

SOUTHERN NAKED-TAILED ARMADILLO

Cabassous unicinctus (Linnaeus, 1758)



FIGURE 1 - Adult dorsal view. Estancia Pa'í Kuára, Departamento Amambay, January 2006. (Photo Hugo del Castillo).

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). There are two quite distinct subspecies, one of which, *C.u.squamicaudis*, is present in Paraguay (Wetzel 1980). It is possible that these two subspecies in fact represent distinct species, with the divergence between them in morphology and other characters of taxonomic importance greater than or equal to differences between *C.u.unicinctus* and other species in many cases. Wetzel (1980) retained them as subspecies presumably on the basis of a reported zone of intergradation in the Amazon River area, though the intergradation of two closely related but distinct species in a zone of overlap may not be completely out of the question.

The species name *unicinctus* means "single band" in Latin. The subspecies name *squamicaudis* means "scaly tail" presumably in reference to the increased presence of tail scutes when compared with the nominate subspecies.

Xenurus squamicaudis (Lund 1843) was considered a fossil species upon its discovery in mixed material from caverns of Minas Gerais, and this arrangement was followed by Winge (1915) and Paula Couto (1950, 1973). Wetzel (1980) however found the material to be referable to this species. He hypothesised that the subspecies 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):

Dasypus unicinctus Linnaeus 1758:50. Type locality "Africa", but restricted to Surinam by O.Thomas (1911).

- Dasypus duodecim cinctus* Schreber 1774:pl. LXXIV. No locality given.
 [*Dasypus*] *octodecimcinctus* Erxleben 1777:113. Type locality "in America australi".
Dasypus undecimcinctus Illiger 1815:109. Nomen nudum.
Dasypus multicinctus Thunberg 1818:68. Type locality "Brasilien".
Tatusia tatouay Lesson 1827:311. In part, not *Loricatus tatouay* Desmarest.
Dasypus tatouay Schomburgk 1840:34. In part, not *Loricatus tatouay* Desmarest.
Dasypus gymnurus var γ JA Wagner 1844:171. Not *Tatus gymnurus* Olfers.
 D[*asypus*]. *verrucosus* JA Wagner 1844:172. Type locality "den nördlichen Theil (des tropischen Südamerikas)". Based on Buffon (1763).
Xenurus [(*Tatoua*)] *unicinctus* Gray 1865:378. Name combination.
Xenurus verrucosus Fitzinger 1871:233. Name combination.
Ziphibila lugubris Gray 1873:23. Type locality "Brazils, St Catherine´s", but restricted to Demerara, Guyana by Gardner (2007).
Xenurus lugubris O.Thomas 1880:402. Name combination.
Xenurus duodecimcinctus Jentink 1888:213. Name combination.
 [*Lysiurus* (*Lysiurus*)] *unicinctus* Trouessart 1898:1146. Name combination.
 [*Lysiurus* (*Ziphibila*)] *lugubris* Trouessart 1898:1148. Name combination.
Tatoua (*Ziphibila*) *lugubris* Miller 1899:6. Name combination.
 C[*abassous*]. (*Ziphibila*) *lugubris* Palmer 1899:72. Name combination.
Tatoua unicincta Miller 1899:2. Name combination.
 C[*abassous*]. *unicinctus* Palmer 1899:72. Name combination.
 [*Cabassus* (*Cabassus*)] *unicinctus* Trouessart 1905:820. Name combination.
Cabassous loricatus Yepes 1928:467. In part, not *Dasypus loricatus* JA Wagner.
Xenurus unicinctus Sanderson 1949:785. Name combination.

Cabassous unicinctus unicinctus Wetzel 1980:343. First use of current name combination.

ENGLISH COMMON NAMES: Southern Naked-tailed Armadillo (Wilson & Cole 2000), Leathered-tail Armadillo (Tomas et al 2009), Naked-tailed Armadillo (Anacleto et al 2006).

SPANISH COMMON NAMES: Armadillo de cola pelada austral (Emmons 1999), Peji, Peji cola blanda, Armadillo de cola desnuda, Carachupa, Metecito (Superina & Aguiar 2006), Armadillo coletrapo amazónico, Cabasú de orejas largas (Abba & Superina 2010).

GUARANÍ COMMON NAMES: Tatuái (Emmons 1999).

