela eversmanii × *Mustela putorius* possible hybrid according to intermediate morphology **IS** Cserkés et al. 2020

Mustela eversmanii × *Mustela sibirica* **IS** Cserkés et al. 2020

Mustela (putorius) furo × *Mustela putorius* IS

https://en.wikipedia.org/wiki/Polecat%E2%80%93ferret_hybrid

Mustela putorius × *Mustela sibirica* Cserkész et al. 2020

Mustela lutreola × *Mustela putorius* IS Cserkész et al. 2020,

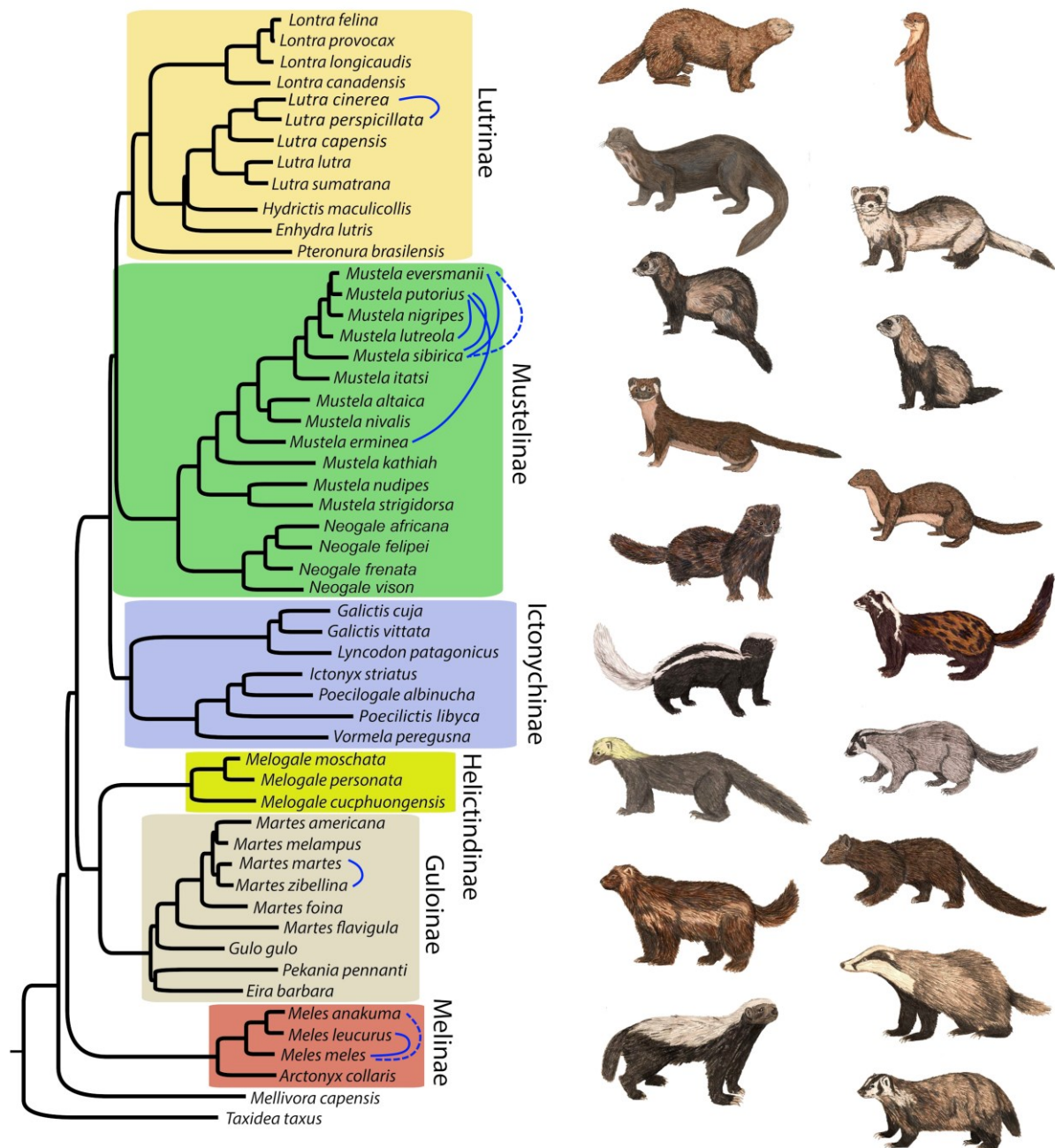
https://en.wikipedia.org/wiki/Polecat%E2%80%93mink_hybrid;

<http://messybeast.com/genetics/hybrid-viverrid-mustelid.htm>

Aonyx cinereus (= *Lutra cinerea*) × *Lutrogale perspicillata* (= *Lutra perspicillata*) Lutrinae

McCarthy 2015 (capt. hyb.), Moretti et al. 2017

Martes foina or *martes* × *Mustela putorius* ISF Guloninae × Mustelinae McCarthy 2015
(nat. hyb., questionable)



Mustelidae: hybridization within a phylogeny according to en.wikipedia 2025 (cf. ChrisJLaw, CC BY-SA 4.0)

References:

Cserkés T et al. (2020) Intra- and interspecific morphological variation in sympatric and allopatric populations of *Mustela putorius* and *M. eversmannii* (Carnivora: Mustelidae) and detection of potential hybrids. Mammal Research.

<https://doi.org/10.1007/s13364-020-00543-6>.

Carnivora clade Pinnipedia → order Pinnipedia

Carnivora: Ursidae 5: 8 + extinct taxa. 4 IG (incl. 1 ISF) **(suborder Caniformia)**

bears = Bären, Großbären

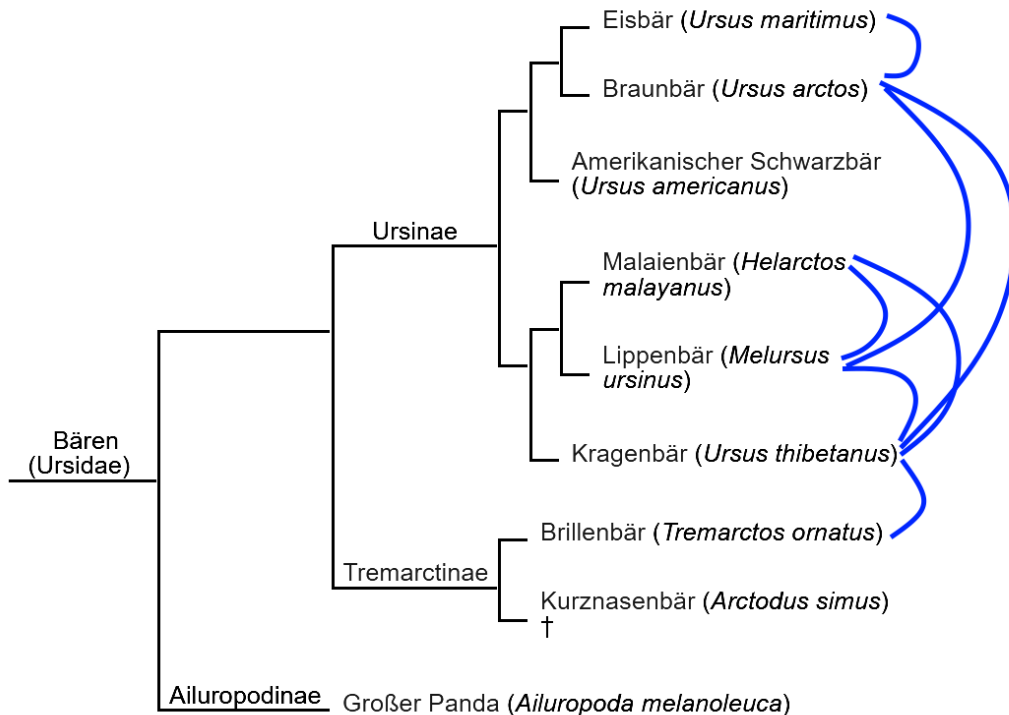
3 extant subfamilies:

Ursinae 3: 6: *Helarctos 1 malayanus* (= sun bear), *Melursus 1 ursinus* (Lippenbär = sloth bear), *Ursus 4 americanus* (Amerikanischer Schwarzbär), *Ursus arctos* (Braunbär = brown bear), *Ursus maritimus* (Eisbär = polar bear = *Thalarctos*° *maritimus*), *Ursus thibetanus* (Asiatischer Schwarzbär = Asian black bear = *Selenarctos*° *thibetanus*)

Ailuropodinae 1: 1: *Ailuropoda melanoleuca* (Großer Panda = giant panda)

Tremarctinae 1: 1 *Tremarctos ornatus* (Brillenbär = spectacled bear). This is the only extant genus of the subfamily. – The extinct genus *Arctodus* (short faced bear = Kurznasenbär) belongs here.

Probably **basic type family Ursidae subfamilies Ursinae + Tremarctinae (5: 8)**, at least for extant species: Zeitz 2011, 2013 (unpubl., Fachtagung Biologie Wort und Wissen). Among Ursidae, two of the three subfamilies (Tremarctinae and Ursinae) have interbred. Since the extinct short-nosed bear (*Arctodus*) is closely related to the extant genus *Tremarctos* within subfamily Tremarctinae (cf. Abella et al. 2012), it can be included here. No hybrids are known from the giant panda *Ailuropoda*, which forms its own subfamily Ailuropodinae.



Ursidae: hybridization in a phylogeny according to de.wikipedia 2025, CC BY 4.0 (Kumar V et al. 2017. doi:10.1038/srep46487).

Helarctos malayanus × *Melursus ursinus* **Ursinae** Asakura 1969, Gray 1972, Van Gelder 1977, en.wikipedia 2012, McCarthy 2015

Helarctos malayanus × *Ursus* (= *Selenarctos*^o) *thibetanus* **Ursinae** McCarthy 2015 (nat. hyb. Cambodia = Galbreath et al. 2008)

Melursus ursinus × *Ursus arctos*, *thibetanus* **Ursinae** Van Gelder 1977, McCarthy 2015

Tremarctos ornatus × *Ursus thibetanus* **ISF Tremarctinae × Ursinae** (capt. hyb.)

Mondolfi & Boede 1981, Mondolfi 1983, Torres 2012, McCarthy 2015

Ursus arctos × *Ursus* (= *Selenarctos*^o) *thibetanus* **IS Ursinae** Gray 1972, Van Gelder 1977, en.wikipedia 2008, McCarthy 2015 (capt. hyb.)

