

Feeding ecology and sexual dimorphism of *Enyalius perditus* in an Atlantic forest, Brazil

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ABSTRACT - We assessed the ecology, morphology and diet of *Enyalius perditus*. The data were compared among and within gender and collection periods. The specimens were collected in an anthropized biological reserve in the Atlantic forest biome, Brazil. The stomach contents were analyzed for number of prey, frequency, mass and volume. Sexual dimorphism occurred. No positive correlation between lizard size and volume of prey, nor between diet and collection period was found. *Enyalius perditus* diet was diverse comprising predominantly Formicidae, Orthoptera, Isoptera and other insect prey. In an urban forest, *E. perditus* was an opportunist predator of terrestrial arthropods. Differences in diet across gender were not found. Intersexual trophic similarities suggest there is no food resource partitioning in the population's diet studied herein.

SEXUAL dimorphism is a phenotypic difference between males and females of the same species. Examples include differences in morphology, ornamentation and behaviour (Tinkle et al., 1970; Carothers, 1984; Anderson & Vitt, 1990). Sexual dimorphism in morphology, behaviour and colour pattern also indicate that sexual selection might be associated with competition for food between sexes (Schoener, 1967; 1977; Teixeira-Filho et al., 2003; Verrastro, 2004). Intersexual differences in body size can reveal impacts of ecological and evolutionary pressures on males and females differently in a population (Howes & Loughed, 2007). Moreover, sexual dimorphism may be displayed in other traits such as the size of appendages (heads, tails and limbs) or scalation and colour (Gienger & Beck, 2007).

Morphologic sexual dimorphism in reptiles has been reported for lizards (Fitch, 1981). Sexual selection tends to ensure that males are larger than females (Vitt & Cooper, 1985), for example in males of territorial iguanids (Stamps, 1977; Fitch, 1980). However, in some forest iguanids such as *Enyaloides*, *Enyalius*, *Polychrus* and *Urostrophus*, the opposite can be observed with larger females

than males (Fitch, 1981). Sexual dimorphism may also be associated with feeding ecology because differences in body and head size can reduce intersexual competition for food resources (Schoener, 1967; 1977). Thus, it is expected that sexual dimorphism can reflect differences in a species' diet.

The trophic relationships of lizards, their environments and foraging mode are important to understand a species' ecology. Diets may vary seasonally, ontogenetically and intersexually, and may differ depending on foraging strategies (Huey & Pianka, 1981; Dunham, 1983; Pianka, 1986; Vitt et al., 1996b). According to Optimal Foraging Theory - OFT (Schoener, 1971; Pianka, 1986), niche size increases as prey availability decreases in the environment, leading to a generalist diet; but, niche size decreases as resources increase, thus resulting in a specialist diet. Subsequently, the composition of an arthropod resource may lead to either generalist or specialist diets. In Atlantic forest biomes high availability of arthropods is common due to high diversity and abundance of species and a range of microhabitats. Thus, if arthropod diversity is high one could expect diet

specialisation. According to OFT, it could be expected that predators would have a specialist diet in such an environment. However, if there is low abundance of some arthropod species then it could be expected that lizards would be generalists.

In order to test this hypothesis, we analyzed the feeding habits and morphology of a Neotropical lizard population from the Atlantic forest, Brazil. *Enyalius* Wied, 1821 lizards are diurnal, insectivorous, and occur in the Amazon region to the country's east coast, in Atlantic forest biome (Etheridge, 1969; Vanzolini, 1972; Jackson, 1978; Vitt et al., 1996a). Information about this genus is sparse (Van Sluys et al., 2004; Lima & Sousa, 2006; Barreto-Lima, 2009) and all species found from Brazil are endemic. *Enyalius perditus* Jackson (1978) from southeastern Brazil is insufficiently known (Lima & Sousa, 2006). The objective of this paper was to assess patterns of morphologic traits and diet of *E. perditus*. We analysed the kind of feeding habits developed, sexual dimorphism and if there was intersexual and temporal segregation in dietary composition of this species.

