

# GREATER NAKED-TAILED ARMADILLO

*Cabassous tatouay* (Desmarest, 1804)



**FIGURE 1-** (FPMAM90PH) Adult, Ypety, Departamento Caaguazú (José Luis Cartes 1998).

**TAXONOMY:** Class Mammalia; Subclass Theria; Infraclass Eutheria; Order Cingulata; Family Dasypodidae; Subfamily Tolypeutinae, Tribe Priodontini (Myers et al 2006). The genus *Cabassous* was defined by McMurtrie (1831) and contains four species, three of which are present in Paraguay. The genus was reviewed by Wetzel (1980). This species is monotypic (González 2001). The species name *tatouay* is an adaptation of the widely-used Tupi/Guaraní name Tatu ai. Desmarest (1804) described the species based on de Azara's (1801) "Tatou Tatouay". Larrañaga's (1923) description was based on de Azara's (1802) "Tatuaí". Cabrera (1958) lists more synonyms, though these are based on misidentifications of other authors who considered *C.tatouay* a junior synonym of *C.unicinctus* (Gardner 2007).

*Xenurus nudicaudis* was the name applied by Lund (1841) to large *Cabassous* living in the Minas Gerais area. Wetzel (1980) found that measurements of fossil remains were in the range for this species. Winge (1915) applied the name *Xenurus duodecimcinctus* (Schreber) to the same remains, but his skull illustration is *C.tatouay* (Wetzel 1980). Wetzel (1980) hypothesised that the species dates from the Upper Pleistocene but noted that supporting documentation is required to confirm the theory.

Formerly placed in the Euphractinae, Möller-Krull et al (2007) provided DNA evidence that demonstrated their position within the Tolypeutinae. Synonyms adapted from Wetzel (1980) and Gardner (2007):

*Loricatus tatouay* Desmarest 1804:28. No type locality given, but restricted to Paraguay by Cabrera (1958) who considered the description to be based on de Azara (1801).

[*Dasypus*] *dasyercus* G.Fischer 1814:124. Type locality "Paraquaiá".

[*Dasypus*] *gymnurus* Illiger 1815:108. Nomen nudum.

[*Tatus*] *gymnurus* Olfers 1818:220. Type locality Paraguay. Based on de Azara (1801).

*Tatusia tatouay* Lesson 1827:311. Name combination.

*Dasypus gymnurus* Rengger 1830:290. Name combination.

*Xenurus nudicaudis* Lund 1839:231. Nomen nudum.

*Dasypus 12-cinctus* Burmeister 1854:282. Variant spelling of *Dasypus duodecimcinctus* Schreber (1774), wrongly applied.

*Xenurus tatouay* P.Gervais 1855:254. Name combination.

*Xenurus uncinatus* Gray 1865:254. In part. Not *Dasypus uncinatus* Linnaeus (1758).

*Xenurus gymnurus* Fitzinger 1871:242. Name combination.

*Tatoua uncinatus* Miller 1899:2. Not *Dasypus uncinatus* Linnaeus.

*Xenurus duodecimcinctus* Winge 1915:32. Not *Dasypus duodecimcinctus* Schreber (1774).

*D[asypus] nudi-cauda* Larrañaga 1923:343. Type locality "Provincia Paracuarensi". Based on de Azara (1802).

*Cabassous tatouay* Cabrera 1958:219. First use of current name.

*Cabassous gymnurus* Ximénez, Langguth & Praderi 1972:14. Name combination.

*Cabassous duodecimcinctus* Paula-Couto 1973:267. Name combination.

**ENGLISH COMMON NAMES:** Greater Naked-tailed Armadillo (Redford & Eisenberg 1992, Wilson & Cole 2000), Spiny Armadillo (Cimardi 1996).

**SPANISH COMMON NAMES:** Tatu de rabo molle (González 2001), Armadillo de Cola Pelada Grande, Armadillo grande (Esquivel 2001), Cabasú de orejas largas (Abba & Superina 2010).

