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Food Habits of Four Armadillo Species in the Cerrado Area, Mato Grosso, Brazil

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Teresa Cristina da Silveira Anacleto (2007) Food habits of four armadillo species in the Cerrado area, Mato Grosso, Brazil. *Zoological Studies* **46**(4): 529-537. Studies based on scatology can substantially improve our knowledge of armadillo ecology. This study describes the food habits of armadillo species in the Cerrado area of Mato Grosso, Brazil by examining fecal samples. Collection of feces occurred through walking along linear transects, occasionally capturing free-living armadillos, and finding dead armadillos. In total, 19 samples from 4 species were examined: *Priodontes maximus* (*n* = 8), *Euphractus sexcinctus* (*n* = 8), *Dasypus novemcinctus* (*n* = 2), and *Cabassous unicinctus* (*n* = 1). Feces of *P. maximus* and *E. sexcinctus* were characterized by their size, odor, and consistency. Feces size did not considerably vary among species, but the odor and consistency were more distinctive. In total, 21 categories of food items were identified. Termites, ants, and beetles were the most frequent prey. Fecal samples of all species also contained high percentages of soil particles. *Euphractus sexcinctus* had the most diverse diet, including invertebrates, plants, and vertebrates. *Dasypus novemcinctus* basically consumed Isoptera (5 species). *Priodontes maximus* and *Cabassous unicinctus* had less-diverse diets. Diets of certain pairs of species overlapped more than others. Insects were a prey category important to all species, thus leading to overlapping niches. However, when prey biomass was considered in the analyses, the niche of *E. sexcinctus* was considerably distinct from those of the other species.
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The Dasypodidae is the most widespread family of the order Xenarthra, occurring from the US to Argentina (Emmons and Feer 1990, Nowak 1991, Eisenberg and Redford 1999). In Brazil, where 10 armadillo species have been recorded, several species may occur in a given area (Emmons and Feer 1990, Eisenberg and Redford 1999). The Cerrado is the 2nd largest Brazilian biome in area (Eiten 1993) and has been predicted to harbor 8 armadillo species: *Cabassous unicinctus*, *C. tatouay*, *Dasypus kappleri*, *D. novemcinctus*, *D. septemcinctus*, *Euphractus sexcinctus*, *Priodontes maximus*, and *Tolypeutes tricinctus* (Anacleto et al. 2006). However, because most of these species are fossorial and nocturnal, we still know little about their biology and ecology in this region.

Knowledge of the food items and feeding habits of mammal species is essential to understanding their evolutionary, ecological, and behavioral responses to the environment and to other species (Ewer 1973, Dietz 1987, Law and Blackford 1992, Johnson et al. 1996). Several techniques have been developed to study the diet of mammals (Dickman and Huang 1988, Sikes et al. 1990, Farfán and Milón 2001). The analysis of stomach contents has often been used in studies of armadillo feeding habits, especially for *D. novemcinctus* (Clark 1951, Breece and Dusi 1985, Wirtz et al. 1985, Sikes et al. 1990). Although providing estimates of prey consumed, the deaths of the organisms due to collection may have a poten-

tial negative impact on endangered or threatened species. Thus, stomach analyses might not be the ideal choice for Brazilian species. Instead, analysis of feces may be more appropriate. Studies based on scatology have increased in number since the 1970s (Putman 1984, Kohn and Wayne 1997) and have become more sophisticated with the development of new chemical (Major et al. 1980, Fernandez et al. 1997) and molecular (Reed et al. 1997) techniques.

Armadillos show great dietary variation, including carnivore-omnivores, generalist insectivores, and specialist insectivores (Redford 1985). Numerous studies have examined the food habits of Dasypodidae species (Baker 1943, Wirtz et al. 1985, Szeplaki et al. 1988, Sikes et al. 1990, Bolkovic et al. 1995), but almost exclusively in North America. Similar studies conducted in the Cerrado are rare (Guimarães 1997, Anacleto and Marinho-Filho 2001, Bonato 2002), despite the high diversity of armadillo species found there (Anacleto et al. 2006). *Priodontes maximus*, *D. novemcinctus*, *E. sexcinctus*, and *Cabassous unicinctus* are sympatric throughout most of their geographic distributions (Emmons and Feer 1990, Eisenberg and Redford 1999), including the Cerrado. The aims of this study were to collect fecal samples from these 4 species to verify if feces vary among species (in size, odor, or consistency) and to examine the food habits and interspecific variations in the diets. Food habits were determined from analysis of the frequency and biomass of consumed prey. Results are discussed in terms of the sympatric occurrence of these armadillo species in the Cerrado.

