

SOUTHERN TAMANDUA

Tamandua tetradactyla (Linnaeus, 1758)



FIGURE 1- (FPMAM905PH) Adult, Departamento Presidente Hayes (Arne Lesterhuis 2010).

TAXONOMY: Class Mammalia; Subclass Theria; Infraclass Eutheria; Magnorder Xenarthra; Order Pilosa; Suborder Vermilingua; Family Myrmecophagidae; (Myers et al 2006, Möller-Krull et al 2007, Gardner 2007). Genus *Tamandua* was split from Linnaeus *Myrmecophaga* by Gray (1825). The species name *tetradactyla* is from the Greek meaning "four fingers", a distinguishing feature of the species when compared to the other living species. The variability in pelage colour in this species has led to a great number of invalid species and subspecific description based largely on the distribution of black on the body. Turner's (1853) name *Tamandua longicaudata*, referred to the wholly yellowish variant lacking a black vest, whilst *Myrmecophaga nigra* (E. Geoffroy St.-Hilaire 1803) and *T[amandua]. quichua* (Lönnerberg 1942) referred to wholly black variants. Gardner (2007) recognised four subspecies, that present in Paraguay being *T.t.straminea* (Cope 1889). Synonyms adapted from Gardner (2007):

Myrmecophaga tetradactyla Linnaeus 1758:35. Type locality "America meridionali". Restricted to Pernambuco, Brazil by O.Thomas (1911).

Myrmecophaga myosura Pallas 1766:64. Type locality Brazil.

- Myrmecophaga nigra* É Geoffroy St.-Hilaire 1803:217. Type locality “La Guyane?” (=French Guiana according to Cabrera 1958).
- Myrmecophaga bivittata* Desmarest 1817:107. Type locality “Brésil”.
- Uroleptes tetradactyla* Wagler 1830:36. Name combination.
- [*Myrmecophaga*] *crispa* Rüppell 1842:179. Type locality “Guiana”
- Tamandua tetradactyla* Gray 1843:91. Name combination.
- M[*Myrmecophaga*]. *longicaudata* JA Wagner 1844:211. Type locality “in dem Nördlichen Theil Sudamericas”. Restricted to “al interior de Surinam” by Cabrera (1958).
- Uroleptes bivittatus* Fitzinger 1860:395. Name combination.
- Tamandua bivittata* Gray 1865:384. Name combination.
- Tamandua longicaudata* Gray 1865:384. Name combination.
- Tamandua brasiliensis* Liáis 1872:360. Type locality “Brasil”, restricted to Recife, Pernambuco, Brazil by Gardner (2007).
- Tamandua tamandua* Jentink 1888:215. Name combination. Not *Myrmecophaga tamandua* G.Cuvier (1798).
- Myrmecophaga bivittata straminea* Cope 1889:132. Type localities “São João (Rio Grande do Sul) or at Chapada (Matto Grosso)” Wetzel (1975) restricted the type locality to Chapada, Matto Grosso, Brazil.
- Tamandua tridactyla* Matschie 1894:62. Name combination. Not *Myrmecophaga tridactyla* Linnaeus (1758).
- [*Tamandua*] *longicauda* Trouessart 1898:1121. Incorrect spelling.
- Tamandua tetradactyla chapadensis* JA Allen 1904:392. Type locality “Chapada, Matto Grosso, Brazil”.
- [*Tamandua tetradactyla*] *straminea* Trouessart 1905:803. Name combination.
- [*Tamandua tetradactyla*] *bivittata* Osgood 1910:24. Name combination.
- T[*amandua*]. *straminea* Osgood 1910:24. Name combination.
- Tamandua longicauda* Vesey-FitzGerald 1936:164. Incorrect spelling.
- Tamandua longicauda* Rode 1937:346. Incorrect spelling.
- Tamandua tetradactyla kriegi* Krumbiegel 1940:171. Type locality “Zanja Moroti” Concepción, Paraguay.
- T[*amandua*]. *kriegi* Lönnberg 1942:42. Name combination.
- T[*amandua*]. *quichua* Lönnberg 1942:43. Name combination.
- Tamandua longicaudata mexicanae* Cabrera 1958:203. Nomen nudum.

ENGLISH COMMON NAMES: Southern Tamandua (Wilson & Cole 2000, Gardner 2007), Tamandua, Tree Anteater, Collared Anteater (Parera 2002), Lesser Anteater (Nowak 1991), Southern Lesser Anteater (Jacintho Perreira et al 2004), Three-toed Anteater (Wislocki 1928), Golden Anteater (Montgomery 1985).