**GUARANÍ COMMON NAMES:** Tatu ai (Emmons 1999, Esquivel 2001).

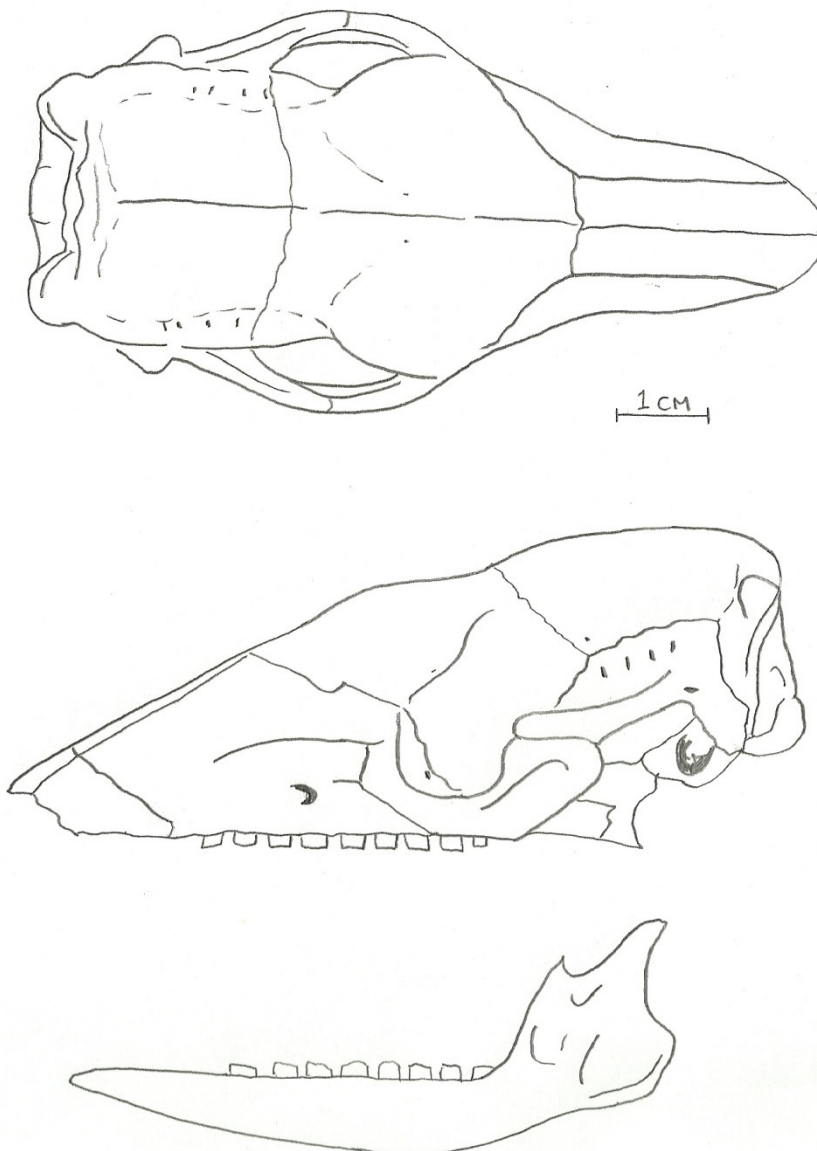
**DESCRIPTION:** Essentially similar to miniature versions of Giant Armadillo. *Cabassous* armadillos have a short, broad snout and small eyes. The cephalic shield has an average of 48.3 scutes  $\pm$  3.7. Dorsal plates are arranged in transverse rows along the body and there are 12-14 movable bands (mean 12.8  $\pm$  0.6) - more than in any other Paraguayan armadillo. The third movable band has a mean of 31 scutes  $\pm$  1.7 and the fourth a mean of 30.8 scutes  $\pm$  1.6. There are two nuchal bands between the head and scapular plates and only isolated scales on the cheek. Scutes of the movable bands are poorly differentiated from the rest of the dorsal scutes and are of a similar size and shape. The scapular and pelvic shields extend almost to the base of the limbs. The first complete band of the scapular shield has a mean of 21.8 scutes  $\pm$  5.5 and the last a mean of 29 scutes  $\pm$  1.5. The first complete band of the pelvic shield has a mean of 29.1 scutes  $\pm$  1.4 and the last a mean of 8 scutes  $\pm$  1.3. Colour ranges from reddish-brown (usually) to blackish (rarely), but they are frequently stained by soils and they may be yellower laterally. There are no hairs present on the dorsal surface, though the lateral hairs may be fairly long. Ventrally greyish almost naked and only sparsely haired. The tail is fairly long and slender, armoured with thin, widely-spaced plates. This species is best identified by its long, funnel-shaped ears, well-separated from each other and extending well above the top of the head. Ears are scaled on the posterior side. Both feet have five pale claws, those of the forefeet being particularly long, especially the central (third) one which is greatly elongated and sickle-shaped. (Wetzel 1980). Core body temperature ranges from 32-34°C (Zajic & Myers 2006).

