Feeding habits and reproductive biology of the glass lizard
Ophiodes cf. *striatus* from subtropical Brazil

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Abstract. Based on the analysis of 249 museum-preserved specimens, together with data on captive individuals, the present paper provides information on the diet, morphology, and reproduction of the glass lizard *Ophiodes* cf. *striatus* in the subtropical domain, permitting comparisons with previous reports from different localities. This species is a generalist predator feeding on a wide variety of invertebrate taxa. In addition, *O.* cf. *striatus* occasionally preys on reptiles, including conspecific individuals. There is no evidence of partitioning of prey types between the sexes or ontogenetic changes. In our study, Aranae was the most important food item in the diet, closely followed by Orthoptera. The total volume of prey, but not the number of prey items in each stomach, was positively correlated with lizard snout-vent length (SVL). Females had greater SVL, whereas males had longer tails and vestigial hind limbs. Female oviductal embryos were recorded between July and December, and parturitions occurred in December. Females had a mean number of eight oviductal embryos, and 11 newborns per litter. Litter size was positively correlated with female SVL. Male spermatogenesis was constant throughout the year, with an increase during the presumed mating period, as evidenced by analyzing the changes in the volume of testes. Hence, the glass lizard showed a seasonal reproductive cycle in the subtropics, which is a general pattern for viviparous species, and has been reported for *O.* cf. *striatus* from lower latitudes.

Key Words: Anguidae, Cannibalism, Dietary overlap, Fecundity, Sexual dimorphism.

Introduction

Recent accumulation of natural history data has allowed comparisons on feeding, morphology, and reproduction of Neotropical squamate populations, from both tropical and subtropical domains. This has been possible through studies of geography- and climate-related variation in life-history traits (Pizzatto et al. 2007, Vitt & Caldwell 2009). In addition, the evaluation of intra- and inter-specific relationships through the analysis of preserved specimens can lead to insights into the ecology and evolutionary history of numerous animal species (Greene 1986).

Ophiodes Wagler 1828 (Squamata: Anguidae) is a Neotropical genus characterized by cryptozoic habits, a long cylindrical body, absence of front limbs, vestigial hind limbs, and capability of caudal autotomy, making its species popularly known as glass lizards or glass snakes (Maginnis 2006, Vitt & Caldwell 2009). Currently, *Ophiodes* is comprised of four species, among which *O. striatus* Spix 1824 apparently represents a species complex

that occurs in Paraguay, Uruguay, Argentina, and in southern to northeastern Brazil (Uetz 2010).

According to Borges-Martins (1998), the name *O. fragilis* should apply to the individuals from northeastern Argentina and southern and southeastern Brazil, and also from parts of the Brazilian states of Minas Gerais, Mato Grosso do Sul and Bahia. We prefer to use the current taxonomy until a revision of *Ophiodes* is published, and refer to individuals from these localities as *Ophiodes* cf. *striatus*. All the individuals analyzed in the present study, as well as the cited literature (Leitão-de-Araújo 1973, Marques & Sazima 2004, Pizzatto 2005, Barros & Teixeira 2007, Montechiaro & Adams 2009), correspond to *O. fragilis sensu* Borges-Martins (1998).

Previous work indicates that the glass lizard is a diurnal predator that actively feeds on a wide spectrum of arthropods occurring in grassy and herbaceous vegetation, and has a seasonal reproductive cycle, with lecithotrophic viviparity. With the exception of occasional observations (e.g., Leitão-de-Araújo 1973, Montechiaro & Adams

2009), no study has examined the biology of *O.* cf. *striatus* from subtropical Brazil.

Based on specimens preserved in museum collections and data on captive individuals, here we report the diet composition of the glass lizard *Ophiodes* cf. *striatus*, and evaluate the extent of sexual and ontogenetic variation in feeding habits. We also report data on reproduction, including fecundity, reproductive cycles, and sexual dimorphism of this species.

