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On the correct name for some subfamilies of Mustelidae (Mammalia, Carnivora)

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ABSTRACT

*Mustelids (Mustelidae) exhibit a wide morphological and ecological diversity, ranging from aquatic to semi arboreal and fossorial forms. It is the most diversity family in Carnivora, and this has promoted a great number of taxonomic arrangements for subfamilies, which can range from two to 15 depending on the author. The relatively recent use of molecular data has helped to elucidate the classification of mustelids, and eight subfamilies are currently recognized: Mustelinae, Galictinae, Helictidinae, Martinae, Melinae, Mellivorinae, Taxidiinae and Lutrinae. However, some of these subfamilies have nomenclatural problems, not receiving the oldest available name. The subfamily that includes martens (*Martes, Charronia *and* Pekania*), tayra (*Eira*) and wolverine (*Gulo*) has received the name of Martinae Wagner, 1841, but the oldest available name is Guloninae Gray, 1825. This problem also occurs for the subfamily that includes the grisons (*Galictis*), Patagonian weasel (*Lyncodon*), marbled polecat (*Vormela*) and striped weasels (*Ictonyx *and* Poecilogale*), which are known as Grisoninae Pocock, 1921, but the correct name for this group is Ictonychinae, Pocock, 1921. The subfamily that includes ferret badgers (*Melogale*) retains the name Helictidinae Gray, 1865, because its validity is not affected when the type-genus of the subfamily becomes a junior synonym of another genus. Furthermore, a list of the extant subfamilies of Mustelidae and their respective synonyms and included genera is provided.*

Key-Words: Mustelidae; Subfamilies; Guloninae; Ictonychinae; Helictinae.

INTRODUCTION

Mustelidae, which includes weasels, martens, wolverines, tayras, polecats, badgers and otters, is the most diverse family in the order Carnivora, with about 60 valid species (Wozencraft, 2005; Larivière & Jennings, 2009). The family has an almost cosmopolitan geographic distribution (Nowak, 1999; Larivière & Jennings, 2009) and shows a great diversity of lifestyles, including aquatic, semi-aquatic, semi-arboreal, semi-fossorial and fossorial species (Larivière & Jennings, 2009). Different taxonomic arrangements were proposed during the 19th and early 20th century (Gray, 1825, 1869; Flower, 1869, 1883; Gill, 1872; Mivart, 1885; Flower & Lydekker, 1891; Trouessart, 1904; Miller, 1912; Pocock, 1920, 1921a), reaching a maximum of 15 subfamilies recognized by Pocock (1921b) (Table 1). Later, Simpson (1945) reduced this number to five (Table 1) in the taxonomic arrangement that became widely accepted by subse-

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TABLE 1: List of the main taxonomical arrangements for the subfamilies of Mustelidae proposed in the 20th and 21st centuries.