MATERIALS AND METHODS

Study area

This study was conducted in a floodplain located between the hydrographic basins of the das Mortes and Araguaia Rivers, in the western Cerrado of Brazil (Fig. 1). Landscapes in this floodplain are typical of the Cerrado region, with mosaics of forest, savanna, and grassland vegetation. The climate is tropical, with 2 well-defined seasons: a dry period (May-Oct.) and a rainy period (Nov.-Apr.). The mean annual precipitation is 1400 mm, and the mean annual temperature is 25°C (Meteorological Station of Nova Xavantina, Mato Grosso). Nine private rural properties and a governmental area (Araguaia State Park) were vis-

ited for sampling between Apr. and Oct. 2004.

Feces collection and analyses

Collection of feces occurred in 3 situations. 1) Walking along linear transects, set in forest, savanna, and grassland vegetation. In total, 139 transects (259 km) were walked. Identification of the species which produced a given feces was based on evidence found along transects, such as tracks and burrows, that were unique to each species. 2) Occasionally capturing free-living armadillos, which were released after having defecated. 3) Discovering dead armadillos. On 2 parcels of private rural property, 1 *E. sexcinctus* and 1 *D. novemcinctus* were found dead (probably killed by a vehicle) on a road, near a transect. In both cases, fecal pellets were collected from the intestines.

Feces was initially placed in paper envelopes for temporary storage. In the laboratory, the feces was dried for 24 h at 60°C then measured (width and length) and weighed. Subjective assessments of odor and consistency were also recorded. Afterwards, a sample (2 pellets) was randomly
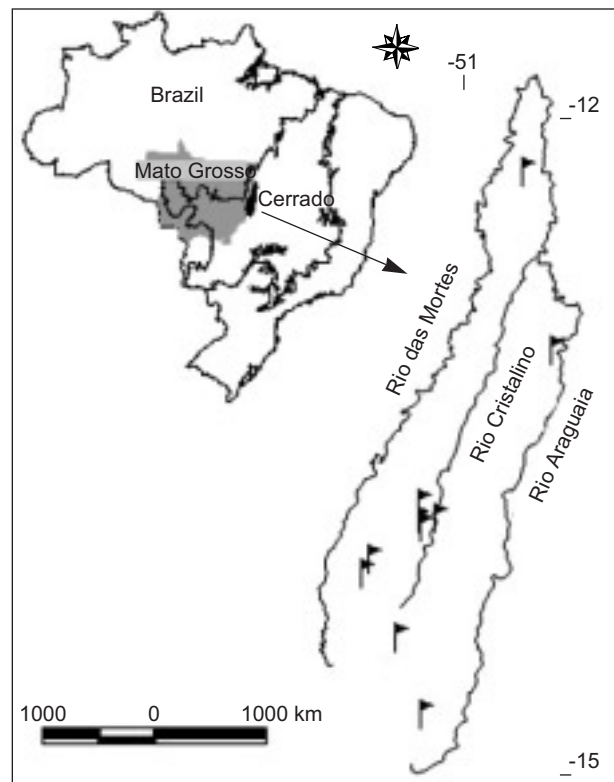

Fig. 1. Location of the study area, in the Cerrado of Mato Grosso state, Brazil. The nine private properties and Araguaia State Park are shown (▸).

selected. The choice of 2 pellets per individual was made because this was the smallest observed sample along the study, so sampling efforts could be easily standardized.

Each sample was stored in water for 24 h and later washed through a 2 mesh sieve (1.0- and 0.8 mm diameters) and a paper filter. Fecal components retained by the mesh were separated while being viewed through a stereomicroscope. They were then identified to the lowest taxonomic level possible and counted. Plant fragments were separated out. These, along with other very fragmented or digested components, and soil particles retained by the paper filter, were air-dried for 10 d before being weighed.

Items found in the feces were identified by specialists (see "Acknowledgments"). Prey were identified by the body part most-often retained in samples. Termites and ants were counted based on the numbers of cephalic capsules. For other items, the most resistant part that permitted taxon identification was considered 1 individual per sample. A rib bone led to the identification of an Anuran, while scales led to the identification of a Lacertilia specimen. I did not attempt to identify vegetal items, which consisted mainly of pulp, fruits, seeds, and pieces of leaves. Instead, just the dry weight of this material was recorded. The same was done for soil particles (which also contained very fragmented or much-digested components). The weights of soil particles were represented by average values for individual samples for each species.

