



# BROWN-EARED WOOLLY OPOSSUM

*Caluromys lanatus* (Olfers, 1818)



**FIGURE 1** - Adult, Brazil (Nilton Caceres undated).

**TAXONOMY:** Class Mammalia; Subclass Theria; Infraclass Metatheria; Magnorder Ameridelphia; Order Didelphimorphia; Family Didelphidae; Subfamily Caluromyinae (Myers et al 2006). The genus *Caluromys* contains four species one of which occurs in Paraguay. *Caluromys* is derived from the Greek meaning "beautiful mouse" (Palmer 1904), *lanatus* means "woolly", in reference to the woolly pelage of the species (Braun & Mares 1995). Thomas (1901) expressed regret at Allen's (1900) usage of the suffix *-mys* in the generic name, as this ending had previously been reserved for Rodentia.

This species was Azara's "*Micouré second, ou micouré laineux*" and is supported by a fluid preserved specimen that was sent to Madrid, the holotype (MNCN-M2630). Olfers (1818) explicitly based his description on Azara's *Micouré second*, but prior to the discovery of this obscure work the species was often known by the objective junior synonym *C. lanigera* (Desmarest 1820). (Voss et al 2009).

There are four subspecies, that present in Paraguay is *C.lanatus* Olfers 1818 (Type Locality Caazapá, Paraguay). The species description was attributed to Illiger (1815) by Redford & Eisenberg (1992) and Massoia et al (2000) but this is a nomen nudum and the error was corrected by Cáceres & Carmignotto (2006). Synonyms adapted from Cáceres & Carmignotto (2006).

[*Didelphys*] *lanata* Illiger, 1815:107. Nomen nudum.

D[*idelphys*] *lanata* Olfers, 1818:206. Caazapá, Paraguay, based on de Azara (1801).

*Didelphis lanigera* Desmarest, 1820:258. Caazapa', Paraguay; based on de Azara's (1801).

*Didelphys lanigera* Waterhouse, 1841:98. Name combination.

*Micoureus lanigera* Lesson, 1842:186. Name combination.

*Didelphys ochropus* Wagner, 1842:359. Barra do Rio Negro, Amazonas, Brazil.

D[*idelphys*] *ornata* Tschudi, 1845:146. "der mittleren und tiefen Waldregion," Peru.

*Didelphys* [*Philander*] *lanigera* Thomas, 1888:339. Part; name combination.

*Philander cicur* Bangs, 1898:161 "Pueblo Viejo, Colombia."

P[*hilander*]. *ornatus*: Bangs, 1898:162. Name combination.

[*Didelphys* (*Philander*)] *cicur* Trouessart, 1898:1238. Name combination.

[*Didelphys* (*Philander*) *laniger*] *ochropus* Trouessart, 1898:1238. Name combination; synonymy of *Didelphys* (*Philander*) *laniger derbiana*.

[*Didelphys* (*Philander*) *laniger*] *ornata* Trouessart, 1898:1238. Name combination.

*Caluromys cicur* Allen, 1900:189. Name combination.

*Caluromys laniger* Allen, 1900:189. Name combination for *Didelphis lanigera* Desmarest, 1820.

*Caluromys derbianus ornatus* Allen, 1900:189. Name combination.

[*Caluromys*] *ochropus* Thomas, 1901:196. Name combination.

C[*aluromys*] [*laniger*] *cicur* Thomas, 1901:196. Name combination.

[*Caluromys*] *ornatus* Thomas, 1901:196. Name combination.

[*Didelphys* (*Philander*) *laniger*] *ornatus* Trouessart, 1905:855. Name combination and incorrect gender.

P[*hilander*] [*laniger*] *cicur* Thomas, 1913:358. Name combination.

P[*hilander*] [*laniger*] *ornatus* Thomas, 1913:358. Name combination.

*Philander laniger jivaro* Thomas, 1913:360. "Sarayacu on the Pastasa River," Pastaza, Ecuador.

