

<https://creationismeweersproken.blogspot.com/2023/01/de-rode-panda-en-cserhati-1-de.html>

THE RED PANDA AND CSERHATI (1): THE SCIENTIFIC SITUATION

On November 5, 2022, Jan van Meerten wrote a web post on his website 'Oorsprong' with the title: "**Scientist solves (creationist) biosystematic riddle of the red panda (*Ailurus fulgens*)**".

That web post made some strange claims:

"Incidentally, not only creationists have problems with the classification of the red panda. Naturalists are also not sure where to classify the beast. Does the beast belong to the bears (Ursidae), the raccoons (Procyonidae), or the skunks (Mephitidae)?"

"The most important conclusion we can draw from this study is that at the whole genome level, *A. fulgens* belongs to the clade of mustelids, not bears or skunks. (Cserhati)"

Jan van Meerten apparently did not take the trouble to look at wikipedia: https://en.wikipedia.org/wiki/Red_panda . Wikipedia summarizes what science thinks about the red panda: the red panda does not belong to the bears, not to the raccoons, not to the skunks and not to the mustelids. The red panda belongs to itself: *Ailurus fulgens* is the only species of the family Ailuridae.

The Ailuridae family belongs to the superfamily Musteloidea, as do three other families: the skunks Mephitidae, the raccoon family Procyonidae, and the mustelid family Mustelidae. The only question is what the relations are within the superfamily Musteloidea: to what family or group or families is the family Ailuridae most closely related? Molecular evolutionary biology work over the last 20-25 years has identified three possibilities for the relationships of the families within the superfamily Musteloidea. The three possibilities are spelled out in wikipedia and shown in the diagram below.

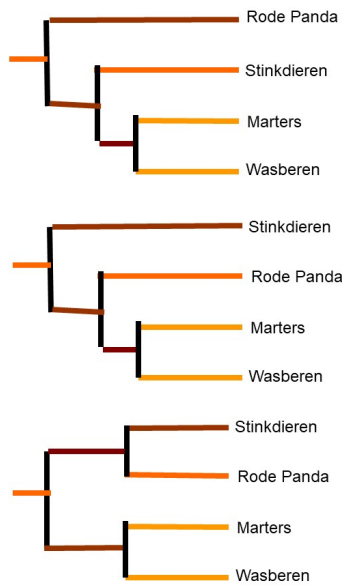


Figure 1 The three options in Wikipedia for the phylogeny of the Musteloidea. (stinkdieren = skunks; rode panda = red panda; marters = marten family; wasberen = raccoon family)

All scientific studies find that the mustelids and raccoons are more closely related to each other than either is to the red panda or the skunks - mustelids and raccoons are sister groups. But what is the relationship of mustelids + raccoons to the red panda and the skunks? Is the red panda the sister group of the skunks + mustelids+ raccoons (top), or of the mustelids + raccoons (middle) or of the skunks (bottom)?

The first possibility for the phylogeny of the Musteloidea can be found in Flynn *et al* (2005).

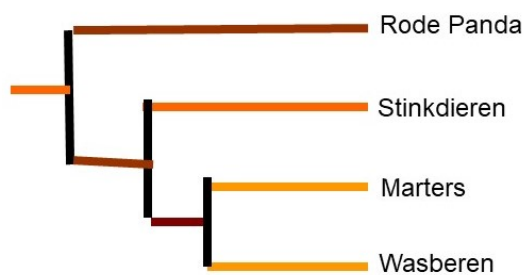


Figure 2 schematic representation of the classification of the Musteloidea as found in Flynn *et al* (2005). The marten families Mustelidae and the raccoon families Procyonidae are close relatives. The skunk family Mephitidae is as related to mustelids as it is to raccoons: the skunks family is the sister group to the Mustelidae + Procyonidae. The red panda, of the Ailuridae family, is as closely related to skunks as it is to martens and raccoons.(stinkdieren = skunks; rode panda = red panda; marters = marten family; wasberen = raccoon family)

Flynn *et al* (2005) used a DNA sequence of 6243 bp from six genes to classify 76 species from the order Carnivora. The Carnivora consist of two large groups: the Feliformia and the Caniformia. The Caniformia fall into two groups: the canid family Canidae and a group called Arctoidea. The Arctoidea fall into two groups: the bear family Ursidae and a group with two more groups: the marine carnivorans Pinnipedia on the one hand and the superfamily Musteloidea on the other. The Musteloidea includes the red panda.