The frequency of occurrence (fo) of each food item was calculated based on the total number of samples. The relative frequency (fr) was calculated in relation to the total quantity of items ingested. I also estimated the total biomass of each prey type that was consumed. Biomass values of individual prey items were based on literature data (Redford and Dorea 1984, Motta-Junior 1996, Guimarães 1997, Granzinolli 2003) and experts' opinions. In the case of the unidentified Anuran and Lacertilia species, the body mass of a small-sized species often found in the study area was considered. The total biomass ingested was then calculated by multiplying the minimal number of prey ingested by the estimated biomass of each (Emmons 1987).

To verify variations in the diets of armadillos, a correspondence analysis was performed. Prey were divided into 5 groups: arachnids, insects, Chilopoda, other invertebrates, and vertebrates. The biomass of each group was used in the analy-

sis. This analysis was performed using Statistica 6.0 (StatSoft 2001). This program produces a diagram in which food items and armadillo species are simultaneously ordered.

Niche overlap was estimated using 4 different data: the proportion of items consumed, the biomass of items consumed, the proportion of items in groups, and the biomass of items in the groups. The groups were the same ones used in the correspondence analysis. Pianka's index (Gotelli and Graves 1996) was calculated in each case. This index is symmetrical, and its values lie between 0 and 1. Low values indicate low overlap between the diets of 2 species, while higher values indicate more-complete overlap (Gotelli and Graves 1996).

RESULTS

In total, 22 fecal samples were found. Most (14) were collected on trails or in burrows. Six were obtained from live animals, and 2 from dead ones. Of these 22 samples, 3 were not examined because identification of the armadillo species was uncertain. These unexamined fecal samples were fragmented (probably by other animals) and located far from burrows and tracks. Thus, 19 samples of 4 species were examined: *P. maximus* (n = 8), *E. sexcinctus* (n = 8), *D. novemcinctus* (n = 2), and *C. unicinctus* (n = 1). Most fecal samples (62.5%) were found at burrow entrances or on associated excavated soils. Other fecal samples were found along trails of each species (25.0%) or at foraging excavations (12.5%).

Feces characterization

Only fecal samples of *P. maximus* (n = 8) and *E. sexcinctus* (n = 2) were characterized (Table 1). Others fecal samples of *E. sexcinctus*, *D. novemcinctus*, and *C. unicinctus* were collected from dead or captured animals. They are not described because their shape, consistency, and odor might have been considerably modified, making characterization inadequate.

Diet composition

In total, 21 categories of food items were found in the diet of the 4 species studied (Table 2). They comprised 4 insect orders (Coleoptera, Hymenoptera, Isoptera, and Orthoptera), 2 Arachnida (Araneae and Acarina), 2 unidentified classes of Miriapoda (Chilopoda), and 2 orders of

vertebrates (Anura and Squamata).

Euphractus sexcinctus had the most diverse diet (15 types of food items). Items with a higher frequency of occurrence in its diet were Hymenoptera (fo = 87.5%, *n* = 7) and Coleoptera (fo = 62.5%, *n* = 5). Fecal samples of *E. sexcinctus* were the only ones to contain vertebrates.

Priodontes maximus consumed 8 types of food items, with higher frequencies of Hymenoptera (fo = 100%, *n* = 8) and Isoptera (fo = 87.5%, *n* = 7). Eight food items were found in the feces of *D. novemcinctus*. Hymenoptera, Isoptera, and Coleoptera were found with equal frequencies of occurrence (fo = 100%, *n* = 2). This species consumed a high diversity of Isoptera (5 species). The only fecal sample of *C. unicinctus* had 4 food items, with a predominance of termites (fr = 99.0%).

Hymenoptera and Isoptera were the preferred prey of all armadillo species. *Priodontes maximus* and *E. sexcinctus* consumed high numbers of Hymenoptera. The other species basically consumed Isoptera. In relation to the consumed biomass, Coleoptera specimens were part of the diet of 3 species, but were predominant only in that of *D. novemcinctus*. *Cornitermes* predominated the diets of *P. maximus* and *C. unicinctus*, while Lacertilia represented most of the biomass consumed by *E. sexcinctus* (Table 2).