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 54 scutes \pm 5.5. Dorsal plates are arranged in transverse rows along the body and there are 12 movable bands (mean 12 \pm 0.4). The third movable band has a mean of 28 scutes \pm 1.3 and the fourth a mean of 27.48 scutes \pm 1.3. 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. Though Wetzel (1980) states that the scales of the first and second complete scapular bands are wider than they are long, in at least one Paraguayan specimen they were approximately square - mean scute sizes: first scapular band 7.35 mm long x 7.55 mm wide; 2nd band 6.45 mm x 6.10 mm; n=20 (Smith et al in press). 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 20.1 scutes \pm 1.9 and the last a mean of 26.3 scutes \pm 1.7. The first complete band of the pelvic shield has a mean of 24.4 scutes \pm 1.6 and the last a mean of 6.6 scutes \pm 1. Colour typically greyish-brown to blackish, but they are frequently stained by soils. 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 short and slender (115.5mm \pm 22.6), armoured with thin, widely-spaced plates. This species may be identified by its fairly long, funnel-shaped ears (27mm \pm 2.2), well-separated from each other and extending slightly above the top of the head. Ears are only slightly granulate 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).

SKELETAL CHARACTERISTICS: Skull robust and notably less elongate than *Cabassous tatouay*. Rostrum broader and more triangular than *Cabassous chacoensis*. Mandible narrow and straight with

condyloid process of much greater height than coronoid process. Tympanic rings present rather than bullae. *Ratio of Palatal length to Upper tooth row* 1.62 (+/-0.05). *Ratio of Rostral Length to Postrostral Length* 0.86 (+/-0.06). *Condylonasal Length* 78.1mm (+/-4.4); *Rostral Length* 36.2mm (+/-2.7); *Palatal Length* 45mm (+/-3.1); *Postrostral Length* 42.1mm (+/-2.5); *Palatal Width* 11.7mm (+/-1.1); *Anterior Rostral Width* 12.2mm (+/-0.8); *Interlacrimial Width* 32.9mm (+/-2.3); *Interorbital Width* 26.6mm (+/-1.4); *Zygomatic Width* 43.7mm (+/-2.9); *Mastoidal Width* 37.4mm (+/-2.2); *Cranial Height* 33.8mm (+/-2.1). (Wetzel 1980).

Vizcaino et al (1999) give the following ulnar dimensions (n=7): *Ulnar Length* 57.6mm (+/-8.4); *Olecranon Length* 27.9 (+/-2.8) mm. 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 0.96 (+/-0.12).

DENTAL CHARACTERISTICS: Teeth are peg-like. Dental formula 9/8=34. There are no teeth present in the premaxillary bone. Maxillary teeth approximately square. *Upper Tooth Row Length* 27.8mm (+/-2.6); *Lower Tooth Row Length* 25.6mm (+/-2.2). *Dimensions of Maxillary (Upper) Teeth (Length x Width):* 4th=2.9 (+/-0.32) x 2.6 (+/-0.26), 5th=2.8 (+/-0.31) x 2.8 (+/-0.26), 6th=2.7 (+/-0.33) x 2.7 (+/-0.31), 7th=2.5 (+/-0.25) x 2.6 (+/-0.30); *Dimensions of Mandibular (Lower) Teeth (Length x Width):* 5th=3.1 (+/-0.39) x 2.7 (+/-0.24), 6th=2.8 (+/-0.20) x 2.7 (+/-0.23), 7th=2.5 (+/-0.25) x 2.6 (+/-0.30). (Wetzel 1980).

GENETIC CHARACTERISTICS: 2n=46. Autosomal complement consists of 12 pairs of large metacentrics, 5 smaller submetacentrics and 6 teleocentrics. X is a medium submetacentric and Y a small acrocentric. (Jacintho et al 2009).

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. Note that the sandy soils in which these species typically occur are not conducive to clear tracks.

EXTERNAL MEASUREMENTS: The medium-sized "naked-tailed armadillo" in Paraguay and the smaller of the two species in the Oriental region. Females are larger than males. Redford (1997) gives the following measurements for 9 individuals from the central Brazilian cerrado (presumably ssp. *squamicaudis*): **HB:** 38.23cm (33.2-42.5cm); **TA:** 12.49cm (11.1-14.8cm); **FT:** 7.10cm (6.1-7.5cm); **EA:** 2.80cm (2.4-3.2cm); **WT:** 2.78kg (2.1-4kg). Smith et al (2011) give the following measurements for two Paraguayan specimens: **HB:** 32.1-34.7cm; **EA:** 2.9-3.2mm.