MATERIALS AND METHODS

The Santa Cândida Municipal Biological Reserve - SCMBR (21°45'S, 43°20'W), in Juiz de Fora, in the State of Minas Gerais, is a secondary urban forest fragment (113 ha) with typical Atlantic forest vegetation. Altitude ranges from 760 to 960 m and the forest is Montana Semidecidual Stational (after Lafetá, 1998). The climate is Cwa mesothermic-type (Köepen's Classification) showing an average annual rainfall of 1547 mm and an average annual temperature of 19.4°C. The seasons are hot and humid (HH), from the end of September (beginning of rainfall) through March of the following year (end of rainfall), and cool and dry (CD) from April through mid-September. We took 60 trips to SCMBR, from October 2003 to November 2004 to collect data. Data were gathered during mornings and afternoons. The sampling sites were chosen at random distances between 200 and 500 m of each other. Climate was recorded by the Universidade Federal de Juiz de Fora (UFJF) Climate Station, 3.11 miles from the study site.

We caught lizards by pitfall trapping and weighed them on a manual scale (0.10 g accuracy). The snout-vent length (SVL), mandibular length (JL), mandibular width (JW) and abdomen width (AW) were recorded with a manual caliper (0.1 mm accuracy). Tail length (TL) was measured with a ruler (to the nearest 1.0 mm).

We performed Mann Whitney U-tests to verify differences among the lizards' gender on morphometry. The above statistic was used as data were non-normally distributed. Sexual maturity was determined by SVL recorded and/or by gonadal ageing. We also described the lizards' general colour pattern before releasing them at the capture sites. Both adult and immature lizards were caught.

A collection of lizards was euthanized, fixed in 10% formalin, and stored in 70% ethanol. Specimens were dissected and their stomach contents removed before being deposited in the Herpetological Collection of UFJF. All other specimens were sampled using the "gastric-suction" method (Barreto-Lima, 2009). Before diet analyses we compared the methods used for collecting stomach contents (paired t-test), but no significant differences were found. Therefore it was possible to analyze both groups together (N: $t = 1.86$, $P = 0.08$; MA: $t = 1.27$, $P = 0.22$; VOL: $t = 1.45$, $P = 0.16$).

We analysed and classified all stomach contents (arthropods), under stereomicroscope to order or family (according to Buzzi, 2002). Stomach contents were then preserved in 70% ethanol. We did not consider dry decomposing plants as food and also removed sand and non-identifiable material.

From each food category we recorded the frequency (N = number of items), the frequency of occurrence (OF = how many times the same item showed in the stomachs), the mass in g (MA) and volume in mm³ (VOL). Depending on the statistical nature of the data we used Spearman Rank correlation or Pearson's t to analyze correlation among the lizards' SVL, mandibular length and width versus the highest VOL of prey eaten. We performed ANOVA tests for each diet variable (N, MA and VOL) versus genders or collection periods (2003 and 2004). All tests used Biostat 5.0 software

(2007) to a significance of $\alpha = 0.05$. We recorded MA with a digital analytical scale (0.0001 g accuracy) after withdrawing any excess liquid with tissue. For VOL, we used the perfect spheroid modified equation (Vitt et al., 1996b), where: $VOL = 4/3\pi (\text{length}/2) \times (\text{width}/2)^2$.