Pocock (1921c)	**Simpson (1945)**	**Wozencraft (1993)**	**McKenna & Bell (1997)**	**Wozencraft (2005)**	**Koepfli *et al.* (2008)**	**Larivière & Jennings (2009)**	**Yu *et al.* (2011)**
Mustelinae	Mustelinae	Mustelinae	Mustelinae	Mustelinae	Mustelinae	Mustelinae	Mustelinae
Mustela	*Charronia*	*Eira*	*Eira*	*Arctonyx*	*Mustela*	*Mustela*	*Mustela*
Gale	*Galera*	*Galictis*	*Galictis*	*Eira*	*Neovison*	*Neovison*	*Neovison*
Putorius	*Grison*	*Gulo*	*Ictonyx*	*Galictis*	Galictinae	*Lyncodon*	Ictonychinae
Vormela	*Grisonella*	*Ictonyx*	*Lyncodon*	*Gulo*	*Galictis*	Galictinae	*Galictis*
Martinae	*Gulo*	*Lyncodon*	*Martes*	*Ictonyx*	*Ictonyx*	*Galictis*	*Ictonyx*
Charronia	*Lyncodon*	*Martes*	*Mustela*	*Lyncodon*	*Vormela*	*Ictonyx*	*Vormela*
Martes	*Martes*	*Mustela*	*Poecilictis*	*Martes*	*Poecilogale*	*Vormela*	*Poecilogale*
Guloninae	*Mustela*	*Poecilogale*	*Poecilogale*	*Meles*	*Lyncodon*	*Poecilogale*	*Poecilictis*
Gulo	*Poecilictis*	*Vormela*	*Taxidea*	*Mellivora*	Helictidinae	Helictidinae	*Lyncodon*
Tayrinae	*Poecilogale*	Mellivorinae	*Vormela*	*Melogale*	*Melogale*	*Melogale*	Helictidinae
Tayra	*Zorilla*	*Mellivora*	Guloninae	*Mustela*	Martinae	Martinae	*Melogale*
Helictidinae	*Vormela*	Melinae	*Gulo*	*Neovison*	*Eira*	*Eira*	Guloninae
Helictis	Mellivorinae	*Arctonyx*	Mellivorinae	*Poecilogale*	*Martes*	*Martes*	*Eira*
Melogale	*Mellivora*	*Meles*	*Mellivora*	*Taxidea*	*Pekania*	*Gulo*	*Martes*
Mellivorinae	Melinae	*Melogale*	Melinae	*Vormela*	*Gulo*	Mellivorinae	*Pekania*
Mellivora	*Arctonyx*	*Mydaus*	*Arctonyx*	Lutrinae	Mellivorinae	*Mellivora*	*Gulo*
Melinae	*Helictis*	Mephitinae	*Meles*	*Aonyx*	*Mellivora*	Melinae	Mellivorinae
Arctonyx	*Melogale*	*Conepatus*	*Melogale*	*Enhydra*	Melinae	*Arctonyx*	*Mellivora*
Meles	*Mydaus*	*Mephitis*	Mephitinae	*Hydrictis*	*Arctonyx*	*Meles*	Melinae
Mephitidae	*Taxidea*	*Spilogale*	*Conepatus*	*Lontra*	*Meles*	Taxidiinae	*Arctonyx*
Conepatus	Mephitinae	Taxidiinae	*Mephitis*	*Lutra*	Taxidiinae	*Taxidea*	*Meles*
Mephitis	*Conepatus*	*Taxidea*	*Mydaus*	*Lutrogale*	*Taxidea*	Lutrinae	Taxidiinae
Spilogale	*Mephitis*	Lutrinae	*Spilogale*	*Pteronura*	Lutrinae	*Aonyx*	*Taxidea*
Mydainae	*Spilogale*	*Amblonyx*	Lutrinae		*Aonyx*	*Enhydra*	Lutrinae
Mydaus	Lutrinae	*Aonyx*	*Aonyx*		*Enhydra*	*Hydrictis*	*Aonyx*
Taxidiinae	*Amblonyx*	*Enhydra*	*Amblonyx*		*Hydrictis*	*Lontra*	*Enhydra*
Taxidea	*Aonyx*	*Lontra*	*Enhydra*		*Lontra*	*Lutra*	*Hydrictis*
Ictonychinae	*Enhydra*	*Lutra*	*Lutra*		*Lutra*	*Lutrogale*	*Lontra*
Ictonyx	*Lutra*	*Lutrogale*	*Lutrogale*		*Lutrogale*	*Pteronura*	*Lutra*
Poecilictis	*Lutrogale*	*Pteronura*	*Pteronura*		*Pteronura*		*Lutrogale*
Grisoninae	*Paraonyx*						*Pteronura*
Grison	*Pteronura*						
Grisonella							
Lyncodontinae							
Lyncodon							
Lutrinae							
Lutra							
Hydrictis							
Lutrogale							
Amblonyx							
Aonyx							
Paraonyx							
Lataxinae							
Latax							

quent authors (Ewer, 1973, Nowak & Paradiso, 1983; Nowak, 1991, 1999), except for Wozencraft (1989, 1993) and McKenna & Bell (1997). In the second edition of the mammalian taxonomic compendium edited by Wilson & Reeder (1993), Wozencraft recognized six subfamilies (Table 1), but in the third edition of this same compendium (2005), the author provisionally placed all mustelids (except skunks and stink badgers, which were placed in their own family, the Mephitidae) into two subfamilies, Mustelinae and Lutrinae, based mainly on Bryant *et al.* (1993), Dragoo & Honeycoot (1997) and Bininda-Emonds *et al.* (1999), who demonstrated the paraphyly of the traditional subfamilies.