Wetzel (1980) gives the following measurements for ssp. *squamicaudis* (n=4): **HB:** 32.40cm (29-34.5cm); **TA:** 11.55cm (8.7-14cm); **FT:** 7.15cm (6.5-7.6cm); **EA:** 2.70cm (2.5-3cm); **WT:** 1.6kg (1.6-1.8kg). For comparative purposes the following measurements are provided for the nominate *unicinctus* (n=12): **HB:** 38.68cm (34.7-44.5cm); **TA:** 18.46cm (16.5-20cm); **FT:** 7.92cm (7-8.4cm); **EA:** 3.52cm (3-4cm); **WT:** 2.9kg (2.5-3.6kg). Note the much larger overall size and much longer tail in relation to HB length of *C.u.unicinctus* in comparison with *squamicaudis*.

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 and crucially has much shorter ears with an unusual fleshy expansion on the anterior margins. The longer funnel-shaped ears of this species extend above the top of the - quite different in length and form to the extremely short ears of *C.chacoensis*. Note that this species also has more scales on the cheek, posterior side of the ear and on the tail than *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 more widespread Greater Naked-tailed Armadillo *Cabassous tatouay* is a larger animal that is sympatric with this species in the northern Oriental region (Smith et al 2011). Though there is a tendency for *C. tatouay* to be more reddish in colouration and *C. unicinctus* to be blackish or dark brownish, colouration alone should not be relied on for specific identification. 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.

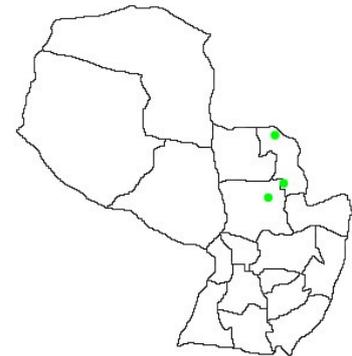
Ratio of Palatal length to Upper tooth row: *C. tatouay* 1.81 (+/-0.09) *C. unicinctus squamicaudis* 1.62 (+/-0.05).

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

DISTRIBUTION: A wide-ranging species split in two subspecies. The nominate *C. u. unicinctus* occurs in northern South America east of the Andes and north of the Amazon in Guianas, parts of northern Brazil, Venezuela, Colombia, Ecuador and Peru. There is a small area of intergradation with *C. u. squamicaudis* in the Amazon-Solimões River area of Brazil and Peru. *C. u. squamicaudis* is found south of the Amazon from the foothills of the Andes in Peru and Bolivia, east through Mato Grosso, Mato Grosso do Sul, Goiás States in Brazil to Minas Gerais and Maranhão. In Bolivia there are very few published records but it has been recorded from Departamentos Pando, Beni and Santa Cruz, with the most southerly record from San José de Chiquitos (18°05.723'S, 60°49.996'W) (Anderson 1997, Maffei 2006).

In Paraguay the only confirmed records of this species are from Reserva Natural de Laguna Blanca (S 23°48'45.4", W 56°17'41.7"), Departamento San Pedro (Smith et al in press). Sightings of small *Cabassous* at Estancia Norte Yboty (S 23°44'44"S, W 56°18'15"W), near Capitán Bado, Departamento San Pedro on 17 December 2009 likely also were this species (P. Smith, Hugo del Castillo) and an individual photographed on 22 January 2006 at Estancia Pa'í Kuára (S 23°13'46"S, W 55°56'58"W), Departamento Amambay (Hugo del Castillo) also seems a good fit for *unicinctus squamicaudis*, though measurements and scale counts were not taken to confirm the identification. The species is possibly widespread throughout the campos cerrados region of north-eastern Paraguay, but to date there are no confirmed records elsewhere in the country. The species is sympatric with *C. tatouay* in parts of Brazil (Ubaid et al 2010) but to what extent the species is sympatric with *C. tatouay* in Paraguay remains to be demonstrated.

Though Bonato et al (2008) make reference to nocturnal field observations of *C. unicinctus* in "Argentina and Paraguay" based on Merritt (1985), in fact Merritt's statement about nocturnal behaviour is general for the genus without particular reference to this species or any geographic location. At that time there were no documented records of the species in Paraguay and there are still no records from Argentina where it is unlikely to occur.