*Philander laniger* Cabrera, 1916:514. Name combination.

*Micoureus ochropus* Matschie, 1916:269. Name combination.

*Micoureus ornatus* Matschie, 1916:269. Name combination.

*Micoureus juninensis* Matschie, 1917:283. "Chanchamayo in der Nähe von La Merced, Provinz Junin, Peru"

*Micoureus meridensis* Matschie, 1917:285. "von Briceno in der Montana de la Sierra bei Merida in Venezuela"

*Micoureus cabhyensis* Matschie, 1917:288. "Am Rio Cahy in Rio Grande do Sul," Brazil.

*Micoureus bartletti* Matschie, 1917:288. "Chamicaros-Fluß, südlicher Nebenfluß des Marañon zwischen Huallaga and Ucayali," Loreto, Peru.

*Micoureus nattereri* Matschie, 1917:291. "von Caissara, Matto Grosso," Brazil.

[*Philander laniger*] *ochropus*: Cabrera, 1919:33. Name combination.

*Mallodelphis lanigera ochropus*: Miranda-Ribeiro, 1936:355. Name combination.

*Mallodelphis lanigera hemiura* Miranda-Ribeiro, 1936:355. Type locality unknown.

*Mallodelphis lanigera vitalina* Miranda-Ribeiro, 1936:355. "Barra do Paraope'ba, Minas Geraes," Brazil.

*Mallodelphis lanigera nattereri* Miranda-Ribeiro, 1936:356. Name combination.

*Mallodelphis lanigera modesta* Miranda-Ribeiro, 1936:356. "Mato Grosso, provavelmente Pantanal," Brazil.

*Caluromys laniger ochropus* Tate, 1939:163. Name combination.

[*Caluromys laniger*] *meridensis* Tate, 1939:163. Name combination.

[*Caluromys laniger*] *jivaro* Tate, 1939:163. Name combination.

*Caluromys laniger ornatus* Sanborn, 1949:277. Name combination.

P[*hilander*] *lanata* Hershkovitz, 1951:552. Name combination.

*Philander calmensis* Vieira, 1955:347 Incorrect subsequent spelling of *Micoureus cabhyensis* Matschie, 1917.

*Caluromys lanatus cicur* Cabrera, 1958:2. Name combination.

*Caluromys lanatus lanatus* Cabrera, 1958:2. Name combination.

*Caluromys lanatus ochropus* Cabrera, 1958:3. Name combination.

*Caluromys lanatus ornatus* Cabrera, 1958:3. Name combination.

**ENGLISH COMMON NAMES:** Brown-eared Woolly Opossum (Gardner 2007), Western Woolly Opossum (Wilson & Cole 2000), Cáceres & Carmignotto 2006), Woolly Opossum (Redford & Eisenberg 1992).

**SPANISH COMMON NAMES:** Comadreja lanuda (Chebez 1996), Comadreja lanosa (Chebez 1996, Massoia et al 2000), Cuica lanosa (Chebez 1996, Redford & Eisenberg 1992), Cuica lanuda (Massoia et al 2000), Chucha (Massoia et al 2000), Zarigüeya lanuda occidental (Emmons 1999), Zarigüeya lanosa, Filandro lanoso (Massoia et al 2009).

**GUARANÍ COMMON NAMES:** Mbicuré lanoso (Chebez 1996), Mykuré viyú (Chebez 1996, Massoia et al 2000), Micuré lanoso (Massoia et al 2006).