**SKELETAL CHARACTERISTICS:** Mandible narrow and straight with condyloid process of slightly greater height than coronoid process. Tympanic rings present rather than bullae. Palate more elongate than other members of the genus with medial posterior margin extending posteriorly beyond a line between the anterior margins of the zygomatic rami of the squamosals. *Ratio of Palatal length to Upper tooth row* 1.81  $\pm$  0.09. *Ratio of Rostral Length to Postrostral Length* 0.94 ( $\pm$  0.05). *Condylonasal Length* 109.9mm ( $\pm$  4.5); *Rostral Length* 53mm ( $\pm$  2.8); *Palatal Length* 68.2mm ( $\pm$  3.2); *Postrostral Length* 56.4mm ( $\pm$  2.4); *Palatal Width* 17.1mm ( $\pm$  1); *Anterior Rostral Width* 17mm ( $\pm$  1.6); *Interlacrimial Width* 44.4mm ( $\pm$  2.6); *Interorbital*

*Width* 33.8mm (+/-1.2); *Zygomatic Width* 56.3mm (+/-2.8); *Mastoidal Width* 49.7mm (+/-3.2); *Cranial Height* 42.4mm (+/-2.2). (Wetzel 1980). Skull illustration based on Chebez (2001).

Vizcaino et al (1999) give the following ulnar dimensions (n=1): Ulnar Length 68.7mm; Olecranon Length 38.4mm. The trend towards fossoriality is correlated with relative development of the olecranon process, and the ratio of the ulnar length to olecranon length is the Index of Fossorial Ability. An IFE above 0.70 is considered indicative of a highly fossorial species and one below 0.55 of a cursorial species. This species has an IFE of 0.84.

**DENTAL CHARACTERISTICS:** Teeth are peg-like. Dental formula  $9/8=34$ . There are no teeth present in the premaxillary bone. Maxillary teeth transversely compressed. *Upper Tooth Row Length* 38.3mm (+/-2.1); *Lower Tooth Row Length* 35mm (+/-1.9). *Dimensions of Maxillary (Upper) Teeth (Length x Width):* 4th=3.6 (+/-0.25) x 2.8 (+/-0.26), 5th=3.7 (+/-0.2) x 3.1 (+/-0.21), 6th=3.6 (+/-0.14) x 3.3 (+/-0.2), 7th=3.5 (+/-0.28) x 3.2 (+/-0.24); *Dimensions of Mandibular (Lower) Teeth (Length x Width):* 5th=3.8 (+/-0.29) x 3.2 (+/-0.21), 6th=3.7 (+/-0.17) x 3.2 (+/-0.25), 7th=3.3 (+/-0.2) x 2.8 (+/-0.32). (Wetzel 1980).



**GENETIC CHARACTERISTICS:**  $2n=50$ ,  $FN=71$ . Autosomal complement consists of 4 large metacentrics, 6 smaller metacentrics and submetacentrics and 14 teleocentrics. X is a small submetacentric and Y minute and likely acrocentric. (Barroso & Seuanez 1991).

