

ECOLOGY OF SMALL MAMMALS IN A GALLERY
FOREST OF CENTRAL BRAZILLESLIE ZUHN NITIKMAN¹MICHAEL A. MARES²

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ABSTRACT

A 7-month mark-recapture study of small mammals was conducted on a 1-ha plot in a gallery forest associated with the Cerrado grasslands of central Brazil. The natural history of small mammals in these forests is poorly known. Ten species were caught: two marsupials (*Monodelphis americana* and *Marmosa agilis*) and eight rodents (*Oryzomys bicolor*, *O. capito*, *O. concolor*, *O. nigripes*, *Rhipidomys mastacalis*, *Akodon cursor*, *Bolomys lasiurus*, and *Oxymycterus roberti*). The present study provides information on a number of life-history characteristics (body size, sex ratios, age class ratio, biomass estimates, survivorship estimates, movement patterns, and habitat utilization patterns). *M. agilis* was the most commonly captured arboreal species (192 times), and *B. lasiurus* was the most frequently caught terrestrial species (141 times). *M. agilis* had the longest mean residency (56.1 days), as well as the highest mean number of captures per marked individual (12.0 times). *O. bicolor* traveled the greatest mean distance between successive captures (45.2 m). *O. concolor* males moved 45.3 m between consecutive captures, much further than female conspecifics (25.9 m). Movement patterns were analyzed for the six most common species (*M. americana*, *M. agilis*, *O. capito*, *O. concolor*, *O. nigripes*, *A. cursor*, and *B. lasiurus*); all exhibited nonrandom movement through the study area. Habitat variables were analyzed by principal component and cluster analyses in order to evaluate habitat preferences with respect to six distinct microhabitats: three types of semideciduous gallery forest (dense forest, vine tangle forest, and forest mosaic), two types of forest ecotones (forest edge and bamboo edge), and one disturbed area (fern thicket). *A. cursor* frequented the dense forest, whereas *O. capito* was caught primarily in dense forest and forest mosaic. *B. lasiurus* was captured almost exclusively in the two ecotonal microhabitats. *O. concolor* had an apparent preference for the fern thicket. *O. nigripes* was trapped more frequently in fern thicket and dense forest than was expected. *M. agilis* tended to avoid the fern thicket, but ranged randomly throughout all other microhabitats.

INTRODUCTION

The Cerrado is an endemic tropical savanna complex located in the highlands of central Brazil. The Cerrado exceeds 1.8 million km² in area (Ab'Sáber, 1971), occupying approximately 25% of Brazil's land area (Joly, 1970). It ranges from the northern part of the state of Goiás southward to western Minas Gerais state and from the western edge of the state of Bahia westward to eastern Mato Grosso and Rondônia states (Eiten, 1972). It is bordered by the Amazon rainforest to the north, semiarid Caatinga to the northwest, Atlantic Rainforest to the east, semiarid Chaco to the south, and Pantanal swamplands to the west.

The Cerrado is composed of four major habitats: cerrado sensu stricto (s.s.), cerradão, gallery forest, and campo (Eiten, 1972). The cerrado (s.s.) is the dominant habitat in the Cerrado vegetation complex. It is a sclerophyllous scrub woodland

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and is readily identified by its open canopy and twisted tree trunks and limbs. The *cerradão*, literally "big cerrado," is a taller, more dense scrub, practically a forest. The canopy is mostly closed and the trees are usually greater than 10 m in height. The gallery forest is a narrow band of vegetation, varying from a few meters to about 200 m in width, that occurs along permanent rivers and streams throughout the Cerrado; it is composed primarily of evergreen tree species. The gallery forest transition into savanna is abrupt; often the ecotone is no more than 5 m in width. Campo is a grassland that varies widely in structure from savannas with scattered low trees or shrubs (*campo cerrado*), to those with few but conspicuous shrubs (*campo sujo*), to prairies with essentially no woody plants (*campo limpo*). Floristically, the Cerrado region is the richest and most diverse savanna system in the world (Sarmiento, 1983). Heringer (1971) counted more than 300 plant species in 1 ha of cerrado (s.s.) in Distrito Federal. Heringer et al. (1977) listed 1063 vascular plant species for the entire Cerrado region and this list is not complete.

The gallery forest is one of the least-known habitats of the Cerrado. Floristically, the Cerrado in general is relatively well known, but only a few botanists have surveyed the gallery forest near Brasília (Barbosa et al., 1984; Ratter, 1980; I. Schiavini da Silva, personal communication). These preliminary studies suggest that gallery forests are very complex; neighboring forests can be markedly different in composition and form (Eiten, 1984). The gallery forest biota is diverse and shares a close affinity in terms of mammal species composition with the neighboring forests of the Amazon and the Atlantic Coast (Redford and Fonseca, in press). Although few, if any, mammals are endemic to gallery forests, many species range into central Brazil only via these mesic forest corridors (Alho, 1982; Redford and Fonseca, in press). To these forest mammals, the gallery forest is an extension of the Amazon or Atlantic rain forests, permitting them to range deeply into the Cerrado (Fonseca and Redford, 1984).

In spite of the great biotic diversity of the Cerrado, ecological studies of mammals are rare. Several recent investigations have provided valuable information on the ecology of various mammal species (e.g., Alho, 1979, 1981; Alho and Souza, 1982; Almeida et al., 1981; Borchert and Hansen, 1983; Dietz, 1981; Lacher et al., 1984; Mello, 1980; Paula, 1983; Pereira, 1982; Pereira and Alho, 1982; Redford, 1984; Souza, 1979; Souza and Alho, 1980). But even so, these studies represent relatively short-term efforts. Basic information on more species is required for advancements in theoretical work, such as analyses of ecosystems or patterns of adaptive radiation and speciation.

The objective of this study was to examine the ecology and natural history of small mammals in a Cerrado gallery forest. A small mammal community was studied using mark-recapture procedures over a 7-month period in 1984. In addition, data were obtained on climate and habitat structure.

STUDY SITE

The study site was located in a gallery forest on the Fazenda Água Limpa, a research and teaching field station jointly administered since the early 1960s by the Departamento de Agronomia and the Laboratório de Ecologia of the Universidade de Brasília. The field station (15°58'S, 47°57'W) encompasses 4062 ha and is located approximately 20 km SSW of downtown Brasília, Distrito Federal. The elevation is approximately 1000 m above sea level. Climatically, the region has a pronounced tropical wet and dry season, with the annual rainfall averaging 1526

mm (Eiten, 1984). The dry season lasts from three to four months during the Southern Hemispheric winter, during which the mean monthly rainfall is only 10.5 mm (Eiten, 1984). On average, 85% of the rain falls in a 6-month period from October to March. The mean daily temperature fluctuates little during the year. Based on a 20-year average for Brasília (1961–80), the mean seasonal temperature is 18.3°C in the two coldest months (June, July) and 21.5°C in the two warmest months (September, October) (Eiten, 1984).

Cerrado (s.s.) is the dominant vegetation type of Fazenda Água Limpa. Campo limpo also covers considerable area, including the higher ground towards the eastern boundary of the reserve. Cerradão is relatively rare within the reserve. Gallery forest occurs along the two permanent watercourses that run through the reserve (Capetinga Creek and Água da Onça). Both creeks eventually flow into Gama Creek, which in turn empties into Lake Paranoá in Brasília. The vegetation of Fazenda Água Limpa is discussed in more detail by Ratter (1980).

The 1-ha trapping grid was set in the Capetinga gallery forest, on the west side of the creek, approximately 3.5 km upstream from its confluence with Gama Creek. The grid was situated on a terrace that ranged from 2.5 to 10.0 m above the creekbed. The eastern edge of the grid ran along Capetinga Creek; whereas, the western edge was bounded by campo limpo habitat (Fig. 1). The Capetinga gallery forest showed evidence of human disturbance—there was some selective cutting of trees both during the study and in recent years. An overgrown network of trails still remained.