Materials and methods

A total of 249 preserved specimens were examined, from the following institutions: Museu de Ciências e Tecnologia of the Pontifícia Universidade Católica do Rio Grande do Sul (MCP), Museu de Ciências Naturais of the Fundação Zoobotânica do Rio Grande do Sul (MCN), Museu de História Natural Capão da Imbuia (MHNCI), and Laboratório de Herpetologia of the Universidade Federal de Santa Maria (ZUFSM) (Appendix 1). None of the individuals analyzed overlaps with previous studies. The sample included only specimens from the southern states of Rio Grande do Sul, Santa Catarina and Paraná. These states include most of the subtropical region in Brazil, which is characterized by a highly seasonal temperature regime and precipitation evenly distributed throughout the year.

The following data were taken from each specimen: snout-vent length (SVL), tail length (TL), head length (HL), head width (HW), length of the vestigial hind limbs (LL, all in mm), body mass, sex, and stage of reproductive maturity. Males were considered reproductively mature if they had opaque and convolute deferent ducts (Shine 1982); females if they had follicles in secondary vitellogenesis (larger than 5 mm) and/or embryos in the oviduct (modified from Shine 1977). Only individuals that were wild-caught and preserved soon after collection were included in the analyses.

The stomachs of 161 specimens could be dissected and their contents were analyzed for food items under a stereomicroscope. Prey items were identified to the taxonomic level of order and deposited in the collections of the institutions mentioned above. Arthropod fragments that could not be identified were grouped as "non-identified arthropods". Fragments that could only be identified as insects and for which the number of individuals could not be determined were grouped in an "insect miscellanea" category. Prey items were counted and measured to the nearest 0.01 mm, using a digital caliper and millimetric ocular. The individual prey volume (in mm^3) was estimated by the ellipsoid formula according to Lima et al. (2010):

$$V = 4/3\pi \ (L/2)(W/2)^2$$

where L is the largest prey length and W is the largest prey width. The total volume of fall prey was calculated as the sum of the volume of all its prey items.

For better representing the diversity of the diet, we estimated the minimum significant sample size for a dietary study. A cumulative diet diversity curve was generated using the Shannon-Weaver index (Shannon & Weaver 1949) as suggested by Kovács & Török (1997). The trophic diversity concerning the number of prey in the stomach contents of males, females, and juveniles was analyzed by the standardized Shannon-Weaver index, according to Krebs (2001):

$$H' = -\Sigma p_i \log_2 (p_i)$$

where p_i is the relative abundance of the prey taxon i in the diet of the lizards.

The dietary overlap regarding numerical and volumetric proportions of prey categories between sexes and ontogenetic stages was evaluated using the similarity index (Pianka 1973), according to Cappellari et al. (2007):

$$O_{jk} = \frac{\sum P_{ij} P_{ik}}{\sqrt{\sum P_{ij}^2 \sum P_{ik}^2}}$$

where p_{ij} and p_{ik} are the proportion of prey items of category i in the groups j and k. Values range from 0 (no similarity) to 1 (complete similarity).

To estimate the importance of each prey category consumed, we calculated the index of importance value (IV) of Gadsden & Palacios-Orona (1997) as:

$$IV = V'_{ij} + N'_{ij} + F'_{ij}$$

where $V'_{ij} = V_{ij} \ / \ \Sigma V_{ij}$; $N'_{ij} = N_{ij} \ / \ \Sigma N_{ij}$; $F'_{ij} = F_{ij} \ / \ \Sigma N_j$ and V_{ij} = Volume of prey category i in predator j; ΣV_{ij} = Total volume of stomach content; N_{ij} = Number of items of prey category i in predator j; ΣN_{ij} = Total number of items in the sample; F_{ij} = Number of stomachs of predator j in which prey category i was found; N_j = Total number of stomachs of predator j.

Differences between sexes and ontogenetic stages in the number and volume of prey consumed were assessed using analysis of variance (ANOVA). We could not test for interaction among independent variables because of the small sample size of recently-fed juveniles. The relationship between number and volume of prey found in each stomach and predator body size was assessed using simple linear regressions.