**DESCRIPTION:** A medium-sized opossum with dense woolly fur. Dorsally they are predominately pale brown in colouration, frequently with shades of greyish or reddish, and more strongly orange on the shoulders, limbs and crown. Some individuals possess a greyish patch between the shoulders. Ventrally they are yellowish-white, darkening to greyish medially. Head somewhat greyer with a dark stripe along the centre of the face passing from the forehead, between the eyes and along the rostrum; contrasting with whitish cheeks. Snout short, giving the face a vaguely flattened appearance. The large, rounded eyes have brownish or orange orbital rings which accentuate their "teddy bear-like" appearance. Eyes give a bright orange-yellow reflection at night. Two long supraocular bristles are present and 10 black vibrissae. Ears are large, rounded and naked with pinkish-tan colouration, appearing dark against the pelage. The reddish-brown feet are strong with well-developed pads for gripping and long claws on all digits except the thumb of the hindfeet. Tail is densely-furred along half the dorsal side and 20% of its ventral side, and is approximately 140% body length. Females develop a pouch only when they have young, and abdominal and inguinal mammae are confined to the pouch region. The terminal portion of the tail is naked, usually pale yellowish in colour and is fully prehensile. Juveniles are similar but greyer in colouration.

**CRANIAL CHARACTERISTICS:** Braincase large, rostrum short but robust. Paraoccipital process does not surpass occipital condyle. Postorbital processes well-developed, lambdoidal and sagittal crests reduced. Dorsal projection of superior portion of zygomatic reduces orbit size. Small palatine foramina and foramen rotundum, and no foramen ethmoidale. Palatal process absent but rostral process of premaxillae present so that upper canine inserts in maxillary bone. Nasal bone broadens posteriorly with tips extending anteriorly above or beyond I1 so that nasal orifice is not visible dorsally. Mandible with two mental foramina. Angular process obtuse and weakly inflected. Maxillopalatine, palatine and maxillary fenestrae all absent. Transverse canal foramen lacking. *Condylolincisive Length* 59.5mm (56.5-62.8mm); *Zygomatic Width* 34.8mm (32.7-37.1mm); *Width of Braincase* 20.6mm (19.4-22.3mm); *Interorbital Constriction Width Posterior to Postorbital Processes* 8.4mm (7.6-9.2mm); *Rostral Length* 22.8mm (21.7-24.0mm); *Rostral Width* 13.0mm (12.3-13.8mm); *k* 25.8mm (22.2-27.1mm); *Length of Palate* 31.9mm (30.5-33.4mm); *Width of Palate* 17.7mm (17.1-18.2mm); *Mastoid Width* 23.3mm (21.4-25.6mm); *Basioccipital Length* 8.7mm (8.2-9.2mm); *Cranial Depth* 18.9mm (16.6-21.1mm); *Length of Molar Row* 9.8mm (9.2-10.1mm); *Length C to M4* 20.6mm (18.2-22.2mm). (Patton et al 2000).

**DENTAL CHARACTERISTICS:** I5/4 C1/1 P 3/3 M 4/4 = 50. Crowns of I2-I5 asymmetrical with longer anterior than posterior cutting edges. Upper canine simple lacking accessory cusps. Upper premolar small and situated directly behind the canine. Clear gap between small P1 and much larger P2. P3 with well-developed cutting edges but shorter in height than P2. M1 wider than M4 and upper molars lack ectoflexus. Molar dentition weakly carnassialized and weakly dilambdodont with a continuous shelf along anterior margin of crowns of M1-M3. Mandibular teeth with distinct lingual cusps in i1-i4, a p2 taller than p3, a deciduous p3 with a complete tricuspid trigonid, a labially salient hypoconid in m3, and a large and well-developed entoconid in m1-m3. Occlusal area of molars reduced. (Redford & Eisenberg 1992, Cáceres & Carmignotto 2006).

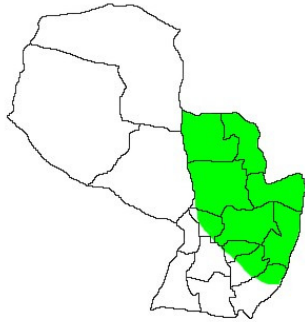
**GENETIC CHARACTERISTICS:** 2n=14 (Svartman & Vianna-Morgante 1999). FN=24. (Redford & Eisenberg 1992). The autosomal complement consists of four pairs of large biarmed and two pairs of medium-sized subtelocentric autosomes; the X-chromosome is a small biarmed element and the Y-chromosome is very small but appears distinctly biarmed (it is uni-armed in other *Caluromys* species). (Patton et al 2000).