**TRACKS AND SIGNS:** This species walks supported by the claws of the forefeet while the entire sole of the hindfoot comes into contact with the substrate. The most obvious characteristic of the track of this species is the sickle-shaped central claw on the forefeet which is greatly elongated and curves inwards. Typically only the three longest claws leave impressions on both feet, the two central toes of the forefeet being notably longer and more curved than the others. The impression of the hindfoot usually shows the three narrow, tapering central toes which are not curved and have normal-sized claws. In soft soil the entire foot leaves an impression, the hindfoot being elongated with the innermost and outermost toes greatly reduced and set well-back from the longer central toes. Faeces are pelleted and composed of insect remains and soil (Zajic & Myers 2006).

**EXTERNAL MEASUREMENTS:** The largest of the "naked-tailed armadillos" in Paraguay and indeed the largest member of the genus. **TL:** 63.68cm (56-80cm); **HB:** 45.78cm (36-49cm); **TA:** 17.9cm (15-20cm) González (2001) gives the tail measurements as 24-32cm, considerably longer than other published sources; **FT:** 8.22cm (8-8.6cm); **EA:** 4.17cm (4-4.4cm); **WT:** 5.35kg (3.4-6.4kg). The weight range of 7-12kg given in González (2001) seems at odds with all other published sources. (Wetzel 1980, Redford & Eisenberg 1992, González 2001).

Ubaid et al (2010) give the following measurements for a live specimen from Sao Paulo Brazil: **TL:** 66cm; **TA:** 18cm; *Length of Carapace* 38cm.

**SIMILAR SPECIES:** *Cabassous armadillos* are essentially smaller versions of *Priodontes maximus*, but size alone immediately rules out confusion with that species - no other armadillo even approaches *Priodontes* in size. They can be further identified by the lack of a complete armour of plates on the tail (the tail is "naked") and the greatly enlarged claw on the forefeet. Highly-fossorial in behaviour these armadillos dig to escape danger - they rarely try to run away.

*Cabassous chacoensis* is a smaller species (approximately 50% smaller than this species) and crucially has much shorter ears with an unusual fleshy expansion on the anterior margins. The long funnel-shaped ears of this species extend well above the top of the head and back beyond the first complete scapular band when folded backwards - quite different in length and form to the extremely short ears of *C. chacoensis*. The two appear to be allopatric with this species confined to eastern Paraguay and *C. chacoensis* only recorded in the Chaco. Note that this species has consistently greater scale counts and cranial measurements than *C. chacoensis* for all standard measurements used in the description.

The Southern Naked-tailed Armadillo *Cabassous unicinctus squamicaudis* has recently been confirmed in Paraguay (Smith et al in press). The two species are sympatric in areas of Brazil (Ubaid et al 2010). It is intermediate in size between the two documented species, but closer to *C. tatouay* in general proportions. Externally the two species are best separated on measurements and scale counts (particularly of the cephalic shield) and a comparison table is presented below taken from Wetzel (1980):

**Number of movable bands:** *C. tatouay* 12.8 (+/-0.6) *C. unicinctus squamicaudis* 12 (+/-0.4).

**Number of head scutes:** *C. tatouay* 48.3 (+/-3.7) *C. unicinctus squamicaudis* 54 (+/-5.5).

**Number of scutes on 3rd movable band:** *C. tatouay* 31 (+/-1.7) *C. unicinctus squamicaudis* 28 (+/-1.3).

**Number of scutes on 4th movable band:** *C. tatouay* 30.8 (+/-1.6) *C. unicinctus squamicaudis* 27.4 (+/-1.3).

**Number of scutes on 1st scapular band:** *C. tatouay* 21.8 (+/-5.5) *C. unicinctus squamicaudis* 20.1 (+/-1.9).

**Number of scutes on last scapular band:** *C. tatouay* 29 (+/-1.5) *C. unicinctus squamicaudis* 26.3 (+/-1.7).

**Number of scutes on 1st pelvic band:** *C. tatouay* 29.1 (+/-1.4) *C. unicinctus squamicaudis* 24.4 (+/-1.6).

**Number of scutes on last pelvic band:** *C. tatouay* 8 (+/-1.3) *C. unicinctus squamicaudis* 6.6 (+/-1).

**Head and Body Length (excluding tail):** *C. tatouay* >36cm *C. unicinctus squamicaudis* <35cm.

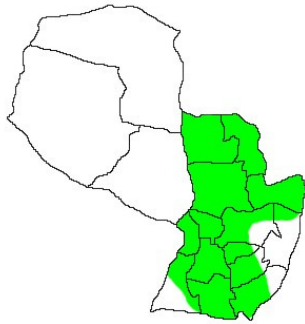
**Ear Length:** *C. tatouay* >40mm *C. unicinctus squamicaudis* <30mm.