Flynn *et al* (2005) found most support for a first split within the Musteloidea between the red panda and the three remaining families (Figure 2, Figure 1 top), and a possibility for a first split between skunks + panda vs. mustelids + raccoons (Figure 1 bottom).

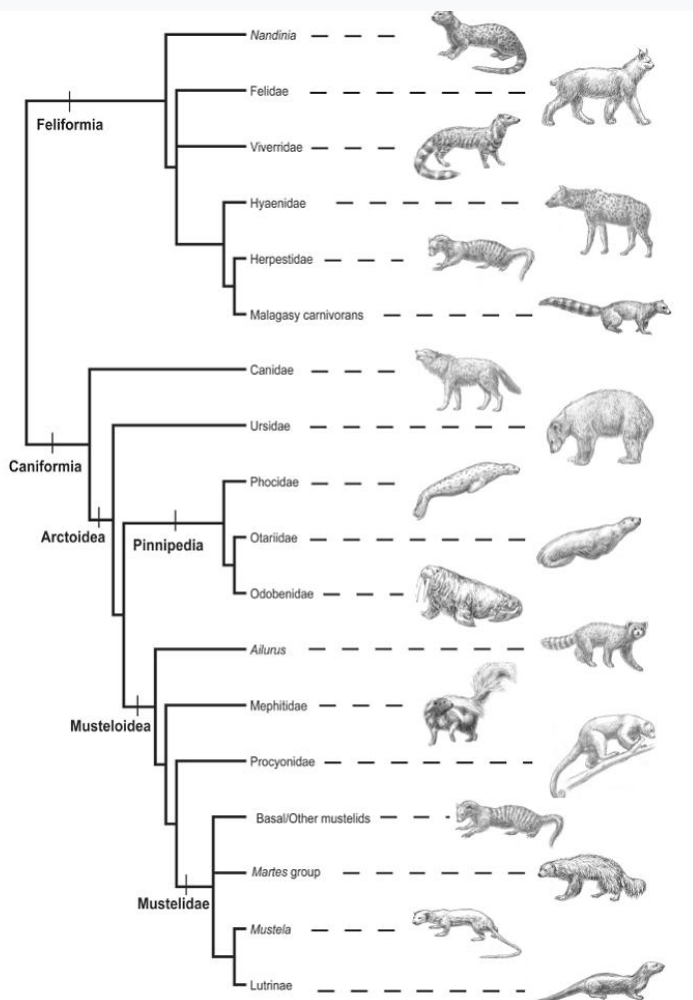


Figure 3 The phylogenetic tree of the Musteloidea based on molecular data of extant species. ; figure 5 from Flynn *et al* (2005)

The second possibility for the phylogeny of the Musteloidea can be found, among others, in Law *et al* (2018).

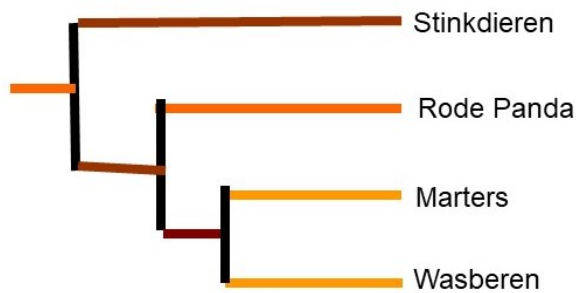


Figure 4 Schematic representation of the classification of the Musteloidea as found in Law *et al* (2018). The marten families Mustelidae and the raccoon families Procyonidae are close relatives. The red panda, of the Ailuridae family, is as closely related to martens as it is to raccoons. The skunk family Mephitidae is as closely related to the red panda as it is to the mustelids and raccoons. (stinkdieren = skunks; rode panda = red panda; marters = marten family; wasberen = raccoon family)

Law *et al* (2018) were interested in the evolution of phenotype and life history in the Musteloidea. First Law *et al*. established a phylogenetic tree of the extant species of the superfamily Musteloidea based on all available molecular data and using Bayesian analysis. Then, Law *et al* combined this phylogenetic tree with available fossils. This yields a time-calibrated phylogenetic tree of Musteloidea, providing mean divergence times for the division of the families and the groups within the families.

The molecular phylogenetic tree of extant Musteloidea species gives as first split the divergence of skunks (Mephitidae) from the other Musteloidea. Figure 5 shows the phylogenetic tree of extant Musteloidea as found by Law *et al* (2018).