Ursus arctos × *Ursus* (= *Thalarctos*^o) *maritimus* **IS Ursinae** Martin 1876, Kowalska 1962, 1965, 1969, Gray 1972, Van Gelder 1977, en.wikipedia 2008, McCarthy 2015 (nat. hyb., capt. hyb.)

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http://www.creationresearch.org/creation_matters/97/cm9709.html *Helarctos malayanus* × *Melursus*, *Thalarctos* (= *Ursus*) *maritimus*) × *Ursus arctos*.
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Cetacea 2 suborders, 13 families, 24: 94

whales = Wale

2 suborders:

Mysticeti (**baleen whales = Bartenwale**): 3 families Balaenopteridae (incl.

Eschrichtiidae) 3: 10, Balaenidae 2, Cetotheriidae 1.

Odontoceti (**toothed whales = Zahnwale**) 10 families Monodontidae 2, Delphinidae 16, Phocoenidae 3, ...

Cetacea: Balaenopteridae (incl. Eschrichtiidae) 3: 10 + 12 extinct genera. **1 IG** (suborder Mysticeti)

rorquals = Furchenwale

Eschrichtius robustus, sometimes separated as a family of its own Eschrichtiidae is included here, according to McGowen et al. 2019.

Balaenoptera 8 *physalus* (fin whale = Finnwal) (incl. *Pterobalaena acuturostrata*, *boanaerensis* and *Rorqualus borealis*, *brydei*, *edeni*, *musculus* (blue whale, Blauwal), *omurai*), *Eschrichtius* 1 *robustus* (gray whale = Grauwal), *Megaptera* 1 *novaeangliae* (humpback whale = Buckelwal).

Possibly **basic type family Balaenopteridae** (3: 10) including *Eschrichtius robustus*. It is likely, but not yet confirmed, that the gray whale (*Eschrichtius*), which was recently added here and was previously considered a separate family, belongs to this group. Perhaps the basic type also includes other families.

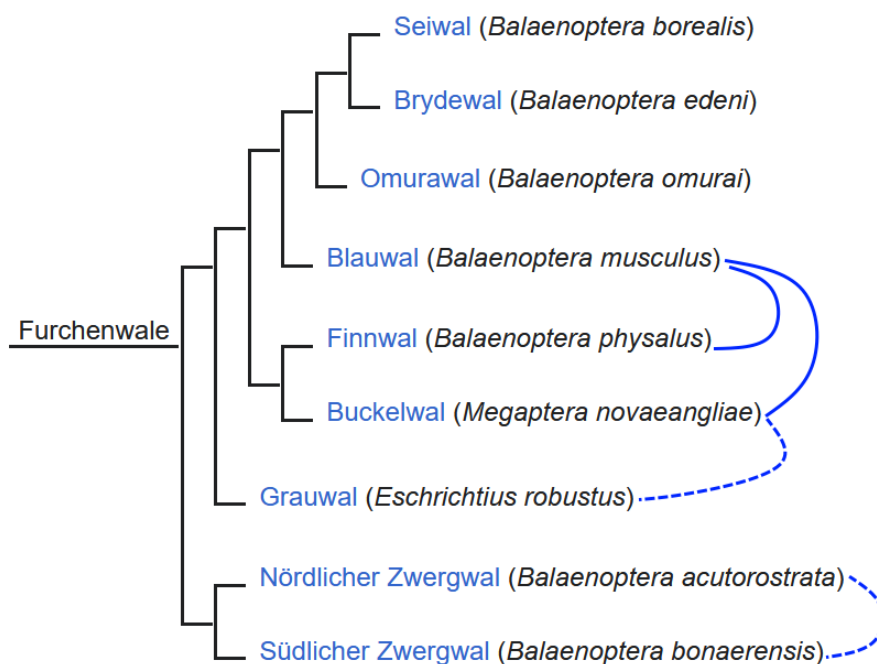
IS:

Balaenoptera acuturostrata × *Balaenoptera bonaerensis* **IS** Cocks 1887 (nat. hyb.) Glover, McCarthy 2015, Crossman et al. 2016 (“probable”)

Balaenoptera musculus × *Balaenoptera physalus* **IS** Cocks 1887 (nat. hyb., detailed information in Pampulie et al. 2021), Crossman et al. 2016, McCarthy 2025

Balaenoptera musculus × *Megaptera novaeangliae* Folkens et al. 2002. (nat. hyb. in the South Pacific, cited by McCarthy as “well documented”)

Eschrichtius robustus × *Megaptera novaeangliae* McCarthy 2015 (NHR. Waddell et al. (2000, p. 317) mention a hybrid but give no details. CON: Pacific). **Unconfirmed, but possible**



Balaenopteridae (incl. Eschrichtiidae): hybridization within a phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. McGowen MR et al. 2020. [doi:10.1093/sysbio/syz068](https://doi.org/10.1093/sysbio/syz068)).

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Cetacea: Eschrichtiidae → Cetacea: Balaenopteridae

Cetacea: Delphinidae 18: 40 + some 12 extinct genera. 14 IG (incl. 7 ISF) (suborder Odontoceti)

Oceanic dolphins = Delfine

The subdivision varies much as to the author. We follow the division by the Society for Marine Mammalogy's taxonomic Committee (2021), cf. en.wikipedia 2025.

Delphininae 6: *Delphinus* 1 *delphis*, *Lagenodelphis* 1 *hosei*, *Sotalia* 2, *Sousa* 4, *Stenella* 5, *Tursiops* 2 *adunus*, *truncatus* (bottlenose dolphin = Großer Tümmler).

Globicephalinae 8 *Feresa* 1, *Globicephala* 2, *Grampus* 1 *griseus* (Risso's dolphin = Rundkopfdelfin), *Orcaella* 2, *Peponocephala* 1 (Breitschnabeldelfin), *Pseudorca* 1, *Steno* 1 (rough-toothed dolphin = Rauzahndelfin)

Lissodelphininae 2 *Cephalorhynchus* 4, *Lissodelphis* 2.

Orcinae 1 *Orcinus* 1 *orca* (orca, killer-whale)

Incertae sedis ("Lagenorhynchinae") 1 *Lagenorhynchus* 6 (incl. *Leucopleurus acutus*)

Probably **basic type family Delphinidae** (18: 40), at least for the extant taxa: Scholl 2024. All three subfamilies are connected by hybridization, independent of the kind of subdivision. – The basic type is possibly more extensive.

Delphinus × *Lagenorhynchus* ISF *Delphininae* × "Lagenorhynchinae" McCarthy 2015 (*D. capensis* × *L. obscurus*, capt. hyb. Peru; *D. delphis* × *L. obliquidens*, capt. hyb. Japan), Crossman et al. 2016 (probable)

Delphinus delphis × *Stenella coeruleoalba* *Delphininae* Antoniou et al. 2018 (nat. hyb., Mediterr., Greece)

Delphinus delphis × *Tursiops truncatus* *Delphininae* Zornetzer & Duffield 2003 (capt. hyb.), Baird et al. 1998 (= Odell unpubl.), McCarthy 2015 (*D. capensis* × *T. truncatus* capt. hyb.; *D. delphis* × *T. truncatus* capt. hyb.), Espada et al. 2019 (*D. delphis* × *T. truncatus*, nat. hyb.)

Globicephala macrorhynchus × *Tursiops truncatus* ISF *Globicephalinae* × *Delphininae* Antrim & Cornell 1981, Sylvestre & Tasaka 1985, McCarthy 2015

Grampus griseus × *Tursiops truncatus* ISF *Globicephalinae* × *Delphininae* Gray 1972, Van Gelder 1977, Sylvestre & Tasaka 1985, Zhang et al. 2014, McCarthy 2015 (capt. hyb., nat. hyb.), Crossman et al. 2016

Lagenorhynchus obscurus × *Lissodelphus peronii* ISF "Lagenorhynchinae" ×

Lissodelphininae Yazdi 2002 (nat. hyb.), McCarthy 2015 (nat. hyb.; probably), Crossman et al. 2016

Lagenorhynchus obliquidens × *Tursiops truncatus* ISF “*Lagenorhynchinae*” × *Delphininae* Baird et al. 1998 (= Odell unpubl.), McCarthy 2015 (capt. hyb.; probably), <http://www.zoochat.com/2/species-crossbreeds-242316/index2.html>

Peponocephala electra × *Steno bredanensis* *Globicephalinae* McCarthy 2024 (“uncertain”), but this hybrid seems to be confirmed now; Baird et al. 2018, <https://www.geo.de/natur/tierwelt/19343-rtkl-hybrid-vor-hawaii-forscher-entdecken-einzigartigen-delfin-mischling>, <https://www.delphinschutz.org/news-delfine/hybrid-aus-zwei-delfinarten-vor-hawaii-entdeckt/> 2018, https://en.wikipedia.org/wiki/Melon-headed_whale 2025, not yet listed in Scholl 2024.

Pseudorca crassidens × *Tursiops truncatus* ISF *Globicephalinae* × *Delphininae* Sylvestre & Tasaka 1985, Lee 2005, <http://en.wikipedia.org/wiki/Wholphin> 2012, McCarthy 2015 (capt. hyb.), Crossman et al. 2016 called “Wholphin”

Sotalia guianensis × *Tursiops truncatus* *Delphininae* Cabellero & Baker 2010 (capt. hyb.)

Sousa chinensis × *Tursiops truncatus* *Delphininae* see McCarthy 2015 (nat. hyb.), Crossman et al. 2016 “(possible)”

Stenella IS *Delphininae* (*coeruleoalba* × *longirostris* → *Stenella clymene* Choi 2014 (nat. hyb.; *attenuata* × *longirostris*, *clymene* × *longirostris* Silva et al. 2010 (nat. hyb., cited in Crossman et al. 2016)

Stenella frontalis × *Tursiops truncatus* *Delphininae* Herzing & Johnson 1997 (interactions observed, but no hybridizations reported before 2003), McCarthy 2015 (nat. hyb., citing Herzing et al. 2003), Herzing et al. 2005 observed a hybrid!, Crossman et al. 2016

Stenella attenuata × *Tursiops truncatus* HY *Delphininae* (McCarthy 2015: *S. frontalis* is possibly a hybridogeneous taxon of this type.)

Steno bredanensis × *Tursiops truncatus* ISF *Globicephalinae* × *Delphininae* Dohl et al. 1974, Van Gelder 1977 (he points out, that some authors have placed *Steno* in the family Stenidae), Sylvestre & Tasaka 1985, McCarthy 2015 (capt. hyb., nat. hyb.)