MATERIALS AND METHODS

Field Techniques

Trapping.—A 1-ha grid was established with 100 stations set at approximately 10-m intervals. The grid was irregularly shaped in order to fit the contours of the gallery forest (Fig. 1). Two collapsible Sherman traps (16 by 5 by 5 cm) were set at each station; one on the ground, next to low vegetation or alongside fallen trees, within a 1-m radius of the stake; the other in trees or vines up to 3 m off the ground and within a 2.5-m radius of the stake.

Trapping of small mammals was conducted from January through July 1984 (Table 1). There were seven trapping periods, roughly corresponding to each of the months. Trapping occurred 10 days/period during the first 5 months. In June, the trapping session was terminated after day 7; in July, traps were set for 11 days. During January, only 57 stations were used and only arboreal traps were set. A total of 12,170 trap-nights was completed on the grid—5800 trap-nights using ground traps and 6370 trap-nights using arboreal traps.

Live traps were baited with peanut butter, either plain or mixed with rolled oats. Traps were rebaited every two or three days as needed. When the minimum nighttime temperature was low enough to affect trap survivorship, cotton was added as insulating material. Animals trapped overnight were removed each morning. On several occasions, traps were checked in late afternoon to determine diurnal activity. Captured animals were marked by toe-clipping and examined to determine approximate age, and reproductive condition. They were then released immediately at the point of capture. Animals were weighed on the initial capture of each trapping period.

Voucher specimens (skin and skeleton) were prepared. They have been deposited in the collection at the Laboratório de Ecologia Animal, Universidade de Brasília and the Stovall Museum of Science and History, University of Oklahoma.

Data Analysis

Characterization of the habitat.—Microhabitats were defined using cluster and principal components analyses on 26 habitat variables. Thirteen variables were direct measurements from each of the 100 trapping stations on the grid (Table 2). Most variables are self-explanatory. Density of trees was calculated as follows. At each station, a pair of trees (with DBH ≥ 9 cm) was marked within a 5-m radius of the stake at each station. The closest tree to the stake was selected as the "A" tree of the pair. The "B" tree was chosen as the one closest to the "A" tree. In all, 174 trees were marked. In

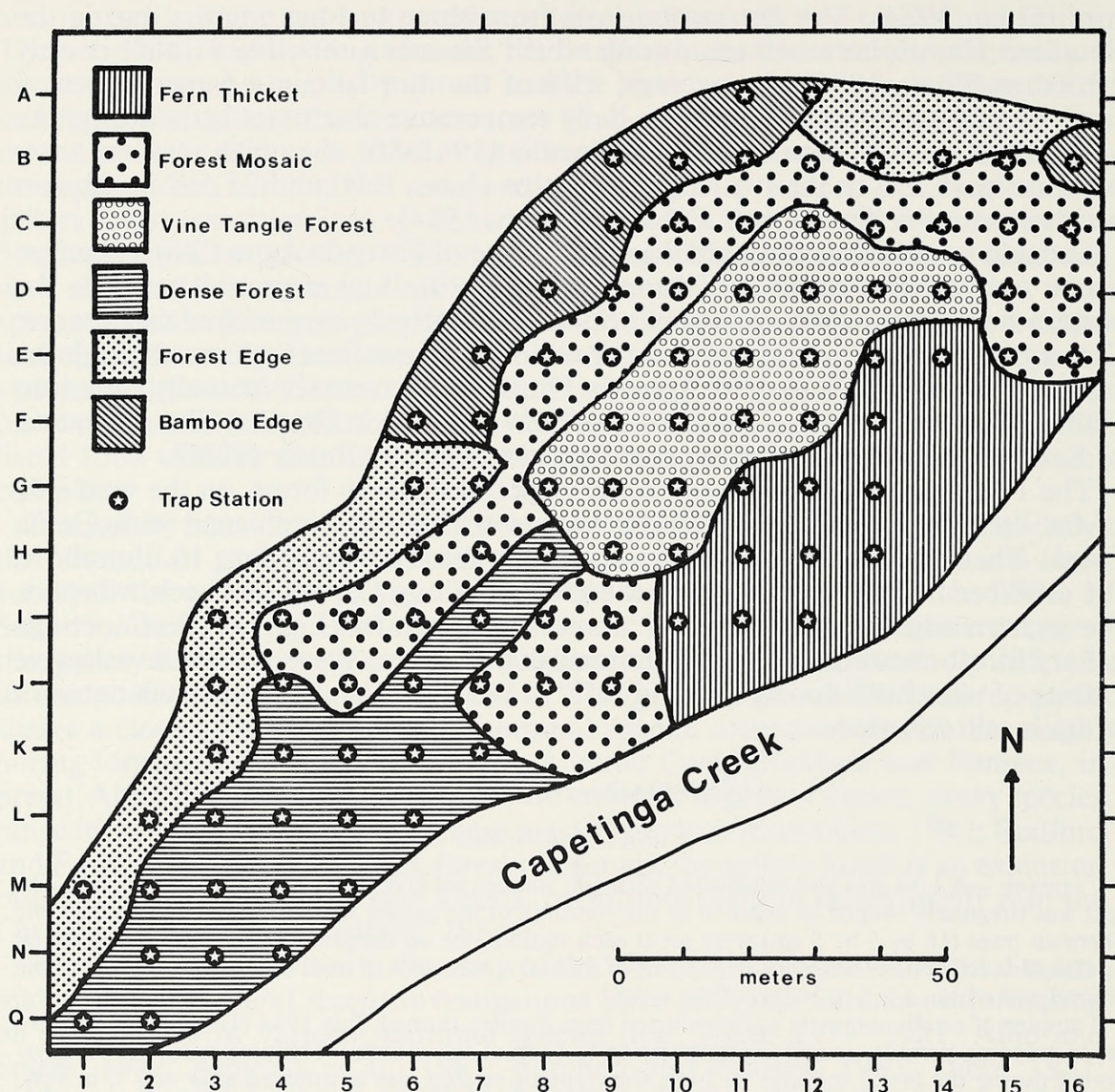


Fig. 1.—Map of the Capetinga study area.

order to include variables that described the area that surrounds each station, 13 more variables were calculated. These were the mean values for each of the original variables of the stations immediately surrounding each station. The number of adjacent stations included in these calculations varied from 1 to 4, depending on the position of the station on the grid. Raw data were standardized (i.e., to make the character mean 0 and the variance 1), and a dendrogram was constructed using the unweighted pair-group method using arithmetic averages (UPGMA; Sneath and Sokal, 1973) on an average distance matrix. Many of these variables were correlated; thus, a principal components analysis was performed on standardized data to produce a new set of orthogonal components to summarize the character variance. Trap sites were projected onto the resulting components using the standardized data.

Computations were performed on the IBM System 3081 and an Apple II at the University of Oklahoma. Most of the analyses were done using the following computer packages: BIOM (Rohlf, 1982); NT-SYS (Rohlf et al., 1979); and SAS (Barr et al., 1979).

Species accounts.—Only species with a sufficient number of captures were included in analyses requiring statistical testing. Animals captured initially as subadults and recaptured later as adults were included in both age class categories for analyses that compared the two classes. Age classes were estimated using pelage, genital characteristics, and mass.