But when the fossils are included, the red panda and skunks emerges as sister group: as in figure 1 at the top. Figure 6 shows the phylogenetic tree of the living and fossil Musteloidea as found by Law *et al* (2018).

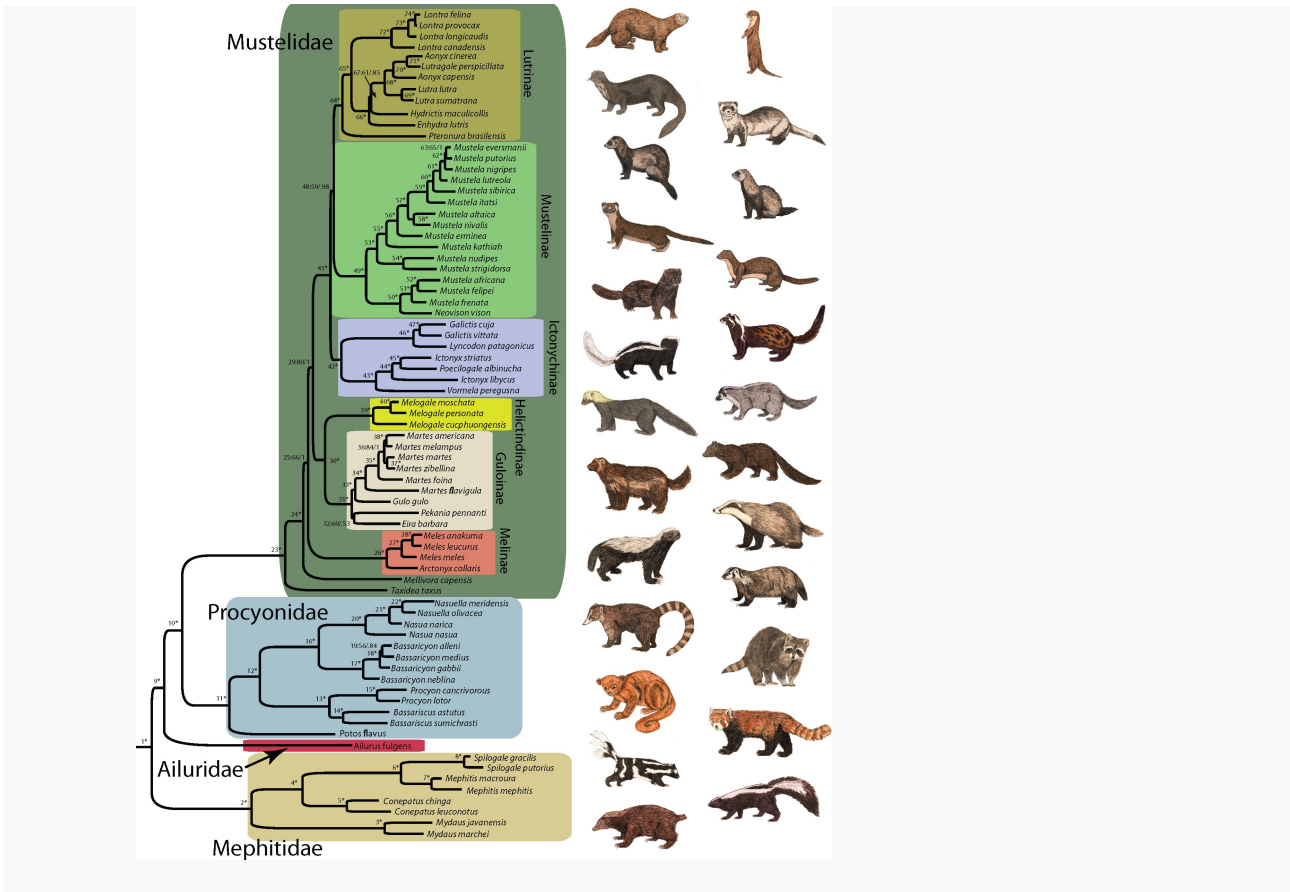


Figure 5 The phylogenetic tree of the Musteloidea based on molecular data from living species; figure 1 from Law *et al* (2018).