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Cetacea: Monodontidae 2: 2 + several extinct genera. 1 IG (suborder Odontoceti)

monodontids = Gründelwale

Monodon monoceros (narwhal = Narwal), *Delphinapterus leucas* (beluga = Weißwal).

Basic type family Monodontidae (2: 2): Borger 2020, at least for the extant taxa. The two living genera are connected by hybridization. The tusk of the male narwhal is unique in animals (Binder 2006). The basic type is possibly more extensive.

Delphinapterus leucos × *Monodon monoceros* Heide-Jorgensen & Reeves 1993 (nat. hyb., first hybridization only supposed), Skovrind et al. 2019 (hybridization confirmed), Saey 2019 (hybridization confirmed by DNA-analysis). Crossman et al. 2016. The hybrid is called “Narluga”.

References:

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Borger P (2020) Der Belwal, ein Mischling aus Beluga und Narwal. *Stud. Integrale J.*

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Skovrind M et al. (2019) Hybridization between two high Arctic cetaceans confirmed by genomic analysis. *Sci. Rep.* 9 (1).

Cetacea: Phocoenidae 3: 7 + 4 extinct genera. 1 IG (suborder Odontoceti)

porpoises = Schweinswale

Neophocaena 2, *Phocoena* 4 (incl. *Australophocaena dioptrica*), *Phocoenoides* 1 dalli.

Possibly **basic type family Phocoenidae (3: 7)**, for the extant taxa, but hybrids with the basal genus *Neophocaena* are unknown.

Phocoena phocoena × *Phocoenoides dalli* Baird et al. 1998, Willis et al. 2004, en.wikipedia 2015, McCarthy 2015 (nat. hyb.), Crossman et al. 2016

References:

Baird RW et al. (1998) An intergeneric hybrid in the family Phocoenidae. *Canad. J. Zool.* 76, 198–204. [Video:](#)

http://wn.com/dall%27s_porpoise?orderby=relevance&upload_time=today.

Willis PM, Crespi BJ, Dill LM, Baird RW & Hanson MB (2004) Natural hybridization between Dall's porpoises (*Phocoenoides dalli*) and Harbour porpoises (*Phocoena phocoena*). *Canad. J. Zool.* 82, 828–834.

Chiroptera 2 suborders, 21 families, 1400 species +
extinct taxa

bats = Fledermäuse etc., Flattertiere

2 suborders.

IS: For interspecific hybrids see <https://www.macroevolution.net/vesper-bat-hybrids.html>

Cingulata 2 extant families + 3 extinct families
(Placentalia: superorder Xenarthra)

armadillos = Gürteltiere

2 extant families: Chlamyphoridae 7 + many extinct taxa, Dasypodidae 1: 8.

Cingulata: Dasypodidae 1: 8

long-nosed armadillos = Langnasen-Gürteltiere

Dasypus 8

Basic type family Dasypodidae (1: 8), anatomically well-defined (P. Klöckner, pers comm. 2008). Hybrids are unknown, though one species has the name *Dasypus hybridus*.

Diprotodontia 17: 155 + many extinct taxa (infraclass
Marsupialia Australidelphia)

3 suborders:

Vombatiformes 2 families.

Phalangeriformes 2 families.

Macropodiformes 7 families.

Diprotodontia: Macropodidae 11: 68 + many extinct taxa. 6 IG

(suborder Macropodiformes)

kangaroos, wallabies and allies = Kängurus

2 extant subfamilies:

Macropodinae 10: 67 (+ extinct genera) *Dendrolagus* 14, *Dorcopsis* 4, *Dorcopsulus* 2, *Lagorchestes* 2, *Macropus* 4, *Notamacropus* 8 (incl. “*Wallabia rufogrisea*”), *Onychogalea* 2, *Osphranter* 4 (incl. *Megaleia*° *rufa*), *Petrogale* 17, *Setonix* 1, *Thylogale* 7, *Wallabia* 1 *bicolor*.
Lagostrophinae 1: 1 *Lagostrophus* 1 *fasciatus* + 2 extinct genera.

Probably **basic type Macropodidae**, at least subfamily **Macropodinae** (10: 67), see the figure below.

IS: For interspecific hybrids see McCarthy 2025, Messybeast 2025, Smith et al. 1979.

Dorcopsis luctuosa × *Thylogale browni* McCarthy 2015 HY (possibly *Dorcopsulus macleayi* is of hybridogeneous origin *Dorcopsis luctuosa* × *Thylogale browni*: <http://www.macroevolution.net/kangaroo-hybrids.html>), messybeast 2025 (nat. hyb. New Guinea, where they are separated by a population of Macleay’s *Dorcopsis*/Papuan Forest Wallaby (*Dorcopsulus macleayi*) which is intermediate in appearance)

Macropus fuliginosus, giganteus × *Osphranter rufus* (= *Megaleia*° *rufa*) Gray 1972 (viable, capt. hyb.), Van Gelder 1977, McCarthy 2015 (capt. hyb., nat. hyb.)

Macropus giganteus × *Notamacropus* (“*Macropus*”) *parryi* McCarthy 2025

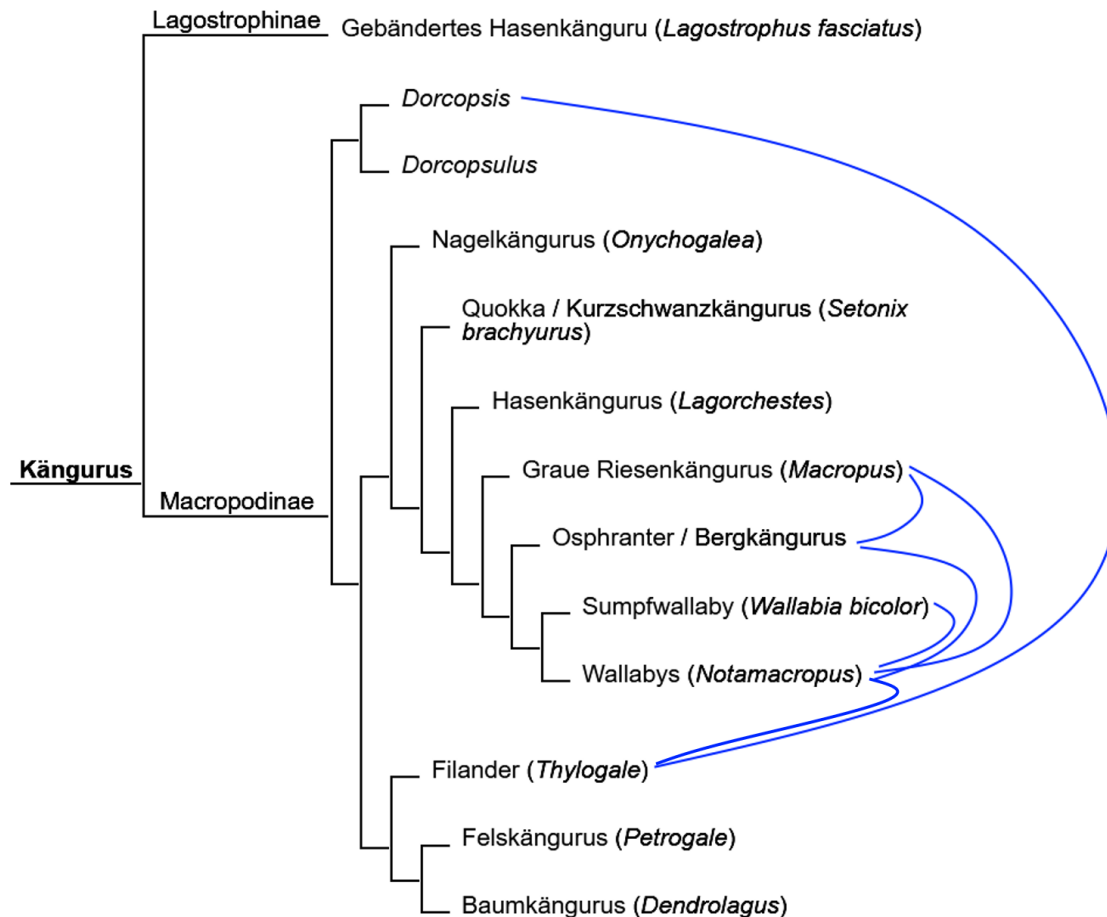
Megaleia° *rufa* (= *Osphranter rufus*) × *Osphranter antilopinus, robustus* IS Gray 1972

Notamacropus (“*Macropus*”) *agilis* × *Osphranter rufus* (*Megaleia*° *rufa*) McCarthy 2025

Notamacropus (“*Wallabia*”) *rufogriseus* × *Thylogale thetis* Gray 1972 (viable, capt. hyb.), Van Gelder 1977, en.wikipedia 2011, McCarthy 2015 (capt. hyb.)

Notamacropus (“*Macropus*”) *agilis, eugenii* × *Wallabia bicolor* (capt. hyb.) McCarthy 2025

Osphranter (“*Macropus*”) *robustus* × *Megaleia*° *rufa* (= *Osphranter rufus*) IS



Macropodidae: hybridization in the phylogeny of Celik et al. 2019, from de.wikipedia (2025, CC BY 4.0).

References:

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Diprotodontia: Phalangeridae 6: 28 (suborder Phalangeriformes)

Ailurops, *Phalanger*, *Spilocuscus*, *Strigocuscus*, *Trichosurus*, *Wyulda*.

Phalanger × *Strigocuscus* see McCarthy 2015:

<http://www.macroevolution.net/phalangerid-hybrids.html>

Eulipotyphlia 4 families + fossil taxa

“Insectivora” = Insektenfresser

Eulipotyphlia: Erinaceidae 10: 24 + fossil genera

hedgehogs + moonrats = Igel

2 subfamilies.

Erinaceus concolor × *Erinaceus* (“*Hemiechinus*”) *europaeus* IS **Erinaceinae** McCarthy 2015

<http://www.macroevolution.net/hedgehog-hybrids.html>

Atelerix albiventris × *Atelerix algirus* IS **Erinaceinae**

<https://uk.inaturalist.org/taxa/990532-Atelerix-albiventris---Atelerix-algirus> (2025);

“This mitonuclear discordance could be the result of an ancient hybridization event between the two species” El-Farhati H et al. 2021, 806. doi:

10.3897/vz.71.e70989

Insectivora → Eulipotyphlia

Lagomorpha 2 extant families 12: 99 (Placentalia)

lagomorphs

Leporidae 11: 70, Ochotonidae (pikas = Pfeifhasen, Pikas) 1: 29 + many extinct species

Lagomorpha: Leporidae 11: 70 + 2 extinct genera

rabbits and hares = Hasen

2 subfamilies: Leporinae 8: 49, Palaeolaginae 3: 6.