SPANISH COMMON NAMES: Tamandúa (Villalba & Yanosky 2000), Tamandúa de collar, Hormiguero de collar, Brazo fuerte, Oso melero (Parera 2002), Oso hormiga (Emmons 1999), Oso colmenero (Emmons 1999), Oso hormiguero rubio (Anderson 1997), Tamandu (Anderson 1997).

GUARANÍ COMMON NAMES: Kaguare **MA** (Villalba & Yanosky 2000), Tamandua miri **A** (Villalba & Yanosky 2000), Tamandua **P** (Villalba & Yanosky 2000), Kuareminí **Ac** (Villalba & Yanosky 2000), Kaaguaré (Parera 2002).

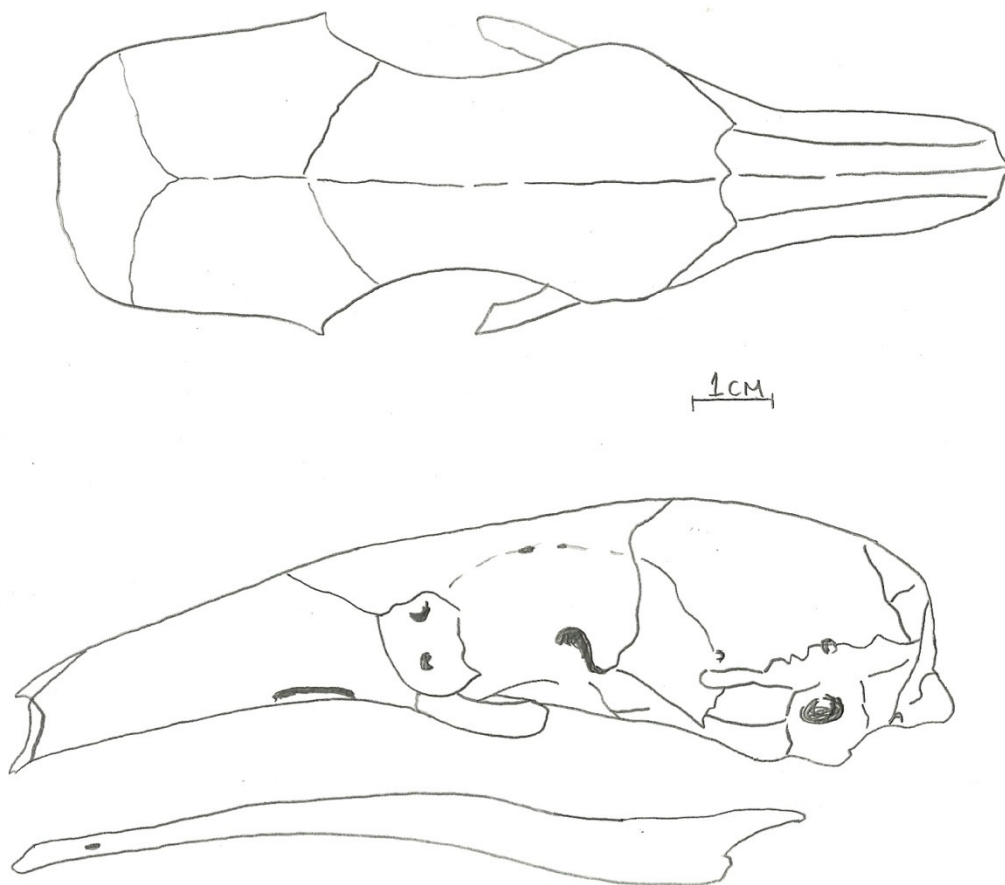
DESCRIPTION: The robust head is of medium-length, somewhat conical with a steeply sloping forehead, tubular snout and tiny, circular mouth - equivalent in diameter to a pencil (Nowak 1991). The extensile tongue is some 40cm long and cylindrical, lubricated by sticky secretions from enormous submaxillary glands located on both sides of the neck. Part of the stomach is modified into a muscular gizzard to accommodate for the lack of teeth. The eye is small and the ears are rounded and of moderate size. The legs are short but muscular with four well-developed, viciously-hooked claws on the forefeet - the third being particularly long, causing the animal to walk on its wrists. The claws are proportionately shorter than those of *Myrmecophaga tridactyla*. The hindfoot has five somewhat elongated toes, which are an adaptation for gripping tree branches. The long, prehensile tail is moderately-furred at the base and naked towards the tip which has a gripping function. The tip of the tail is irregularly blotched with pinkish-yellow and brownish-black. The soft, short pelage is two-tone with the head, upper back, legs and furred part of the tail a creamy-yellow colour, though the tonality varies substantially and some individuals are almost orange-yellow in colour. A black "sleeveless jacket" forms a distinct V-shape on the dorsum of the animal and reaches to the rump, though the size is often variable. It acts to break up the outline of the animal

when it is climbing in trees. The tip of the snout and area in front of the eyes is usually darker than the rest of the head, tinged grey-black.