Since the inclusion of molecular data in the 2000s, new insights challenged the traditional classification arrangement of mustelids (Stone & Cook, 2002; Flynn *et al.,* 2005; Fulton & Strobeck, 2006; Koepfli *et al.,* 2008; Larivière & Jennings, 2009; Yu *et al.,* 2011; Sato *et al.,* 2012). According to these molecular studies, skunks (*Spilogale, Mephitis* and *Conepatus*) and stink badgers (*Mydaus*) form a separate family (Mephitidae), a sister group in relation to the clade formed by the remaining Mustelidae and Procyonidae. Furthermore, the relationships within the remaining Mustelidae were rearranged and eight subfamilies were recognized: Mustelinae, Galictinae, Helictidinae, Martinae, Melinae, Mellivorinae, Taxidiinae, and Lutrinae (Table 1). This taxonomic arrangement is currently the most accepted, also used in *"The Handbook of the Mammals of the World, volume 1"* (Larivière & Jennings, 2009), a reference mammalian compendium not only for systematics zoologists, but also for ecologists and conservationists, among others. However, there is a problem in this new arrangement concerning the correct nomenclature of some subfamilies, which have often not received the oldest available names. Herein, I will briefly discuss this issue and propose nomenclatural changes based on principles of the ICZN (1999).

MATERIAL AND METHODS

Discussion of this nomenclatural issue was based on information obtained from the literature, especially from studies by Gray (1825, 1865), Wagner (1841), Pocock (1921b), ICZN (1956, 1967, 1999), Simpson (1945), Wozencraft (1993, 2005), McKenna & Bell (1997), Stone & Cook (2002), Flynn *et al.* (2005), Fulton & Strobeck (2006), Koepfli *et al.* (2008), Larivière & Jennings (2009), Yu *et al.* (2011) and Sato *et al.* (2012).

RESULTS AND DISCUSSION

Guloninae or Martinae?

The clade that grouped the martens (*Martes*), wolverine (*Gulo*), and tayra (*Eira*) received the name Martinae by most of authors (Stone & Cook, 2002; Flynn *et al.,* 2005; Fulton & Strobeck, 2006; Koepfli *et al.,* 2008; Larivière & Jennings, 2009; Yu *et al.,* 2011) ["(…) the *Martes-Eira-Gulo* clade, we propose that this clade also be afforded subfamilial status as Martinae"; Fulton & Strobeck, 2006: 178], but this is contrary to the rules of ICZN Code (1999), which states:

"Article 23. Principle of Priority.

23.1. Statement of the Principle of Priority. The valid name of a taxon is the oldest available name applied to it, unless that name has been invalidated or another name is given precedence by any provision of the Code or by any ruling of the Commission. For this reason priority applies to the validity of synonyms (…), to the relative precedence of homonyms (…), the correctness or otherwise of spellings (…), and to the validity of nomenclatural acts (such as acts taken under the Principle of the First Reviser (…) and the fixation of name-bearing types (…).

(…)

23.2. Purpose. In accordance with the objects of the Code (…), the Principle of Priority is to be used to promote stability and it is not intended to be used to upset a long-accepted name in its accustomed meaning by the introduction of a name that is its senior synonym or homonym (…), or through an action taken following the discovery of a prior and hitherto unrecognized nomenclatural act (…)".