Table 1. Feces description of 2 armadillo species found in the Cerrado area of Mato Grosso State, Brazil. Values within brackets are standard deviation

Characteristic	*Priodontes maximus*	*Euphractus sexcinctus*
Width (mm)	14.7 (± 1.7)	15.0 (± 1.5)
Length (mm)	22.7 (± 3.0)	20.0 (± 1.3)
Weight (g)	2.8 (± 0.9)	2.3 (± 0.8)
Consistency	firm	fragile
Odor	weak	strong
Site of deposition	burrow entrances and excavated soils	excavated soils and along trails

Table 2. Relative frequency (Fr%) and biomass (Bp%) of prey consumed by armadillos in the Cerrado area of Mato Grosso State, Brazil

Item	*Priodontes maximus* (*n* = 8)		*Euphractus sexcinctus* (*n* = 8)		*Dasypus novemcinctus* (*n* = 2)		*Cabassous unicinctus* (*n* = 1)	
	Fr%	Bp%	Fr %	Bp%	Fr%	Bp%	Fr%	Bp%
Invertebrates								
unidentified	0.0	0.0	0.7	> 0.1	0.0	0.0	0.0	0.0
unidentified egg	0.2	> 0.1	0.0	0.0	0.0	0.0	0.0	0.0
Acarina	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.3
Araneae	0.0	0.0	0.4	0.7	0.0	0.0	0.0	0.0
Coleoptera								
unidentified	0.1	4.9	1.0	3.6	1.1	71.3	0.0	0.0
Scarabaeidae	0.1	6.2	0.7	3.1	0.0	0.0	0.0	0.0
Hymenoptera								
unidentified	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.0
Formicidae	56.8	27.5	72.8	1.9	32.6	16.5	0.0	0.0
Isoptera								
unidentified	0.0	0.0	0.0	0.0	22.3	3.8	86.5	42.5
Anhangatermes	0.0	0.0	0.0	0.0	6.5	0.8	0.0	0.0
Coptotermes	0.1	> 0.1	0.0	0.0	0.0	0.0	0.0	0.0
Cornitermes	36.8	60.6	17.4	1.6	0.5	0.9	11.5	56.7
Nasutitermes	0.7	0.2	0.0	0.0	14.7	3.7	0.0	0.0
Rhynchotermes	0.0	0.0	0.4	> 0.1	6.0	1.0	1.0	0.5
Velocitermes	5.2	0.6	2.4	> 0.1	16.3	2.0	0.0	0.0
Lepidoptera	0.0	0.0	0.7	1.8	0.0	0.0	0.0	0.0
Orthoptera	0.0	0.0	0.7	2.2	0.0	0.0	0.0	0.0
Other Insecta	0.0	0.0	0.7	> 0.1	0.0	0.0	0.0	0.0
Chilopoda	0.0	0.0	0.7	1.8	0.0	0.0	0.0	0.0
Anura	0.0	0.0	0.4	9.2	0.0	0.0	0.0	0.0
Lacertilia	0.0	0.0	0.7	73.9	0.0	0.0	0.0	0.0

Euphractus sexcinctus consumed food items with a substantial range in weight (1.1-20,000 mg). *Priodontes maximus* and *D. novemcinctus* fed on small prey (< 1000 mg) (Fig. 2). Prey weighing between 1.0 and 10.0 mg were the most abundant in all diets.

The correspondence analysis showed the existence of interspecific variations in the diet of the species selected (Fig. 3). The Eigenvalues of the 2 main axes were 99.86% and 0.14% of the variance of the prey biomass. This analysis separated *E. sexcinctus* from the other species. Vertebrate, Chilopoda, and arachnids were clearly separated from other prey categories.

Niche overlap varied according to the measure used. Using the relative frequency of prey (not grouped), niche overlap was highest between *P. maximus* and *E. sexcinctus* (0.94). This occurred due to similar consumption of Formicidae and *Cornitermes* by both species. When the prey were grouped, overlap was high between all species (0.99), due to intense ingestion of insects by all species. Using biomass (categories not grouped), overlap was highest between *P. maximus* and *C. unicinctus* (0.72), mainly due to a high consumption of *Cornitermes*. When the biomass was grouped, overlap was high (1.0) for most pairs of species. The only exception was *E. sexcinctus* (0.16), which consumed vertebrates.

