SHORT NOTE

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ECOLOGICAL OBSERVATIONS ON *MABUYA DORSIVITTATA* (SQUAMATA; SCINCIDAE) FROM A HIGH ALTITUDE HABITAT IN SOUTH-EASTERN BRAZIL

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We present new data on the ecology of a high-altitude population of *M. dorsivittata*, at the Itatiaia National Park in south-eastern Brazil, based on 16 lizards collected in February 2000. Litter size for five mature females was 3-4. Body temperatures of eight lizards averaged 29.1±3.4 °C and was positively correlated with air and substrate temperatures. *M. dorsivittata* consumed a range of arthropods, with no clear dominance of any one prey category.

Key words: diet, reproduction, skink, thermoregulation

The ecology of Neotropical skinks of the genus *Mabuya* was, until recently, very poorly known. Most ecological studies on these lizards were published after 1990 (Vitt, 1991, 1995; Vitt & Blackburn, 1991; Stevaux, 1993; Vrcibradic & Rocha 1995, 1996, 1998*a,b*, 2002*a,b*; Rocha & Vrcibradic, 1996, 1999; Vitt *et al.*, 1997; Vitt & Zani, 1998; Mesquita *et al.*, 2000; Rocha *et al.*, 2002*a,b*). These studies include information on about half of the fifteen currently recognized mainland South American members of the genus (see Mijares-Urrutia & Arends, 1997; Rodrigues, 2000), including the widespread species *M. frenata* and *M. nigropunctata*. *Mabuya dorsivittata* also has a relatively wide distribution in South America (Peters & Donoso-Barros, 1970; Cei, 1993), but ecological data available for this species are presently restricted to some observations on habitat use and general habits and behaviour (Vanzolini, 1948; Gallardo, 1968; Gudynas, 1980). Quantitative data on food habits, thermal ecology and reproduction of *M. dorsivittata* are presently lacking in the literature. In this study, we present data on the ecology of a high-altitude population of *M. dorsivittata*, including information about microhabitat use, body and environmental temperatures, reproduction and diet.

Sixteen lizards were collected between 0830-1500 hr during 6-7 February 2000 at a site (22° 23' S, 44° 40' W; altitude 2460 m) on the Prateleiras mountain, in the Itatiaia National Park, Rio de Janeiro state, Brazil. The study area is characterized by vegetation typical of the "campos de altitude" (montane fields) biome and by the presence of numerous roundish granitic boulders surrounded by tall grass (for a more detailed description of the area see Scarano *et al.*, 2001).

Lizards were captured using rubber bands and glue-traps. A piece of elastic rubber band about 40 cm long and 1cm in diameter, with both ends knotted together, was used in collections. Whenever a lizard was sighted, the band was stretched and released so that the knot would hit the animal and immobilize it (whereupon it was captured). Glue-traps consisted of rectangular pieces of cardboard with one adherent surface. Glue-traps were set randomly on top of rocks and checked every 15 min for lizards. Captured lizards were released from the traps by using an ether-soaked ball of cotton wool (ether will readily dissolve the glue), and then immediately euthanased by being placed in a plastic bag with an ether-soaked ball of cotton wool. We believe the removal of 16 specimens of *M. dorsivittata* from the study area is unlikely to have a significant effect on that population, as the species appears to be quite abundant locally.

For lizards collected with rubber bands, cloacal temperatures and temperatures of the substrate and air (1 cm above the point where the lizard was sighted) were taken with fast-reading cloacal thermometers, microhabitat type was recorded and perch height was taken with a measuring tape. Lizards were measured and weighed in the field after being humanely euthanized. Snout-vent length (SVL) was taken with a digital calliper (to the nearest 0.1 mm) and body mass was taken with Pesola spring balances. All lizards were fixed with 10% formalin and later transfered to 70% ethanol. In the laboratory, all animals were opened for examination of gonads and excision of stomachs. Prey items found in stomachs were identified to the level of order and had their longer and shorter axes measured with a digital calliper. Volume of each prey item was estimated using the

TABLE 1. Sizes of juvenile and adult *Mabuya dorsivittata* from Itatiaia, Brazil. For each variable, we give sample size (*n*), mean value ± SD, and range.

Stage	*n*	Mean	Range
JUVENILES			
SVL	4	44.3±2.9 mm	40.0-46.3 mm
Mass	4	1.6±0.5 g	0.8-1.9g
ADULTS			
SVL	12	64.9±3.5 mm	58.8-74.3 mm
Mass	12	4.9±0.9g	3.5-7.0g

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formula for an ellipsoid (see Vitt, 1991). Basic statistics given throughout the text refer to arithmetic means plus one standard deviation.