Smith et al (2011) document three specimens from Paraguay, from Reserva Natural Laguna Blanca (CZPLT-M 001) and Estancia Las Mañanitas (CZPLT-M 002) both in Dpto San Pedro, and PN Cerro Corá (MNHNP 919), Departamento Amambay. Additionally the species has been photographed at Estancia Pa'í Kuára, Departamento Amambay by Hugo del Castillo. The species is probably more widespread in the Paraguayan cerrado than is currently known.

HABITAT: All Paraguayan records to date are from cerrado-type habitats with loose sandy soils. Sight records of small *Cabassous* presumably of this species have occurred in open cerradón-type forest and campo sucio cerrado.

Dos Reis et al (2006) report the species as present in the Amazon, caatinga, cerrado, Atlantic forest and Pantanal biomes of Brazil. In cerrado at the Estação Ecológica de Itirapina, São Paulo State most captures were in campo sucio cerrado, with about half as many in sensu strictu cerrado and about two-thirds as many again in gallery forest (Bonato et al 2008). Da Silva & Henriques (2009) also captured the species in sensu strictu cerrado near Brasilia. Loughry & McDonough (1997) captured individuals in swampy habitat at Poço das Antas, Rio de Janeiro State, Brazil. Tomas et al (2009) list specimens from the Pantanal region of Mato Grosso and Mato Grosso do Sul States, Brazil from cerrado, cerradón, flooded grasslands, cultivated fields of *Brachiaria* sp (in an area of former cerrado) and secondary growth.

Maffei (2006) recorded an individual in Chiquitano forest, a transitional habitat between cerrado and chaco biomes, in Departamento Santa Cruz, Bolivia.

ALIMENTATION: Bonato et al (2008) linked activity levels of this species to availability of arthropods, suggesting that the species is more active under conditions of food limitation. When food supply is low more foraging time is required to fulfil their energetic requirements. Anthony Mathews (1977) found a stomach of one specimen (which he called *Cabassous hispidus*) in Mato Grosso to contain principally (95%) workers and soldiers of *Cornitermes snyderi*, with the remaining 5% being four other species of termites and other insects. The author concluded that all the insects may have come from a *Cornitermes snyderi* mound "which it may be presumed to have opened itself".

REPRODUCTIVE BIOLOGY: Limited data suggests aseasonal reproduction. Three of six females captured in the cerrado of Sao Paulo State, Brazil between October and March were reproductively active. The proportion of juveniles in this population was estimated at 9%. (Bonato et al 2008).

GENERAL BEHAVIOUR: Highly fossorial and rarely observed. They are solitary and though frequently considered to be primarily nocturnal, Paraguayan specimens have been seen and captured by day. Bonato et al (2008) captured 97% of their 44 individuals by day and only 1 by night, suggesting diurnal activity. Most individuals were captured between 10am and 2pm, and considerably fewer were captured after 6pm. Activity levels were not affected by changes in climate from wet to dry season.

Home Range Densities in cerrado at the Estação Ecológica de Itirapina, São Paulo State Brazil were estimated at 0.27 individuals/ha (Bonato et al 2008).

Refuges At Serra da Canastra NP in Brazil Carter & Encarnação (1983) found the mean dimensions of the burrow to be 17cm wide x 15 cm high at the entrance, narrowing slightly to 15cm x 14cm 10cm inside the burrow. Burrows are approximately circular, as the animal rotates the body in a helical fashion whilst digging. There was a significant difference in burrow width (21cm) but not height from *Cabassous tatouay*, and a significant difference in height from *Euphractus sexcinctus*. Burrows of females were also significantly larger than males. The mean burrow angle was calculated to be 35.3°. Mean slope of the land into which burrows were dug was 7.9 °, they did not dig into banks or slopes despite ample opportunity to do so. Burrows are dug so that the prevailing wind blows away from the entrance. Holes are re-used only rarely (1 of 82 observations) and animals do not remain in a burrow for longer than a 24hr period. Burrows were dug into active (41%) and inactive (46%) termite mounds with approximately equal frequency. Burrows have a single entrance (Redford 1994).

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. The dorsal plate extends well down the side of the animal but would provide little defence against large predators.

VOCALISATIONS: Handled males may give a pig-like grunting noise, but females are generally silent (Emmons 1999). No captured Paraguayan specimens have uttered vocalisations (Hugo del Castillo pers. comm.).