**Ratio of Palatal length to Upper tooth row:** *C. tatouay* 1.81 (+/-0.09) *C. unicinctus squamicaudis* 1.62 (+/-0.05).

**Ratio of Rostral Length to Postrostral Length:** *C. tatouay* 0.94 (+/-0.05) *C. unicinctus squamicaudis* 0.86 (+/-0.06).

**DISTRIBUTION:** Occurs from south-central Brazil south to Uruguay.

In Argentina it is found in Corrientes and Misiones Provinces, and perhaps as far as south as Entre Rios Province in that country. In Uruguay it has been recorded in Cerro Largo, Treinta y Tres, Lavalleja, Maldonado y Durazno Departments (Daniel Hernández pers.comm.).



In Brazil there are recent records of this species from the following states: Espírito Santo (Moreira et al. 2008), Goiás (Sanderson & Silveira 2003), Mato Grosso (Anacleto et al. 2005), Minas Gerais (Leal et al. 2008), Paraná (Rocha-Mendes et al. 2005), Rio de Janeiro (Rocha et al. 2004), Rio Grande do Sul (Cherem 2005), Sao Paulo (Ubaid et al. 2010) and Santa Catarina (Cherem et al. 2004). According to Fonseca & Chiarello (2003) it also occurs in the States of Mato Grosso do Sul, Piauí and Pará.

It is apparently widespread in eastern Paraguay with records from all Departments, though absent from most of Neembucú Department where the habitat and climate are reminiscent of the Humid Chaco. The confirmation of the presence of *C.unicinctus* in northeastern Paraguay (Smith et al. in press) however creates some confusion as to the precise distribution of this species in Paraguay, with all *Cabassous* records from the Oriental region generally having been unquestionably attributed to *tatouay*. The level of sympatry between the two species, or indeed whether or not

they are sympatric at all, needs to be carefully investigated.

Abba & Vizcaíno (2008) list 1 specimen from Paraguay in the Museo Argentino de Ciencia Naturales "Bernadino Rivadavia" (MACN47.377 carapace and skull, Capitán Meza, Alto Paraná, 1939) and 1 specimen in the Museo de La Plata without precise locality data (MLP16.IX.35.84 skin, approx 1900).

**HABITAT:** The primary habitat of this species appears to be forest. Esquivel (2001) notes that the species is found in Atlantic forest areas at the Mbaracayú Forest in Paraguay as well as in the extensive cerrado area.

In Uruguay it is found in grasslands with bushes and patches of forest (González 2001). Anacleto et al. (2006) used the genetic algorithm program GARP to predict the species distribution in Brazil, with results suggesting this species would occur in Amazonia, Cerrado Caatinga, Atlantic Forest and Pampas biomes in that country. dos Reis et al. (2006) confirm the presence of the species in Cerrado, Atlantic Forest, Pantanal and southern grasslands habitats in Brazil. The fossorial habits of this species means that it is likely under-recorded.

**ALIMENTATION:** They feed largely on ants and termites which are extracted from their nests, either by burrowing into mounds from the surface, or by approaching from below via the tunnels. The long, extensile tongue is used to lick up prey and the sickle-shaped mid-claw of the forefeet is used to cut through small roots as the animal digs (Nowak 1991). In the process other invertebrates may be incidentally ingested, as well as soil. They possess a keen sense of smell which is used in the location of food (Zajic & Myers 2006).

**REPRODUCTIVE BIOLOGY:** A single young is born (González 2001).

**GENERAL BEHAVIOUR:** Almost nothing is known of the behaviour of this species other than the fact that it is highly fossorial and rarely observed. They are solitary and primarily nocturnal, with activity beginning after dark.