The main diet items were those that showed the highest values in I(x) Importance Index (see Howard et al., 1999) for N, OF, MA and VOL variables. I(x) was calculated to assess the relative importance of a prey type in the whole diet. In the original equation, N, VOL, and OF are considered together to reduce index influence when fewer variables are used. The equation produced 0 to 1 values, representing the relative importance of a certain food item into the diet. In this study, we introduced MA variable in our analyses. Using all the variables together made the following equation possible:

$$I[x] = (n/N) + (v/V) + (f/F) + (m/MA) / 4$$

We carried out a survey on invertebrates in the area and calculated their Dominance Index (DI = number of individuals of a specific taxon/total number of individuals of a site x 100) and Occurrence (OI = number of samples where a taxon had been recorded/total number of samples recorded within a site x 100). In DI there are classes: from 0% to 25% = accidental; 25% to 50% = accessory; 50% to 100% = dominant. In OI, the classes are: from 0% to 25% = accidental; 25% to 50% = accessory, and from 50% to 100% = constant. This index combination allowed us to classify prey into: common, which is constant and dominant; intermediate, constant and accessory, constant and accidental, accessory and accidental, accessory and dominant; rare, accidental and accidental (Scatolini & Pentead-Dias, 2001). Jacobs Electivity Index I(EJ) was calculated with each type of prey found in the stomach and in the environment in order to verify the quantitative importance between them:

$$D = r - p / r + p - 2r$$

Here r and p are the percentage of diet and environment items respectively. Prey is avoided by

a predator when D values are between -1 and approaching 0 (negative electivity) while it is selected when D values are between more than 0 to +1 (positive electivity). A value equal to 0 suggests null electivity.

RESULTS

Collecting

Twenty-eight invertebrate types were found in the environment (Table 1). Orthoptera, Coleoptera, Hymenoptera and Aranea were the most frequent but only Orthoptera was common. We collected 52 *E. perditus*, being successful during HH (Oct-Dec/2003, Sep-Nov/2004) only. At the beginning of HH seasons we found juvenile lizards as well as pregnant females during minimum rises in temperature.

Morphology

Few juveniles were collected (SVL = 34.4 ± 0.33 , range = 29.0-42.0 mm, n = 14). The adults' morphological data and mass/gender data (SVL = 74.7 ± 7.1 , range = 63.0-93.0 mm, n = 38) are shown in Table 2. Body differences were found (SVL: U = 29.0, P < 0.0001, JW: U = 84.0, P = 0.0238, TL: U = 80.5, P = 0.0177, AW: U = 48.5, P = 0.0007 and MA: U = 24.0, P < 0.0001) according to gender, except for JL (U = 109.5, P = 0.1442).

Colour

Males are leaf-green on their backs, displaying sky-blue colour down below their necks and irregular dark or light spots on their lower limbs. They might display an orange-yellow colour on their lower limbs (witnessed during reproductive time). Females are brown with dark symmetrical or asymmetrical spots along the paravertebral region, locomotion limbs and tail. They may display parallel white or off-white lines along their backs, from their heads to the tail base, and horizontal or irregular moss-green or brown traces up on their heads. On their backs, small off-white spots and/or short lines may come down from their necks. In both genders, the abdomen colour ranges from off-white to light brown and the tail exhibits scattered irregular dark spots (more evident in females).

Class	Order	N	DI (%)	OI (%)	Classification
Arachnida					
	Araneae	111	5.18	100	Intermediate
	Opiliones	30	1.40	75.0	Intermediate
	Pseudoscorpiones	08	0.37	31.2	Intermediate
	Gamasida	03	0.14	6.2	Rare
	Ixodida	01	0.04	6.2	Rare
	non-identified	11	0.51	25	Rare
Diplopoda					
	Polydesmida	03	0.14	6.2	Rare
	Spirobolida	17	0.79	37.5	Intermediate
	Spirostreptida	03	0.14	12.5	Rare
	non-identified	18	0.84	12.5	Rare
Ellipura (Para-Insecta)					
	Collembola	02	0.09	12.5	Rare
Insecta					
	Blattariae	21	0.98	56.2	Intermediate
	Coleoptera	432	20.20	87.5	Intermediate
	Dermaptera	11	0.51	12.5	Rare
	Diptera	01	0.04	6.2	Rare
	Isopoda	27	1.26	43.7	Intermediate
	Hemiptera	65	3.03	62.5	Intermediate
	Homoptera	01	0.04	6.2	Rare
	Hymenoptera				
	Formicidae	199	9.30	87.5	Intermediate
	Larvas	36	1.68	18.7	Rare
	Lepidoptera	06	0.28	18.7	Rare
	Neuroptera	01	0.04	6.2	Rare
	Odonata	01	0.04	6.2	Rare
	Orthoptera	1124	52.50	100	Ordinary
	Pupas	01	0.04	25	Rare
Total		2142	100	-	-