Four of the lizards (one male, three females) were immature, judging by the state of their gonads, whereas the remaining twelve (seven males, five females) were adult (Table 1). Of the five adult females (64.0-74.3 mm SVL), four had oviductal ova 2.5-3.5 mm in diameter (three in three females, four in one female) and one had three near-term embryos. This indicates that brood size for this population (mean=3.2±0.45; n=5) is equivalent to that of lowland coastal populations of *M. agilis* (Rocha *et al.*, 2002*b*), and relatively small compared to most Neotropical congeners studied so far (Rocha & Vrcibradic, 1999; Mesquita *et al.*, 2000). Unfortunately, we know of no published data on brood size of other *M. dorsivittata* populations, thus we cannot say if the small brood size observed is a characteristic of that particular population or of the species as a whole. It is also worth noting that 80% of the collected adult females had implanted ova in an early stage of development (stage 3 of Rocha & Vrcibradic, 1999), whereas a single female had well-developed foetuses (stage 6 of Rocha & Vrcibradic, 1999). This suggests that the month of February may represent the end of the parturition period for the present population of *M. dorsivittata*, as in a few other studied populations of Brazilian congeners (see Rocha & Vrcibradic, 1999).

All animals collected with rubber bands were first sighted while basking on granitic boulders, at a height above the ground ranging from 15-55 cm (mean 33.0±11.0 cm; n=9). Mean body temperature of *M. dorsivittata* was 29.1±3.4 °C (range 24.4-35.6 °C; n=8), whereas mean air temperature was 25.0±3.8 °C (range 20.0-29.4 °C; n=7) and mean substrate (rock) temperature was 26.3±2.6 °C (range 23.0-30.6 °C; n=8). These values are somewhat lower than those reported for other Neotropical congeners from lowland and mid-elevation habitats (Brooks, 1968; Fitch, 1968; Vitt & Blackburn, 1991; Vitt, 1995; Rocha & Vrcibradic, 1996; Vitt *et al.*, 1997; Vrcibradic & Rocha, 1998*a*, 2002*a,b*), but body temperatures of *M. dorsivittata* were always higher than environmental temperatures and averaged 4.5±2.4 °C above air temperature (range 0.4-6.2 °C; n=7) and 2.9±1.4 °C above substrate temperature (range 0.6-5.0 °C; n=8). Such difference values are comparable to those reported for other *Mabuya* species in the Neotropics (Brooks, 1968; Fitch, 1968) and in southeast Asia (Inger, 1959), even though mean body and environmental temperatures were higher in the latter cases. This indicates an active thermoregulatory behaviour for *M. dorsivittata* and may suggest possible limitations for thermoregulation in high-altitude areas due to the lower environmental temperatures (see Mathies & Andrews, 1995), although more data would be needed to assess this point. Body temperatures of *M. dorsivittata* were positively and significantly correlated with both air (r^2=0.63; P<0.05; n=7) and substrate (r^2=0.86; P=0.001; n=8) temperatures.

TABLE 2. Absolute values and proportions for volume (Vol., in mm³), number (n) and frequency of occurrence (Freq.) of each prey category in the diet of *Mabuya dorsivittata* in Itatiaia, Brazil (n=16). Category "Miscellaneous" refer to unidentifiable fragments of arthropods.

Items	Vol.	%Vol.	*N*	%*N*	Freq.	%Freq.
Araneae	153.7	7.6	10	17.5	8	50.0
Blattaria	15.1	0.7	1	1.8	1	6.3
Coleoptera	478.3	23.6	11	19.3	7	43.8
Diptera	471.0	23.3	12	21.1	8	50.0
Hemiptera	7.6	0.4	1	1.8	1	6.3
Homoptera	58.5	2.9	15	26.3	7	43.8
Hymenoptera	0.1	0.01	1	1.8	1	6.3
Lepidoptera	639.9	31.6	6	10.5	4	25.0
Miscellaneous	198.6	9.8	-	-	-	-
Total	2022.8		57			

All sixteen lizards contained food in their stomachs, indicating that the population must be in positive energy balance (see Huey *et al.*, 2001). Mean number of prey items per stomach was 3.8±2.2 (range 1-8; n=16). Diet of *M. dorsivittata* comprised a diverse array of arthropod types (mainly insects), with no clear dominance of any one prey category (Table 2). The consumption of a great diversity of food items seems to be the rule among the New World *Mabuya* (Vitt & Blackburn, 1991; Vitt, 1995; Vrcibradic & Rocha, 1996, 2002*b*; Vitt *et al.*, 1997; Pinto, 1999; Mesquita *et al.*, 2000; Rocha *et al.*, 2002*a*), with few exceptions (Vrcibradic & Rocha 1995, 1998*a*). Even taking the small sample size into account, the absence of termites in the diet of this population is notable, considering that such insects are important items in the diet of some populations of other Brazilian congeners (Vitt, 1995; Vrcibradic & Rocha, 1995; 1996; 1998*a*; 2002*b*; Vitt & Zani, 1998; Pinto, 1999). The absence of termites in the diet of *M. dorsivittata* from Itatiaia may be due to a low density of such insects in the area or to the particular food preferences of that species.

In summary, our data on the ecology of *M. dorsivittata* in the montane habitat of Itatiaia point to a population with relatively low body temperatures and small broods (compared to most Neotropical congeners) and with a varied diet, based on arthropods (as in most Neotropical congeners). Also, *M. dorsivittata* from Itatiaia seems to have saxicolous habits, but these skinks may actually use the rocks mostly for basking and probably forage among the surrounding vegetation, as appears to be the case for a population of *M. frenata* previously studied by us (Vrcibradic & Rocha 1998*a*).