The study on the reproductive biology of *O.* cf. *striatus* was based on 249 preserved specimens. Data on newborns came from captive specimens, recorded in the catalogues of the above-mentioned collections. We recorded, for males, the length and width of both testes; and for females, the number of ovarian follicles or oviductal embryos and the diameter of the largest vitellogenic follicles or embryos. The volume of testes was calculated by the ellipsoid formula, using the largest testis length and width. Seasonal changes in the volume of testes were analyzed by combining data from each of the four seasons of the year. Residuals from the regression of testes volume on SVL were used to indicate spermatogenic activity (Volsøe 1944), and differences among seasons were evaluated through a Kruskal-Wallis test. The conversion rate of follicles into embryos was evaluated as the difference between the number of vitellogenic follicles and the number of embryos, using the Mann-Whitney U test.

We used the Student's t test in order to evaluate sexual dimorphism in SVL. We used analysis of covariance (ANCOVA) with SVL as a covariate to compare TL, HL,

HW and LL between sexes because body parts are related to body length. The index of sexual size dimorphism (SSD) was calculated as follows: (mean SVL of the larger sex) / (mean SVL of the smaller sex) – 1. SSD is expressed as positive if females are the larger sex, and negative if males are the larger (Shine 1994). Data were tested for variance normality and homogeneity, through the Kolmogorov-Smirnov and Levene tests, and transformed according to the assumptions of each test. A significance level of $\alpha = 0.05$ was assumed for all analyses.

Results

Feeding

The minimum sample size for dietary analysis was estimated in 34 individuals. Of a total of 161 stomachs of *O.* cf. *striatus* we analyzed, 73 (45.3%) contained prey, and we consider this to be representative for the diet diversity study. We classified the identified prey in 14 categories, most of them pertaining to Arthropoda (Table 1).

Araneae was the most frequent prey category consumed, being present in 25.8% of the stomach contents. The second most frequent prey category was Orthoptera (19.6%). Two glass lizards had scales of unidentified Squamata in their stomach contents. Scales of *O.* cf. *striatus* were found in one stomach, whereas four almost undigested juveniles *O.* cf. *striatus* were found in the other (Table 1). The mean species richness of prey found for the stomach contents was 1.48 (± 0.59, range = 1–3). The mean number of items per stomach was 2.54 (± 2.38), and the maximum number of items was 12.

The Importance Value Index of prey items indicated that Araneae was the most important category in the diet of juveniles (IV = 0.82), whereas Orthoptera was the most important category in the diets of mature males (IV = 1.07) and females (IV = 0.80). For the overall sample, the most important item in the diet of *O.* cf. *striatus* was Araneae (IV = 0.76), closely followed by Orthoptera (IV = 0.75) (Table 2).

The mean number of prey items consumed by mature males was 1.19 (± 0.45), being significantly lower than 3.26 (± 2.78) preys consumed by mature females (ANOVA, F = 4.614, p = 0.036). The mean volume of prey consumed by individual mature males was 2257.33 mm³ (± 2965.67), and 3781.34 mm³ by mature females (± 6426.93), showing no significant difference between sexes (ANOVA, F = 3.567, p = 0.063).

The number of prey items consumed by ma-ture lizards (mean = 2.60, SD = 2.51) did not differ from the number of prey items consumed by juveniles (mean = 2.27, SD = 1.74; ANOVA, F = 0.399, p = 0.530). The mean volume of prey consumed by mature individuals (3273.34 mm³, SD = 4341.28) also did not differ from the volume consumed by juveniles (2727.34 mm³, SD = 4380.34) (ANOVA, F = 0.0192, p = 0.890).

Mature females fed on a wider variety of prey categories (n = 14) in comparison to mature males (n = 7), and prey richness was significantly greater in females (ANOVA, F = 6.509, p = 0.013). Trophic diversity was greater in the diet of mature females (H' = 2.72) than in juveniles (H' = 2.22) and mature males (H' = 1.92). Females also consumed a larger proportion of the total prey items (71.2%, n = 109) and of the total prey volume (59.5%). Glass lizards were the most important category in volume, for both mature males (32.2%) and juveniles (45.3%) (Table 1).

Feeding similarity, based on the numerical proportions of prey categories, was higher between juveniles and mature females (O_{jk} = 0.77) than between mature males and mature females (O_{jk} = 0.59) and between juveniles and mature males (O_{jk} = 0.44). Regarding volumetric proportions, the feeding similarity was higher between juveniles and mature males (O_{jk} = 0.84) than between mature males and females (O_{jk} = 0.69) and between juveniles and mature females (O_{jk} = 0.33).