**Refuges** At Serra da Canastra NP in Brazil Carter & Encarnaçao (1983) found the mean dimensions of the burrow to be 21cm wide x 15 cm high at the entrance, narrowing slightly to 21cm x 14cm 10cm inside the burrow, finding no significant difference in burrow width from those of *Euphractus sexcinctus* but a significant difference in burrow height. Width but not height was significantly larger than *Cabassous unicinctus squamicaudis*. The mean burrow angle was calculated to be 47.7°. Burrows are dug so that the prevailing wind blows away from the entrance. Holes have a single entrance and are used only once. On rare occasions they may spend more than 24 hours in a single burrow but burrows are never re-used. Carter & Encarnaçao (1983) only found burrows to be dug into active termite mounds.

**Defensive Behaviour** Being essentially slow-moving animals their main form of defence is to dig rapidly into soft soil, and they are capable of completely burying themselves within a few seconds. However some may attempt to escape by running, and some individuals have been recorded to immerse themselves in water during pursuit (Grzimek 2003). The dorsal plate extends well down the side of the animal but would provide little defence against large predators.

**Mortality** Martins et al (2008) found this species in 13 of 12 (24.9%) scats of Puma *Puma concolor* in São Paulo, Brazil but absent from 14 scats of Ocelot *Leopardus pardalis*. This represented 19.3% of the relative biomass consumed by Puma in the study area.

**Parasites** Botelho et al (1989) report the Ixodid tick *Amblyomma pseudoconcolor* from this species in Minas Gerais, Brazil. Castro & González (2010) report the nematode *Aspidodera fasciata* from Uruguay.

**VOCALISATIONS:** Handled males may give a pig-like grunting noise, but females are generally silent.

**HUMAN IMPACT:** This species was recorded amongst the prey items of the indigenous Aché in Mbaracayú Biosphere Reserve, though only 24 individuals were taken in the period 1980 to 1996, representing just 130kg of meat or 0.8% of the biomass that they consumed, suggesting that it is not one of their principal targets, or perhaps, given the ease with which it may be captured, reflecting the scarcity with which the species is encountered (Cartés 2007).

**CONSERVATION STATUS:** The Greater Naked-tailed Armadillo is considered Lowest Risk, least concern by the IUCN (Abba & Superina 2010), see <http://www.iucnredlist.org/search/details.php/3414/all> for the latest assessment of the species. The Centro de Datos de Conservación in Paraguay consider the species to be persecuted by humans in Paraguay and give it the code **N3**. The species is not listed by CITES. Despite being widespread in Brazil it appears as Data Deficient on the national list of threatened species and figures on the red list of six states (DD in Espírito Santo, Paraná. São Paulo, Rio Grande do Sul, NT in Minas Gerais, and Presumably Threatened in Rio de Janeiro) (Ubaid et al 2010). The last conservation assessment of the species in Paraguay considered it Least Concern (Morales 2007), but Smith (in press) recommends that the species be considered vulnerable at the national level under IUCN criteria C2a(i).

Though widespread, the fossorial behaviour and low density of this species means that it is rarely detected. It is able to tolerate some degree of habitat disturbance, but the transformation of large tracts of eastern Paraguay into agricultural land is not conducive to the continued presence of this species and it is presumably in decline or has suffered from regional extinctions over much of eastern Paraguay. Of course the fossorial habits of this species are damaging to agriculture and it may be persecuted for that reason, whilst the extensive use of pesticides eliminates the food resources. Clearing of habitat by fire is also likely to take its toll, the species being ill-equipped to escape. It is hunted opportunistically for food along with other armadillo species, but hunting pressure is unlikely to be the major cause of population decline. It is present in several protected areas in Paraguay and other countries in its range (Abba & Superina 2010).

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**FIGURE 2** - (FPMAM91PH) **Greater Naked-tailed Armadillo** *Cabassous tatouay*.  
Adult frontal view. Ypety, Departamento Caaguazú, 1998.  
Photo José Luis Cartes.