**TRACKS AND SIGNS:** No information. This is a predominately arboreal species that rarely descends to the ground (Redford & Eisenberg 1992).

**EXTERNAL MEASUREMENTS:** A medium-sized opossum with tail approximately 140% head and body length. **TL:** 66.1cm (60.2-70.2cm); **HB:** 27.3cm (20.1-31.9cm); **TA:** 38.77cm (33-44.6cm); **FT:** 4.22cm (3-5.1cm); **EA:** 3.49cm (3-4.1cm); **WT:** 320g (310-520g); **WN:** 3.6g. (Massoia et al 2001, Emmons 1999, Redford & Eisenberg 1992, Marshall 1978 (Cáceres & Carmignotto 2006).

**SIMILAR SPECIES:** Unlikely to be confused if seen well. This is the only medium-sized, arboreal, pale brownish opossum with dense woolly fur. Note also the characteristic vertical line down the centre of the face.



**DISTRIBUTION:** Widely distributed in the Neotropics, east of the Andes from central Colombia and southern and western Venezuela south through eastern Ecuador and western Brazil to Bolivia and eastern Paraguay, reaching extreme northern Argentina in Provincia Misiones (Departamentos Eldorado, Montecarlo, Iguazú, Guaraní and General Belgrano - Barquez et al 2006, Chebez 2009). In Brazil the species has been recorded from the following states: Acre, Amazonas, Mato Grosso do Sul, Minas Gerais, São Paulo y Rio Grande do Sul (Patton et al 2000, Brown 2004, Cáceres et al 2008, Martinelli 2010). In Bolivia the species has been recorded in Departamentos Beni, La Paz and Santa Cruz (Anderson 1997).

Brown (2004) lists the following specimen for Paraguay Departamento Canendiyú; Curuguaty 13.3 km N (Myers. 1979. MZUM). There are four described subspecies, the nominate subspecies *C.lanatus lanatus* (Olfers 1818) being found in Paraguay, northern Argentina, and

from Mato Grosso to São Paulo states in Brazil. *C.l.cicur* (Bangs 1898) is the most northerly subspecies occurring in eastern Colombia and western Venezuela. *C.l.lornatus* (Tschudi 1845) is found in extreme eastern Ecuador, much of eastern Peru (except the north-eastern corner) and central-west Bolivia; *C.l.lochropus* (Goldman 1914) is the most wide-ranging subspecies occurring in southern Colombia and Venezuela, the Orinoco and Amazon Basins of Brazil and Amazonian Peru and Bolivia.

**HABITAT:** Found in humid and gallery forest, generally being trapped in the canopy and subcanopy at heights of 5-15m. Reports also exist of individuals in xerophytic forest and dense savanna.

They are apparently able to survive in quite fragmented forest as well as larger tracts. Martinelli (2010) provides details of a suburban population in Peirópolis, Minas Gerais, Brazil, located in a highly disturbed area strongly modified by sugar cane agriculture and with islets of native cerrado type vegetation. The species showed no preference for native over introduced trees when foraging.

**ALIMENTATION: Foraging Behaviour and Diet** The species would seem to be mainly frugivorous but opportunistically omnivorous (Casella & Cáceres 2006). The anatomy of the digestive tract shows specialisations for a diet of fruit and plant matter, having a large hind gut and caecum (associated with a plant based diet) and a small stomach chamber (associated with frugivory). In Brazil and Peru they are largely nectar feeders and likely play an important role in the pollinisation of certain plant species.