Lizard body size was positively correlated with total volume of prey in each stomach (R^2 = 0.074, F = 5.70, p = 0.020), but not with the number of prey items in each stomach (R^2 = 0.027, F = 1.68, p = 0.190).

Reproductive biology

Mature female SVL ranged from 107 to 220 mm (mean = 161.04 mm, SD = 25.68, n = 46), whereas mature male SVL ranged from 105 to 195 mm (mean 146.66, SD = 23.3, n = 47). The seasonal distribution of the snout-vent length of *O.* cf. *striatus* showed that females attain sexual maturity around the age of nine months (Fig. 1A). The same may occur for males, although many individuals larger than the smallest mature male seemed to show a delayed sexual maturation (Fig. 1B).

Females in secondary vitellogenesis were recorded between February and October, whereas oviductal embryos occurred between July and December, with a concentration in October (Fig. 2). In captivity, three parturitions were recorded, all in December. Body-size-adjusted testes volume of

Table 1. Number (N), volume (V), and frequency of occurrence (F) of each prey category in the diet of juveniles, mature males, and mature females of *Ophiodes* cf. *striatus* from subtropical Brazil.

Item	Juveniles (n = 13)			Mature males (n = 20)			Mature females (n = 40)			Total (n = 73)		
	N (%N)	V (%V)	F (%F)	N (%N)	V (%V)	F (%F)	N (%N)	V (%V)	F (%F)	N (%N)	V (%V)	F (%F)
Reptilia												
Squamata undet.								747.39 (0.5)	1 (1.7)		747.39 (0.29)	1 (1.03)
O. cf. *striatus*	4 (16.0)	16055.21 (45.3)	1 (6.7)	1 (5.3)	21763.97 (32.2)	1 (4.5)				5 (3.27)	37819.18 (14.89)	2 (2.06)
Gastropoda												
Stylommatophora							1 (0.9)	181.05 (0.1)	1 (1.7)	1 (0.65)	181.05 (0.07)	1 (1.03)
Crustacea												
Isopoda	9 (36.0)	1905.17 (5.4)	3 (20.0)				33 (30.3)	9150.85 (6.1)	9 (15.0)	42 (27.45)	11056.02 (4.35)	12 (12.37)
Arachnida												
Acari							2 (1.8)	0.23 (<0.01)	1 (1.7)	2 (1.30)	0.23 (<0.01)	1 (1.03)
Araneae	8 (32.0)	4136.98 (11.7)	5 (33.3)	6 (31.6)	12391.41 (18.4)	6 (27.3)	17 (15.6)	37122.3 (24.6)	14 (23.3)	31 (20.26)	53650.67 (21.13)	25 (25.77)
Opiliones	1 (4.0)	179.15 (0.5)	1 (6.7)				8 (7.3)	2730.11 (1.8)	3 (5.0)	9 (5.88)	2909.26 (1.14)	4 (4.12)
Insecta												
Blattaria				3 (15.8)	8791.39 (13.0)	3 (13.6)	6 (5.5)	13204.02 (8.7)	4 (6.7)	9 (5.88)	21995.41 (8.66)	7 (7.22)
Coleoptera (larvae)	1 (4.0)	2380.43 (6.7)	1 (6.7)				2 (1.8)	212.13 (0.1)	2 (3.3)	3 (1.96)	2592.56 (1.02)	3 (3.09)
Diptera	1 (4.0)	424.52 (1.2)	1 (6.7)				1 (0.9)	10.25 (<0.01)	1 (1.7)	2 (1.30)	434.77 (0.17)	2 (2.06)
Hemiptera							1 (0.9)	11.53 (<0.01)	1 (1.7)	1 (0.65)	11.53 (<0.01)	1 (1.03)
Lepidoptera (larvae)				1 (5.3)	182.28 (0.3)	1 (4.5)	19 (17.4)	10986.03 (7.2)	10 (16.7)	20 (13.07)	11168.31 (4.40)	11 (11.34)
Orthoptera	1 (4.0)	4139.15 (11.7)	1 (6.7)	8 (42.1)	16566.22 (24.5)	8 (36.4)	19 (17.4)	57086.7 (37.8)	10 (16.7)	28 (18.30)	77792.11 (30.63)	19 (19.59)
Insect miscellanea		4879.8 (13.8)	2 (13.3)		1024.51 (1.5)	3 (13.6)		3606.75 (2.4)	3 (5.0)		9511.03 (3.74)	8 (8.25)
Non-identified arthropods		1355.07 (3.8)			6791.91 (10.0)			15976.91 (10.6)			24123.89 (9.50)	
Total	25	35455.5	15	19	67511.7	22	109	151026.3	60	153	253993.41	97