Population size was estimated by direct enumeration, based on the minimum number of individuals

Table 1.—*Dates of trapping periods and numbers of traps used at Capetinga.*

Period	Dates	Duration (in days)	No. traps		Total trap-nights
			Arboreal	Ground	
1	11–20 Jan	10	56	—	560
2	23 Feb–3 Mar	10	100	100	2000
3	20–29 Mar	10	100	100	2000
4	19–28 Apr	10	100	100	2000
5	13–22 May	10	100	100	2000
6	15–21 Jun	7	100	100	1400
7	14–24 Jul	11	100	100	2200

known to be alive during a particular trapping period. Biomass, defined as the combined mass (in grams) of conspecifics per hectare, was used as a measure of ecological dominance. Monthly biomass estimates for each species were determined by multiplying the minimum number of individuals known alive each month by the mean monthly mass of all animals captured.

Sex ratio and age class distributions were based on monthly capture data. Sex ratios for subadults and adults were calculated separately but were not reported unless statistically different. Deviations from the expected 1:1 ratio were tested for significance using χ^2 analysis.

Estimations of survivorship and longevity were made by examination of the mean and maximum number of days between the first and final captures. All individuals captured more than once were included in these calculations.

Body mass of species was examined when sufficient data were available. To examine possible seasonal differences or patterns in the distribution of body mass, data were compiled for each month.

Movement patterns of each species were examined by calculating the mean and maximum distance traveled between successive capture sites. All individuals captured more than once were included in these calculations. Reproductive data were based on external examination of captured animals and were not sufficient to permit analyses of annual cycles.

Patterns of habitat utilization were examined in terms of a species' use of three-dimensional space and choice of microhabitat. Use of three-dimensional space was examined in arboreal and semi-arboreal species only. The following variables were measured: *trap location*, general characterization of arboreal support (e.g., horizontal branch, tree fork, etc.); *trap slope*, relative slope of arboreal trap support over 1 m preceding the trap entrance; *trap height*, height above ground of the trap entrance; *support diameter*, diameter of arboreal support (to the nearest 10 mm) at the entrance of the trap. A χ^2 analysis was used to test whether these variables affected trap selection. Microhabitat preferences

Table 2.—*Description and sampling method for 13 habitat variables at Capetinga.*

Variable	Sampling method
Canopy height	Relative height of canopy on a 0–3 scale
Density of trees	Sum of the distances between station stake and “A” tree, and between “A” tree and “B” tree
Number of trees	Number of trees within a 5 m radius of the station stake
Number of tree species	Number of tree species within a 5 m radius of the station stake
Density of ferns	Relative density of ferns within a 5 m radius of the station stake on a 0–4 scale
Density of bamboo	Relative density of individual clumps of bamboo (woody grasses) within a 5 m radius of the station stake on a 0–4 scale
Density of grass	Relative density of grass ground cover within a 5 m radius of the station stake on a 0–4 scale
Density of vines	Relative density of vines and lianas on a 0–4 scale
Vine size 1	Presence of vines with a maximum diameter of 0–3 cm
Vine size 2	Presence of vines with a maximum diameter of >3–6 cm
Vine size 3	Presence of vines with a maximum diameter of >6–9 cm
Vine size 4	Presence of vines with a maximum diameter of >9–12 cm
Vine size 5	Presence of vines with a maximum diameter of >12 cm

Table 3.—*Relative composition of each principal component of microhabitat analysis at Capetinga. The first 13 variables are defined in Table 2; the last 13 are the mean values of surrounding traps.*

Variables	Components				
	I	II	III	IV	V
Canopy height	0.247	-0.222	0.079	-0.333	0.287
Density of trees	0.094	-0.400	0.121	-0.239	0.531
Number of trees	0.715	-0.024	-0.116	0.032	-0.306
Number of tree species	0.732	-0.003	-0.138	-0.042	-0.268
Density of ferns	-0.360	0.593	-0.044	-0.077	-0.007
Density of bamboo	-0.264	-0.358	0.060	0.603	-0.153
Density of grass	-0.003	-0.106	-0.297	-0.094	0.637
Density of vines	-0.110	-0.443	0.255	-0.331	0.169
Vine size 1	0.241	-0.523	-0.022	-0.143	0.004
Vine size 2	-0.199	-0.352	0.424	-0.350	-0.068
Vine size 3	-0.249	-0.317	0.543	-0.105	0.173
Vine size 4	-0.118	-0.209	0.649	0.313	0.144
Vine size 5	-0.003	-0.106	-0.297	-0.094	0.637
Sur. canopy height	0.397	-0.266	-0.418	-0.089	0.295
Sur. density of trees	0.058	-0.123	-0.557	0.056	-0.034
Sur. density of species	0.761	-0.121	0.245	0.059	0.024
Sur. density of ferns	-0.139	0.548	0.055	-0.104	0.370
Sur. density of bamboo	-0.252	-0.444	-0.082	0.641	-0.119
Sur. density of grass	0.123	0.395	-0.203	0.042	0.098
Sur. density of vines	-0.391	-0.192	-0.141	-0.423	-0.479
Sur. vine size 1	0.205	-0.497	-0.178	-0.388	-0.322
Sur. vine size 2	-0.421	-0.249	-0.185	-0.535	-0.295
Sur. vine size 3	-0.437	-0.313	-0.422	-0.125	0.164
Sur. vine size 4	-0.065	-0.388	-0.512	0.301	0.198
Sur. vine size 5	-0.126	-0.402	-0.421	0.430	0.048
Percent of character variance explained	13.6	11.6	10.7	9.0	6.9

were examined by using a χ^2 analysis to compare observed trapping frequencies in each microhabitat against the expected (based on the percentage of available traps in each microhabitat type).

RESULTS

Microhabitats

The first five principal components of the initial set of 26 habitat variables explained 51.8% of the variation (Table 3). Generalized trends were identified by examining the habitat variables with significant loadings (greater than ± 0.5). Table 3 can be summarized by noting that high positive loadings on Component I reflect a high density and diversity of trees, while negative loadings mean more open forest. Component II positive loadings indicate dense fern patches and the absence of slender vines. Positive loadings on Component IV indicate dense stands of bamboo and few surrounding vines, while Component V positive loadings mean that dense clumps of grass were present, along with a high density of trees, both of these being surrounded by areas of lower vegetation density. On each component, negative loadings reflect the opposite traits of positive loadings. Relative loadings of each component reflect six distinctive microhabitats (fern thicket, dense forest, vine tangle forest, forest mosaic, bamboo edge, and forest edge; Fig. 1). Components with loadings greater than ± 0.20 were also considered as contributing factors in the overall make-up of a microhabitat.

A cluster analysis of 26 habitat variables was performed to further define the

relationship that these microhabitats have with each other. Results were projected onto a dendrogram that clustered similar trap stations together (Fig. 2). The analysis shows a distinct dichotomy between the Fern Thicket and Bamboo Edge and the remaining microhabitats. The primary division separates the Fern Thicket from the others. The secondary division separates three trap stations that are characterized as having dense tangles of lianas and vines. These stations were located within the Vine Tangle Forest (station E12) and the Forest Mosaic (stations C13 and I8). The tertiary division separated the Bamboo Edge microhabitat from the others. Some structure is evident within the remaining group, such as the presence of a subcluster of Forest Edge trapsites within the larger cluster. The three types of semideciduous gallery forest (Dense Forest, Forest Mosaic, and Vine Tangle Forest) were not divisible by cluster analysis, suggesting that these microhabitats are not as distinctive as the ecotonal microhabitats (Bamboo Edge, Forest Edge, and Fern Thicket).

The Fern Thicket microhabitat was a cleared area at the north end of the grid (Fig. 1; 12% of the total area), where bracken fern (*Pteridium aquilinum*) formed extremely dense thickets 2 to 4 m in height. Other plants included low grasses, small vines, and sparsely scattered emergent trees, many of which were dead. This area received direct sunlight and experienced extreme daily temperature fluctuations, especially in winter when the temperature ranged from 3°C at night to 34°C during the day. The ferns formed a closed canopy and provided good cover for both arboreal and terrestrial mammals.