The oldest available name for *Martes-Gulo-Eira* clade should be Guloninae, as Sato *et al.* (2012) correctly used in their article, since Gray created the tribe Gulonina in 1825 to include the wolverine, and it was created before Martina Wagner (1841). Furthermore, according to the ICZN Code (1999):

"Article 34. Mandatory changes in spelling consequent upon changes in rank or combination.

34.1. Family-group names. The suffix of a family-group name must be changed when the taxon denoted by the name is raised or lowered in rank; the author and date of the name remain unchanged."

"Article 36. Principle of Coordination.

36.1. Statement of the Principle of Coordination applied to family-group names. A name established for a taxon at any rank in the family group is deemed to have been simultaneously established for nominal taxa at all other ranks in the family group; all these taxa have the same type genus, and their names are formed from the stem of the name of the type genus (…) with appropriate change of suffix (…). The name has the same authorship and date at every rank."

In this case, the name Gulonina, which rose from tribe to subfamily rank (Guloninae), must remain with the name of its original author, Gray (1825).

Zorillinae, Galictinae or Ictonychinae?

Regarding the clade that currently includes the grisons (*Galictis*), Patagonian weasel (*Lyncodon*), marbled polecat (*Vormela*), striped polecats (*Ictonyx*) and striped weasel (*Poecilogale*), the oldest name to designate them would be Zorillinae, which was first used as a tribe by Gray (1865) (as Zorillina) and subsequently raised to subfamily by Gill (1872). However, the type genus *Zorilla* I. Geoffroy (1826) was suppressed by the ICZN committee in 1967 (Opinion 818) ("suppressed under the plenary power for the purposes of the Principle of Priority but not for those of the Principle of Homonymy"). According to ICZN Code (1999):

"Article 37. Nominotypical taxa.

(…)

37.2. Effect of change of name on nominotypical taxa. If the name in use for a family-group taxon is unavailable or invalid it must be replaced by the name valid under Article 23.3.5; any subordinate taxa containing the type genus of the substitute nominal taxon (and therefore denoted by the valid family-group name, with appropriate suffixes) become nominotypical taxa."

The subsequent valid name for the subfamily would be Ictonychinae Pocock, 1921b, which was published on the same page as Grisoninae, but the former name was referred to before the latter. Furthermore, the type genus of Grisoninae, *Grison* Oken, 1816, was suppressed by the ICZN Commission in 1956. According to the rule of priority (Article 23), Galictinae Reig, 1956 is considered a junior synonym of Ictonychinae Pocock, 1921b, invalidating the proposed name given by Fulton & Strobeck (2006) and Koepfli *et al.* (2008). The valid name for this subfamily is thus Ictonychinae Pocock, 1921b, as Sato *et al.* (2012) also pointed out.

Helictinae or Melogalinae?

This subfamily comprise the ferret-badgers (*Melogale* spp.) from Asia (Wozencraft, 2005; Larivière & Jennings, 2009). *Melogale* I. Geoffroy, 1831 was published a few months before *Helictis* Gray, 1831. Gray (1865) created the tribe Helictina and subsequently Gill (1872) raised it to the subfamily rank, a decision followed by later authors, such as Pocock (1921b). In view of the genus-type should be *Melogale* and this has priority over *Helictis,* the subfamily of ferret-badgers would be named based on the first genus, and thus receiving the name "Melogalinae". However, this name was never created and the name Helictinae has been extensively used. For the purpose of maintaining taxonomic stability, the name Helictinae must be preserved, in accordance to the ICZN Code (1999):

"Article 40. Synonymy of the type genus.

40.1. Validity of family-group names not affected. When the name of a type genus of a nominal family-group taxon is considered to be a junior synonym of the name of another nominal genus, the family-group name is not to be replaced on that account alone.

40.2. Names replaced before 1961. If, however, a family-group name was replaced before 1961 because of the synonymy of the type genus, the substitute name is to be maintained if it is in prevailing usage.

40.2.1. A name maintained by virtue of this Article retains its own author but takes the priority of the replaced name, of which it is deemed to be the senior synonym.