SKELETAL CHARACTERISTICS: Occipitonasal length 120mm. Slightly elongated rostrum about half the greatest length of the skull, with nasal bones shorter than the frontal bones. Palate with posterior extension. (Díaz & Barquez 2002). Skull illustration based on Chebez (2001).

Jenkins (1970) describes the anatomy of the ribs of this species, noting that skeletal variations are common in Edentates. Seventeen thoracic and 3 lumbar vertebrae (T17-L3) are typically present, but occasionally T18-L2 is seen (due to a supernumerary rib) or T17-L3 (due to a deficiency in segmentation). Ribs are least expanded of the myrmecophgids, with the posterior flanges moderately developed and the anterior flanges negligible. An incipient secondary expansion on the distal end of the ribs is visible. Dorsal and intermediate facets of the xenarthrous vertebrae occur together from the lumbosacral articulation to the T14-T15 joint; with the intermediate facet continuing to the T12-T13 joint.

DENTAL CHARACTERISTICS: IO/0 C0/0 P 0/0 M 0/0 = 0.



GENETIC CHARACTERISTICS: $2n=54$. Redi et al (2005) gives the genome size as 4.11pg (+/-0.36) or 4020 Mbp. The X chromosome a large metacentric and the Y chromosome a small acrocentric. This species shows four large metacentrics in Group I, three pairs of metacentrics in Group II, seven medium-sized submetacentrics in Group III and 12 medium to small metacentrics in Group IV. Jacintho Perreira Jr (2004) report a karyotype of $2n=56$ for a specimen from southeastern Brazil which differed in having three pairs of metacentrics in Group I and nine pairs of submetacentrics in Group III. They speculate on whether this may in fact represent an undescribed species.

TRACKS AND SIGNS: The forefoot leaves a distinctive print with a rounded sole and single, viciously-hooked claw on the anterior edge, with the point facing inwards. The hindfoot is elongated, almost twice

as long as it is wide, and with five long toes. The tail is dragged when walking on the ground and in soft substrates leaves a distinct impression between the prints of the left and right side. **FP:** 7 x 5.2cm **HP:** 8.7 x 4.7cm **PA:** 21cm. Tamandua excrement is distinctive, consisting of piles of discrete spheres composed almost entirely of termite remains. The presence of Tamanduas in an area is revealed by arboreal termite nests showing considerable damage left by the claws of the species. This species has a characteristically strong smell. (Villalba & Yanosky 2000).

EXTERNAL MEASUREMENTS: The smaller of the two anteater species in Paraguay. **TL:** male 95.9cm (93-98.8cm), female 94.5cm (84-105cm), unsexed 100.2cm (90.5-130cm); **HB:** 61.5cm (52.2-88cm); **Head** male 13.75cm (13-5-14cm), female 13.77cm (12-16cm); **TA:** male 41.5cm, female 41.8cm (37.2-48.2cm), unsexed 43.5cm (37-59cm); **FT:** male 9.05cm (8.6-9.5cm), female 8.47cm (7.5-9cm), unsexed 9.1cm (5.7-10.5cm), **EA:** male 4.7cm (4-5-4.9cm), female 4.5 (4.2-5cm), unsexed 4.7cm (4-6cm); **WT:** male 4.88kg (4.02-5.74kg), female 3.61kg (2.54-4.63kg), unsexed 5.66kg (3.6-8.5kg). (Parera 2002, Neris et al 2002, Nowak 2001, Emmons 1999, Redford & Eisenberg 1992, Rodrigues & Marinho-Filho 2003).

SIMILAR SPECIES: Unmistakable on account of its size and colouration. Only *Myrmecophaga tridactyla* has the same basic shape, but it is blackish in colouration, much larger and longer-headed, has a voluminous bushy tail and is strictly terrestrial in behaviour. The footprint of *Myrmecophaga* shows traces of several large, hooked claws on the forefoot (the species walks on its knuckles) and a more rounded hindfoot with much shorter toes. *Myrmecophaga* never leaves an impression of its tail, it being held well clear of the ground.