A stomach of an individual from southern Brazil contained hundreds of *Ficus* seeds of which only 0.9% had been predated, whilst others in this region were observed to consume fruits of *Cecropia*, *Piper*, *Cyphomandra* and Solanaceae. Coleoptera larvae, Lepidopterans and Hymenopterans were the most prevalent arthropod items in stomach samples from Paraná, Brazil with small birds and small mammals figuring in 40 and 60% of the stomachs analysed respectively (n=5). Nowak (1991) describes them as omnivores, noting that the diet consists of fruit, seeds, leaves, vegetables, insects and small vertebrates and even carrion. Massoia et al (2009) mention a video of a specimen from PN Iguazú eating an adult *Cacicus haemorrhous* at a colony of that species whilst Vieira & Astúa de Morães (2003) note a sight record of predation on Spiny Rats of the family *Echimyidae*.

**Diet in Captivity** Captives have been fed on a diet of meat, fruit and eggs, showing a preference for bananas (Bucher & Fritz 1977) whilst another group had a preference for meat (Nowak 1991).

**REPRODUCTIVE BIOLOGY:** Little known.

**Seasonality** Two females from the Amazon Basin of Brazil were trapped with pouched young at Rio Juruá during July and November, with post lactating females trapped in the same area in February, March and October, leading the authors to assume that year-round breeding occurred. (Patton et al 2000).

**Pregnancy** Females have an oestral cycle of 27-29 days throughout the year but develop a pouch only when carrying young. Litter size is 3 or 4 for the southern population inhabiting Paraguay, but generally 1 or 2 further north in the range - notably less than for most other marsupials. Sex ratios of three litters from a seasonal forest in southern Brazil were strongly male biased 1:0.22 (Cáceres & Carmignotto 2006).

**Development of Young** As the young grow they may be carried on the back, tail or hang onto the pelage as the mother moves through the trees (Massoia et al 2000). The species failed to breed in captivity during a three-year study. Males attempted to mount and performed pelvic thrust displays but were rejected by the females. (Bucher & Fritz 1977).

**GENERAL BEHAVIOUR: Activity Levels** Nocturnal, solitary and arboreal, this species rarely descends to the ground. Nowak (1991) states that they are active mainly during the evening, night and early morning and pass the day in tree hollows or holes in branches. It occasionally forages in pairs, but because of its canopy habits and nocturnal behaviour it is rarely seen and is trapped only in low numbers (Nowak 1991). Captive individuals became more excitable in small cages (Bucher & Fritz 1977).

**Locomotion** They are agile climbers but relatively slow moving when compared to other arboreal Didelphids, walking deliberately through the trees and using the prehensile tail as a fifth limb. They are known to use power lines when crossing roads, though some individuals also cross on the ground, as evidenced by a roadkill specimen in PN Iguazú (Chebez 2009).

**Home Range** Population density estimated at 13.3/km<sup>2</sup> in Amazonas State, Brazil, with a biomass of 4.6kg/km<sup>2</sup> (Cáceres & Carmignotto 2006).

**Refuges** Massoia et al (2006) mention a platform of twigs and leaves at a height of 12m in PN Iguazú.

**Grooming** The Iguazú individual emerged from its nest at 7pm, remaining at the entrance for 15 minutes as it scratched and groomed its pelage.

**Mortality** Animals at Flora y Fauna Itaipú Binacional have been electrocuted by power lines and Nelson Pérez-Villamayor is in possession of a mummified specimen that died in this way (Nelson Pérez-Villamayor pers. comm.). Images of an animal killed in a similar manner are provided by Martinelli (2010). A roadkill specimen was found at PN Iguazú on 11 April 1994 (Massoia et al 2006).

**Parasites** In Brazil individuals have been found infected with *Trypanosoma cruzi* (Thatcher 2006). Nymphs of *Amblyomma* on a specimen in Peru. (Cáceres & Carmignotto 2006).

Vicente et al (1997) listed the following nematodes in this species from Brazil: *Aspidodera railletii* Travassos, 1913 and *Turgida turgida* (Rud., 1819) - the latter is described as *C.philander*, but the locality of Goiás corresponds to this species and not *C.philander*.