Table 1. Invertebrates collected in Reserva Biológica Municipal Santa Cândida, Juiz de Fora, Minas Gerais, between 2003 and 2004. Data on individuals number (N), Dominance Index (DI), Occurrence Index (OI) and classification of orders according to indices. DI = relative frequency (%).

Diet

We recorded 206 items in 14 prey categories. Five of 38 stomachs analyzed were empty. Two stomachs contained lizard scales. Formicidae and Isoptera were more consumed in N, insect larvae in OF, insect larvae and Orthoptera in MA, and Isoptera and Orthoptera in VOL. The main prey items I(x) were Formicidae, insect larvae, Isoptera and Orthoptera. Isoptera, Mantodae and insect eggs were the highest I(EJ). We did not find any significant correlation among the lizard SVL and the highest VOL of prey eaten ($r^s = 0.0959$, $P = 0.5956$, $n = 33$), neither among the jaw length and width of lizard versus the

highest VOL of prey ($r^s = - 0.0876$, $P = 0.6278$; $P = 0.3355$, $P = 0.562$, $n = 33$, respectively). According to gender, the highest I(x) were Formicidae, Isoptera, Orthoptera and insect larvae (Table 3).

Differences in diet according to gender were not found (N: $F = 1.3782$, $P = 0.2930$; MA: $F = 0.0208$, $P = 1.0000$; VOL: $F = 0.0271$, $P = 1.0000$, $n = 12$). In 2003 and 2004 the highest I(x) were Formicidae, Isoptera, insect larvae, and Orthoptera. There were differences in diet between the years to MA ($F = 5.4158$, $P = 0.0037$, $n = 12$) and VOL ($F = 10.1764$, $P = 0.0003$, $n = 12$), except for N ($F = 1.1118$, $P = 0.4287$, $n = 12$).

	Males (n = 26)			Females (n = 12)		
	Avg.	SD	Range	Avg.	SD	Range
SVL	71.5 ± 4.6		63.0 - 81.0	81.8 ± 6.5		73.0 - 93.0
JL	14.4 ± 1.9		12.0 - 18.0	15.3 ± 1.6		13.0 - 18.0
JW	12.1 ± 1.1		10.0 - 14.0	13.3 ± 1.4		12.0 - 16.0
TL	156.8 ± 14.9		136.0 - 172.0	170.9 ± 13.9		152.0 - 200.0
AW	11.3 ± 1.8		0.9 - 15.0	15.3 ± 3.3		10.0 - 20.0
MA	8.3 ± 2.0		4.0 - 12.5	15.4 ± 4.3		8.0 - 22.0

Table 2. Morphological data on 38 adult *Enyalius perditus* collected in Reserva Biológica Municipal Santa Cândida, Juiz de Fora, Minas Gerais, in 2003/2004. Snout-vent length (SVL), jaw length (JL), jaw width (JW), tail length (TL), abdomen width (AW) in mm and mass in g (MA).

DISCUSSION

Climate

Rain scarcity may have influenced availability and abundance of prey because we collected fewer and less diverse arthropods under dry conditions. It is known there is a relation between rainfall, primary productivity and abundance of insects in tropical habitats (Pianka, 1986; Vitt, 1990). Juvenile lizards, gravid females and adult males observed during HH indicated that the population was most reproductively active during the hottest seasons. There was strong environmental influence on the lizards' reproductive tactics (Colli, 1991), perhaps in response to greater productivity and reproduction by arthropods in the area. The absence of lizards from February-August 2004 may have been caused by heavy rainfall (Feb) and a fall in temperature in CD. This could have restrained physical activity of

the lizards. During CD *E. perditus* may decrease its activity or enter a seasonal torpor as suggested for other *Enyalius* spp. in Brazilian winter (Grantsau, 1966).