Soil particles were found in all fecal samples. Higher mean percentage values were found in the feces of *P. maximus* (85%) and *D. novemcinctus* (78%). Values were slightly lower in *E. sexcinctus* (62%) and *C. unicinctus* (63%). Plant fragments were found at low mean percentage values in 3 species: *E. sexcinctus* (18%), *P. maximus* (0.1%), and *D. novemcinctus* (0.5%). Plant resources were not found in the feces of *C. unicinctus*.

DISCUSSION

Rather than killing animals and examining gut contents, the collection of feces can be used to assess armadillo diets, at a low cost and with minimal technology. Despite the small sample size in this study, some valuable inferences may be drawn about this relatively unstudied group.

Feces characterization

Feces of *P. maximus* had a firm consistency and a weak acrid odor. The surface was flat, and ant, termite, and coleopteran remains could be observed with the naked eye. The odor was probably caused by formic acid, due to the predominance of termites and ants in the diet, while the firm consistency may have resulted from the frequent ingestion of soil. Feces of *E. sexcinctus* had a crumbly consistency and a strong odor (probably due to a mix of formic acidic and decomposing vegetal matter). The surface was irregular and plant particles could be observed. It is known that the consumption of leaves, shoots, and fruits produces soft, easily broken feces in tropical ecosystems (Chame 2003).

In this study, fecal samples of *P. maximus* were found on soil excavated from the burrow and in intact areas, similar to findings in the eastern Cerrado (Minas Gerais state, Anacleto and Marinho-Filho 2001). Such feces deposition is likely a form of behavior related to territory or burrow demarcation. Fecal samples of *E. sexcinctus* were found spread along trails in open areas, but feces of *D. novemcinctus* and *C. unicinctus* was not. *Dasypus novemcinctus* preferred closed areas (forests), which made it difficult to find its feces. *Cabassous unicinctus* has strong fossorial habits (Eisenberg and Redford 1999), and its feces is probably deposited within its burrows.

Signs repeatedly left by armadillos need to be associated with other evidence so that the species can be identified. The results obtained here showed that feces might be just such evidence, in addition to providing insights into aspects of armadillo biology such as diet composition.

Diet composition

Although the studied species have different fossorial (Vizcaíno et al. 1999) and foraging (Redford 1985) habits, specimens of Hymenoptera, Isoptera, and Coleoptera were the most frequent prey in all diets. Diets differed
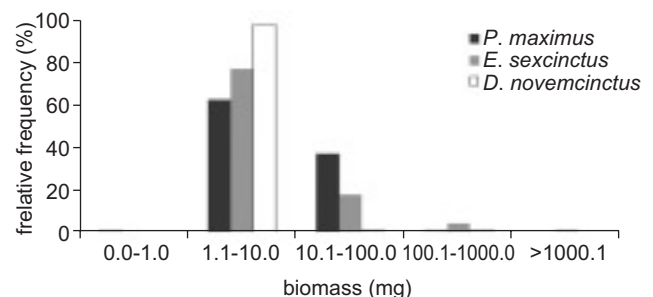
Fig. 2. Biomass of prey consumed by *Priodontes maximus* (*n* = 8), *Euphractus sexcinctus* (*n* = 8) and *D. novemcinctus* (*n* = 2).

among species, but diets of certain species pairs overlapped more than others.

Digging behavior is part of the feeding strategy of many armadillo species. *Dasypus novemcinctus* is recognized as a generalist insectivore (Redford 1985). Based on 2 samples analyzed, its diet included beetles, ants, and Isoptera. *Dasypus novemcinctus* consumed 5 different species of termites. Among these, *Nasutitermes* and *Velocitermes* were dominant. Nests of these 2 termite groups are easily opened (Negret and Redford 1982), suggesting that *D. novemcinctus* excavates nests to obtain its food. These termites have a chemical defense considered to repel armadillos (Coles 1980). It seems likely that, for *D. novemcinctus*, the chemicals produced by numerous nasute soldiers are easier to overcome than the harder, much more-resistant nests typical of large termites with a mandibulate defense. Termites and ants are remarkably abundant in South American regions, including the Cerrado (Cavalcanti 1999). Therefore, *D. novemcinctus* seems to exploit prey that are readily available in its habitat.