**Physiology** Nogueira et al (1999) describe the penile morphology of this species.

**VOCALISATIONS:** Typically silent for much of the time (Emmons 1999). Open-mouthed threat displays are accompanied with hissing noises. Clicking sounds are used during courtship and other male female encounters and may progress into chirps at high intensity. (Redford & Eisenberg 1992)

**HUMAN IMPACT:** Previously much in demand for its fur, though the demand has now abated (Emmons 1999). Impact on fruit crops has been suggested, but this is likely to be negligible in Paraguay given the apparent rarity of the species compared to other potential fruit eaters. They are of potential interest for laboratory studies (Bucher & Fritz 1977). Massoia et al (2006) mention a leather bag made by indigenous groups from the leather of this species in the Museo Aníbal Cambas in Posadas.

**CONSERVATION STATUS:** Globally considered to be of Low Risk Near Threatened by the IUCN, see <http://www.iucnredlist.org/search/details.php/3648/all> for the latest assessment of the species. The major threat to species would seem to be habitat destruction and though undoubtedly under-recorded it would seem to be nowhere common in Paraguay. The species was previously hunted for its pelage though this would no longer seem to pose a threat. An urgent review of the conservation status of this species is required. Flores (2006) considers the species potentially vulnerable in Argentina, though Chebez (2009) notes that is reasonably common in areas of suitable habitat.

## REFERENCES:

- Allen JA** 1900 - Note on the generic names *Didelphis* and *Philander* - *Bulletin of the AMNH* 13: p185-190.
- Anderson S** 1997 - Mammals of Bolivia: Taxonomy and Distribution - *Bulletin AMNH* 231.
- Azara F de** 1801 - Essais sur l'histoire naturelle de s quadrupé des de la Province du Paraguay - Charles Pougens, Paris, France.
- Bangs O** 1898 - Descriptions of some new mammals from the Sierra Nevada de Santa Marta, Colombia - *Proceedings of the Biological Society of Washington* 12: p161-165.
- Barquez RM, Diaz MM, Ojeda RA** 2006 - Mamíferos de Argentina: Sistemática y Distribución - SAREM, Tucumán.
- Braun JK, Mares MA** 1995 - The Mammals of Argentina: An Etymology - *Mastozoología Neotropical* 2: p173-206.
- Brown BE** 2004 - Atlas of New World Marsupials - *Fieldiana Zoology* 102.
- Bucher JE, Fritz HI** 1977 - Behaviour and Maintenance of the Woolly Opossum *Caluromys* in Captivity - *Laboratory Animal Science* 27: p1007-1012.
- Cabrera A** 1916 - El tipo de *Philander laniger* Desm. en el Museo de Ciencias Naturales de Madrid - *Boletín de la Real Sociedad Española de Historia Natural* 16: p514-516.