Recommendation 40A. Citation of author and date. If the author and date are cited, a family-group name maintained under the provisions of Article 40.2.1 should be cited with its original author and date (…), followed by the date of its priority as determined by this Article; the date of priority should be enclosed in parentheses."

List of subfamilies and genera of extant Mustelidae

I herein provide a list of the extant subfamilies of Mustelidae with their respective synonyms and gen-

era, based on the information provided by Simpson (1945), Wozencraft (1993, 2005) and McKenna & Bell (1997):

Mustelidae Fischer de Waldheim, 1817

Mustelinae Fischer de Waldheim, 1817. [includes Mustelini Fischer de Waldheim, 1817; Mustelina Gray, 1825; Mustelina Gray, 1865 (part); Mustelinae Gill, 1872; Mustelinae Flower, 1883 (part); Mustelinae Flower & Lydekker, 1891 (part); Musteleae Trouessart, 1904; Putorinae Schlosser (in Zittel & Schlosser), 1911; Mustelinae Miller, 1912 (part); Mustelinae, Pocock, 1921; Mustelinae Simpson, 1945 (part); Mustelinae Wozencraft, 1993; Mustelinae Wozencraft, 2005 (part)].

Genera included: Mustela Linnaeus, 1758 (weasels, stoats, minks and polecats); and *Neovison* Baryshnikov & Abramov, 1997 (American mink).

Ictonychinae Pocock, 1921b. [includes Zorillina Gray, 1865; Mustelina Gray, 1865 (part); Zorillinae Gill, 1872; Mustelinae Flower, 1883 (part); Melinae Flower, 1883 (part); Mustelinae Flower & Lydekker, 1891 (part); Melinae Flower & Lydekker, 1891 (part); Grisoninae Pocock, 1921c; Lyncodontinae Pocock, 1921c; Mustelinae Simpson, 1945 (part); Galictinae, 1956; Mustelinae Wozencraft, 1993; Mustelinae Wozencraft, 2005 (part)].

Genera included: Galictis Bell, 1826 (grisons); *Vormela* Blasius, 1884 (marbled polecat); *Lyncodon* Gervais, 1844 (Patagonian weasel); *Ictonyx* Kaup, 1835 (striped polecats); and *Poecilogale* Thomas, 1883 (striped weasel).

Helictidinae Gray, 1865. [includes Helictidina Gray, 1865; Helictidinae Gill, 1872; Melinae Flower & Lydekker, 1891 (part); Helictidini G. Petter, 1971; Melinae Wozencraft, 1993 (part); Mustelinae Wozencraft, 2005 (part)].

Genera included: Melogale I. Geoffroy Saint-Hilaire, 1831 (ferret-badgers).

Guloninae Gray, 1825. [includes Gulonina Gray, 1825; Martina Wagner, 1841; Martinae Burmeister, 1850; Mustelina Gray, 1865 (part); Mustelinae Flower, 1883 (part); Mustelinae Flower and Lydekker, 1891 (part); Guloninae Miller, 1912 (part); Mustelinae Miller, 1912 (part); Martinae, Pocock, 1921c; Tayrinae, Pocock, 1921c; Mustelinae Simpson, 1945 (part); Mustelinae Wozencraft, 1993; Mustelinae Wozencraft, 2005 (part)].

Genera included: Eira C.E.H. Smith, 1842 (tayra); *Gulo* Pallas, 1780 (wolverine); *Pekania* Gray, 1865 (fisher); *Charronia* Gray, 1865 (yellow-throated marten); and *Martes* Pinel, 1792 (true martens).

Melinae Bonaparte, 1838. [includes Melina Bonaparte, 1838; Melinae Burmeister, 1850; Melina Gray, 1865 (part); Melinidae Gray, 1869; Melinae Flower, 1883 (part); Melinae Flower & Lydekker, 1891 (part); Melinae Simpson, 1945 (part); Melini G. Petter, 1971; Melinae Wozencraft, 1993 (part); Mustelinae Wozencraft, 2005 (part)].

