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de los próximos años información necesaria para evaluar el estado poblacional de varias especies de edentados, así como el grado de diversidad existente en la región. De poder lograr nuestros objetivos, en los próximos años habremos dando un paso importante en lo referente al orden Xenarthra y su conservación *in situ* y *ex situ* en el Gran Chaco argentino.

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## Fitting Radio Transmitters to Giant Anteaters (*Myrmecophaga tridactyla*)

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Methods to remotely monitor free-ranging animals have become more frequent in studies on wildlife ecology and behavior. The methodology

of attaching a transmitter to an animal varies from collars to a surgically-placed transmitter under the skin of the animal. Regular collars cannot be used with some xenarthran species such as armadillos and anteaters, for lack of space between the head and the carapace in armadillos, or because the neck is thicker than the head, as in the anteaters.

There are few studies reporting the attachment of transmitters in anteater species. Montgomery and Lubin (1977) and Montgomery (1985) radiotracked individuals of the four recognized living species of anteaters, using adhesive tape to attach the transmitters to the tails. However, the transmitters remained on the animals for a short period of time (between 30 and 75 days, depending on the species), required periodic repair, and caused necrosis of the tissue under the transmitter during the rainy season (Montgomery, 1985). An additional disadvantage of this method is related to the possibility that giant anteater females may use the male's tail as an indicator of the male's health; therefore the gap on the tail caused by the adhesive tape could relay a false message of sickness. Sunquist and Montgomery (1973) attached a small transmitter (7 g) to the fur of a silky anteater with clear silicone seal. This method can be used only in short studies, because the transmitter falls off with the hair.

Shaw *et al.* (1987) used harnesses made with cotton web to fix radio transmitters to giant anteaters. They were able to monitor the anteaters for seven months, but three out of twelve marked animals removed their harnesses. Two of them were recaptured and the transmitters were fitted with a braided nylon cord tied to the fur at the animal's flanks. Leather adjustable harnesses (manufactured for use in dogs) also were used to attach transmitters on collared anteaters (Rodrigues *et al.*, 2001). Although the harnesses were adapted successfully to collared anteaters, only two out of eight individuals could be monitored for a satisfactory period of time (six and nine months, respectively). The other animals lost their transmitters between one and two months, mainly because their rest-

ing behavior in armadillos' burrows, tree hollows and rock rifts created heavy friction, arrest and breakage of the harness fasteners. Mourão and Medri (2002) tested the use of an inexpensive, large-scale assembled GPS radiocollar to monitor free-ranging giant anteaters in the Pantanal over short time intervals.

Here, we describe our experience of fitting radio transmitters on giant anteaters. The studies took place at Emas National Park (18°15'S, 52°53'W), Cerrado region of central Brazil, and at Nhimirim Ranch (18°59'S, 56°39'W), Pantanal region of western Brazil.

At Emas National Park we used harnesses by Telonics Inc., using techniques from captive individuals at the Brasília Zoo. The harnesses were made of nylon and had five pieces: one strap with a circumference of 56 cm around the neck, one strap with a circumference of 86 cm around the thorax, one strap of 31.5 cm linking both straps, where the transmitter was attached, and two straps of 31 cm (one at each side of the animal), to provide better stability of the harnesses (avoiding movements of the harnesses due to the transmitter's weight). The transmitters were positioned above the animal, and the flexible antenna on the back of the transmitter was inclined about 45 degrees (Fig. 1).

Fifteen giant anteaters were captured and equipped with these harnesses. The monitoring period, sex and age of each anteater and



**FIGURE 1.** Giant anteater equipped with harness at Emas National Park, Brazil.

**TABLE 1.** Period of monitoring and evaluation of the transmitter attachment methods at Emas National Park and Nhumirim Ranch.