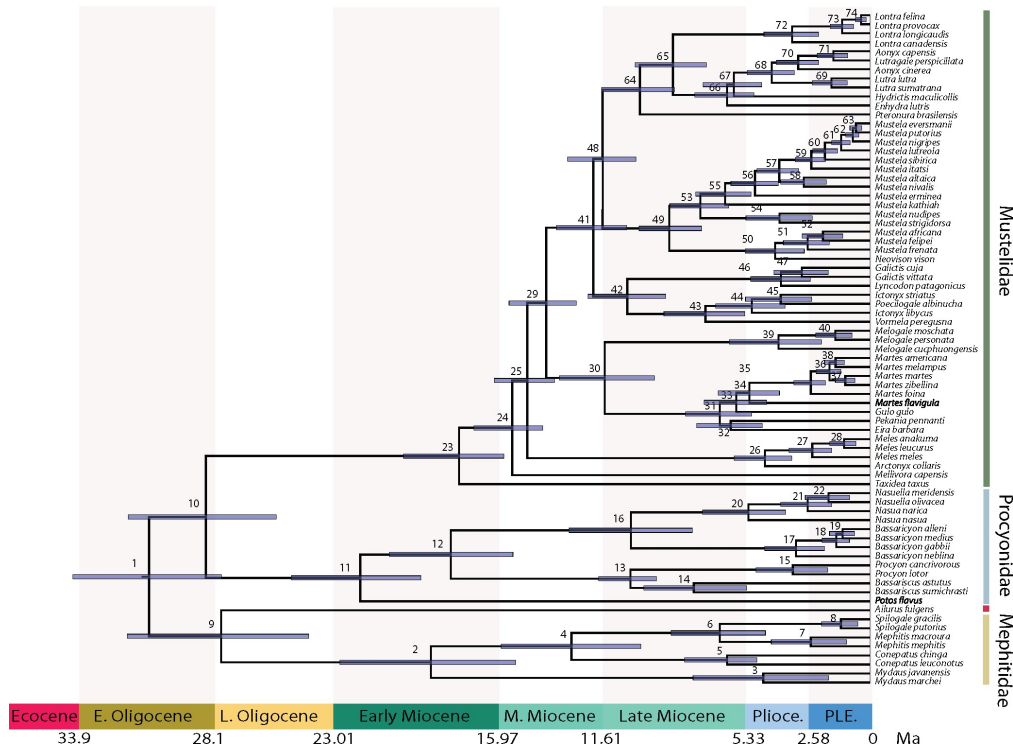


Figure 6 The phylogenetic tree of the Musteloidea based on molecular data from living species and known fossils.; figure 2 from Law *et al* (2018).

The third possibility for the phylogeny of the Musteloidea can be found in Hassanin *et al* (2021), and as a minor possibility in Flynn *et al* (2005) and Law *et al* (2018).

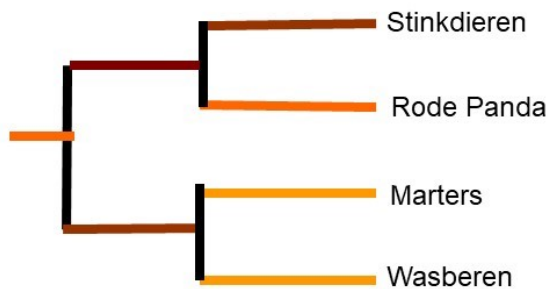


Figure 7 Scheme of the classification of the Musteloidea as found in Hassanin *et al* (2021). The marten families Mustelidae and the raccoon families Procyonidae are close relatives. The red panda, the family Ailuridae, and the skunk family Mephitidae are close relatives. The red panda and the skunks are as closely related to mustelids as they are to raccoons. (stinkdieren = skunks; rode panda = red panda; marters = marten family; wasberen = raccoon family)

Hassanin *et al* (2021) performed the most comprehensive molecular study of the order Carnivora to date. Hassanin *et al* used the DNA sequence of the complete mtDNA of 220 species of Carnivora. They sequenced the mtDNA of some species themselves, while the mtDNA sequence of other species was already in the database. In total, they used DNA sequences from 2442 mitochondrial genomes, 220 species and 14892 base pairs per species.

Hassanin *et al* (2021) used Bayesian analysis to find the mtDNA phylogenetic tree of the Carnivora.

This largest molecular study of the phylogeny of the Musteloidea to date yields the red panda and the skunk family as sister groups. Previous studies had difficulty rejecting this possibility, but the large study by Hassanin *et al* (2021) is decisive: the possibility at the top of figure 1 has the best credentials.

All scientific studies indicate that the marten family Mustelidae and the raccoon family Procyonidae are sister groups. The red panda, family Ailuridae, and the skunk family Mephitidae as sister group have most support.