In **family Leporidae**, combining the two phylogenies of Huang Y-L et al. (2019, Fig. 1. <https://doi.org/10.1080/23802359.2019.1681321>) and Shan W et al. (2021, Fig. 5. doi: 10.3897/zookeys.1012.59035) probably at least all members of the **genus Lepus** with 30 species belong to the same basic type.

IS: *Lepus timidus* × *Lepus europaeus* Koch W 1964

https://www.zobodat.at/publikation_articles.php?id=309919

Lepus × *Oryctolagus cuniculus* **Leporinae** Rorig 1912 (nat. hyb. *L. europaeus*. × *O.*

cuniculus; McCarthy 2015: presumed, artificial hybridization failed), Gray 1972

(presumed; art. hyb., embryos failed to develop), McCarthy 2015 (*L. americanus* ×

O. cuniculus; “the fertilized ova apparently all degenerate”.)
Oryctolagus cuniculus × *Sylvilagus* **Leporinae** Gray 1972 (presumed; art. hyb., only a few eggs survived up to the blastocyst stage)

References:

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Marsupialia → Diprotodontia. Microbiotheria

Microbiotheria 1 family + fossil taxa (Marsupialia: Australidelphia)

Microbiotheria: Microbiotheriidae 1: 1–2 + 8 extinct genera.

monito del monto = **Chiloe-Beutelratte**

Dromiciops gliroides 1(–2).

South America.

Probably **basic type Microbiotheriidae** (1: 1–2). *Dromiciops* is the only extant member of this very isolated family. 8 fossil genera are known. But according to morphology they are closely related.

Perissodactyla 3 extant families, 6: 16 + extinct taxa

odd-toed ungulates = **Unpaarhufer**

Equidae 1: 6–8, Rhinocerotidae 4: 5, Tapiridae 1: 4.

References:

Monroe JS (1985) Basic created kinds and the fossil record of Perissodactyls. Creation Evolution J. 5, 4–30. <http://ncse.com/cej/5/2/basic-created-kinds-fossil-record-perissodactyls>

Perissodactyla: Equidae 1: 6–8 + some 30 prehistoric species

horses = **Pferdeartige**

Equus africanus (African wild ass), *caballus* (domestic horse), *ferus* (wild horse), *grevyi* (Grévy's zebra), *hemionus* (onager), *kiang* (kiang), *quagga* (plains zebra), *zebra* (mountain zebra).

Basic type family Equidae (1: 8) Stein-Cadenbach (1993, 2025), for the extant species.
– For extinct taxa cf. Crompton 2013.

IS:

Equus asinus (= *Asinus*°) × *Equus caballus* **IS** Simpson 1961, Gray 1972.

Mule = *E. (africanus) asinus* ♂ × *E. (ferus) caballus* ♀ (mostly infertile)

Hinny = *E. (africanus) asinus* ♀ × *E. (ferus) caballus* ♂ (infertile)

Equus quagga or *zebra* × *Equus asinus* or *caballus* etc. **IS Zebroids**: see

<http://en.wikipedia.org/wiki/Mule>: Zeedonk or Zonkey, a zebra/donkey cross.;

Zorse, a zebra/horse cross; Zony or Zetland, a zebra/pony cross („zony“ is a generic term; „zetland“ is specifically a hybrid of the Shetland pony breed with a zebra)

References:

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[https://genesis-net.de/wp-content/uploads/2025/01/Die Entstehung der Pferdartigen.pdf](https://genesis-net.de/wp-content/uploads/2025/01/Die_Entstehung_der_Pferdartigen.pdf)

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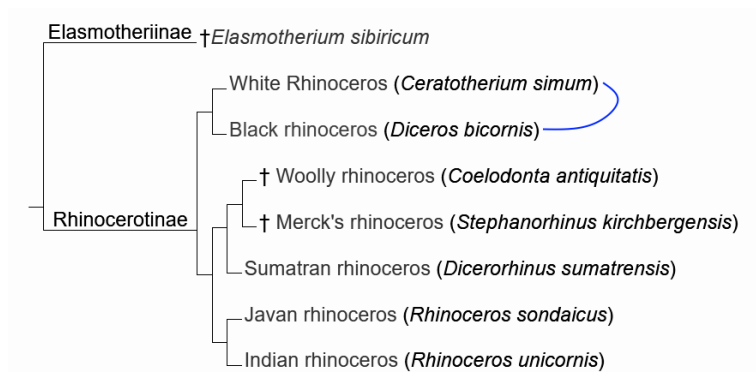
Stein-Cadenbach H (2025) Hybrids, chromosome structure, and speciation within the horses (Equidae). In: Sanders RW (ed.) *Basic types of life*. Tulsa, Oklahoma: Blyth Institute Press, pp. 343–368. [translation of the German edition 1993](#)

Perissodactyla: Rhinocerotidae 4: 5 + several extinct subfamilies and other extinct taxa. 1 IG

rhinoceros = **Nashörner**

Ceratotherium 1, *Diceros* 1, *Rhinoceros* 2, *Dicerorhinus* 1

Ceratotherium bicornis × *Diceros simium* Dobigny et al. 2006, McCarthy 2015 (capt. hyb.)



Rhinocerotidae: hybridization within a phylogeny according to en.wikipedia 2025, CC BY 4.0 (cf. Liu S et al. 2021. doi:10.1016/j.cell.2021.07.032).

References:

Dobigny G, Waters PD, Robinson TJ (2006) Absence of hypomethylation and LINE-1 amplification in a white × black rhinoceros hybrid. Genetica 127, 81–86.

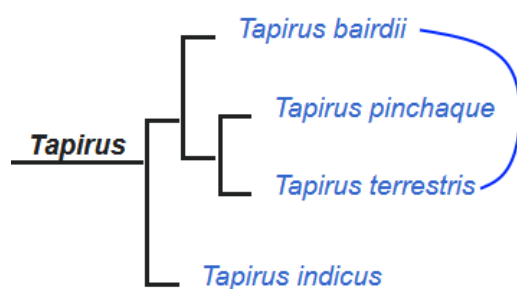
Perissodactyla: Tapiridae 1: 4 + ca. 12 extinct genera

tapirs = Tapire

Tapirus 4 (incl. Acrocodia indica)

Probably **basic type family Tapiridae** (1: 4), for the extant species. Anatomically well-defined (P. Klöckner, pers comm. 2008). 3 of the 4 species are connected by hybridization, see the figure below.

IS: *Tapirus bairdii* × *T. terrestris* **IS** messybeast 2025 (bred at the San Francisco Zoo around 1968 and a female hybrid was back-crossed to a Baird's Tapir resulting in a 2nd generation hybrid around 1970)



Rhinocerotidae: hybridization within a phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Steiner CC & Ryder OA 2011. <https://doi.org/10.1111/j.1096-3642.2011.00752.x>).

Pholidota 1 extant family 3: 8 + 3 extinct families (Placentalia)

Pholidota: Manidae 3: 8 + 9 extinct species

pangolins = Schuppentiere

Manis 4, *Phataginus* 2, *Smutsia* 2.

Probably **basic type family Manidae** (3: 8), because anatomically well-defined (P. Klöckner, pers comm. 2008).

Pilosa 4 extant families + 6 extinct families (Placentalia superorder Xenarthra)

pilosans = Zahnarme

2 suborders:

Folivora 2 extant families Bradypodidae 1: 5, Choloepodidae 1: 2.

Vermilingua 2 families + 6 extinct families.

Pilosa: Bradypodidae 1: 5 (suborder Folivora, superfamily Megatherioidea)

three-toed sloths = Dreifinger-Faultiere

Bradypus 5.

Pinnipedia 3 families, 19: 36 (now often part of Carnivora) + extinct taxa

seals = Robben

Odobenidae (walruses= Walrosse) 1: 1, Otariidae 7: 16, Phocidae 11: 19.

Pinnipedia: Otariidae 7: 16 + extinct taxa. 6 IG

eared seals, otariids, otaries = Ohrenrobben

Arctocephalus 8, *Callorhinus* 1, *Eumetopias* 1, *Neophoca* 1, *Otaria* 1 *flavescens* = *byronia*°, *Phocarcos* 1, *Zalophus* 3.

Basic type family Otariidae (7: 16), due to intergeneric connections between distant genera (see the figure below), monophyletic.

Arctocephalus australis × *Otaria flavescens* (+ *byronia*) (nat. hyb. *A. a.* × *O. flavescens*, see McCarthy 2015); see also 2021: https://link.springer.com/chapter/10.1007/978-3-030-59184-7_12 (nat. hyb. Uruguay *A. a.* × *O. byronia* Franco-Trecu et al. 2016 (fertile!))

Arctocephalus pusillus × *Zalophus californianus* Schliemann 1968, Gray 1972 (art. hyb.), Wilson et al. 1974, Van Gelder 1977, McCarthy 2015

Callorhinus ursinus × *Eumetopias jubatus* (nat. hyb.) McCarthy 2015

~~*Callorhinus ursinus* × *Otaria byronia* Gray 1972 ("alleged"), McCarthy 2015~~

(“erroneous”)

Callorhinus ursinus × *Zalophus californianus* (nat. hyb., capt. hyb.) McCarthy 2015

Eumetopias jubatus × *Zalophus californianus* (nat. hyb.) see McCarthy 2015

Otaria flavescens (= *byronia*) × *Zalophus californianus* Kirchshofer 1968, Gray 1972 (art. hyb.), Brunner 2002, McCarthy 2015



Otariidae: hybridization in a phylogeny of Yonezawa T et al. (2009)

<https://doi.org/10.1016/j.gene.2009.01.022>, from de.wikipedia (2025, CC BY SA 4.0)

References:

Brunner S (2002) A probable hybrid sea lion: *Zalophus californianus* × *Otaria byronia*. J. Mammalogy 83, 135–144.

Franco-Trecu V et al. (2016) Sex beyond species: the first genetically analyzed case of intergeneric fertile hybridization in pinnipeds. Evolution & Development 18, 127–136.

Kirchshofer R (1968) Notizen über zwei Bastarde zwischen *Otaria byronia* (de Blainville) und *Zalophus californianus* (Lesson). Z. Säugetierkunde 33, 45–49.