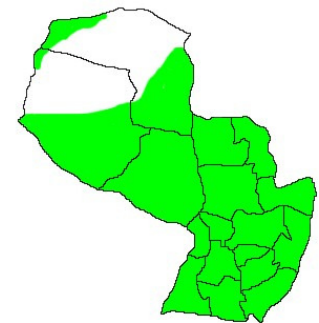
DISTRIBUTION: Distributed east of the Andes from Venezuela, through Amazonas and south through Bolivia and Paraguay to extreme northern Argentina and Uruguay (Departamentos Salto, Tacuarembó, Rivera, Cerro Largo, Treinta y Tres y Rocha - Daniel Hernández pers. comm.).

There are four subspecies. *T.t.nigra* (É.Geoffroy St-Hilaire 1803) occurs from eastern Colombia through Venezuela, Trinidad and the Guianas to the northern Amazon Basin and east-central Brazil; *T.t.quichua* O.Thomas 1927, is in the upper Amazon Basin of eastern Ecuador, Peru and Brazil; *T.t.tetradactyla* (Linnaeus 1758) is in the Atlantic lowlands and eastern highlands of Brazil from Rio Grande do Norte to Rio Grande do Sul; *T.t.straminea* (Cope 1889) ranges from the southern Amazon Basin of Brazil, through to the southern and western limits of the species range in Bolivia, Argentina, Paraguay and northern Uruguay.

In Paraguay it is found throughout the country though there has been considerable local extinction in eastern Paraguay as a result of human activities. It appears to be most common in the Humid Chaco, Pantanal and cerrado belt of north-eastern Paraguay. (Neris et al 2002, Parera 2002). In Argentina it occurs in Provincias Corrientes, Chaco, Formosa, Jujuy, Misiones, Salta, Santa Fe, Santiago del Estero, Tucumán and Catamarca, with the southern limit of the distribution in central Córdoba (Julia et al 1994, Torres et al 2009). In Bolivia it has been recorded from Departamentos Pando, northern La Paz, Beni, northern Cochabamba, Santa Cruz, eastern Chuquisaca and eastern Tarija (Anderson 1997).

Abba & Vizcaíno (2008) list 10 specimens from Paraguay in the Museo Argentino de Ciencia Naturales "Bernadino Rivadavia most lacking precise locality data (MACN 45.022, skin and skull, Estancia Casilda, Puerto Casado 1944; MACN 4.391, skull, Zoo Buenos Aires 1904; MACN 17.102 skin and skull, 1917; MACN 17.104 skin and skeleton, Zoo Buenos Aires 1917; MACN 17.110 skull, 1917; MACN 24.164 skin and skeleton, Zoo Buenos Aires 1924; MACN 30.202 skin and skull, 1930; MACN 6.22, skull 1906; MACN 11.38 skin, 1911; MACN 21.25 skin and skeleton, 1921).

HABITAT: Adaptable and occurs in a variety of habitats, though the presence of some tree cover is usually necessary. It can be found in both dry and humid forest, occurring in the dry Chaco forest, the humid Atlantic forest, the palm savannas of the Low Chaco and the semi-humid forest of the Pantanal. It is also present in the cerrado belt being most common in cerradón and campo sucio cerrado. In most areas it appears to be most common in dense vegetation and along waterways where its favoured prey



species tend to congregate (Emmons 1999). Merritt (2008) notes that this species is more frequent in the humid Low Chaco than the Dry Chaco, where there are more dependable sources of moisture and associated vegetation. Santos-Filho & da Silva (2002) found the species in palm forest dominated by *Orbignia martiniana* in Mato Grosso, Brazil.

ALIMENTATION: Tamanduas feed almost exclusively on social insects, raiding their nests and exposing their contents by ripping them open with their hooked foreclaws. Being semi-arboreal, Tamanduas are equally able to exploit arboreal termitaria, wasp, bees and ants nests as well as ground colonies, taking the larvae, adults and eggs as well as honey, beeswax and other substances that the nest may contain - hence the Spanish name Oso melero (Honey Bear). Studies suggest that worker and reproductive castes are preferred to soldiers. Prey items become adhered to the sticky substance secreted onto the tongue by the extensive submaxillary glands and are licked up by the animal. Tamandua have poor eyesight and hearing but a well-developed sense of smell that helps them locate food sources (Parera 2002). Wild individuals typically consume a diet containing between 30-65% protein and 10-50% fat (Redford & Dorea 1984). Merritt (2008) notes that the food habits of this species in Chaco habitats are unstudied.

Redford (1986) notes that he was told by a zookeeper that *Tamandua* captured and consumed iguanine lizards that were kept in the same cage.