Priodontes maximus and *C. unicinctus* are considered to be powerful diggers (Vizcaíno et al. 1999). These 2 armadillo species, possessing large falciform nails, consumed large amounts of Isoptera. *Priodontes maximus* consumed mostly

Cornitermes specimens (by frequency and biomass), which are common in a wide range of habitats in Brazil, including disturbed areas (Constantino 1999). Their nests are resistant (Negret and Redford 1982) to being opened, requiring considerable effort. Considering these prey categories, *P. maximus* seems to specialize on prey more difficult to capture. This strategy was also previously noted (Barreto et al.1985, Anacleto and Marinho-Filho 2001). *Cabassous unicinctus* consumed only termites, but *Cornitermes* was not a major part of the diet. Although only a single fecal sample of *C. unicinctus* was available, it may be possible to make comparisons between *P. maximus* and *C. unicinctus*. These 2 species displayed the greatest potential for competition because they are in the same subfamily (Tolypeutinae) (Delsuc et al. 2004), are reported to be specialist insectivores (Redford 1985), and in this study, mostly consumed termites. However, there seems to be some niche separation in the species of termites utilized (Table 2).

Euphractus sexcinctus rarely digs (Vizcaíno et al. 1999) and is considered a carnivore-omnivore (Redford 1985). The diet of this species was more varied, including ingestion of anurans and lizards. However, the predominance of *Cornitermes* might be an indication of its good digging skills. Some
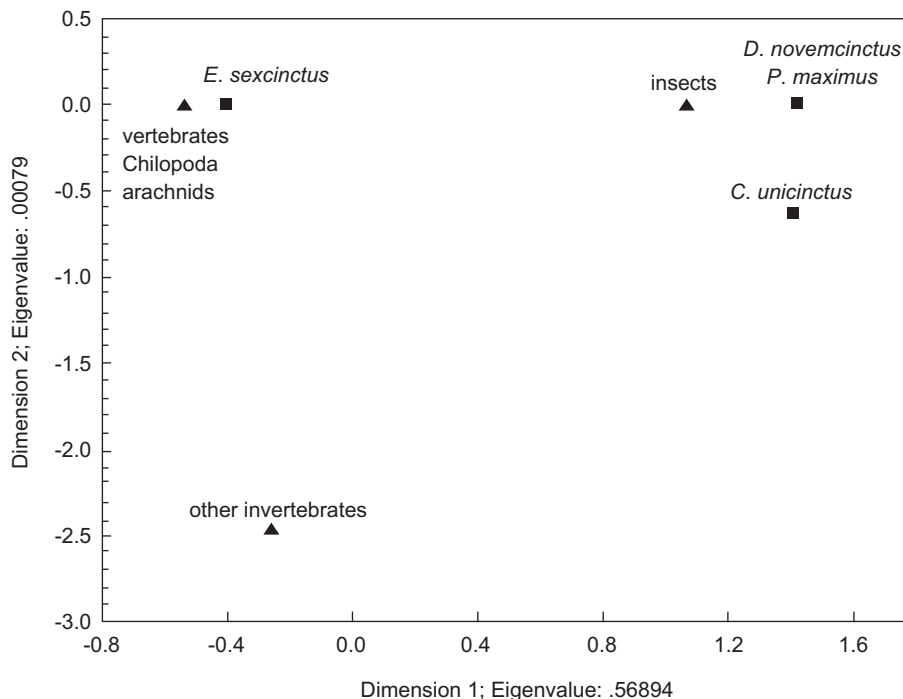

Fig. 3. Correspondence Analysis showing the relation of armadillo species with the categories of pley biomass found in their feces.

terrestrial anurans (Brandão and Araújo 2001) and lizards (Sluys 1992) can be found within termite nests. It is likely that the vertebrates found in the diet of *E. sexcinctus* were captured during foraging activities in termite nests.

The mean percentage value of soil particles was high for all species. The relatively higher amounts of soil consumed by *P. maximus* and *D. novemcinctus* likely result from their great preference for termites and ants, which might lead to accidental ingestion of pieces of the nest. As *E. sexcinctus* also feeds on vertebrates and plants, its contact with ant and termite nests might be more limited. However, geophagy (the intentional ingestion of soil) might occur. Numerous valuable elements with nutritional properties (Reilly and Henry 2000), antitoxins (Houston et al. 2001), and high concentrations of sodium and potassium (Aufreiter et al. 1997) are features of soil and, thus, characteristic of ant and termite nests. Whether accidental or not, the ingestion of soil particles might have costs as well as benefits. For example, armadillos inhabiting contaminated environments might be threatened by parasites, heavy metals, or toxic agents present in the soil.