Morphology

As expected, females were heavier (MA) and larger in body size (SVL), tail (TL), and other measurements (JW and AW). As observed in this study, and for other continental forest genera, male *Enyalius* spp. lizards are smaller than females (Fitch, 1981; Jackson, 1978; Vitt et al., 1996a; Teixeira et al., 2005). For *E. perditus*, Sturaro & Silva (2010) revealed no sexual dimorphism in the majority of morphometric characters, except in SVL. Typically, sexual dimorphism is affected by sexual selection (Carothers, 1984; Vitt et al., 1996b) or female reproductive strategy in lizards

Dietary Category	Males (n = 22)					Females (n = 11)				
	N(%)	OF(%)	MA(%)	VOL(%)	I(x)	N(%)	OF(%)	MA(%)	VOL(%)	I(x)
Araneae	5.6	22.7	3.5	7.4	0.0978	3.7	27.3	6.6	7.1	0.0737
Blattariae	0.8	2.2	2.6	3.4	0.0278	2.5	18.2	14.0	23.9	0.1207
Coleoptera	2.4	6.6	4.2	4.6	0.0614	2.5	9.1	1.2	2.1	0.0245
Dermaptera	0.8	2.2	3.6	1.4	0.0256	1.25	9.1	3.8	3.0	0.0301
Diplopoda	3.2	8.8	5.5	2.6	0.0735	1.25	9.1	0.6	0.5	0.0150
Diptera	0.8	2.2	0.01	0.01	0.0130	0	0	0	0	0
Formicidae	45.2	54.5	18.5	14.6	0.3319	37.5	27.3	5.5	3.8	0.1470
Isopoda	2.4	6.6	1.6	1.2	0.0469	1.25	9.1	.2	1.1	0.0186
Isoptera	28.6	9.1	12.3	23.1	0.1822	17.5	45.5	7.8	20.9	0.1657
Insect larvae	4.0	22.7	14.6	15.7	0.1423	5.0	36.4	45.0	17.1	0.2078
Mantodea	0.8	2.2	5.6	3.0	0.0347	0	0	0	0	0
Orthoptera	5.6	22.7	27.9	22.6	0.1511	5.0	27.3	11.9	19.8	0.1218
Insect eggs	0	0	0	0	0	22.5	9.1	2.5	0.6	0.0739
Total	~100	-	~100	~100	-	~100	-	~100	~100	-

Table 3. Percentage values of *Enyalius perditus* diet (n = 33) collected in RBMSC, Juiz de Fora, Minas Gerais, in 2003 and 2004, presenting frequency (N), occurrence frequency (OF), mass in g (MA), volume in mm³ (VOL) and Importance Index I(x) for each type of prey consumed in accordance with the lizards' sex.

(Tinkle et al., 1970). Larger females have increased fecundity because they can accommodate more eggs inside their bodies (Trivers, 1972; Arak, 1988). However, differential mortality between gender is more often due to increased activity and predation risk exhibited by males when searching for mates (Anderson & Vitt, 1990). This factor could influence sexual dimorphism observed in *E. perditus*. The size of prey eaten by lizards may also be associated with gape size. However, we did not find any positive correlation between size of lizard and prey (in VOL) as is exhibited for *E. leechii* (Vitt et al., 1996a), *E. bilineatus* (Zamprogno et al., 2001) and *E. brasiliensis* (Van Sluys et al., 2004). *E. perditus* seems to not select prey based on size because there is no relationship between SVL, head length and prey length (Sturaro & Silva, 2010). To the contrary, Sousa & Cruz (2008) found opposing results for *E. perditus*, but this may have been because they used the prey's average length and not VOL in analyses. In this study, Isoptera was the most consumed prey (in VOL). Termites are small invertebrates with little variation in size, and as such they are easily consumable by both small and mid-sized lizards (Teixeira-Filho et al., 2003). Interestingly, we found Orthopteran nymphs in the stomachs of two juvenile lizards, identical in size and volume to those found in adult lizards.