Schliemann H (1968) Notiz über einen Bastard zwischen *Arctocephalus pusillus* (Schreber, 1776) und *Zalophus californianus* (Lesson, 1828). Z. Säugetierkunde 33, 42–45.

Wilson AC, Maxson LR & Sarich VM (1974) Two types of molecular evolution:

evidence from studies of interspecific hybridization. Proc. Natl. Acad. Sci. USA 71, 2843–2847. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC388568/pdf/pnas00060-0257.pdf>

Pinnipedia: Phocidae 11: 19

earless seals = Hundsrobben

2 subfamilies:

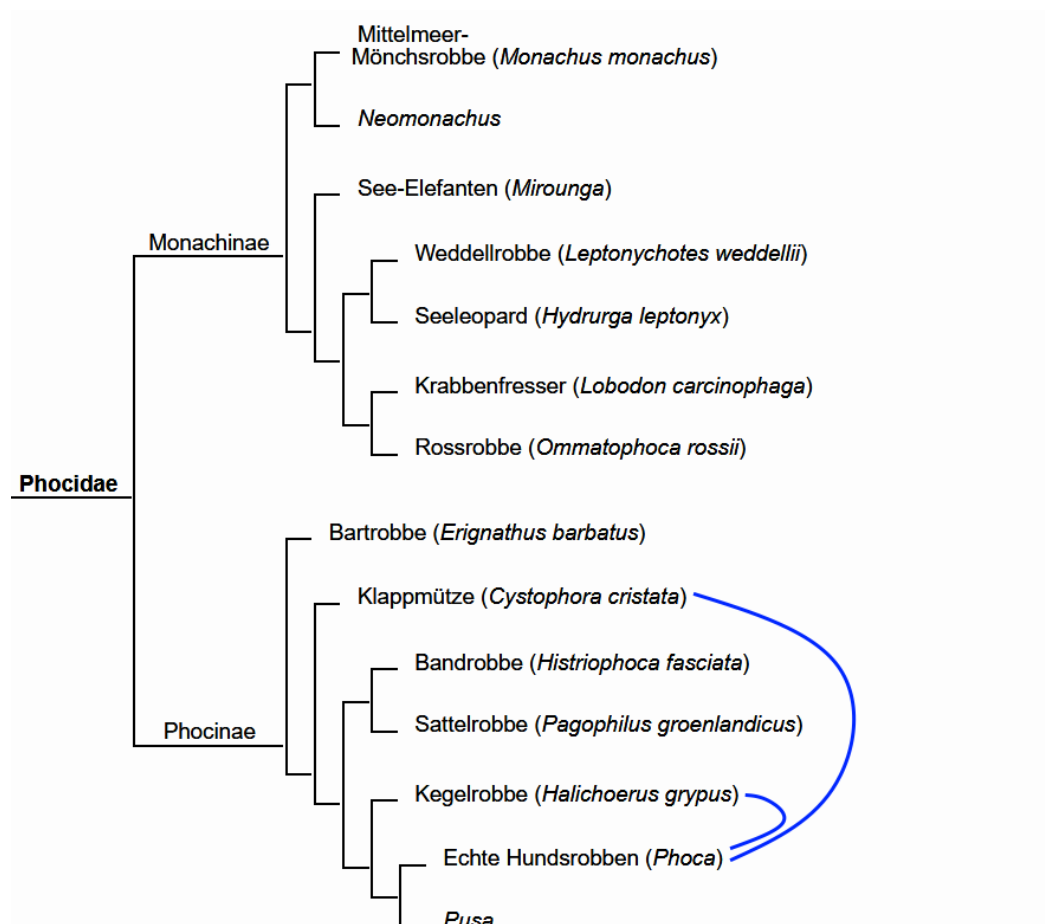
Phocinae 5: 10 *Cystophora* 1, *Erignathus* 1, *Histiophoca* 1, *Holichoerus* 1, *Phoca* 6.

Monachinae 6: 9 *Hydrurga* 1, *Leptonychotes* 1, *Lobodon* 1, *Monachus* 3, *Mirounga* 2, *Ommatophoca* 1.

In family Phocidae, probably all members of subfamily Phocinae (5: 10) belong to the same basic type.

Cystophora cristata × *Phoca groenlandica* Phocinae Kovacz et al. 1997, McCarthy 2015 (nat. hyb.)

Halichoerus grypus × *Phoca hispida* Phocinae Lönnberg 1929 a, b, Gray 1972 (art. hyb.), McCarthy 2015 (capt. hyb.)



Phocidae: hybridization within a phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Scheel D-M et al. 2014. doi: 10.3897/zookeys.409.6244).

References:

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Primates 2 extant suborders, 6 families

primates = Primaten

2 suborders:

Haplorhini 5 families Callitrichidae, Cebidae, Cercopithecidae, Hominidae,

Hylobatidae

Strepsirrhini 1 family Lemuridae

References:

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https://digitalcommons.cedarville.edu/context/icc_proceedings/article/1515/viewcontent/09_Brummel_and_Wood_1515_Preliminary_Evaluation_of_Ape_Baramins.pdf

Primates: Callitrichidae 8: 50 + extinct taxa. 1 IG (suborder Haplorhini)

marmosets and tamarins = Krallenaffen

Callibella, *Callimico*, *Callithrix* 6, *Cebuella* 2, *Mico*, *Leontocebus*, *Leontopithecus*, *Saguinus*.

Callithrix jacchus × *Cebuella pygmaea* Anzenberger et al. 2001 (*Ca. jacchus* × *Ce. pygmaea*), Neusser et al. 2005, McCarthy 2015 (capt. hyb.)

References:

- Anzenberger G, Münch M, Moisson P, Petit C (2001) Intergeneric marmoset hybrids (*Cebuella pygmaea* × *Callithrix jacchus*): An important case study for callitrichid taxonomy. *Folia Primatol.* 72, 153.
- Neusser M, Münch M, Anzenberger G & Müller S (2005) Investigation of marmoset hybrids (*Cebuella pygmaea* × *Callithrix jacchus*) and related Callitrichinae (Platyrrhini) by cross-species. *Cytogenet. Genome Res.* 108, 191–196.

Primates: Cebidae 3: 29 + extinct taxa (suborder Haplorhini) new world monkeys, capuchins and squirrel monkeys = Kapuzineraffen

2 subfamilies:

Cebinae 2: 22 *Cebus* 15, *Sapajus* 7.

Saimiriinae 1: 7 *Saimiri* 7.

Primates: Cercopithecidae 24: 138. (24 IG (incl. IT) (suborder Haplorhini)

old world monkeys = Meerkatzenverwandte, Hundsaffen

2 subfamilies:

Cercopithecinae 13: 79, Colobinae 11: 59.

Cercopithecinae 13: 79. 20 IG (incl. 3 IT)

2 tribes:

Cercopithecini 6: 36 *Allenopithecus* 1, *Allochrocebus*, *Cercopithecus*, *Chlorocebus* 7, *Erythrocebus*, *Miopithecus*,

Papionini 7: 43 *Cercocebus*, *Lophocebus*, *Macaca*, *Mandrillus*, *Papio* (incl. *Comopithecus*°), *Rungwecebus*, *Theropithecus*.

Basic type Cercopithecidae subfamily Cercopithecinae (13: 79): Hartwig-Scherer 1993, 2025. The 2 tribes are connected by several hybrids. The whole subfamily Cercopithecinae is included via *Chlorocebus* × *Macaca* (cf. Xing J et al. (2005, Fig. 2), Perelmen et al. (2011, Fig. 1+2), Shao et al. (2023, Fig. S5–S9, S11–12, S34), Cole (2023)). „Mammal Species of the World“ (Wilson & Reeder 2005) lists for this subfamily 11 genera, 73 species and 89 subspecies.

IS:

Cercopithecus cephus × *C. nictitans* **IS** (Jong & Butynski (2010, 43f+50f): “probable” hybrid)

Cercopithecus denti × *C. mitis doggetti* **IS** (Jong & Butynski (2010, 43f+50f): “apparent” hybrid)

Cercopithecus mona × *C. pogonias* **IS** Jong & Butynski 2010, 43f+50f

Cercopithecus sclateri × *C. erythrogaster* **IS** Jong & Butynski 2010, 43f+50f

Chlorocebus pygerythrus × *C. sabaeus*, *C. aethiops* **IS** Roos 2010

Allenopithecus nigroviridis × *Chlorocebus* (“*Cercopithecus*”) *aethiops* **Cercopithecini** Gray 1972 (capt. hyb., viable), Hartwig-Scherer 1993, McCarthy 2015

Cercocebus × *Cercopithecus* **IT** **Papionini** × **Cercopithecini** Gray 1972, Hartwig-Scherer 1993, McCarthy 2015

Cercocebus × *Lophocebus albigena* **Papionini** McCarthy 2015

Cercocebus × *Macaca* **Papionini** Gunning 1910, Gray 1972, Hartwig-Scherer 1993, McCarthy 2015

Cercocebus × *Mandrillus* **Papionini** Gray 1972, McCarthy 2015

Cercocebus × *Papio anubis* **Papionini** McCarthy 2015 (capt. hyb.)