Table 2. Importance of each prey category in the diet of *Ophiodes* cf. *striatus* from subtropical Brazil according to the index of importance value (IV) of Gadsden & Palacios-Orona (1997).

Item	Juveniles	Males	Females	All individuals
Acari	0.00	0.00	0.04	0.03
Araneae	0.82	0.80	0.75	0.76
Blattaria	0.00	0.44	0.24	0.24
Coleoptera (larvae)	0.18	0.00	0.07	0.07
Diptera	0.13	0.00	0.03	0.04
Hemiptera	0.00	0.00	0.03	0.02
Isopoda	0.64	0.00	0.59	0.48
Lepidoptera (larvae)	0.00	0.11	0.50	0.33
O. cf. *striatus*	0.69	0.43	0.00	0.21
Opiliones	0.12	0.00	0.17	0.13
Orthoptera	0.23	1.07	0.80	0.75
Squamata undet.	0.00	0.00	0.03	0.02
Stylommatophora	0.00	0.00	0.04	0.02
Insect miscellanea	0.29	0.17	0.10	0.15
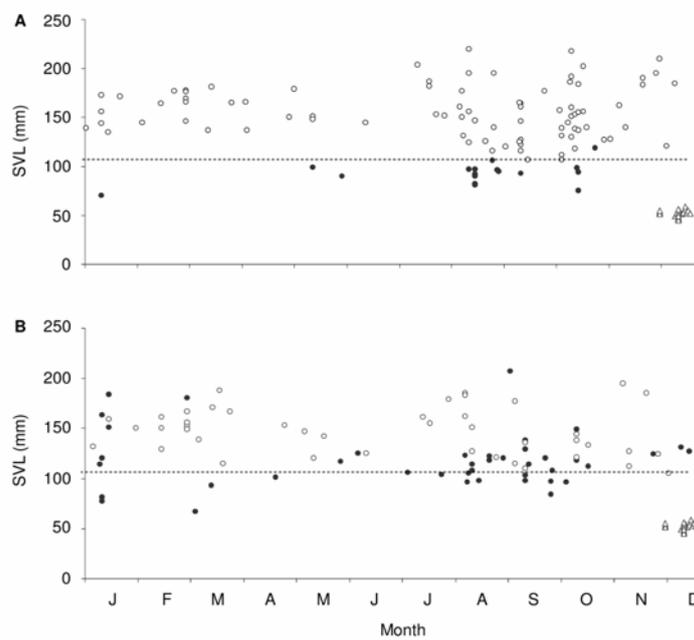
Figure 1. Seasonal variation of the SVL of females (**A**) and males (**B**) of *Ophiodes* cf. *striatus* from subtropical Brazil. Solid circles represent immature individuals, open circles represent mature individuals, and triangles represent newborn. The dashed line represents the SVL of the smallest mature individual.

mature male *O.* cf. *striatus* did not differ among seasons (H = 3.683, p = 0.29; Fig. 3).

The number of oviductal embryos per *O.* cf. *striatus* female ranged from 2 to 14 (mean = 7.93, SD = 3.79, n = 14). The mean number of newbornsper litter was 11.33 (± 2.08, n = 3). Newborn SVL ranged from 45 to 59 mm (mean = 51.64, SD =

3.29, n = 22) and the mean mass was 0.50g (± 0.11, n = 22). None of the analyzed females contained vitellogenic follicles and oviductal embryos simultaneously. Moreover, there was no difference between the number of vitellogenic follicles and oviductal embryos/newborns (U = 257.5, p = 0.97, n = 51). Therefore, litter size can be inferred as the

number of vitellogenic follicles or oviductal embryos, which ranged from 2 to 16 (mean = 7.96, SD = 3.48, n = 51). Litter size was positively related to female SVL (R^2 = 0.25, F = 35.76, p < 0.0001, n = 51).