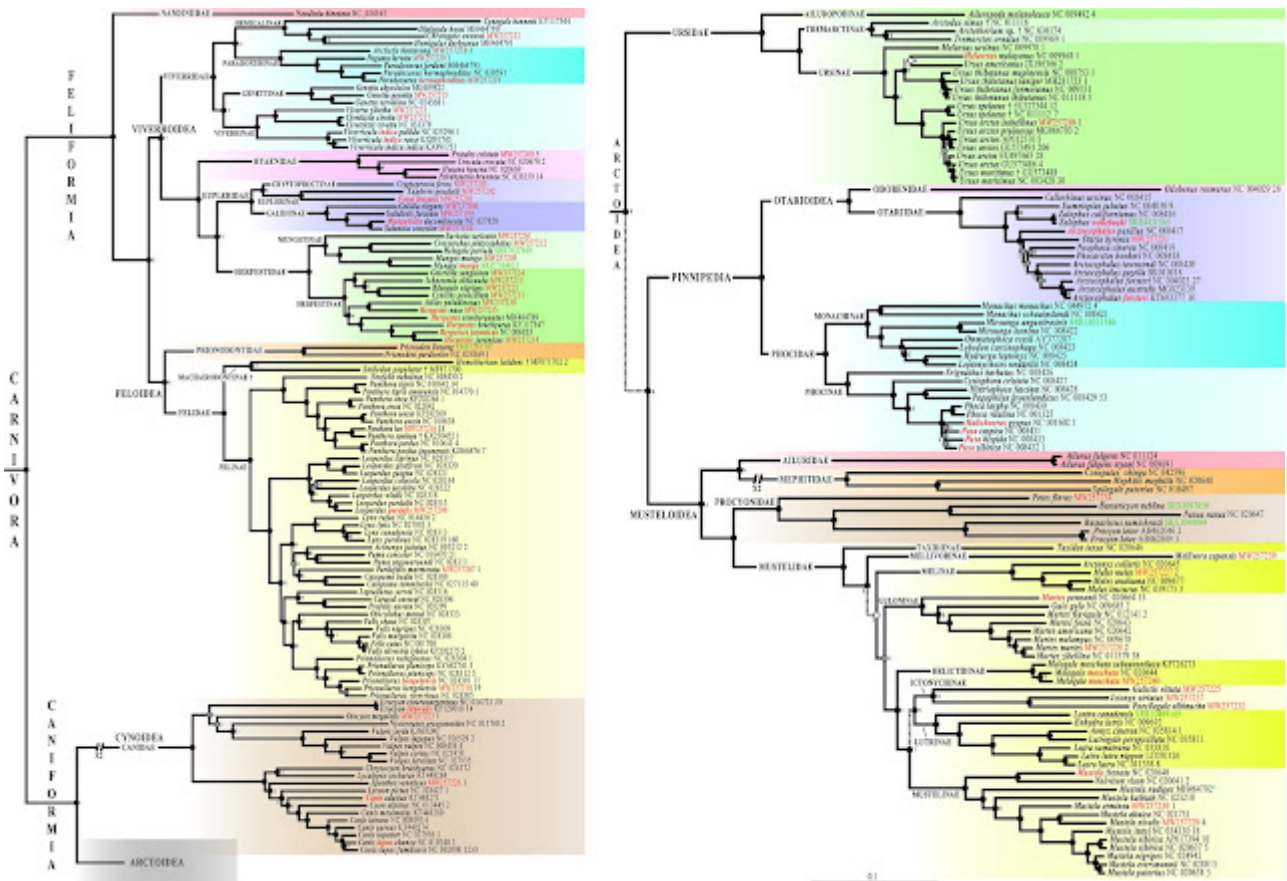


Figure 8 Phylogenetic tree of the Carnivora based on mtDNA. Figure 2 from Hassanin *et al* (2021).