Colour

Sexual selection in *E. perditus* is possibly related to other factors such as coloration (Sturaro & Silva, 2010). Male lizards shift colour to a darker shade of brown compared to females when copulating (Lima & Sousa, 2006), stressed or sick in captivity, or when exposed to mild temperatures. *E. perditus* colour dimorphism (Jackson, 1978) may be the result of selective pressures for the species', intra and intersexual recognition and/or associated with the length of time evolved in a particular microhabitat (Rocha, 1994; Vitt et al., 1996a). Colour dimorphism has frequently been identified among *Enyalius* spp. (Jackson, 1978; Vitt et al., 1996a; Rodrigues et al., 2006; Zatz, 2002; Sturaro & Silva, 2010).

Diet

Enyalius perditus diet diversified with higher

intake of highly active prey (Formicidae and Orthoptera), low mobility prey (larvae), and randomly distributed prey (Isoptera). This possibly suggests opportunistic foraging. Ants were also consumed, suggesting a prey item costing low energy expenditure (Barreto-Lima et al., unpublished data). Isoptera, Mantodeae, and insect eggs were important for I(EJ) because they were collected in the stomach content rather than in the environment. Nonetheless, Mantodeae and insect's eggs were found in only one stomach, so were not significant to the total diet. Orthoptera and Formicidae were not important for I(EJ), probably because they were available in higher abundance. A priori, *Enyalius* was considered a generalist predator of soil arthropods (Zamprogno et al., 2001; Van Sluys et al., 2004; Teixeira et al., 2005). However *E. perditus* was considered an active forager with a broad diet but it still exhibits some prey preferences (Sousa & Cruz, 2008; Sturaro & Silva, 2010).

In this study, *E. perditus* feeding habits do not appear to be typical of a forest specialist and lean more toward opportunistic predation. Lizards in such an intermediary category, adopting both strategies (active and ambush forager) are defined as cruising foragers (Pough et al., 1999). As expected by OFT (Schoener, 1971; Pianka, 1986) niche size increases when prey availability decreases in an environment and this thus leads to a generalist diet (herein only Orthoptera was a common active prey). One possible explanation for these findings is anthropic alteration to the habitats (i.e., the study area, SCMBR was a formerly disturbed coffee plantation). In native forest areas, Sousa & Cruz (2008) reported that *E. perditus* consumed more Isopoda, Formicidae and insect larvae, than reported herein. However, in other studies larvae of Lepidoptera, Araneae, Formicidae and Isoptera were the most abundant food items in *E. perditus*' diet (Sturaro & Silva, 2010).

The SCMBR urban forest physiognomy differs from typical natural forests in the region because anthropic actions have altered the local arthropod fauna's natural balance. Thus, as populations of *E. perditus* are in distinct areas, prey availability influences dietary composition (C.F.D. Rocha, pers. comm.). In *E. leechii* diet, Isoptera and insect

larvae were dominant (Vitt et al., 1996a), while in *E. catenatus* diet, Orthoptera were dominant (Grantsau, 1966). In *E. bilineatus* Orthoptera, Homoptera, Hymenoptera, Blattariae, Hymenoptera and Dytioptera were recorded (Vanzolini, 1972; Zamprogno et al., 2001), while *E. brasiliensis* ate Formicidae, insect larvae, Orthoptera and Isoptera (Van Sluys et al., 2004). It is likely that *Enyalius* consume their shed skin to reingest proteins (Vanzolini, 1972; Vitt et al., 1996a; Teixeira et al., 2005).