Genera included: Arctonyx F.G. Cuvier, 1825 (hog badgers) and *Meles* Brisson, 1762 (Old World badgers).

Mellivorinae Gray, 1865. [includes Mellivorina Gray, 1865; Melinae Flower, 1883 (part); Melinae Flower & Lydekker, 1891 (part); Guloninae Miller, 1912 (part); Mellivorinae Simpson, 1945; Mellivorinae Wozencraft, 1993; Mustelinae Wozencraft, 2005 (part)].

Genera included: Mellivora Storr, 1780 (honey badger).

Taxidiinae Pocock, 1920. [includes Melina Gray, 1865 (part); Melinae Flower, 1883 (part); Melinae Flower & Lydekker, 1891 (part); Taxideinae Pocock, 1922; Melinae Simpson, 1945 (part); Taxidini G. Petter, 1971; Taxideini Kalandadze & Rautian, 1992; Taxidiinae Wozencraft, 1993; Mustelinae Wozencraft, 2005 (part)].

Genera included: Taxidea Waterhouse, 1839 (North American badger).

Lutrinae Bonaparte, 1838. [includes Enhydrina Gray, 1825; Enhydrinae Gill, 1872; Lutrina Bonaparte, 1838; Latacina Bonaparte, 1838; Lataxinae Burmeister, 1850; Lutridae deKay, 1842; Lutrinae Baird, 1857; Lutrinae Flower, 1883; Lutrinae Flower & Lydekker, 1891; Lutrinae Simpson, 1945; Lutrinae Wozencraft, 1993; Lutrinae Wozencraft, 2005 (part)].

Genera included: Lutra Brisson, 1792 (Old World otters); *Lontra* Gray, 1843 (New World otters), *Enhydra* Fleming, 1822 (sea otter), *Aonyx* Lesson, 1827 (small-clawed otters), *Hydrictis* Pocock, 1921c (spotted-necked otter); *Lutrogale* Gray, 1865 (smooth-coated otter); and *Pteronura* Gray, 1837 (giant otter).

RESUMO

*Os mustelídeos (Mustelidae) exibem uma grande diversidade morfológica e ecológica, variando desde formas aquáticas até formas semi-arborícolas e fossoriais. É a família mais diversa em Carnivora, e isso promoveu uma grande quantidade de arranjos taxonômicos para as subfamílias, que podem variar de duas até 15 dependendo do autor. Recentemente a inclusão de dados moleculares tem ajudado a elucidar a classificação dos mustelídeos e atualmente oito subfamílias são reconhecidas: Mustelinae, Galictinae, Helictidinae, Martinae, Melinae, Mellivorinae, Taxidiinae e Lutrinae. Porém, algumas dessas subfamílias apresentam problemas nomenclaturais, não recebendo o nome mais antigo disponível. A subfamília que inclui as martas (*Martes, Charronia *e* Pekania*), a irara (*Eira*) e o carcaju (*Gulo*) tem recebido o nome de Martinae Wagner, 1841, porém o nome mais antigo disponível é Guloninae Gray, 1825. Este problema também ocorre para a subfamília que inclui os furões-sul-americanos (*Galictis*), a doninha-da-patagônia (*Lyncodon*), a doninha-marmoreada (*Vormela*) e as doninhas-listradas (*Ictonyx *e* Poecilogale*), que são conhecidos por Grisoninae Pocock, 1921, mas o nome correto para este grupo é Ictonychinae, Pocock, 1921. A subfamília que inclui os texugos-furões (*Melogale*) mantém o nome Helictidinae Gray, 1865, pois sua validade não é afetada quando o gênero-tipo da subfamília torna-se sinônimo-júnior de outro gênero. Além disso, é fornecida uma lista das subfamílias de Mustelidae viventes contendo seus respectivos sinônimos e os gêneros incluídos.*

Palavras-Chave: Mustelidae; Subfamílias; Guloninae; Ictonychinae; Helictinae.

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