The Bamboo Edge microhabitat (13% of the grid) was situated along much of the gallery forest margin, where there were dense stands of woody bamboo (*Ichnanthus bambusiflorus*) forming a canopy at 5 m. This species was present throughout the grid, but was sparse inside the gallery forest. Trees were widely dispersed. Dominant tree species included *Belangeria glabra* and *Callisthene major*.

The Forest Edge microhabitat comprised 10% of the grid and was important in understanding the distributional patterns of the resident mammals. The transition from forest to savanna was rather abrupt, with the average width being 7 m. Here the tall grass of the campo intermingled with the thinning trees. Trees were large and leaned toward the adjoining campo, forming a wall that joined the gallery forest canopy with the substrate of the campo. The dominant tree species were *Belangeria glabra*, *Callisthene major*, and *Qualea dichotoma*. The undergrowth shrubs and saplings were dense. Herbaceous vines and lianas were abundant and acted as an arboreal network for climbing mammals.

Three types of semideciduous gallery forest occurred over the rest of the grid. At the south end was Dense Forest, representing 21% of the grid. This was the least disturbed habitat and plant diversity was high. The forest floor was bare except for scattered small shrubs and small trees. The 15-m high canopy was relatively closed, with few emergent trees. Common tree species were *Amaioua guianensis* and *Protium* sp.

The Forest Mosaic, a mixture of forest and light gaps, comprised 27% of the grid. Light gaps were formed either by natural tree falls or selective cutting by humans. In light gaps, the canopy was completely open and the sun shone directly on the forest floor. Undergrowth was thick and, in older gaps, became an impenetrable thicket. In between light gaps, the canopy was relatively open and ranged from 7 to 10 m in height. Large trees emerged above the forest canopy. Dominant emergent species were *Callisthene major*, *Copaifera langsdorfii*, and *Piptocarpha macropoda*. *Tapirira guianensis* was a common canopy-level tree.

The third type of forest was the Vine Tangle Forest (16% of the grid), and was

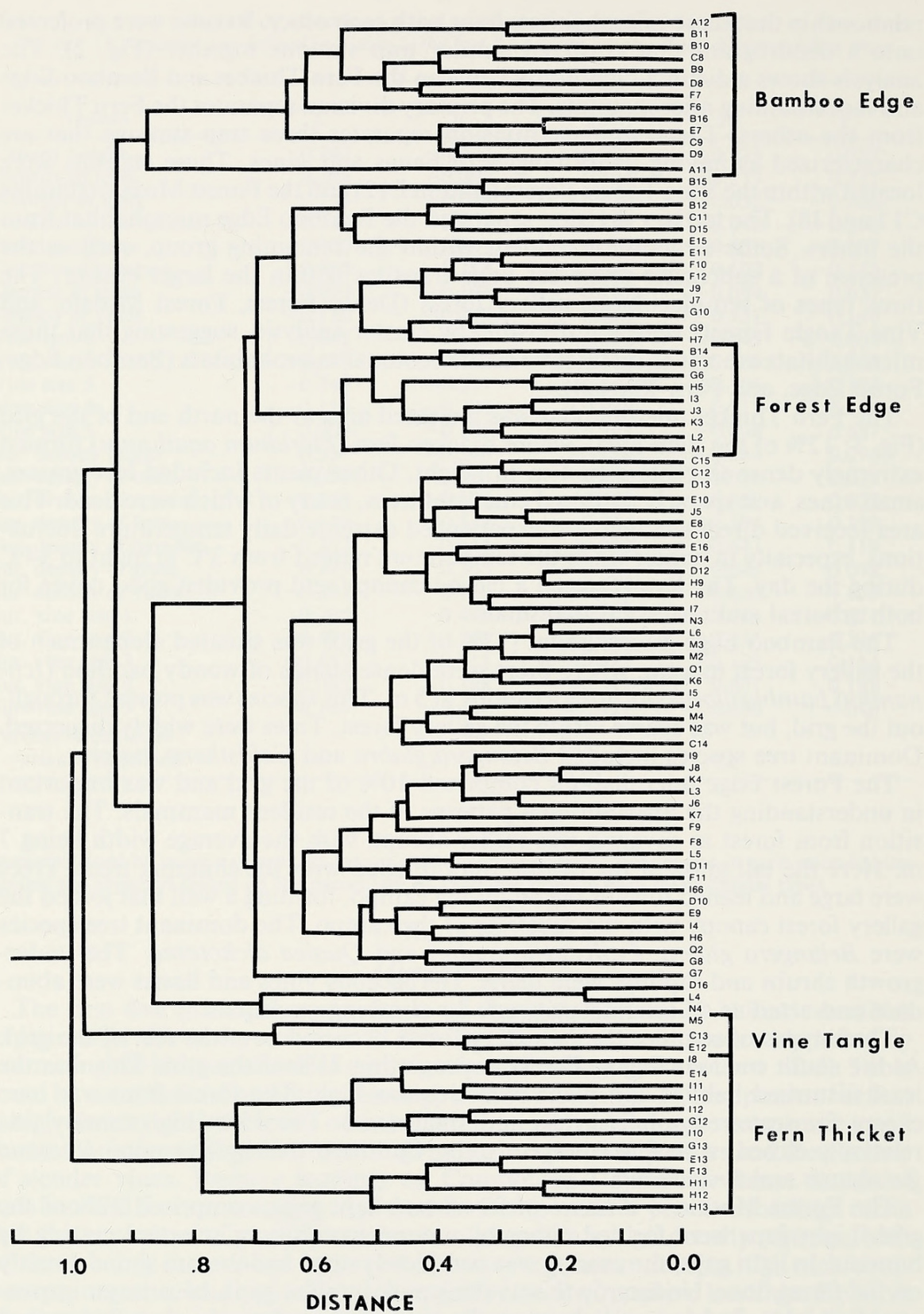


Fig. 2.—Distance dendrogram of 100 trap stations based on characters and clustered by unweighted pair-group method using arithmetic averages. The cophenetic correlation is 0.85.

characterized by large trees having dense tangles of vines and lianas to a height of 4 m. Common tree species were *Piptocarpha macropoda* and *Xylopia aromatica*. This microhabitat seemed to be a more mature form of the forest mosaic. Throughout the grid, neither palms nor epiphytes were common. *Salacia elliptica* was one of the most common subcanopy trees. Alongside the creek, *Piper* sp. and a grass (*Panicum* sp.) were common undergrowth plants.

Species Accounts

During seven months of trapping, 118 individuals were caught 731 times, including two species of marsupials and eight species of rodents. *Marmosa agilis* and *Monodelphis americana* were the marsupials, and the rodents were *Oryzomys bicolor*, *Oryzomys capito*, *Oryzomys concolor*, *Oryzomys nigripes*, *Rhipidomys mastacalis*, *Akodon cursor*, *Bolomys lasiurus*, and *Oxymycterus roberti*.

Marmosa agilis.—This small nocturnal didelphid marsupial ranges widely in the Cerrado region. It is generally associated with mesic areas, such as gallery forests and orchards and was the most commonly caught species at the Capetinga study site. Although primarily arboreal, 18% of the captures were in terrestrial traps. Individuals always escaped upon release by way of trees and vines. *M. agilis* had the longest mean residency of any of the small mammal species on the grid and had the greatest mean number of captures per individual (Table 4). Average mass and biomass estimates are given in Tables 5 and 6. *M. agilis* is insectivorous and frugivorous (Nowak and Paradiso, 1983); this was supported by observations of a captive individual that accepted a wide variety of fruits and insects.