Females were larger than males in snout–vent length (t = 3.12, p = 0.002), with a degree of sexual size dimorphism of 0.09. However, males had relatively longer tails (ANCOVA, F = 17.13, p < 0.001) and larger vestigial hind limbs (ANCOVA, F = 17.13, p < 0.001). Sexes did not differ in head length (ANCOVA, F = 1.65, p = 0.20) and head width (ANCOVA, F = 0.43, p = 0.51).

Discussion

Ophiodes cf. *striatus* in subtropical Brazil is a generalist predator that feeds on a wide variety of invertebrate taxa, as also recorded for this species in tropical areas (Marques & Sazima 2004, Barros & Teixeira 2007). This latter study also reported reptile scales in the gut of *O.* cf. *striatus*, but did not indicate predation on conspecifics or other squamates, suggesting that these lizards may sometimes feed on dead organic material, such as shed skins. We found occasional predation on reptiles by *O.* cf. *striatus*, including one case of cannibalism, in addition to that reported by Montechiaro &
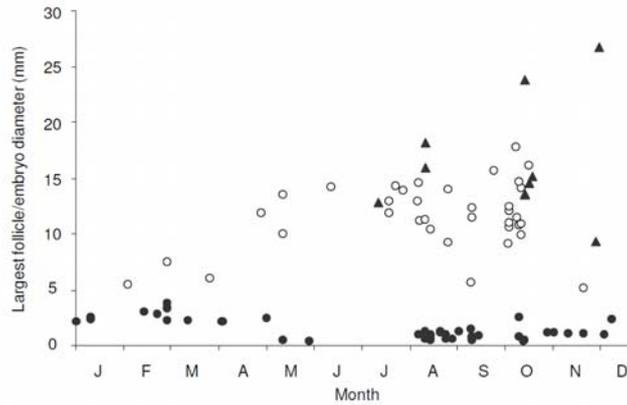

Figure 2. Seasonal variation in the diameter of the largest follicle or oviductal embryo of females of *Ophiodes* cf. *striatus* from subtropical Brazil. Solid circles represent non-vitellogenic follicles, open circles represent vitellogenic follicles, and triangles represent embryos.
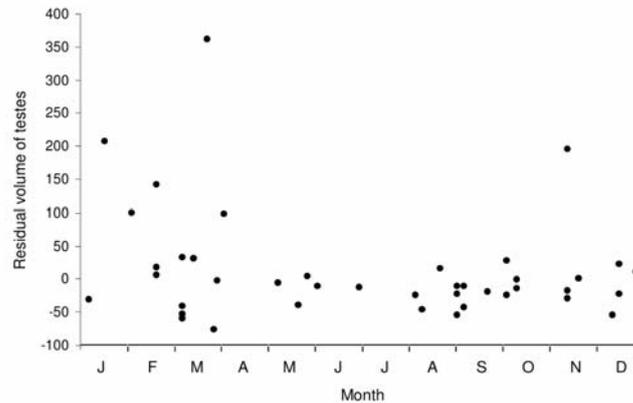

Figure 3. Seasonal variation in the residual volume of the testes in mature males of *Ophiodes* cf. *striatus* from subtropical Brazil.

Adams (2009), also from subtropical Brazil. Intraspecific predation is widespread in lizards (Siqueira & Rocha 2008), and generalist predators such as *O*. cf. *striatus* tend to have particularly strong cannibalistic tendencies, which may be interpreted as an extension of their ordinary opportunistic predatory behavior (Mayntz & Toft 2006, Siqueira & Rocha 2008).