Cercopithecus albogularis, mitis × *Chlorocebus* (“*Cercopithecus*”) *pygerythrus*

Cercopithecini Erhart et al. 2005, de Jong & Butynski 2010, Zinner et al. 2011, McCarthy 2015

Cercopithecus mitis × *Chlorocebus pygerythrus* *Cercopithecini* 8,1 million years divergence time (Jong & Butynski 2010, 43f + 50f) vs. 10,1 million years (Shao et al. 2023, Fig. S12)

Cercopithecus × *Erythrocebus* *Cercopithecini* Gray 1972, Hartwig-Scherer 1993, McCarthy 2015

Chlorocebus × *Erythrocebus patas* *Cercopithecinae* (capt. hyb.) McCarthy 2015

Chlorocebus × *Macaca sinica* **IT** *Cercopithecinae* × *Papionini* capt. hyb.) McCarthy 2015

Chlorocebus × *Macaca* **IT** *Cercopithecinae* × *Papionini* Roos 2010 (*C. pygerythrus* × *M. sinica*, *fascicularis*, *radiata*), Hartwig-Scherer 1993 (*C. aethiops* × *M. mulatta*, *radiata*, *sinica*; fertile)

Chlorocebus sabaeus × *Erythrocebus patas patas* *Cercopithecinae* „presumed“ hybrid (de Jong & Butynski (2010, 43f+50f)

Comopithecus° (*Papio*) × *Macaca* Van Gelder 1977 see *Macaca* × *Papio*

Comopithecus° (*Papio*) × *Theropithecus* Van Gelder 1977, see *Papio* × *Theropithecus*

Cynopithecus° (= *Macaca*) *nigra* × *Macaca* **IS** *Papionini* Gray 1972

Macaca × *Mandrillus* *Papionini* Gray 1972, Hartwig-Scherer 1993, McCarthy 2015

Macaca × *Papio* *Papionini* Gray 1972, Hartwig-Scherer 1993, Moore et al. 1999, McCarthy 2015

Mandrillus × *Papio* *Papionini* Gray 1972, Hartwig-Scherer 1993, McCarthy 2015

Papio × *Theropithecus* *Papionini* Gray 1972, Hartwig-Scherer 1993, Jolly et al. 1997, McCarthy 2015

Papio anubis × *Theropithecus gelada* *Papionini* (de Jong & Butynski (2010, 43f+50f): “three probable” hybrids; 3–4 million years divergence time; Lhota et al. 2022: 4,1 million years)

Papio hamadryas × *Theropithecus gelada* *Papionini* Lhota et al. 2022

Rungwecebus (= *Lophocebus*) *kipunji* × *Papio cynocephalus* *Papionini* (nat. hyb. Tanzania: In 2005, this new taxon was described as *Lophocebus*, which obviously is the result of an intergeneric cross *Lophocebus* × *Papio* and was later called *Rungwecebus kipunji*.) Roos 2010, Zinner et al. 2009, 2011, McCarthy 2015

Colobinae 10: 67 + 7 extinct genera. 4 IG

langurs = Languren

2 tribes:

Colobini 3: 22 *Colobus* 5, *Piliocolobus* 16, *Procolobus* 1 *verus*..

Presbytini 7: 45 *Nasalis* 1, *Presbytis* 11, *Pygathrix* 3, *Rhinopithecus* 5, *Semnopithecus* 8 *entellus*, *vetulus*, *Simias* 1 *concolor*, *Trachypithecus* 16 *johnii*, *obscurus*, *vetulus*, ...

In *Cercopithecinae* subfamily *Colobinae*, at least all members of tribe **Presbytini** (7: 45) seem to belong to the same **basic type** (cf. Wang et al. (2012, Fig. 1: 4 of 6 cladograms, Fig. 2), Xing et al. (2005, Fig. 2), Cole (2023); Shao et al. (2023, Fig. S5–S9, S11–12, S34).

IS:

Colobus polykomos × *C. vellerosus* IS **Colobini** (instead of subspecies *Colobus polykomos dollmani*) Oates & McGraw 2009; more *Colobus* IS hybrids are listed here:

<https://www.macroevolution.net/old-world-monkey-hybrids.html>

Semnopithecus ("Presbytis") *entellus* × *Semnopithecus* ("Presbytis") *vetulus* IS **Presbytini** **langur group** Hill 1936, Gray 1972, Chiarelli 1973, Roos 2010

Nasalis larvatus × *Pygathrix nemaeus* **Presbytini odd-nodes group** (capt. hyb.)

McCarthy 2015, Lhota et al. 2022 (in Zoo Erfurt, Germany)

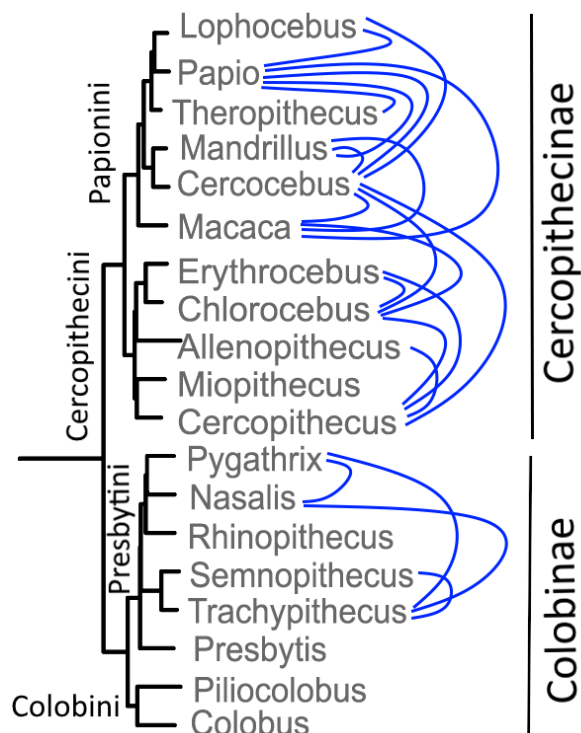
Nasalis larvatus × *Trachypithecus cristatus* **Presbytini** Lhota et al. 2022

Pygathrix nemaeus × *Trachypithecus hatinhensis* **Presbytini** Roos 2010

Semnopithecus × *Semnopithecus* ("Trachypithecus") *johnii* IS **Presbytini langur group**

Gray 1972, Rowe 1996, Roos 2010, McCarthy 2015

Semnopithecus ("Presbytis") *entellus* × *Trachypithecus* ("Presbytis") *obscurus* **Presbytini langur group** Hill 1936, Gray 1972, Chiarelli 1973, Roos 2019 (short notice)



Cercopithecoidea: two probable basic types are: Cercopithecoidea and Presbytini. Hybridizations in the phylogeny of Perelman et al. 2011; the status of tribe Colobini is unclear due to unknown intergeneric hybrids (cf. Perelman et al. 2011, Fig. 1. <https://doi.org/10.1371/journal.pgen.1001342>, CC0)

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<http://www.nal.usda.gov/awic/zoo/macaca.pdf> Bibliography from 1988 on the genus *Macaca* with many references on hybrids.

Primates: Hominidae 4: 8 + extinct taxa (suborder Haplorhini)

hominids = Hominiden

Real humans (true genus *Homo*)

Homo 1 (+ 5 extinct)

Basic type real humans (true genus *Homo*): The following paleoanthropological “species” of the genus *Homo* have been confirmed by molecular genetics through crossbreeding: *Homo sapiens*, Neanderthal, Denisova, *Homo heidelbergensis* (s. l.); anatomical transitions show crossbreeding with *Homo erectus* (s. l. incl. *georgicus* & *ergaster*) and *Homo floresiensis*. Fossil species such as “*Homo*” *habilis*, *rudolfensis*, and *naledi* have been excluded since from the genus *Homo* (see: great apes).

For the genus *Homo* as a real distinct basic type, see e.g.: Evolution. Ein kritisches Lehrbuch. 7. ed. 2013, p. 287–299; Scholl 2018, 2022a/b, 2023a/b/c; Brandt 2020, 2023 and Borger & Scholl 2025.

great apes (incl. false genus “*Homo*”)

Gorilla 2, *Pan* 2, *Pongo* 3 (+ extinct hominin genera)

It is not yet clear if all living **great apes** belong to one, two or three basic types. All 2 *Gorilla* species are connected by hybridization, as well as the *Pan* species and *Pongo* species.

The same problem exists within **extinct great apes** (incl. **nonhuman hominins** like “*Homo*” *rudolfensis*, *habilis* and *naledi* as well as different species of *Sahelanthropus*, *Orrorin*, *Ardipithecus*, *Kenyanthropus*, *Australopithecus* and *Paranthropus*; see above). Probably fossil *Sivapithecus* (incl. *Ramapithecus*°) belongs to the same basic type as *Pongo*. For the problems concerning fossil Great Apes taxonomy: see Scholl 2022b. – Hybrids between gorillas and chimpanzees, known as “Bili Apes,” found in the wild, turned out to be large chimpanzees (cf. Hartwig-Scherer 2005; https://en.wikipedia.org/wiki/Bili_ape 2025).

IS:

- Gorilla beringei* × *G. gorilla* **IS** Ackermann & Bishop 2010, 272+281 (morphologically, all gorillas were classified as belonging to the same species); Lhota et al. 2022; Brummel & Wood 2023
- Pan paniscus* × *P. troglodytes* **IS** (at least 3 capt. hybrids are known) Vervaecke & Van Elsacker 1992; Allen et al. 2020, Suppl. Tab. 2; Brummel & Wood 2023
- Pongo abelii* × *P. pygmaeus* **IS** Dugoujon et al. 1984; Brummel & Wood 2023; Allen et al. 2020 (fully fertile hybrids; ca. 29 % of orangutans in US zoos in the 1990s were F1 hybrids; Allen et al. 2020, Suppl. Tab. 1)
- Pongo abelii* × *P. tapanuli* (new species) **IS** Banes et al. 2022; Brummel & Wood 2023

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Primates: Hylobatidae 4: 15. 3 IG (suborder Haplorhini) gibbons = Gibbons

Hoolock 2 (*hoolock*, *leuconedys*), *Hylobates* 7 (*agilis*, *albibarbis*, *klossii*, *lar*, *moloch*, *muelleri*, *pileatus*), *Nomascus* 6 (*annamensis*, *concolor*, *gabriellae*, *hainanus*, *leucogenys*, *nasutus*, *siki*), *Symphalangus* 1 (*syndactylus*).