- Cabrera A** 1919 - Genera Mammalium: Marsupialia, Monotremata - Museo Natural de Ciencias Naturales, Madrid, Spain.
- Cabrera A** 1958 - Catalogo de los mamíferos de América del Sur - *Revista del Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Ciencias Zoológicas* 4: p1-308.
- Cáceres NC, Carmignotto AP** 2006 - *Caluromys lanatus* - *Mammalian Species* 803: 1-6.
- Cáceres NC, Carmignotto AP, Fischer E, Ferreira Santos C** 2008 - Mammals from Mato Grosso do Sul, Brazil - *Check List* 4: p321-335.
- Casella J, Cáceres NC** 2006 - Diet of Four Small Mammal Species from Atlantic Forest Patches in South Brazil - *Neotropical Biology and Conservation* 1: p5-11.
- Chebez JC** 1996 - Fauna Misionera - LOLA, Buenos Aires.
- Chebez JC** 2009 - Otros que Se Van - Editorial Albatros, Buenos Aires.
- Desmarest MAG** 1820 - Mammalogie ou description des espèces de mammifères. Première partie, contenant les ordres des binames, des quadrumanes et des carnissiers - V. Agasse, Paris, France.
- Eisenberg JF** 1989 - Mammals of the Neotropics: Volume 1 The Northern Neotropics - University of Chicago Press, Chicago.
- Eisenberg JF, Redford KH** 1999 - Mammals of the Neotropics: Volume 2 The Central Neotropics - University of Chicago Press, Chicago.
- Emmons LH** 1999 - Mamíferos de los Bosques Húmedos de América Tropical - Editorial FAN, Santa Cruz.
- Flores DA** 2006 - Orden Didelphimorphia in *Bárquez R, Díaz, MM, Ojeda RA* eds Mamíferos de Argentina, Sistemática y Distribución - SAREM, Buenos Aires.
- Gardner AL** 2007 - Mammals of South America Vol 1: Marsupials, Xenarthrans, Shrews and Bats - University of Chicago Press, Chicago.
- Illiger JKW** 1815 - Ueberblick der Säugthiere nach ihrer Verthcilung über die Welttheile -. *Abhandlungen der Königlichen Akademic der Wissenschaften in Berlin* 1804-1811: p39-159.
- Lesson RP** 1842 - Nouveau tableau de règne animal. Mammifères - Arthus-Bertrand, Paris, France.
- Martinelli AG** 2010 - Nuevo Registro de la Cuica Lanosa *Caluromys lanatus* (Olfers, 1818) (Mammalia, Didelphimorphia, Didelphidae) en el Oeste del Estado Minas Gerais, Brasil - *Notulas Faunísticas 2sa Serie* 59: p1.3.
- Massoia E, Chebez JC, Bosso A** 2006 - Los Mamíferos Silvestres de la Provincia de Misiones, Argentina - DVD-ROM.
- Massoia E, Forasiepi A, Teta P** 2000 - Los Marsupiales de la Argentina - LOLA, Buenos Aires.
- Matschie P** 1916 - Bemerkungen über die Gattung *Didelphis* L. - *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin* 8: p259-272.
- Matschie P** 1917 - Einige neue Formen der *Didelphis lanigera*-Gruppe. *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin* 4: p280-294.