Fourteen males and only two females were caught over six months. One of the females was captured 37 times. Neither female seemed to reach adulthood during the study period; however, accurate aging of females was difficult since the vaginal opening is internal. Females lack a true pouch and teats remain hidden when not lactating. Neither of the two females was ever observed to lactate during the study period. During the first 4 months of the study, the only males caught were subadult, identified by their relatively small size and the hairy condition of their scrotums. From May onward, males began to show signs of sexual maturity; their growth rate began to stabilize, the testes enlarged significantly, and the scrotum lost its hairy appearance and turned a blue-gray color. In June and July, all unmarked males that appeared on the grid were fully mature adults.

Marmosa agilis was a resident species; 50% of the individuals were caught in three or more consecutive months. Their ranges tended to shift slightly each month and overlapped with other individuals at the margins. Adults traveled significantly further than subadults between successive captures (41.1 m vs. 28.9 m; Student's *t*-test, $P < 0.01$).

Marmosa agilis was caught in all six microhabitats (Table 7). The χ^2 analysis showed that its distribution across the grid differed significantly from that predicted if habitats had been used randomly ($P < 0.01$). However, when the fern thicket microhabitat was removed from the analysis, the distribution was random. Therefore, it seems that *M. agilis* was actively avoiding the fern thicket and not distinguishing among the other microhabitats. Considering that *M. agilis* was strongly arboreal, these findings are not surprising. The fern thicket was the only microhabitat analyzed that was located outside the forest. Arboreal access was limited in this area.

Analysis of three-dimensional space requirements showed that *M. agilis* entered

Table 4.—Mean number of captures, percent arboreal, length of residency (in days), and mean distance (in meters) traveled between consecutive captures for small mammals caught at Capetinga.

Species	Number of individuals	Mean no. captures	Percent arboreal	Residency		Distance	
				Mean	Maximum	Mean	Maximum
<i>Marmosa agilis</i> ^a	16 (192) ^b	12.0 ± 12.7 ^c	82	56.1 ± 59.4	160	41.1 ± 35.0	142.1
<i>Monodelphis americana</i>	9 (33)	3.7 ± 5.4	0	17.2 ± 37.3	110	28.9 ± 19.0	89.4
<i>Oryzomys bicolor</i>	8 (22)	2.8 ± 2.3	86	23.8 ± 47.9	140	35.8 ± 26.1	128.1
<i>O. capito</i>	14 (68)	4.9 ± 4.5	3	33.2 ± 39.8	143	45.2 ± 44.2	136.0
<i>O. concolor</i> ^d	8 (68)	8.5 ± 8.3	71	46.5 ± 39.3	94	18.4 ± 16.2	67.1
<i>O. nigripes</i>	23 (134)	5.8 ± 6.0	30	28.8 ± 35.3	116	45.3 ± 25.9	107.7
<i>Rhipidomys mastacalis</i>	3 (7)	2.3 ± 1.5	100	—	—	25.9 ± 15.4	53.9
<i>Akodon cursor</i>	10 (53)	5.2 ± 5.2	0	49.3 ± 60.1	147	27.3 ± 22.7	106.0
<i>Bolomys lasiurus</i> ^e	22 (141)	7.0 ± 6.5	2	31.0 ± 30.9	88	32.4 ± 37.2	142.1
<i>Oxymycterus roberti</i>	5 (13)	2.6 ± 2.6	0	—	—	27.5 ± 40.2	162.0
						10.2 ± 9.5	31.6
						—	—

^a First distance for 54 adults; second for 122 subadults.
^b Number of individuals captured (total number of captures).
^c Mean ± one standard deviation.
^d First distance for 26 males; second for 16 females.
^e First distance for 51 males; second for 42 females.

Table 5.—Average mass (grams) for each species of small mammal at Capetinga.

Species	Average mass	
	Adult	Subadult
<i>Marmosa agilis</i>	26.4 ± 5.7 ^a 15.0–36.0 (26) ^b	16.2 ± 3.3 6.5–24.0 (45)
<i>Monodelphis americana</i>	19.5 (1)	14.1 ± 2.6 9.5–18.0 (12)
<i>Oryzomys bicolor</i>	28.4 ± 4.0 21.0–53.0 (11)	17.0 ± 5.3 10.0–22.0 (4)
<i>O. capito</i>	58.7 ± 7.7 42.0–72.0 (17)	33.5 ± 16.6 12.0–65 (4)
<i>O. concolor</i>	58.8 ± 7.1 41.0–72.0 (19)	42.6 ± 5.8 36.0–50.0 (9)
<i>O. nigripes</i>	22.6 ± 4.4 16.0–33.0 (39)	12.7 ± 3.0 6.0–18.0 (19)
<i>Rhipidomys mastacalis</i>	68.0 (1)	27.5 12.0–43.0 (2)
<i>Akodon cursor</i> ^c	47.2 ± 4.9 39.5–57.0 (15) 38.0 ± 1.6 36.0–40.0 (14)	21.5 ± 6.4 12.5–26.0 (4)
<i>Bolomys lasiurus</i>	42.2 ± 7.5 33.0–63.0 (33)	30.8 ± 3.4 21.0–35.0 (14)
<i>Oxymycterus roberti</i>	71.0 ± 3.8 66.0–75.0 (4)	55.0 52.0–58.0 (2)

^a Mean ± one standard deviation.

^b Range, with sample size in parentheses.

^c First average mass for adult males; second for adult females.

traps set on fern fronds less frequently than expected ($P < 0.01$). These results agree with the macrohabitat data. *M. agilis* had a preference for traps set on branches 20–40 mm in diameter ($P < 0.01$) and entered traps randomly without regard to support angle or height.

Cotton balls were provided in all traps for insulation, but *M. agilis* never used the material to make temporary nests. During the cool winter mornings, this species often was found torpid in the traps. Torpidity was apparently an effective response against low temperatures; despite the lack of an insulating nest, *M. agilis* had the lowest rate of trap mortality.

Monodelphis americana.—This small terrestrial didelphid is widespread throughout eastern Brazil (Nowak and Paradiso, 1983), although little information is available on its ecology. Both sexes have three dark stripes on the dorsum, and females lack a true pouch.

At the Capetinga study site, *M. americana* was relatively uncommon. It was highly transient, with only two individuals (22%) caught more than twice. Individuals were found in traps during most of the late afternoon trap checks, suggesting that they are active during the day. Only one adult (a male) was trapped; all other individuals were subadults. The sex ratio of *M. americana* caught in traps on the grid was 8:1.

Animals were caught during all the months that terrestrial traps were set. The sample size was too small to test for significance of microhabitat preference. Nevertheless, this species did not seem to show strong preference for any particular

Table 6.—Monthly biomass estimates (g/ha) based on the minimum number of known individuals for 10 small mammal species from Capetinga. Mean of *Marmosa agilis* computed for months of January through July; means for all other species computed for February through July. Number of individuals/month given in parentheses.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Mean
<i>Monodelphis americana</i>	—	56 (4)	42 (3)	10 (1)	47 (3)	16 (1)	20 (1)	32
<i>Marmosa agilis</i>	67 (5)	79 (5)	92 (6)	123 (7)	122 (6)	142 (6)	258 (9)	126
<i>Oryzomys bicolor</i>	—	137 (5)	103 (5)	54 (2)	28 (1)	29 (1)	30 (1)	63
<i>O. capito</i>	—	358 (10)	319 (7)	185 (4)	55 (1)	63 (1)	192 (3)	195
<i>O. concolor</i>	—	64 (1)	94 (2)	161 (4)	150 (3)	276 (5)	309 (5)	176
<i>O. nigripes</i>	—	18 (1)	117 (6)	162 (9)	136 (7)	149 (10)	241 (11)	137
<i>Rhipidomys mastacalis</i>	—	110 (2)	—	—	—	68 (1)	—	30
<i>Akodon cursor</i>	—	127 (3)	84 (2)	191 (5)	117 (3)	205 (5)	242 (5)	161
<i>Bolomys lasiurus</i>	—	—	—	198 (4)	290 (7)	467 (12)	558 (16)	252
<i>Oxymycterus roberti</i>	—	75 (1)	72 (1)	58 (1)	—	—	125 (2)	55
Total	67	969	923	1142	945	1415	1975	

microhabitat. *M. americana* did not have a torpidity response to low temperatures, nor did it make use of the cotton provided in each trap. Trap mortality was high on cool nights.