The wide spectrum of insects consumed by *O*. cf. *striatus* in the subtropical region is reported also in an earlier study on a population from southeastern Brazil (Barros & Teixeira 2007), evidencing some degree of evolutionary stability regarding feeding habits (Cooper 1994). Barros & Teixeira (2007) found Blattodea as the most frequently consumed prey category, followed by Aranae and Orthoptera. However, we found that Aranae was the most frequently consumed prey, followed by Orthoptera and Isoptera. These differences in relative prey frequency are probably related to differential prey availability between the areas studied, and studies considering this aspect might allow conclusions regarding prey preferences among populations from different localities. A study on the diet of the fossorial anguid lizard *Diploglossus lessonae* showed that it mainly feeds on arthropods such as Opiliones and pupae of Scarabaeidae, which are generally found underneath rocks (Vitt 1985). This case demonstrates the roles of both habitat specialization and opportunistic feeding strategies in the composition of prey categories consumed, regardless of the above-mentioned conservative effects of phylogenetic affinity (Cooper 1994).

Although females consumed a greater variety of prey, this study found no evidence of partitioning in prey types between sexes, and there were no sexual differences in head length or width. Trophic ontogeny was also not significant, and even cannibalism, which is commonly performed by mature individuals (Siqueira & Rocha 2008), was recorded for juveniles in this study. Interestingly, trophic dissimilarity among size classes was observed for a tropical population of *O*. cf. *striatus*, where juveniles were not cannibalistic and fed mainly on Blattaria (Barros & Teixeira 2007). Given that we did not record cockroaches in the stomachs of juvenile *O*. cf. *striatus*, this may be partially responsible for the observed lack of feeding partitioning in relation to the mature individuals. In addition, the report of no evidence of spatial segregation between juvenile and adult *O*.

cf. *striatus* during a field study (Barros & Teixeira 2007) can also explain the feeding similarity between ontogenetic stages. There were no isopterans in the gut contents, and this prey category was previously regarded as rare for *O*. cf. *striatus* (Barros & Teixeira 2007). The absence of Isoptera is believed to be related either to a preference for larger prey types or to the environmental availability of this taxon (Rocha et al. 2004).

The seasonal reproductive cycle recorded for *O*. cf. *striatus* in the subtropics was expected, given that it is a general pattern for viviparous species (e.g., Teixeira 2001, Carvalho & Araújo 2004, Vrcibradic & Rocha 2005), and has been reported for *O*. cf. *striatus* from lower latitudes (Pizzatto 2005). As widely observed in temperate zones, there was no seasonal variation in testes volume throughout the year, which is probably related to the low cost of sperm production in reptiles (Nagy 1983). However, the highest values for residual volume of testes occurred between January and March (Fig. 3), probably when mating takes place in *O*. cf. *striatus*. The recruitment period differs from earlier reports on this species, given that captivity parturitions recorded in southern Brazil occurred in December (Leitão-de-Araújo 1973, this study), whereas in southeastern Brazil this period extends from August through November (Marques & Sazima 2003, Pizzatto 2005). This might be related to latitudinal differences in temperature and rainfall regimes, although conditions in captivity can distort lizard reproductive cycles.

The sexes were dimorphic in body size, with females larger than males, as previously reported for this species (Pizzatto 2005, Barros & Teixeira 2007) and numerous other species of lizards (Pianka & Vitt 2003). Given that female SVL and clutch size are positively correlated in other lizards (Vitt & Price 1982), including Diploglossinae (Vitt & Caldwell 2009), and *O*. cf. *striatus* (Barros & Teixeira 2007, this study, but see Pizzatto 2005), selective pressures related to size-dependent fecundity may be involved, since a larger body cavity may provide more space for reproductive organs and embryos (Fitch 1981). Sexual dimorphism in two additional traits, relative tail length and length of the vestigial hind limbs, was evaluated and reported for the first time for *O*. cf. *striatus*. According to the Morphological Constraint hypothesis of King (1989), larger tails in males are normally related to the accommodation of the hemipenes and its retractor muscles. Males also

had relatively larger vestigial hind limbs, and this may be related either to the use of these structures for sexual stimulus during mating interactions, or their use in male-male combats, as observed for snakes (Carpenter et al. 1978).