Herein, *E. perditus* could be considered semi-arboreal because we observed the lizards on the ground (pitfalls) and by scanning tree branches. Overlapping of resources in the population's diet is likely to exist because there is neither intersexual difference in the diets (in N, MA and VOL), nor a positive correlation between the preys highest VOL and the lizards SVL. This lack of a positive correlation eliminates possible differences in the population's diet that could result from resource sharing due to size (Heideman & Bates, 1999). Sturaro & Silva (2010) also observed numeric and volumetric diet overlap between males and females. However, Sousa & Cruz (2008) saw differences in *E. perditus*' diet according to gender. In this case, gender differences in diet may be explained as a local adaptation to prey availability rather than a characteristic of the population.

Although there is evidence for sexual dimorphism in *E. perditus*, in this study we observed intersexual trophic similarities in diet. This is to the contrary with previously observed tendencies to resource partition by genders in many lizard species (see Schoener, 1967; 1977; Carothers, 1984). The consumption of similar food items across samples in our area of study does not seem to support competition as a major influence on sexual dimorphism. At SCMBR, most arthropods were terrestrial and we also noticed *E. perditus* foraging among litter in the reserve.

We also found decomposed vegetation inside stomachs. Apparently, this suggests accidental intake during predation as previously noted for *E. perditus* (Sturaro & Silva, 2010), *E. brasiliensis* (Van Sluys et al., 2004) and *E. bilineatus* (Zamprogno et al., 2001). Our dietary records showed alterations between years (MA and VOL).

Diversity of prey in the diet may vary between species, time, area and seasonal availability of prey type (Pianka, 1986) or in adaptation to an environment (Colli, 1991). It is also possible that the number of lizards examined between years (13 in 2003 and 20 in 2004) influenced these observed differences in prey MA and VOL. Furthermore, larvae abundance should correspond to insect productivity in the area and coincide with a successful collection period (HU). For Isoptera, the collections during HU coincided with termite nests release of flying adults followed by their agglomeration on the ground for nesting (F. Prezoto, pers. comm.). However, Formicidae and Orthoptera were abundant at the site throughout the period of study.

As expected, in the anthropized forest area with lower prey abundance *E. perditus* was considered an opportunist predator of terrestrial arthropods, having Formicidae, Isoptera, insect larvae and Orthoptera as dominant prey items. However, sexual dimorphism shown by *E. perditus* in this study disagreed with previously recorded accounts because there were intersexual trophic similarities. This suggests there is possibly no differences in resource partitioning of food by gender.

ACKNOWLEDGEMENTS

This study formed part of an M.Sc. (PPG - Comportamento e Biologia Animal/UFJF). Thanks to the Course Coordination and Capes for aid and financial support. To Juiz de Fora Town Hall for access permission to the reserve, IBAMA for collection permissions (227/2003, Fauna/MG), Comissão de Ética na Experimentação Animal da Pró-Reitoria de Pesquisa - UFJF (47/2003), and to the Laboratório de Climatologia e Análise Ambiental - UFJF for data. Thanks to Carlos F.D. Rocha, Guarino R. Colli, Fábio Prezoto, Leny C.M. Costa, Artur Andriollo and Erick Daemon for constructive comments. To Miguel T. Rodrigues for one specimen identification, to Sônia S.S. Brugiolo for her help with arthropod data, and Alyson Gains and Thiago M. Pinto for reviewing the manuscript. Thanks to the following colleagues for help in the field: Alessandro A. Mathias, Fabrício M. Carvalho, Marcos R.S. Lemes, Leonardo B. Ribeiro, Flávia O. Junqueira,

André F.S.F. Rodrigues, Márcio E. Almeida, Leandra R. Gonçalves, Usha Vashist, Adriano Rener, Marcelo Mendes, Danielle Paiva, Teresa, Maísa, and Cléiton. We thank Todd Lewis, *Herpetological Bulletin* for constructive improvements.

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