No.	Sex	Capture date	Last location	Recaptures	Equipment evaluation
ENP 1	M	07/25/2001	09/19/2001	-	Signal lost, not evaluated
ENP 2	M	07/27/2001	01/29/2003	01/29/2003	Antenna broken, harness intact
ENP 3	M	07/28/2001	08/15/2002	08/15/2002	Antenna and one lateral strap broken
ENP 4	M	08/28/2001	01/27/2003	01/27/2003	Antenna and harness intact
ENP 5	M	08/28/2001	01/28/2002	-	Signal lost, not evaluated
ENP 6	M	08/29/2001	08/22/2002	-	Signal lost, not evaluated
ENP 7	F	08/29/2001	10/21/2002	08/11/2002	Antenna and harness intact; signal lost in October 2002
ENP 8	F	08/29/2001	05/08/2002	01/22/2002	Antenna and harness intact; signal lost in May 2002
ENP 9	F	08/30/2001	10/25/2001	-	Signal lost, not evaluated
ENP 10	M	08/31/2001	01/29/2003	01/28/2003	Antenna broken, harness intact
ENP 11	M	08/31/2001	08/05/2002	01/23/2002	Antenna broken, harness intact
ENP 12	M	08/31/2001	05/10/2002	08/16/2002	Antenna broken, harness intact
ENP 13	M	09/01/2001	01/22/2002	01/22/2002	Antenna broken, harness intact
ENP 16	F	08/14/2002	01/27/2003	01/27/2003 *	Antenna and one lateral strap broken
ENP 20	F	08/19/2002	01/28/2003	01/28/2003	Antenna and harness intact
Nhu 1	F	03/17/2001	03/19/2001	-	Signal lost, not evaluated
Nhu 2	M	03/29/2001	12/05/2001	09/20/2001, 10/03/2001 and 12/05/2001	Collar intact
Nhu 3	F	03/31/2001	12/14/2001	12/05/2001 and 12/14/2001	Collar intact
Nhu 4	M	04/04/2001	09/04/2001	-	Collar intact
Nhu 5	M	04/23/2001	10/03/2001	10/03/2001	Collar intact
Nhu 6	M	04/25/2001	12/04/2001	12/04/2001	Collar intact
Nhu 7	M	09/20/2001	12/14/2001	-	Collar intact

\* Visual contact; not captured.

the evaluation of the harnesses' efficiency are summarized in Table 1. Ten of the captured giant anteaters were recaptured and both the animals and the harnesses were examined for injuries and damages. One of the anteaters not recaptured (ENP 16) was seen after the transmitter failed (in February 2003), and therefore an evaluation of the animal and harness condition could also be made. We could not evaluate the efficiency of four harnesses, because the transmitters failed after two to fifteen months from the first capture, probably due to antenna breakage. After two to twenty months of monitoring, none of the anteaters lost their harness, and they showed no sign of injury. The lateral straps of two harnesses were broken after six and twelve months, respectively. Some antennas broke, and this component was the most fragile point of the system.

At Nhumirim Ranch, we used standard collars, made of leather, but attached to the anteater's thorax (scapular waist), with the transmitter positioned below the animal (Fig. 2). We captured and equipped seven giant anteaters, and the monitoring period varied from two to 259 days (Table 1). Except for the individual Nhu 1, all anteaters were seen periodically and we were able to evaluate the condition of the collar. One giant anteater had wounds on the back, close to the collar, which could have been caused by irritation from the collar. This individual was seen one week before and did not show signs of any injury. Another giant anteater was found dead two weeks after its last telemetry location, but it was not possible to determine the cause due to the advanced state of decay. There was no evidence of injuries caused by the collar to the anteater that could have led to its death.



**FIGURE 2.** Giant anteater equipped with collar at Nhimirim Ranch, Brazil.

Both the harnesses and the collar attached to the thorax were effective methods to fix transmitters on giant anteaters. The damage to the animal was minimal and the anteaters could be monitored for a relatively long time. The harness has the advantage of allowing better signal transmission due to the location of the transmitter on the back of the anteater. The harness also could be adjusted more comfortably to the animal. The collar needs to be adjusted much more firmly to avoid rotation and for positioning the transmitter in the ventral region, and was not accurate for monitoring fast-growing juveniles or pregnant females. The external antennas of the harness were not very effective and the internal antenna (built into the collar) produced better results. Therefore, the combination of harness and internal antennas seems to be the best method to fit radio-transmitters on giant anteaters.

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### Observations of *Xenarthra* in the Brazilian Cerrado and Guyana

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