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Appendix 1. Specimens examined:
MCN 522; MCN 523; MCN 769; MCN 776; MCN 778; MCN 779; MCN 1039; MCN 1051; MCN 1052; MCN 1053; MCN 1054; MCN 1055; MCN 1056; MCN 1057; MCN 1058; MCN 1060; MCN 1061; MCN 1063; MCN 1155; MCN 1163; MCN 1164; MCN 1165; MCN 1166; MCN 1167; MCN 1168; MCN 1306; MCN 1392; MCN 1393; MCN 1442; MCN 1445; MCN 1784; MCN 1864; MCN 1895; MCN 1896; MCN 1944; MCN 1956; MCN 1957; MCN 1958; MCN 1960; MCN 1961; MCN 1962; MCN 1966; MCN 1967; MCN 1968; MCN 2053; MCN 2080; MCN 2414; MCN 2415; MCN 2416; MCN 2417; MCN 2426; MCN 2427; MCN 2428; MCN 2429; MCN 2430; MCN 2461; MCN 2612; MCN 2634; MCN 2682; MCN 2686; MCN 2694; MCN 2725; MCN 2896; MCN 2897; MCN 2901; MCN 2902; MCN 2903; MCN 2904; MCN 2905; MCN 2906; MCN 2907; MCN 3002; MCN 3003; MCN 3004; MCN 3007; MCN 3125; MCN 3127; MCN 3238; MCN 3520; MCN 3553; MCN 3556; MCN 3578; MCN 3800; MCN 4051; MCN 4098; MCN 4548; MCN 6638; MCN 6639; MCN 6640; MCN 6641; MCN 6642; MCN 7019; MCN 7228; MCN 7701; MCN 8029; MCN 8646; MCN 9094; MCN 14965; MCN 15001; MCN 15565; MCN 15566; MCN 15567; MCN 15568; MCN 15569; MCN 15570; MCN 15571; MCN 15573; MCN 15574; MCN 15614; MCN 15623; MCP 295; MCP 1018; MCP 1793; MCP 2154; MCP 2155; MCP 2165; MCP 2259; MCP 3152; MCP 3466; MCP 3608; MCP 3796; MCP 3808; MCP 3810; MCP 3815; MCP 3816; MCP 3817; MCP 3820; MCP 3823; MCP 3824; MCP 3964; MCP 4638; MCP 4639; MCP 4640; MCP 4878; MCP 4879; MCP 4880; MCP 4881; MCP 4883; MCP 4885; MCP 4886; MCP 4887; MCP 4888; MCP 4889; MCP 4890; MCP 4955; MCP 4966; MCP 4981; MCP 4982; MCP 4983; MCP 4984; MCP 4985; MCP 4986; MCP 4987; MCP 4988; MCP 4989; MCP 5403; MCP 5404; MCP 5406; MCP 5407; MCP 5419; MCP 5745; MCP 5889; MCP 5930; MCP 5987; MCP 5990; MCP 6169; MCP 6211; MCP 6305; MCP 6359; MCP 6388; MCP 6456; MCP 6525; MCP 6526; MCP 7216; MCP 7500; MCP 7841; MCP 7842; MCP 7843; MCP 7844; MCP 7845; MCP 7846; MCP 7847; MCP 7848; MCP 8495; MCP 8507; MCP 9917; MCP 10484; MCP 10485; MCP 10486; MCP 10516; MCP 10570; MCP 11890; MCP 11899; MCP 12118; MCP 12119; MCP 12368; MCP 12462; MCP 12463; MCP 12464; MCP 12465; MCP 12466; MCP 12467; MCP 12468; MCP 12469; MCP 12470; MCP 12471; MCP 12472; MCP 12473; MCP 12474; MCP 12475; MCP 12504; MCP 12578; MCP 12689; MCP 12764; MCP 13136; MCP 13738; MCP 14289; MCP 14342; MCP 15572; MCP 15816; MCP 17667; MCP 17668; MCP 17669; MCP 17670; MCP 17671; MCP 17802; MHNCI 7391; MHNCI 9203; MHNCI 9232; MHNCI 9662; MHNCI 9742; MHNCI 9743; MHNCI 9744; MHNCI 9745; MHNCI 9746; MHNCI 10020; MHNCI 10665; MHNCI 10846; MHNCI 11662; ZUFSM 0006; ZUFSM 0007; ZUFSM 0008; ZUFSM 0016; ZUFSM 0018; ZUFSM 0043; ZUFSM 0113; ZUFSM 0146; ZUFSM 0148; ZUFSM 0149.