Oryzomys bicolor.—This nocturnal cricetid rodent ranges from Panama to tropical South America east of the Andes (Handley, 1976; Honacki et al., 1982; Patton et al., 1982). Within this range, it inhabits unflooded evergreen forest (Alho, 1982) and is sometimes found in native dwellings (Husson, 1978). It has fleshy thick-padded feet characteristic of arboreal rodents. During this study it was captured in ground traps only three times (14% of captures).

Eight individuals (6 males and 2 females) were captured 22 times. Three of the eight (37%) were caught in more than one trapping period and only one was captured for more than two periods. In other areas, this species has also been difficult to recapture. For example, in Venezuela, 71% were never recaptured (O'Connell, 1979). Of all the species present on the grid, *O. bicolor* traveled the greatest mean distance between successive captures (Table 4). The sample size was not large enough to test for microhabitat preferences. No preference was shown for specific traps based on their height or slope (χ^2 test, $P > 0.05$).

Oryzomys capito.—This species is common throughout the Neotropics and can be found in nearly all habitats, including campo, cerrado, dry and humid forests, agricultural fields, as well as in houses (Alho, 1981; Handley, 1976; Mares et al., 1981a; Mello and Moojen, 1979; Moojen, 1966). During the seven months of trapping, six females and eight males were caught a total of 68 times. Only three percent of the captures were made in arboreal traps. Forty-four percent of the

Table 7.—Percent of captures made in each of the following microhabitats: BE, Bamboo Edge; DF, Dense Forest; FE, Forest Edge; FM, Forest Mosaic; FT, Fern Thicket; VT, Vine Tangle Forest. n = number of captures. χ^2 test; * = $P < 0.05$, ** = $P < 0.01$, nt = not tested.

Species	n	Microhabitats						χ^2
		BE	DF	FE	FM	FT	VT	
<i>Monodelphis americana</i>	34	15	23	15	23	6	18	nt
<i>Marmosa agilis</i>	192	20	21	10	27	4	18	**
<i>Oryzomys bicolor</i>	22	0	14	5	45	0	36	nt
<i>O. capito</i>	68	6	38	7	43	0	6	**
<i>O. concolor</i>	68	1	6	3	15	59	16	*
<i>O. nigripes</i>	133	14	30	11	12	26	7	**
<i>Akodon cursor</i>	52	2	52	17	8	13	8	**
<i>Bolomys lasiurus</i>	141	42	6	46	6	0	0	**
Percent expected		13	21	10	27	12	17	

marked animals were caught in only one trapping period. In February and March (late wet season), it was the most commonly caught species on the grid; in May and June (mid-dry season), it was one of the rarest.

Oryzomys capito was caught in all areas of the grid, except the fern thicket. The χ^2 analysis indicated that this species was trapped in dense forest and forest mosaic more frequently (81% of all the captures) than would be expected by chance (Table 7).

Oryzomys concolor.—This species is found in tropical forests and marsh-forest complexes from southern Costa Rica to northern Argentina (Alho, 1982; Honacki et al., 1982; Paula, 1983; Pine, 1973). At the Capetinga study site, it was the largest arboreal rodent species caught on the grid.

Six males and two females were captured 68 times. Although *O. concolor* has the well-padded feet characteristic of arboreal rodents, 29% of the captures were in ground traps. All captures were made at night. Six individuals (75%) were caught in two or more trapping periods. *O. concolor* had the longest mean length of residency of all the small rodents on the grid (Table 4). There was a significant sex and age difference in the mean distance traveled between consecutive captures. Mean distance for adult males was 45.3 m, whereas for adult females, it was only 25.9 m (Student's t -test, $P < 0.01$). Adults of both sexes traveled a mean distance of 37.2 m; subadults traveled 22.9 m (Student's t -test, $P < 0.05$).

Oryzomys concolor was quite specific in its habitat preference. Seventy-five percent of all captures were made either in the fern thicket or in traps adjacent to this microhabitat. It was caught more frequently in traps set on fern fronds than was expected by chance ($P < 0.01$). It showed a similar preference for traps that were set on supports less than 10 mm in diameter ($P < 0.01$); fern petioles never exceeded 10 mm in diameter. Home ranges overlapped only slightly in the cleared patches of forest.

Analysis of the three-dimensional space usage showed that *O. concolor* entered traps set at less than 45° more frequently than expected. Trap height was not important.

Oryzomys nigripes.—This small cricetid rodent commonly inhabits cerrado, dense brush, gallery forests, coastal scrub, pastures, agricultural fields, and human dwellings (Alho, 1981, 1982; Mares et al., 1981a, 1981b; Mello, 1969, 1977; Mello and Moojen, 1979; Veiga-Borgeaud, 1982). At Capetinga, it was the smallest

rodent on the grid and one of the most commonly trapped species. During the course of this study, 23 individuals (8 females and 15 males) were captured 134 times. *O. nigripes* had one of the shortest mean residencies (28.8 days; Table 4). Over half (52%) of the marked individuals were caught in only one trapping period; 26% were caught only once.

Oryzomys nigripes exhibited a significant preference for the fern thicket and the dense forest ($P < 0.01$). It entered traps in the forest mosaic less often than expected. Analysis of traps set at specific heights revealed that *O. nigripes* preferred traps set within 1 m of the ground. This species was primarily terrestrial. The slope of the trap was not important.

Rhipidomys mastacalis.—This species is found primarily in mesic forests (Alho, 1981, 1982; Dietz, 1983; Fonseca and Redford, 1984; Handley, 1976; Mello, 1969; Mello and Moojen, 1979). During this study, all captures were made in arboreal traps.

Only three individuals (two males and one female) were captured a total of seven times, making *R. mastacalis* the least frequently captured small mammal. None was caught in more than one period and all captures were made at night. This species was captured only in the months of February and June, corresponding to early and mid-dry season.

Akodon cursor.—This cricetid rodent is a heavy-bodied, vole-like mouse that is found throughout the Cerrado region in gallery forests and cultivated fields (Mello, 1969; Moojen, 1952). It is completely terrestrial. Three females and seven males were caught a total of 53 times. In spite of the long mean residency (Table 4), 50% of the individuals were never caught a second time and thus were not included in the calculation of residency length. Only one individual was caught in more than two trapping periods.

Adult males weighed significantly more than females (47.2 vs. 38.0 g; Student's *t*-test, $P < 0.05$). There was no significant difference in the mass of subadult males and females. At Capetinga, subadults were captured only from April through June, suggesting that young are born in the late wet season (ca. February and March). Fifty-two percent of the captures of *A. cursor* were made in dense forest; this was statistically higher usage than would be predicted if the animal randomly frequented microhabitats (Table 7).

Bolomys lasiurus (= *Zygodontomys lasiurus*).—This cricetid rodent is common in nearly all habitats, both disturbed and natural (Alho, 1981; Dietz, 1983; Mares et al., 1981a; Mello and Moojen, 1979; Moojen, 1966). At the Capetinga study site, it was very common; 22 individuals (13 females and 7 males) were caught 141 times. Every month, 50% of the active individuals were previously unmarked, suggesting that turnover was high. Only two individuals were not recaptured at least once.