REPRODUCTIVE BIOLOGY: There is surprisingly little data available for wild populations. Females give birth to a single young after a gestation period of 4 to 5 months, though twins are very occasionally reported (Jimeno 2003). Published gestation periods range from 130 to 190 days (Merritt 1975) with a mean of around 160 days (Redford & Eisenberg 1992). Kusuda et al (2011) report a pregnancy of 165 days with an accompanying lactation period of about 6 months. They noted that the timing of estrus recurrence after parturition may not be controlled by lactation. A captive female consumed the placenta of its newborn young (Jimeno 2003).

Hay et al (1994) analysed urine samples of females for estrone conjugates (EC), pregnanediol-glucuronide (PdG) and cortisol, comparing with vaginal smears in order to correlate changes in vaginal epithelial cells and endocrine patterns. One female showed a regular estrus cycle of 42 days (+/-3) with no seasonal effect. The luteal phase lasted 23.4 days (+/-10) with peak PdG concentrations occurring 12 days after peak EC. A second female showed regular bloody vaginal discharges every 40 days, lasting for 7 to 12 days but without changes in excretory endocrine patterns. Concentrations of oestrogen and progesterone metabolites in urine were greater during the initial three cycles, but there was no correlation between declining ovarian steroid levels and urinary cortisol concentrations.

Kusuda et al (2011) estimated estrus cycle length at 44.3 days (+/-4.5) based on Estradiol-17b (E2) cycles. Vulvar bleeding was recorded as serum progesterone (P4) decreased and the cycle length for vulvar bleeding was 43.3 days (+/-4.2). The interval from the first day of bleeding to the peak of E2 was 23.1 days (+/-3.1). Serum P4 remained high during pregnancy and E2 increased 8 weeks after conception, remaining high throughout the rest of the pregnancy. Three weeks after parturition the E2 and P4 cycles resumed. The authors suggest that visual bleeding may be used as an indicator of ovarian cycle in this species and estrus can be expected approximately 3 weeks after first bleeding.

Juveniles are carried on their mother's back for several months and even up to a year during which the offspring learns certain aspects of survival - including location of food sources (Parera 2002) and may even adopt her dietary preferences (Redford & Eisenberg 1992). Juveniles may occasionally be left in a "nest" (Redford & Eisenberg 1992). A captive juvenile increased in weight by an average 13.5g per day in weight during its first 6 months of life and 6.86g during the second 6 months, a mean of 10.12g per day over the first year, representing an increase in weight of 3665g in the first 12 months (Jimeno 2003).

GENERAL BEHAVIOUR: Solitary and nocturnal or diurnal in behaviour (more nocturnal where persecuted), activity periods last an average of 8 hours (Parera 2002). In humid forest areas they are frequently accompanied by clouds of flies and regularly rub the eyes with their front legs. Though they are able climbers, using their prehensile tail as a fifth limb, they are just as comfortable on the ground, where they walk slowly but purposefully. However unlike *Myrmecophaga tridactyla* it seems they are not capable of galloping.

Home Range The average territory size is around 350-400ha (Parera 2002). Desbiez & Medri (2010) estimated density in the Central Pantanal of Brazil at 0.34/km² with density slightly higher in forested areas (0.20/km²) compared to floodplain areas (0.10/km²). Biomass was estimated at 5.35kg/km².

Refuges Tamanduas take refuge in tree-holes, well-vegetated branches or in ground nests - using old burrows of other mammals which may be enlarged. Animals in the cerrado of Brazil were found to almost exclusively take refuge on the ground (presumably as a result of the scarcity of tree cavities), typically in armadillo burrows and often at the base of termite mounds (35.4% of cases). On one occasion an animal was found sleeping exposed on bare ground next to a termite mound and on another an adult spent three days in a burrow apparently without leaving in the interim. Individuals taking refuge in armadillo burrows are often clearly visible to predators. (Rodrigues & Marinho-Filho 2003).

Longevity A captive individual lived for 9 years and 6 months (Jones 1982).

Defensive Behaviour When threatened Tamanduas rear up on their hind legs with the forelegs held out before them. If in a tree they balance by gripping the branch with the tail and hind legs. If on land they lean the back against a tree-trunk or rock for extra support. They make swift "hooking" motions with the forelegs, the hooked claws that they bear acting as potentially lethal weapons.

Mortality Tamanduas have been included as prey items in the diet of Ocelot *Leopardus pardalis* and Jaguar *Panthera onca* and juveniles are likely taken by foxes and small cats (Redford & Eisenberg 1992). Taber et al (1997) found remains of this species in 2 of 106 scats of Jaguar and 2 of 95 scats of Puma in the Paraguayan Chaco. Martins et al (2008) found this species in 1 of 12 (8.3%) scats of Puma *Puma concolor* and 1 of 14 (7%) scats of Ocelot in São Paulo, Brazil. This represented 8.1% of the relative biomass consumed by Puma and 6.5% of the relative biomass consumed by Ocelot in the study area.