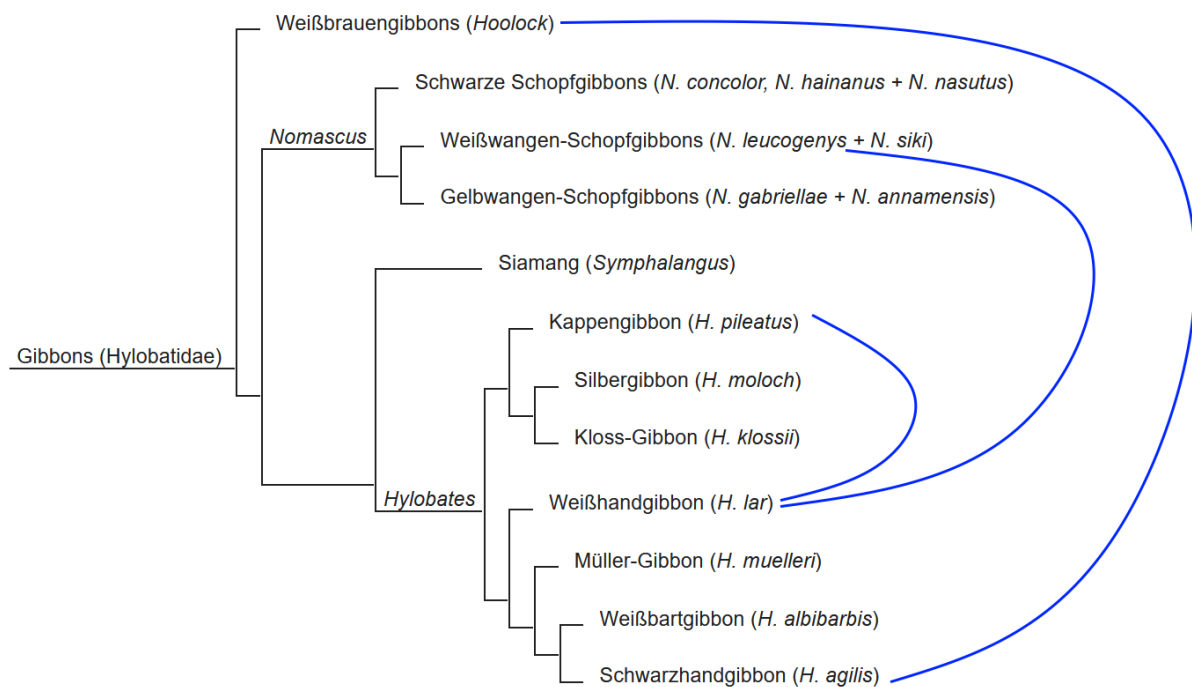
Basic type family Hylobatidae (4: 15): All 4 genera are linked by hybridization. This possibly explains why so many conflicting phylogenies of Hylobatidae exist (cf. Li et al. 2017; Roos 2016, 154; Roos lists 19 species instead of 15).

Hoolock (= *Hylobates*) *hoolock* × *Hylobates* *agilis* (fertile) Montagu 1950, Chiarelli 1973, see <https://eol.org/pages/58999993>

Hylobates *lar* × *Nomascus* (= *Hylobates*) *leucogenys* Hirai et al. 2007 (→ „Larcon“: *Hylobates* = female), Baicharoen et al. 2010 (→ „Conlar“: *Hylobates* = male), Hirai et al. 2007 (*Nomascus* *leucogenys* × *Hylobates* *lar* had 48 chromosomes (instead of 44 or 52 like the parent species), Baicharoen et al. (2014, 1+3: *Hylobates* × *Nomascus* hybrids in zoos)

Hylobates lar × *H. pileatus* IS Lhota et al. 2022

Hylobates moloch, muelleri × *Symphalangus syndactylus* (→ „Siabon”) Myers & Shafer 1979, Pellicciari et al. 1988, Lhota et al. 2022, Baicharoen et al. 2014, 1+3



Hylobatidae: hybridization within a phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Rocatti R & Perez SI 2019. nature.com/articles/s41598-019-51685-w).

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Primates: Lemuridae 4: 21 + 1 extinct genus (suborder Strepsirrhini)

lemurids = Gewöhnliche Makis

Eulemur 12, *Haplemur* 6 (incl. *Prolemur sinus*), *Lemur* 1 *catta*, *Varecia* 2 *rubra*, *variegata*.

In family **Lemuridae**, at least all 12 species of genus *Eulemur* belong to the same **basic type**.

IS:

Eulemur rufus × *E. albocollaris* (= *E. cinereiceps*) **IS** Lhota et al. 2022

Eulemur mongoz × *E. fulvus* **IS** Lhota et al. 2022

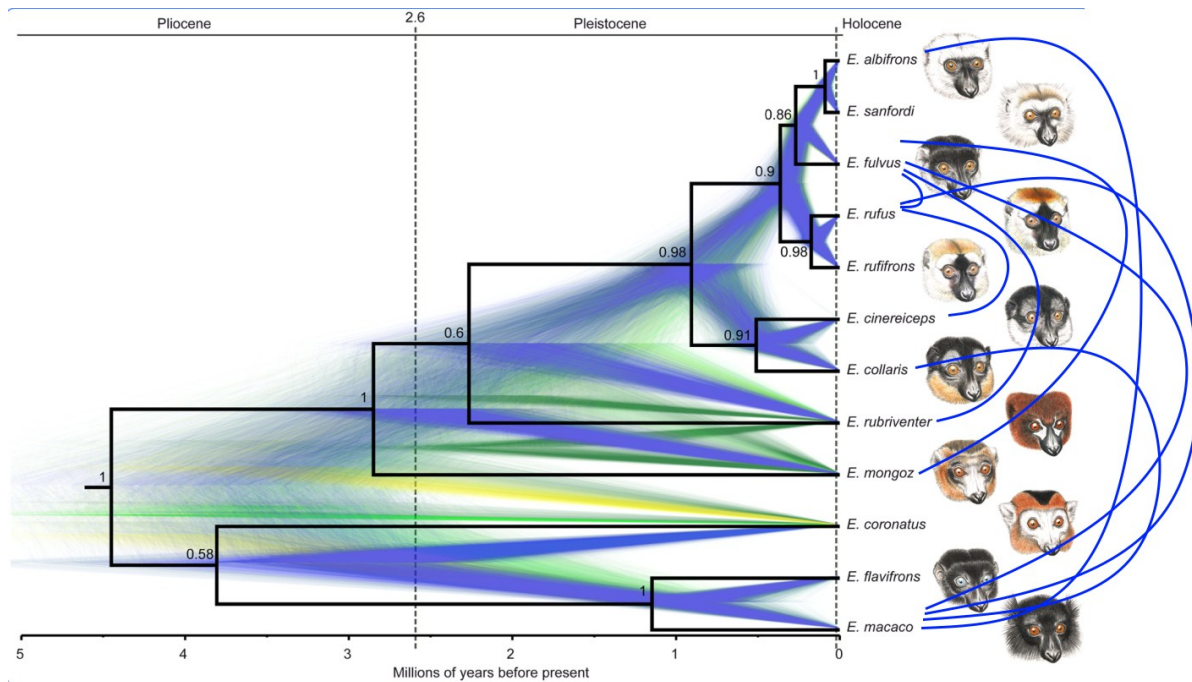
Lemur m. (= *Eulemur*) *macaco* × *L. m.* (= *Eulemur*) *albifrons*, *L. m. colaris*, *L. m. rufus*, *L. m. fulvus* **IS** International Zoo Yearbook 1971, cf.

<https://www.macroevolution.net/lemur-hybrids.html>

Lemur m. (= *Eulemur*) *fulvus* × *L. (= Eulemur) rubriventer*, *L. m. rufus* **IS** International Zoo Yearbook 1971, cf. <https://www.macroevolution.net/lemur-hybrids.html>

Varecia variegata × *Varecia rubra* **IS**

https://en.wikipedia.org/wiki/List_of_genetic_hybrids



Lemuridae genus *Eulemur*: hybridization within a phylogeny according to Markolf & Kappeler (2013) (cf. © 2013 Markolf and Kappeler; licensee BioMed Central Ltd., CC BY 2.0, <https://creativecommons.org/licenses/by/2.0/>)

References:

International Zoo Yearbook 1971, 262

<https://archive.org/details/internationalzoo0011luca/page/262>

Lhota S et al. (2022) Is Malaysia's "mystery monkey" a hybrid between *Nasalis larvatus* and *Trachypithecus cristatus*? An assessment of photographs. International Journal of Primatology 43, 513–532, <https://doi.org/10.1007/s10764-022-00293-z>

Markolf M & Kappeler PM (2013) Phylogeographic analysis of the true lemurs (genus *Eulemur*) underlines the role of river catchments for the evolution of micro-endemism in Madagascar. Front. Zool. 10, 70. <https://doi.org/10.1186/1742-9994-10-70>

Proboscidea 1 extant family, 2: 3, + 13 extinct families
elephants etc. = Rüsseltiere

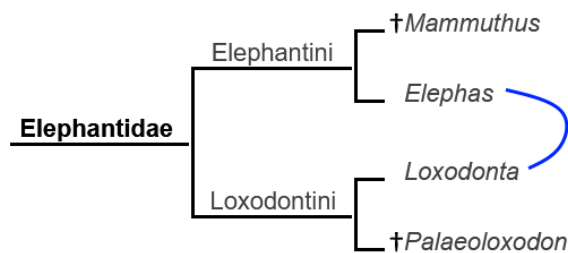
Proboscidea: Elephantidae 2: 3 + 8 extinct genera. 1 IG
elephants = Elefanten

Elephas 6, *Loxodonta* 2.

Basic type family Elephantidae, at least for the extant taxa (2: 3). According to new genome data the fossil genus *Mammuthus* is closer related to *Elephas* than to *Loxodonta*, so probably all fossil species of subfamily Elephantinae belong to the same basic type, also (cf. Sandoval-Velasco et al. 2024, van der Valk et al. 2022, Baleka

et al. 2022, Todd 2009): *Primelephas* † 2, *Elephas* 7 (1 extant + 6 extinct), *Loxodonta* 4 (2 + 2 extinct), *Mammuthus* † 10 (there are even more fossil Elephantinae: see <https://en.wikipedia.org/wiki/Elephantidae> 2025).

Elephas maximus × *Loxodonta africana* <http://www.hybridelephant.com/motty.html>,
http://www.elephant.se/motty_die_elefanten_kreuzung.php,
<http://en.wikipedia.org/wiki/Motty>



Elephantidae: hybridization within a phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Meyer M et al. 2017. doi:10.7554/eLife.25413)

References:

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Rodentia 5 suborders, 34 families, 481: 2500

rodents = Nagetiere

5 suborders:

Anomaluromorpha 3 families

Castorimorpha 3 families

Hystricomorpha (incl. Caviomorpha) 17 families

Myomorpha 9 families

Sciuromorpha 3 families

Rodentia: Castoridae 1: 2 + extinct species (suborder Castorimorpha)

beavers = *Biber*

Probably **basic type family Castoridae** (1: 2), at least for the 2 extant species.

IS:

Castor canadensis × *Castor fiber orientoeuropaeus* IS (capt. hyb., stillborn but normal large cub (33,5 cm length) with black fur) Lavrov 1996, McCarthy 2015, https://en.wikipedia.org/wiki/Eurasian_bever 2025

References:

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Rodentia: Muridae 150: 870 + 31 extinct genera. 3 IG (suborder Myomorpha)

murids, true rats, true mice and gerbils = Langschwanzmäuse

5 subfamilies, e.g. Murinae 140: 519.