Bolomys lasiurus is almost exclusively terrestrial. One individual was trapped twice in the same arboreal trap; this trap was set on a fallen tree less than 1 m above the ground. Even though there are several previous studies concerning this species (e.g., Alho, 1979, 1981; Alho and Souza, 1982; Almeida et al., 1981; Pereira, 1982; Souza, 1979; Souza and Alho, 1980), there are no other reports of *B. lasiurus* being captured in arboreal traps.

Bolomys lasiurus had the lowest mean distance traveled of any species in the study. This was due, in part, to *B. lasiurus*' tendency to enter certain traps more than others; four adjacent traps located within 1 m of the tall dense grass of the

cerrado accounted for 39% of the captures. Adult males traveled significantly further than adult females (Table 4).

On 12 occasions, the traps were checked twice each day; once early in the morning and again in the late afternoon. Every afternoon check revealed one to three *B. lasiurus*; generally, these were animals not found in traps during that day's morning check, suggesting that most individuals were diurnal. In a related study, Lacher et al. (in press) found this species to be diurnal in cerrado grassland habitat.

Bolomys lasiurus was absent from the grid during the first three trapping periods (January–March 1984) and was first trapped in April. Thereafter, the number of individuals increased dramatically, until by June it was the most commonly encountered species. Adults began to appear in April and new adults continued to be marked in the ensuing months; subadults were not captured before May. The sex ratio of captured *B. lasiurus* was 4.1:1.

At Capetinga, *B. lasiurus* was quite specific in its microhabitat preferences; distribution across the grid varied significantly from the expected (Table 7). Eighty-eight percent of all captures were made in two microhabitats: the forest edge and the bamboo. These two areas were located on the edge of the grid that bordered the savanna. It was never trapped beyond the forest edge, entering the gallery forest only at certain points and never very far.

Oxymycterus roberti.—This species is a characteristic resident of brejos, the permanently inundated savanna that borders gallery forest. Several authors state that typically it is confined to this habitat and is only rarely caught in adjacent areas (Borchert and Hansen, 1983; Fonseca and Redford, 1984; Mathews, 1977; Redford, 1984), although T. E. Lacher (personal communication) caught it frequently in campo limpo. At the Capetinga study site, there was no bordering brejo, yet *O. roberti* was trapped on the grid.

Five individuals were caught a total of 13 times; all were males. None of the marked animals seemed to be resident in the study area. Three were caught only once and none was caught in more than one trapping period. All but one capture was made in the part of the grid that was dominated by bracken fern; one individual was caught inside the gallery forest. Individuals were caught in four of the seven months; the species was uncommon in both the dry and wet seasons.

DISCUSSION

Small Mammal Diversity

Previous workers have noted that the gallery forest is the most complex habitat in the Cerrado region (Fonseca and Redford, 1984; Mares et al., 1986; Ratter, 1980). In this study, eight species of rodents and two species of marsupials were caught in gallery forest habitat. In an earlier live-trapping study at the Fazenda Água Limpa, Alho (1981) surveyed the rodents of three other habitats. In the cerrado (s.s.), three species of rodents were trapped; in the campo, there were four, and in the cerrado, there were also four. In a related study in a different gallery forest, Mares et al. (1986) found seven rodent species in the gallery forest and six in the campo. Thus, gallery forest is generally richer in species than the other kinds of Cerrado habitats. Of the rodent species Alho (1981) caught, only *Calomys callosus* was not caught during this study. *O. nigripes* (= *O. eliurus*) was captured both inside and outside the gallery forest in sizeable numbers; it was considered

to be a habitat generalist (Alho, 1982). *B. lasiurus* was caught in all four habitats, but is not considered a regular inhabitant of the gallery forest.

Didelphid Life History

Earlier studies have noted that the life expectancy of some *Marmosa* species is approximately 1 year (Hunsaker, 1977; Nowak and Paradiso, 1983). Further evidence suggests that only one litter is produced in a lifetime (Enders, 1935). The data presented here imply that *M. agilis* may breed only once annually. During the entire study, all males gained weight at the same rate and passed through various stages of development at the same time (Fig. 3). In the early half of the study, all males were judged to be subadults. They began to show indications of maturity in May, and by June and July, all males caught on the grid were fully mature adults. During the latter months of the study, the only animal remaining on the grid was a lone female we judged to be a subadult (based on body size). She weighed 14.0 g on her first day of capture (23 February), reached a mass of 19.0 g by late April, and did not gain weight thereafter. She was captured periodically until the study ended. *M. americana* exhibited a similar growth pattern. During most of the study, only subadults were captured. A single adult male was captured once in July.

Data for *M. agilis* and *M. americana* indicated sex ratios that were strongly skewed (7:1 and 8:1, respectively). Although this difference was statistically significant, it may have been an artifact of the differential activity of each sex. Males might be more active, inquisitive, or aggressive, and females might not be as rare as the trapping record suggests. In Venezuela, adult male *M. cinerea* were trapped six times as frequently as adult females, and lactating females were never captured (O'Connell, 1979; August, 1981). A lactating female's movement may be hampered by the physical burden of young, and her foraging radius may be reduced. At Capetingá, the only females of either species caught were subadults, suggesting that *M. agilis* and *M. americana* were behaving in a similar manner.

Marmosa agilis was a long-term resident at Capetingá. This contrasted with what is generalized about didelphids, that they are "nomadic, solitary animals that do not consistently restrict their activities to any particularly areas" (Hunsaker, 1977:119). During this study, most *M. agilis* individuals remained on the grid for three or more months. Their ranges shifted slightly every month and a few individuals seemed to eventually shift enough to be off the grid. *M. agilis* did not seem to have mutually exclusive territories, since ranges overlapped with each other.

Demographic Patterns

Demographic patterns varied from species to species. *R. mastacalis* seemed to be present on the grid on a seasonal basis. At Capetingá it was only caught in February and June, whereas at Parque Nacional de Brasília, it was caught in May, June, and July (dry season; Paula, 1983). Dietz (1983) noted that 90% of the captures of *R. mastacalis* at Parque Nacional Serra da Canastra, Minas Gerais, Brazil, were made in the dry season. If it did not migrate up into the canopy or to other gallery forest sites during the months when it was absent from the gallery forest study area, it probably moved to a habitat having a pronounced arboreal component, such as cerradão.

Oxymycteris roberti was caught at Capetingá within the fern thicket microhabitat during the wet season, and twice in the forest mosaic during the dry season.