Parasites Nava et al (2007) note the presence of the Ixodid tick *Amblyomma calcaratum* in Paraguay, though the collectors did not note the host species. In the rest of its South America range this tick is closely associated with Myrmecophagidae (Brum et al 2003). Bechara et al (2000) collected *Amblyomma cajennense* and *A.nodosum* in Nhecolândia Pantanal of Brazil, the latter exclusively from this species. The same two species have also been recorded on this species in Argentina by Guglielmone & Nava (2006) and on the banks of the Paraná River between Mato Grosso do Sul and São Paulo States, Brazil by Labruna et al (2002). The latter reported infestation rates of 6.8 (+/-7.6, range 0-18, n=4 infested, 1 uninfested) for *A.cajennense*. with all ticks nymphs, and 5.6 (+/-9.2, range 0-22, n=4 infested, 1 uninfested) for *A.nodosum* with all ticks adult. Martínez et al (2001) associate *Amblyomma cajennense* with this species in Provincia Misiones, Santa Fé and Corrientes, Argentina. Guglielmone et al (2003) note specimen records of *Amblyomma auricularium*, though this species is more often associated with armadillos of the genus *Dasyfus*. Martins et al (2004) listed *Amblyomma parvum* and *A.nodosum* from the Brazilian Pantanal, noting that the latter species is specific to anteaters in its adult phase. Evans et al (2000) report *Amblyomma calcaratum* and *A.nodosum* from Rio Grande do Sul, Brazil.

Fain & Johnston (1964) describe mange-like lesions on this species caused by immatures of the mite *Psoralges libertus* (Psoroptidae). The lesions consisted of small subepidermal vesicles converging into prominent orange-colored areas located on the hosts' ventral region, though adult mites lived freely on the skin surface (de Souza et al 2009).

Ferreira et al (1989) note that the acanthocephalan *Gigantorhynchus echinodiscus* (Gigantorhynchidae) has been documented from this species and isolated eggs of it from coprolites belonging to a myrmecophagid in Piauí, Brazil.

Vicente et al (1997) list the following nematodes for this species from Brazil in their catalogue: *Aspidodera lacombae* Vicente, 1964; *Bradipostrongylus inflatus* (Molin, 1861) Travassos, 1937; *Bradipostrongylus panamensis* Prince, 1928; *Caenostromylus splendidus* Lent & Freitas, 1938; *Delicata appendiculata* (Travassos, 1928) Travassos, 1937; *Delicata kalili* (Travassos, 1928) Travassos, 1937; *Delicata perronae* Durette-Desset, Chabaud & Cassone, 1977; *Delicata soyeriae* Durette-Desset, Chabaud & Cassone, 1977; *Filicaptis longicollis* Travassos, 1949; *Fontesia fontesi* Travassos, 1928; *Fontesia secunda* Lent & Freitas, 1938; *Graphidiops costalimai* Lent & Freitas, 1938; *Graphidiops inaequalis* Lent & Freitas, 1938; *Graphidiops major* Travassos, 1949; *Graphidiops ruschii* Travassos, 1949; *Graphidiops* sp. I Lent & Freitas, 1938; *Graphidiops* sp. II Lent & Freitas, 1938; *Moennigia alonsoi* Durette-Desset, Chabaud & Cassone, 1977; *Moennigia baeveri* Durette-Desset, 1970; *Moennigia barbarae* Durette-Desset, 1970; *Moennigia lentaignae* Durette-Desset, Chabaud & Cassone, 1977; *Moennigia levyi* Durette-Desset, Chabaud & Cassone, 1977; *Moennigia michelae* Durette-Desset, Chabaud &

Cassone, 1977; *Moennigia obelsi* Durette-Desset, Chabaud & Cassone, 1977; *Paragraphidium pseudosexradiatum* Freitas & Mendonça, 1959; *Physaloptera magnipapilla* Molin, 1860; *Trichostrongylus alatus* (Linstow, 1879) Travassos, 1918; *Trifurcata minuscula* (Travassos, 1915) Schulz, 1926.

Martinez et al (1999) note the presence of cestodes of the genus *Mathevotaenia* (Anoplocephalidae) in this species.

The following coccidians have been described from this species: *Eimeria corticulata* Lainson & Shaw (1990) and *Eimeria marajoensis* Lainson & Shaw (1991).

Smit (1987) reports the flea *Tiamastus cavicola* from a specimen in Villamontes, Bolivia.

Physiology Machida et al (1966) studied the histochemical and histological properties of the skin of this species, finding it to share many similarities with the domestic pig. Jenkins (1970) describes the myology of the intercostal muscles.