Only 2 species ingested plants. The consumption of vegetation by *D. novemcinctus* might be related to seasonal variation in its diet or represent accidental ingestion. *Dasypus novemcinctus* actively eats fruit when available (Breece and Dusi 1985). However, my study was restricted to the dry period, when fruiting is low in the Cerrado. Thus, the few plants found in the feces were probably consumed accidentally. In contrast, plants were important in the diet of *E. sexcinctus*, confirming previous studies (Schaller 1983, Bonato 2002, Anacleto pers. obs).

Methodologies measuring the frequency and percentage volume of prey items have often been used in studies of armadillo diets (Kalmbach 1944, Schaller 1983, Redford 1985, Barreto et al. 1985, Breece and Dusi 1985, Wirtz et al. 1985, Szeplaki et al. 1988, Sikes et al. 1990). However, assessments of prey biomass may provide a better estimate of the relative importances of different food items. Such analyses can be problematic though, because they can overestimate the consumption of a prey category, especially if ingestion of a whole item is assumed from fragments found in the feces. In my study, only the diet of *E. sexcinctus*, which often consumed relatively large prey, might have been affected by this. Therefore, analysis of ingested biomass was considered useful in this study.

Coleoptera, Isoptera, and Lacertilia represented most of the biomass consumed by *D. novemcinctus*, *P. maximus*, and *E. sexcinctus*, respectively. Prey represented by a few individuals might be an important energy source for *D. novemcinctus* and *E. sexcinctus*. Although *P. maximus* ingested relatively large amounts of Hymenoptera, *Cornitermes* (Isoptera) was important in its diet. This indicates that consuming prey occurring in high numbers, but with little biomass, might represent an alternative foraging strategy. The approach based on biomass confirmed the trophic classification obtained by other analyses. The high frequencies of termites and ants in the diets of *P. maximus*, *D. novemcinctus*, and *E. sexcinctus* highlight the ingestion of small prey items (between 1.1 and 10.0 mg).

The correspondence analysis separated *E. sexcinctus* from the others armadillos. *Dasypus novemcinctus*, *P. maximus*, and *C. unicinctus* were clustered fairly closely to one another because they basically consumed Isoptera and Hymenoptera; they were classified as insectivores. *Euphractus sexcinctus* was distant from the other species due to its omnivorous-carnivorous habits. These trophic categories agree with the classification proposed by Redford (1985).

Niche overlap between these species was principally due to the consumption of insects. When the biomass of grouped categories was considered, only *E. sexcinctus* showed a smaller overlap with other species, due to its consumption of vertebrates. Nonetheless, given the extensive overlap between certain species pairs, the question becomes: How do these sympatric species manage to coexist ?

Formicidae and *Cornitermes* were consumed in great quantities by *P. maximus* and *E. sexcinctus*. However, the 2 species may be able to coexist because they forage in different habitats. *Euphractus sexcinctus* is often found in native open vegetation (Carter and Encarnação 1983) and in disturbed areas, mainly exotic pastures (Anacleto pers. obs). Its home range is about 957 ha (Encarnação 1986). *Priodpntes maximus*, the largest living armadillo species, has a smaller home range (of about 725 ha) (Encarnação 1986) and is more often found in Cerrado areas covered by native vegetation (Anacleto and Marinho-Filho 2001). Similarly, although Isoptera was very important in the diet of both *D. novemcinctus* and *C. unicinctus*, *D. novemcinctus* consumed low quantities of several different species while *C. unicinctus* consumed high quantities of workers of

a single, unidentified termite species (smaller than *Cornitermes*).

Coleoptera, Hymenoptera, and Isoptera predominated in the diets of all species. These are abundant organisms (Borror and DeLong 1969, Mill 1983, Domingos et al. 1986, Hölldobler and Wilson 1990). Predation on these social insects might be advantageous, as they represent a concentrated and abundant food source. Further, termite nests might harbor up to 14 termite species (Domingos et al. 1986), as well as ants, spiders, and scorpions (Domingos 1982). *Dasypus novemcinctus* spends nearly 18 h a day sleeping and resting. It spends the remaining short period feeding (McDonough and Loughry 1997). The other species in this study might show a similar strategy. With the short time available to search for food items, ingestion of the most abundant and available prey might be an adaptive foraging strategy for these animals.

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