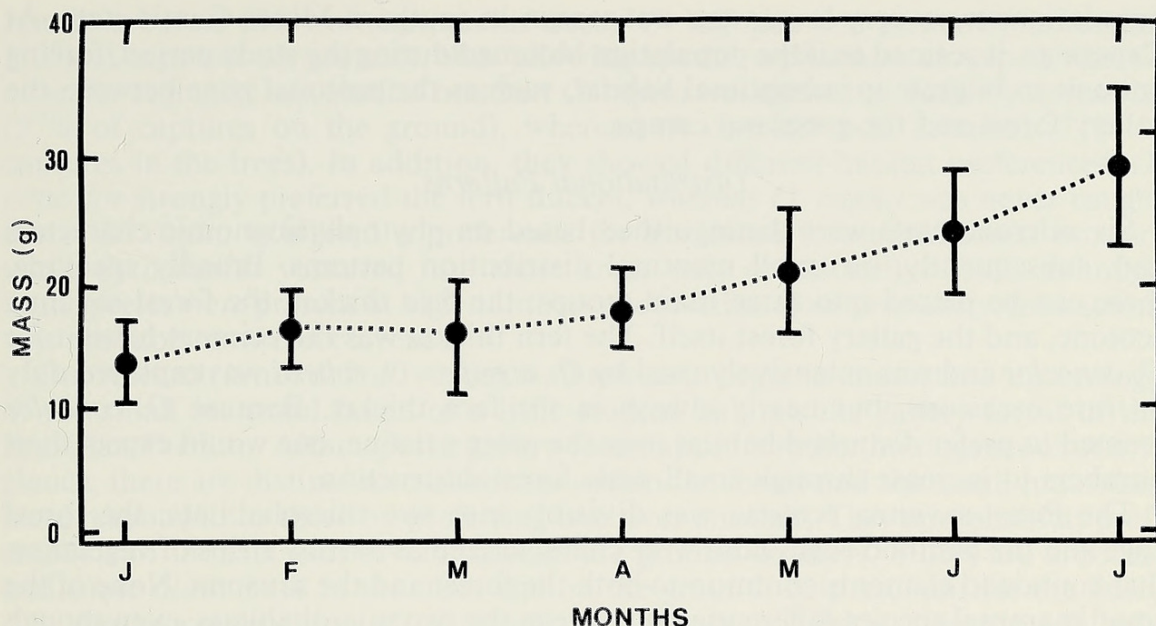


Fig. 3.—Mean monthly weight (grams $\pm$ SE) of *Marmosa agilis* males over course of study.

Alho (1981) caught it a few times in the gallery forest; Borchert and Hansen (1983) and Paula (1983) noted that it was trapped in low numbers in all habitats except gallery forest.

Paula (1983) reported on seasonal movements of small mammals in gallery forest and campo habitats at Parque Nacional de Brasília, approximately 25 km from the Capetinga study site. He trapped from February to September, roughly the same time period as the Capetinga study. Six species of small mammals (defined as <120 g mean mass) were caught at his study site; these same six were also caught at Capetinga. *O. bicolor*, *A. cursor*, and *O. roberti* were not captured in the gallery forest at Parque Nacional de Brasília. *M. agilis* was extremely common, even though Paula only sampled with terrestrial traps. In the wet season, this species was caught primarily in the dry gallery forest; whereas, in the dry season, it moved to the wet gallery forest. At Capetinga, seasonal movements were not evident for *M. agilis*; it remained common in the gallery forest during all the months of the study.

Bolomys lasiurus was captured only from April onward (fourth month of trapping). Even so, its biomass increased rapidly until by July it was 558 g/ha (Table 6); by then, it became the dominant small mammal species on the grid. Since the forest margin, its preferred habitat, represented only 0.25 ha of the grid, its biomass per ha of preferred habitat during that month was 2232 g/ha, or approximately 50 individuals per ha of forest margin. This is impressive when one considers that the number of individuals/ha increased from 0 to 50 in just 4 months. Other studies have noted that populations of *B. lasiurus* fluctuated. Mello (1980) found that this species was absent from her grid during the spring of one year and abundant the following spring. In Exu, state of Pernambuco, populations were monitored periodically through several years. From 1967 to 1971, the density of *B. lasiurus* reached 187 individuals ha^{-1} month $^{-1}$ (Karimi et al., 1976). Years later, in 1977, three months of trapping in the same general area (29,250 trap-nights) yielded only one individual (Streilein, 1982). Dietz (1983) reported that

populations were very low in the wet season in southern Minas Gerais state. At Capetinga, it seemed as if the population bloomed during the study period, forcing animals to migrate to suboptimal habitat, such as the ecotonal zone between the gallery forest and the grassland campo.

Distributional Patterns

Six microhabitats were distinguished based on phytophysiognomic characters and, subsequently, on small mammal distribution patterns. Broadly speaking, these can be placed into three main groups: the fern thicket, the forest-savanna ecotone, and the gallery forest itself. The fern thicket was the primary habitat for *O. concolor* and was extensively used by *O. nigripes*. *O. roberti* was captured only on rare occasions, but nearly always in the fern thicket. Because *O. concolor* seemed to prefer disturbed habitat over the more pristine, one would expect their numbers to increase through small-scale forest destruction.

The forest-savanna ecotone was divisible into two microhabitats: the forest edge and the bamboo edge. Both were characterized as narrow strips of vegetation that contained elements common to both the forest and the savanna. None of the small mammal species differentiated between the two microhabitats, even though they were quite different phytophysiognomically. Both constituted the dominant microhabitats for *B. lasiurus*. Other studies conducted at the Fazenda Água Limpa suggest that the cerrado (s.s.) is the primary habitat for *B. lasiurus* (Alho, 1981; Souza, 1979), but it is caught in nearly all major habitats throughout its range (Alho, 1982). The other small mammal species did not show preferences for the ecotonal zone. *O. concolor* was caught in this area less than expected, but this was probably due to the relatively long distance that lay between the forest margin and the primary habitat for this species, the fern thicket.

The gallery forest proper was subdivided into three kinds of forest: dense forest, vine tangle forest, and the forest mosaic. Some small mammals appeared to distinguish the apparently subtle differences that marked these microhabitats. *A. cursor* had a clear preference for the dense forest, the least disturbed part of the grid. All 10 species were trapped in the forest mosaic and yet no one species showed a specific preference for it. The forest mosaic microhabitat was the least definable by statistical classification methods.

Interspecific Avoidance Mechanisms

Several of the mammal species are very similar in appearance and are closely related taxonomically, creating a potential for resource competition. *A. cursor* and *B. lasiurus* are two such species. Physically they are quite similar, but the microhabitat preferences showed that the two species overlapped little. *A. cursor* preferred the inner forest, whereas *B. lasiurus* was a savanna species that entered the Capetinga gallery forest only at the forest-savanna ecotone. In addition, *B. lasiurus* seemed to be primarily diurnal, while *A. cursor* was nocturnal. Therefore, both spatial and temporal mechanisms minimize competition for resources.

Four species of *Oryzomys* coexisted on the study area. Several differences served to minimize resource competition between them. An obvious division was size: *O. bicolor* and *O. nigripes* are smaller-bodied (28.4 and 22.6 g, respectively), whereas *O. capito* and *O. concolor* are more than twice as large (58.7 and 58.6 g, respectively). Small and large rodents could select food items of different sizes and, thus, minimal niche overlap would occur. Within weight classes, spatial separation reduces the degree of interaction between species. *O. bicolor* was pri-

marily arboreal (86% of captures in trees); *O. nigripes* was primarily terrestrial (70% of captures on ground), thus allowing spatial separation. *O. capito* and *O. concolor* segregate in a similar manner: *O. capito* was almost exclusively terrestrial (97% of captures on the ground), whereas *O. concolor* was arboreal (71% of captures in the trees). In addition, they showed different habitat preferences. *O. concolor* strongly preferred the fern thicket, whereas *O. capito* was never caught there. *O. capito* exhibited a preference for the dense forest and forest mosaic, while *O. concolor* ventured into these areas only occasionally. Thus, although both species were present in high numbers and lived in close proximity, interaction was probably a rare occurrence.

Our research is not definitive, but it allows us to begin to understand the ecology of the small mammal fauna of a little-studied habitat, the gallery forest of the Brazilian Cerrado. Although the gallery forest appears rather homogeneous at first glance, there are distinct microhabitats within the forest and the small mammals have responded to these by preferring one over another. This microhabitat preference and the fact that several species are ground dwellers, others are arboreal and some occur both in the trees and on the ground, help account for the fairly rich species composition of mammals in this narrow habitat, that extends only from 100 m to 1 km in width. Our preliminary findings suggest that habitat selection by small mammals is quite important in the tropical gallery forest at permitting coexistence, perhaps by reducing competition. Additional research should allow us to formulate a more detailed understanding of coexistence and species richness in this extensive and important tropical habitat.

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