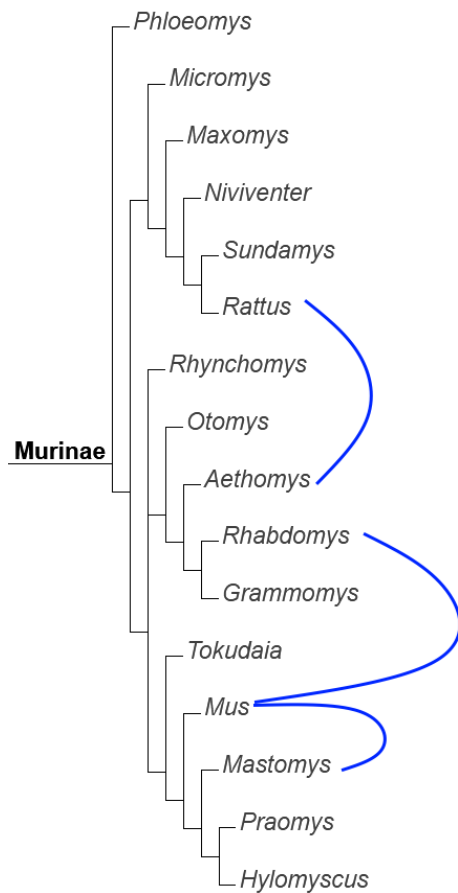
Probably **basic type Muridae subfamily Murinae** (140: 519, + 31 extinct genera); cf. <https://en.wikipedia.org/wiki/Murinae> 2025), but questions remain regarding the basal genus *Phloeomys*, see the figure below.

Aethomys chrysophilus × *Rattus norvegicus* Murinae Gray 1972 (art. hyb., viable), McCarthy 2015 <http://www.macroevolution.net/murine-hybrids.html>

Mastomys (= „*Rattus*“) *natalensis* × *Mus musculus* Murinae Gray 1972 (viable), Van Gelder 1977, McCarthy 2015

~~*Mus* × *Jaeculus*~~ IF Muridae × Dipodidae erroneous (see McCarthy 2015)

Mus musculus × *Rhabdomys* (= *Arvicanthis*°) *pumilio* Murinae Gray 1972 (viable), McCarthy 2015



Muridae subfamily Murinae: hybridization within a phylogeny with 16 genera of Murinae according to de.wikipedia 2025, CC BY 4.0 (cf. Meyer M et al. 2017. doi:10.7554/eLife.25413)

Rodentia: Sciuridae 51: 270–280 (suborder Sciuromorpha)

Squirrels = Hörnchen

Spermophilus 22, ...

At least the 22 species of **genus *Spermophilus*** (1: 22) belong to the same **basic type**.

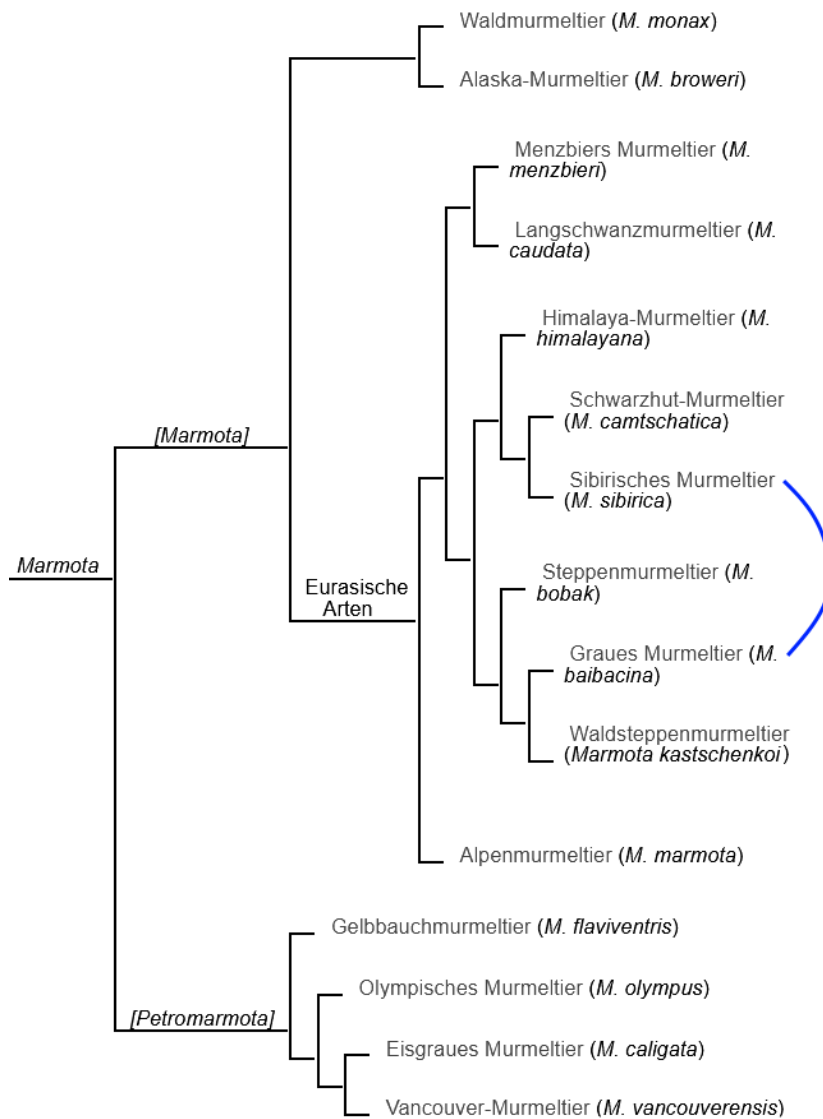
IS:

Marmota sibirica × *M. baibacina* **IS** **Xerinae** Kapustina et al. 2018

Spermophilus alaschanicus × *S. pallidicauda* **IS** **Marmotinae** Kapustina et al. 2018

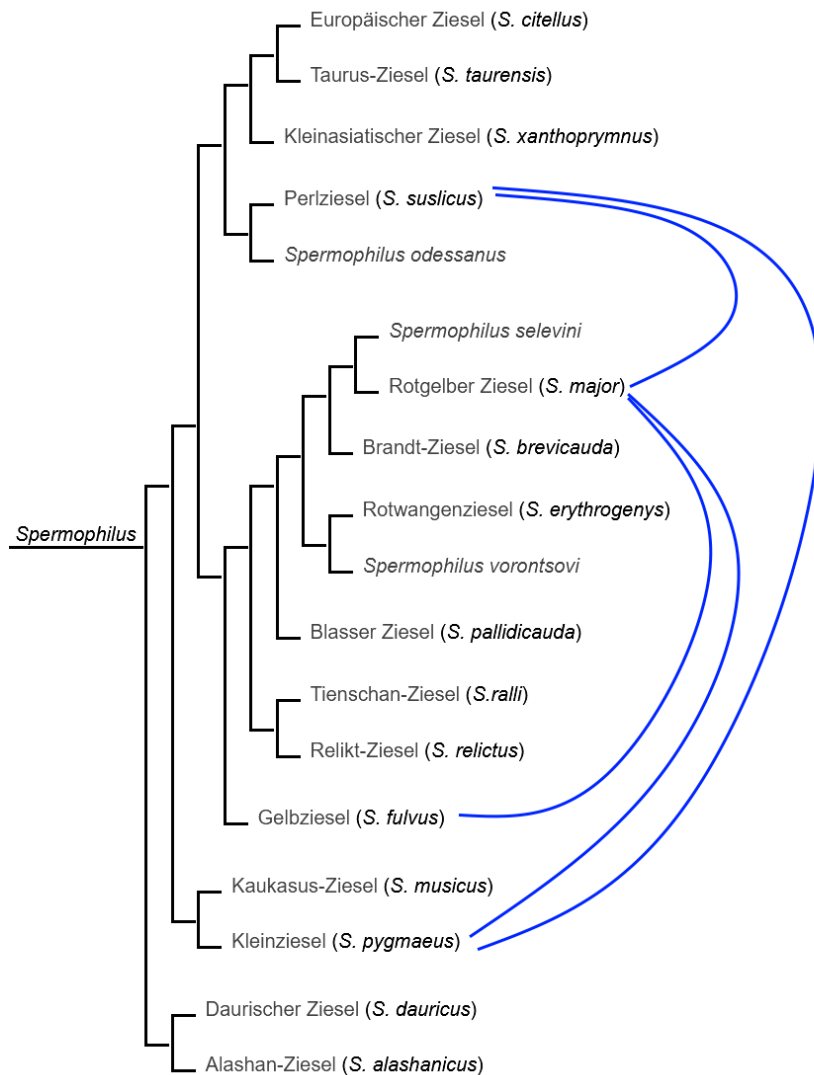
Spermophilus major × *S. fulvus*, *S. pygmaeus*, *S. suslicus* **IS** **Marmotinae** Ermakov et al. 2002, 2006

Spermophilus pygmaeus × *S. suslicus* **IS** **Marmotinae** Ermakov et al. 2006



Sciuridae genus *Marmota*: hybridization within a phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Brandtler OV & Lyopunova EA 2009).

<https://web.archive.org/web/20160803075746/http://marmota.cons-dev.org/marm/MARM/BIBMAR/BibpdfBz/10454.pdf>



Sciuridae genus *Spermophilus*: hybridization within a phylogeny according to de.wikipedia 2025, CC BY 4.0 (cf. Herron MD et al. 2004. doi:10.1016/j.ympev.2003.09.015)

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Sirenia 2 families 2: 4 + 2 extinct families

sea cows, sirenians = Seekühe

2 families: Dugongidae 1: 1 (dugong), Trichedidae 1: 3 + extinct taxa (manatees)

IS: *Trichechus manatus* × *T. inunguis* Trichedidae (nat. hyb.) de Oliveira et al. 2022

References:

de Oliveira EHC et al. (2022) Karyotypical confirmation of natural hybridization between two manatee species, *Trichechus manatus* and *Trichechus inunguis*. Life 12, 616. <https://doi.org/10.3390/life12050616>

Tubulidentata 1 family 1: 1 (Placentalia Afrotheria)

tubulidentates = Röhrenzähler

Tubulidentata: Orycteropodidae 1: 1 + 5 extinct genera

aardvark = Erdferkel

Orycteropus afer.

Basic type family Orycteropodidae (1: 1), at least for the extant species.

Anatomically well-defined (P. Klöckner, pers comm. 2008). *Orycteropus afer* is the only extant species in the whole order Tubulidentata.

Xenarthra → Cingulata and Pilosa