Wislocki & Enders (1935) recorded body temperatures of 33.7-34.6°C at air temperatures of 25-27.6°C. Fernandes & Young (2007) note that the method used by Wislocki & Enders (1935) of taking anal readings of body temperature causes stress and can artificially elevate readings. They took readings of the temperature of the tympanic membrane and found a range of 28-33.5°C with a mean of around 29.9°C. Minimum readings were recorded during sleep and it seems that the species uses shallow torpor as a means of energy economization, this occurring at any time of day whilst asleep. This species was less affected by air and substrate temperature than the related *Myrmecophaga tridactyla*, presumably as a result of their habit for sleeping in a wooden box (or tree holes in the wild).

Fournier-Chambrillon et al (1997) used two doses of ketamine hydrochloride (KH) 11.2 mg/kg (+/-1.4) and 19.7 mg/kg (+/-1.3) in combination with xylazine hydrochloride 1 mg/kg (+/-0.1) to anaesthetise this species in French Guiana. The immobilisation time was significantly longer and muscle relaxation better with the higher dosage of KH (48.3 minutes +/-15.8 versus 35 minutes +/-9.5) but the recovery times were similar. Heart rate was higher under the higher dosage, but overall it was recommended for use in minor surgery procedures.

VOCALISATIONS: Noisy feeders, grunting sounds when consuming prey can be used to locate the species. Also look out for debris falling from the trees, at night it's a tell-tale sign that a *Tamandua* is breaking open an arboreal termite mound. The same sound during the day can be attributed either to a diurnal *Tamandua* or to Brown Capuchins (Parera 2002, Emmons 1999).

HUMAN IMPACT: Slow-moving and easily hunted, the *Tamandua* is figuring more and more on the menu for hunters and indigenous groups (Cartés 2007, Neris et al 2002, Hanazaki et al 2009). Merritt (2008) notes that the foul smell of this species may be an impediment to its consumption, but that this factor may become less important if other prey species become less common. Five villages of the Waimiri Atroari Indians of central Amazonia hunted just 2 animals in a year (Sep 1993-Oct 1994) in central Brazil (Souza-Mazurek et al 2000) and 2 were taken in northern Ecuador in 9 months by the Quichua tribe (Zapata Rios 2001).

Merritt (2008) notes that skins are sometimes offered for sale by local people in the Paraguayan Chaco, but that this practice is infrequent. The species is occasionally kept as a pet in the Argentine Chaco and skins are often seen adorning the walls of rural houses in this area (Altrichter 2006).

Alves & Rosa (2006) state that the powdered bones are drunk in a tea as a treatment for thrombosis in Maranhão and Paraíba States, Brazil.

Moreira (1955) found that when subjected to the cow-pox virus the disease developed normally with an incubation period of five days.

Leishmaniasis Leishmaniasis is a disease caused by protozoans in the genus *Leishmania* and transmitted to humans via the bite of sandflies principally of the genus *Lutzomyia* (Phlebotominae). This species has been found infected with *Leishmania amazonensis* in the Pacific region of Ecuador. (Mimori et al 2002, Calvopina et al 2004).

Chaga's Disease The causative agent of Chaga's disease is *Trypanosoma cruzi*, a digenetic kinetoplastid and enzootic parasite of almost 100 mammal species, including humans. Though typically transmitted to humans via the Reduviid bug *Triatoma infestans*, oral infection with the disease does occur and is often associated with acute forms of the disease.

Rodrigues & Brito Melo (1942) report the first specimens of this species testing positive for *T. cruzi* and they found infected adults and nymphs of the Triatomine vector *Panostrongylus geniculatus*.

CONSERVATION STATUS: The Southern Tamandua is considered Lowest Risk, least concern by the IUCN (Superina et al 2010), see <http://www.iucnredlist.org/search/details.php/21350/all> for their latest assessment of the species. The species was removed from CITES Appendix II in June 1992. It is widespread and occurs in a large number of protected areas across its large range. Studbooks are available for captive breeding and a population management plan is established in AZA zoos (Superina et al 2010). The last conservation assessment of the species in Paraguay considered it Least Concern (Morales 2007), and Smith (in press) concurs with that evaluation, noting however that the effects of harvesting quotas on populations, especially those in the most accessible areas of the species range, needs to be closely monitored.

It is widespread in Paraguay but local extinction has occurred in large areas of eastern Paraguay on account of human influences. It remains common in the Humid Chaco but is less so in the Dry Chaco. Some individuals may fall prey to domestic dogs (Superina et al 2010).