- Mirando-Ribeiro A de** 1936 - Didelphia ou Mammalia-Ovovipara - *Revista do Museu Paulista* 20: p245-424.
- Myers P, Espinosa R, Parr CS, Jones T, Hammond GS, Dewey A** 2006 - The Animal Diversity Web (online). Accessed December 2007.
- Nogueira JC, Martinelli PM, Costa SF, Carvalho GA, Câmara BGO** 1999 - The Penis Morphology of *Didelphis*, *Lutreolina*, *Metachirus* and *Caluromys* (Marsupialia, Didelphidae) - *Mammalia* 63: p79-92.
- Novak RM** 1991 - Walker's Mammals of the World 5th Ed Volume 1 - Johns Hopkins, Baltimore.
- Olfers IFJ** 1818 - Bemerkungen zu Illiger's Ueberblick der Saugthiere nach ihrer Vertheilung über die Welttheile, rücksichtlich der Südamericanischen Arten (Species). p192-237 in *Journal von Brasilien, oder vermischte Nachrichten aus Brasilien, auf wissenschaftlichen Reisen gesammelt* (W. L. von Eschwege, ed.) - Verlage des Gr. H. S. Landes-Industries-Comptoirs, Weimar, Germany.
- Palmer TS** 1904 - Index Generum Mammalium - US Department of Agriculture Biological Survey, North American Fauna 23, 984pp.
- Patton JL, da Silva MN, Malcolm JR** 2000 - Mammals of the Rio Juruá and the evolutionary and ecological diversification of Amazonia - *Bulletin AMNH* 244.
- Redford KH, Eisenberg JF** 1992 - Mammals of the Neotropics: Volume 2 The Southern Cone - University of Chicago Press, Chicago.
- Sanborn CC** 1949 - Mammals from the Rio Ucayali, Peru - *Journal of Mammalogy* 30: p277-288.
- Svartman M, Vianna-Morgante AM** 1999 - Comparative Genome Analysis in American Marsupials: Chromosome Banding and In Situ Hybridization - *Chromosome Research* 7: p267-275.
- Tate GHH** 1939 - The mammals of the Guiana region-general environment and faunistic treatment - *Bulletin of the American Museum of Natural History* 76: p151-229.
- Thatcher VE** 2006 - Os Endoparasitos dos Marsupiais Brasileiros p53-68 in *Cáceres NC, Monteiro-Filho ELA Os Marsupiais do Brasil:Biologia, Ecologia e Evolução* - Editora UFMS, Campo Grande.
- Thomas O** 1888 - Catalogue of the Marsupialia and Monotremata in the collection of the British Museum (Natural History) - Trustees of the British Museum (Natural History), London, England.
- Thomas O** 1901 - The Generic Names *Myrmecophaga* and *Didelphis* - *American Naturalist* 35: p143-145.
- Thomas O** 1901 - New South American Sciuri, *Heteromys*, *Cavia* and *Caluromys* - *Annals and Magazine of Natural History Series* 7 7: p192-196.
- Thomas O** 1913 - The geographical races of the woolly opossum (*Philander laniger*) - *Annals and Magazine of Natural History Series* 8 12: p358-361.
- Trouessart EL** 1898 - Catalogus mammalium tam viventium quam fossilium. Fasciculus V. Sirenia, Cetacea, Edentata, Marsupialia, Allotheria, Monotremata. Volume 2 - R. Friedländer and Sohn, Berlin, Germany.
- Trouessart EL** 1905 - Catalogus mammalium tam viventium quam fossilium. Quinquennale supplementum (1899-1904). Cetacea, Edentata, Marsupialia, Allotheria, Monotremata.- Index alphabeticus. Fascicle 4 - R. Friedländer and Sohn, Berlin, Germany.
- Tschudi JJ** 1844-1846 - Untersuchungen über die Fauna Peruana auf einer Reise in Peru während der Jahre 1838, 39, 40, 41 und 42 - Scheitlin und Zollikofer, Saint Gallen, Switzerland.
- Vicente JJ, Rodrigues H de O, Gomes DC, Pinto RM** 1997 - Nematóides do Brasil Parte V: Nematóides do Mamíferos - *Revista Brasileira de Zoologia* 14 Supp 1: p1-452.
- Vieira CO da C** 1955 - Lista remissiva dos mamíferos do Brasil - *Arquivos de Zoologia* 8: p341-353.
- Vieira EM, Astúa de Morães DA** 2003 - Carnivory and Insectivory in Neotropical Marsupials p271-284 in *Jones M, Dickman C, Archer M eds.* 2003 - Predators With Pouches: The Biology of Carnivorous Marsupials - CSIRO, Collingwood.
- Voss RS, Myers P, Catzeflis F, Carmignotto AP, Barreiro J** 2009 - The Six Opossums of Félix de Azara: Identification, Taxonomic History, Neotype Designations, and Nomenclatural Recommendations. p406-433 in *Voss RS, Carleton MD* (Eds.), *Systematic Mammalogy: Contributions in Honor of Guy. G. Musser* - *Bulletin AMNH* 331.
- Wagner JA** 1842 - Diagnosen neuer Arten brasilischer Säugthiere - *Archiv für Naturgeschichte* 8: p356-362.
- Waterhouse GR** 1841 - Marsupialia or pouched animals Volume 24 of The Naturalist's Library - W.H. Lizars, Edinburgh, Scotland.

**Wilson DE, Cole FR** 2000 - Common Names of Mammals of the World - Smithsonian Institution Press, Washington and London.

**CITATION:** Smith P 2008 - FAUNA Paraguay Handbook of the Mammals of Paraguay Number 16 *Caluromys lanatus* - [www.faunaparaguay.com/callanhb.html](http://www.faunaparaguay.com/callanhb.html).