HUMAN IMPACT: The species is hunted locally in the Pantanal of Brazil, and likely also in Paraguay. However its fossorial behaviour and difficulties associated with locating it means that it most likely to be hunted opportunistically rather than specifically. Local people in the Laguna Blanca area know the species and distinguish it from other armadillos that occur there. However they commented that the species is not consumed or hunted on account of its "strong smell" and one person interviewed said that he had always avoided eating the species having been told that its consumption causes severe stomach pains (Jorge Damian Ayala Santacruz and Concepción XXXX pers. comm.).

Just two individuals were harvested in 33 months during a study of the diet of the Xavante peoples of the cerrado of central-west Brazil, this in comparison to a total 138 *Euphractus sexcinctus* and 18 *Pridontes maximus* taken during the same period (Leeuwenberg 1997).

CONSERVATION STATUS: The Southern Naked-tailed Armadillo is considered Lowest Risk, least concern by the IUCN on account of its wide distribution and occurrence in a number of protected areas (Abba & Superina 2010), see <http://www.iucnredlist.org/apps/redlist/details/3415/0> for the latest assessment of the species. The species is not listed by CITES.

This species has been recently confirmed as present in Paraguay (Smith et al in press) and though likely more widespread than is currently known in the campos cerrados region of north-eastern Paraguay, it is probably worthy of conservation concern at the national level. Abba & Superina (2010) note that populations in southern Brazil are subject to hunting pressure and habitat loss, and with the newly discovered Paraguayan populations in an area suffering the effects of similarly intense population pressure, coupled with the lack of specimen records until very recently, the species may best be considered vulnerable at the national level. The discovery of populations of this species in Paraguay, though long suspected, represent a range extension of approximately 278km to the south (Smith et al in press). Additionally the possibility of *C.u.squamicaudis* representing a distinct species from northern *C.u.unicinctus* is also worthy of investigation from a conservation perspective. If southern populations of this species are indeed under conservation threat, then it is possible that the conservation status of *squamicaudis* as a distinct species would require careful review. Tomas et al (2009) however noted that the apparent rarity of the species in the Brazilian Pantanal was perhaps an artefact of insufficient sampling and that the species may in fact be more common than previously believed. The same may be true of Paraguay.

The fossorial behaviour of this species means that it is rarely detected and this has possibly contributed to the lack of Paraguayan records until recently. 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. Of course the fossorial habits of this species are damaging to agriculture and it may be persecuted for that reason. 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.

At present it is known only from the 815ha Reserva Natural Laguna Blanca and immediate surroundings in Paraguay, though it is likely more widespread than is currently known (Smith et al in press). The RNLB is protected by decree only for a period of five years (2010-2015), but the unique and localised fauna that has so far been documented there means that the implementation of permanent and effective protective measures is a conservation priority in Paraguay.

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FIGURE 2- (FPMAM60PH)
Southern Naked-tailed Armadillo *Cabassous unicinctus*.
Adult frontal view. Estancia Pa'í Kuára, Departamento Amambay, January 2006.
Photo Hugo del Castillo.



FIGURE 3- (FPMAM85PH)
Southern Naked-tailed Armadillo *Cabassous unicinctus*.
Adult lateral view. Estancia Pa'í Kuára, Departamento Amambay, January 2006.
Photo Hugo del Castillo.



FIGURE 4- (FPMAM86PH)
Southern Naked-tailed Armadillo *Cabassous unicinctus*.
Stage 1 in burrowing process. Estancia Pa'í Kuára, Departamento Amambay, January 2006.
Photo Hugo del Castillo.



FIGURE 5- (FPMAM87PH)
Southern Naked-tailed Armadillo *Cabassous unicinctus*.
Stage 2 in burrowing process. Estancia Pa'í Kuára,
Departamento Amambay, January 2006.
Photo Hugo del Castillo.



FIGURE 6- (FPMAM88PH)
Southern Naked-tailed Armadillo *Cabassous unicinctus*.
Stage 3 in burrowing process. Estancia Pa'í Kuára,
Departamento Amambay, January 2006.
Photo Hugo del Castillo.



FIGURE 7- (FPMAM89PH)
Southern Naked-tailed Armadillo *Cabassous unicinctus*.
Stage 4 in burrowing process. Estancia Pa'í Kuára,
Departamento Amambay, January 2006.
Photo Hugo del Castillo.