Though the species is being hunted with more frequency (Cartés 2007, Neris et al 2002, Hanazaki et al 2009), in most areas it is liable to generate curiosity rather than appetite, and may be captured as a pet or handed over to zoos in a misguided attempt to look after the animals interests. As a recent example fieldworkers at Para La Tierra Biological Station (PLT), based at Reserva Natural Laguna Blanca, Dpto San Pedro were alerted to an individual that had been captured in a nearby village. The animal had aroused considerable curiosity amongst villagers and had been locked in a shed with a leash tied around its neck. Villagers had taken turns in "walking" the animal on the leash causing considerable damage to its neck due to friction burns and sudden jerking of the leash when the animal did not respond. Representatives of PLT (who had been performing environmental education workshops in the community) were then called once it became unclear what they would do with it. The consensus of opinion was that it did not represent good eating, and though payment was at first requested (and refused) the decision was made to release the animal inside the reserve. Though the results of the environmental education may have been at least partly responsible for this collective decision, the curiosity that the animal generated had resulted in the animal being subjected to considerable stress and resulted in potentially life-threatening wounds during its period of captivity. (Karina Atkinson pers. comm.)

In 2010 the first permissions were granted establishing quotas for the harvesting of this species by for-profit companies for export abroad under the *Proyecto de Conservación y Utilización de la Vida Silvestre* (Project for the Conservation and Utilisation of Wildlife - henceforth PCUVS), and a value of 160,000Gs (27.59 euros) has been established as payment to landowners for each individual of this species captured on their land.

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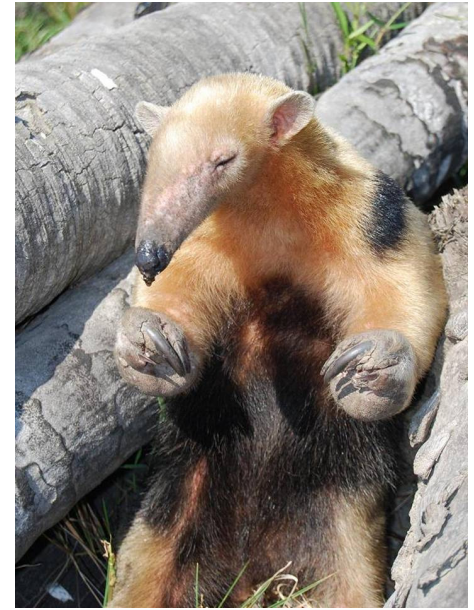
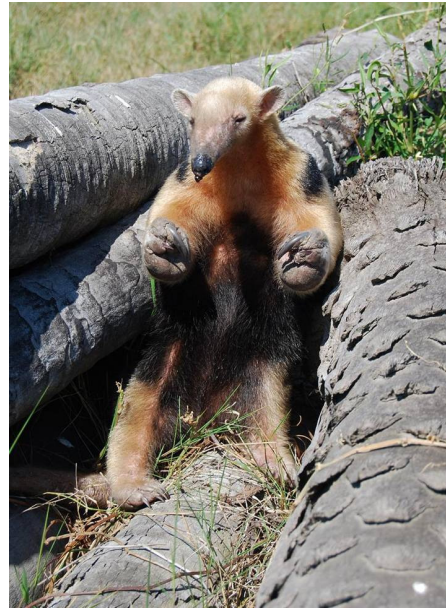


FIGURE 2- (FPMAM908PH) **Southern Tamandua** *Tamandua tetradactyla*. Photo Arne Lesterhuis. Adult lateral. Departamento Presidente Hayes, 2010.

FIGURE 3- (FPMAM907PH) **Southern Tamandua** *Tamandua tetradactyla*. Photo Arne Lesterhuis. Adult in defensive posture. Departamento Presidente Hayes, 2010.

FIGURE 4- (FPMAM906PH) **Southern Tamandua** *Tamandua tetradactyla*. Photo Arne Lesterhuis. Adult in defensive posture. Departamento Presidente Hayes, 2010.



FIGURE 5- (FPMAM903PH) **Southern Tamandua** *Tamandua tetradactyla*. Photo Paul Smith. Forefoot of roadkill. Ruta Trans-Chaco km250, Departamento Presidente Hayes, November 2010.

FIGURE 6- (FPMAM904PH) **Southern Tamandua** *Tamandua tetradactyla*. Photo Paul Smith. Hind foot of roadkill. Ruta Trans-Chaco km250, Departamento Presidente Hayes, November 2010.



FIGURE 7- (FPMAM39PH) **Southern Tamandua** *Tamandua tetradactyla*. Photo Hugo del Castillo. Adult dorsal. Departamento Concepción, December 2007.