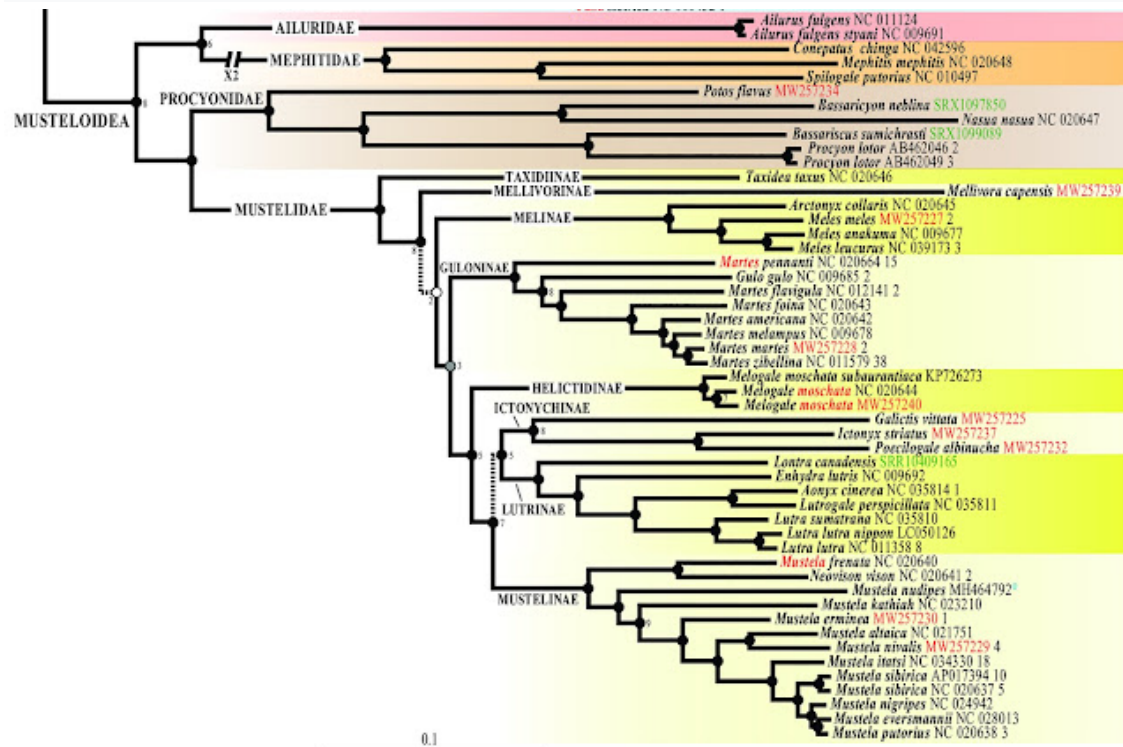


Figure 9 Phylogenetic tree of the Musteloidea according to their mtDNA. Detail of Figure 2 from Hassanin *et al* (2021).

Other studies do not give a different picture. This is the scientific state of affairs. The scientific state of affairs is in stark contrast to:

"Incidentally, not only creationists have problems with the classification of the red panda. Naturalists are also not sure where to classify the beast. Does the beast belong to the bears (Ursidae), the raccoons (Procyonidae), or the skunks (Mephitidae)?"

The red panda does not belong to the Ursidae bears, not to the Procyonidae raccoons, and not to the Mephitidae skunks. For evolutionary biologists, Jan van Meerten's question is 20 years out of date.

The scientific state of affairs is in complete contradiction with what Cserhati writes according to Jan van Meerten:

"The most important conclusion we can draw from this (Cserhati's) study is that at the whole genome level, A. fulgens belongs to the clade of mustelids, not bears or skunks."

The red panda is not a mustelid, it does not belong to the family Mustelidae, although it does belong to the superfamily Musteloidea.

<https://oorsprong.info/wetenschapper-lost-creationistisch-biosystematisch-raadsel-van-de-rode-panda-ailurus-fulgens-op/>

<https://evolutiebiologie.blogspot.com/2010/10/het-raadsel-van-de-rode-panda.html>

Flynn, J.J.; Finarelli, J. A.; Zehr, S.; Hsu, J. & Nedbal, M.A. (2005). Molecular phylogeny of the Carnivora (Mammalia): Assessing the impact of increased sampling on resolving enigmatic relationships. *Systematic Biology*. 54: 317–337. doi:10.1080/10635150590923326.

Law, C.J.; Slater, G.J. & Mehta, R.S. (2018). Lineage Diversity and Size Disparity in Musteloidea: Testing Patterns of Adaptive Radiation Using Molecular and Fossil-Based Methods. *Systematic Biology*. 67: 127–144. doi:10.1093/sysbio/syx047. .

Hassanin, A.; Veron, G.; Ropiquet, A.; van Vuuren, B. J.; Lécuyer, A.; Goodman, S. M.; Haider, J.; Nguyen, T. T. (2021). Evolutionary history of Carnivora (Mammalia, Laurasiatheria) inferred from mitochondrial genomes. *PLOS ONE*. 16 (2): e0240770.