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REFERENCES

Brooks, G. R. (1968). Body temperatures of three lizards from Dominica, West Indies. *Herpetologica* **24**, 209-219.

Cei, J. M. (1993). Reptiles del Noroeste, Nordeste y Este de la Argentina. Herpetofauna de las selvas subtropicales, puna y pampas. *Monografía del Museo Regionale di Scienze Naturali, Torino* **14**, 949 pp.

Fitch, H. S. (1968). Temperature and behavior of some equatorial lizards. *Herpetologica* **24**, 35-38.

Gallardo, J. M. (1968). Las especies argentinas del género *Mabuya* (Scincidae, Sauria). *Revista del Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Zoología* **9**, 177-196.

Gudynas, E. (1980). Notas adicionales sobre la distribuición, ecologia y comportamiento de *Mabuya dorsivittata* (Lacertilia: Scincidae). *Centro Educativo Don Orione, Contribuciones en Biología* **2**, 1-13.

Huey, R. B., Pianka, E. R. & Vitt, L. J. (2001). How often do lizards "run on empty"? *Ecology* **82**, 1-7.

Inger, R. F. (1959). Temperature responses and ecological relations of two Bornean lizards. *Ecology* **40**, 127-136.

Mathies, T. & Andrews, R. M. (1995). Thermal and reproductive biology of high and low elevation populations of the lizard *Sceloporus scalaris*: implications for the evolution of viviparity. *Oecologia, Berlin* **104**, 101-111.

Mesquita, D. O., Péres, A. K., Jr., Vieira, G. H. C. & Colli, G. R. (2000). *Mabuya guaporicola* (Calango-Liso). Natural history. *Herpetological Review* **31**, 240-241.

Mijares-Urrutia, A. & Arends, A. (1997). Un nuevo *Mabuya* (Squamata: Scincidae) de la costa semiárida del noroeste de Venezuela. *Revista Brasileira de Biologia* **57**, 595-601.

Peters, J. A. & Donoso-Barros, R. (1970). Catalogue of the Neotropical Squamata; part 2 - Lizards and amphisbaenians. *Bulletin of the U. S. National Museum* **297**, 293 pp.

Pinto, M. G. M. (1999). *Ecologia das espécies de lagarto simpátricas* Mabuya nigropunctata *e* Mabuya frenata *(Scincidae) no cerrado de Brasília e Serra da Mesa (GO)*. Unpubl. MSc dissertation. Universidade de Brasília. Brasília, DF. 104 pp.

Rocha, C. F. D., Dutra, G. F., Vrcibradic, D. & Menezes, V. A. (2002*a*). The terrestrial reptile fauna of the Abrolhos archipelago: species list and ecological aspects. *Brazilian Journal of Biology* **62**, 285-291.

Rocha, C. F. D. & Vrcibradic, D. (1996). Thermal biology of two sympatric skinks (*Mabuya macrorhyncha* and *Mabuya agilis*) in a Brazilian restinga habitat. *Australian Journal of Ecology* **21**, 110-113.

Rocha, C. F. D. & Vrcibradic, D. (1999). Reproductive traits of two sympatric viviparous skinks (*Mabuya macrorhyncha* and *Mabuya agilis*) in a Brazilian restinga habitat. *Herpetological Journal* **9**, 43-53.

Rocha, C. F. D., Vrcibradic, D., Teixeira, R. L. & Cuzzuol, M. G. T. (2002*b*). Interpopulational variation in litter size of the skink *Mabuya agilis* in southeastern Brazil. *Copeia* **2002**, 857-864.

Rodrigues, M. T. (2000). A new species of *Mabuya* (Squamata: Scincidae) from the semiarid caatingas of northeastern Brazil. *Papéis Avulsos de Zoologia, São Paulo* **41**, 313-328.

Scarano, F. R., Duarte, H. M., Ribeiro, K. T., Rodrigues, P. J. F. P., Barcellos, E. M. B., Franco, A. C., Brulfert, J., Deléens, E. & Luttge, U. (2001). Four sites with contrasting environmental stress in southeastern Brazil: relations of species, life form diversity, and geographic distribution to ecophysiological parameters. *Botanical Journal of the Linnean Society* **136**, 345-364.

Stevaux, M. N. (1993). Estratégia reprodutiva de *Mabuya* sp. (Sauria: Scincidae): um padrão geral de reprodução para o gênero na região neotropical. *Revista Nordestina de Biologia* **8**, 61-86.

Vanzolini, P. E. (1948). Notas sobre os ofídios e lagartos da Cachoeira de Emas, no município de Pirassununga, estado de São Paulo. *Revista Brasileira de Biologia* **8**, 377-400.

Vitt, L. J. (1991). An introduction to the ecology of Cerrado lizards. *Journal of Herpetology* **25**, 9-90.

Vitt, L. J. (1995). The ecology of tropical lizards in the caatinga of northeast Brazil. *Occasional Papers of the Oklahoma Museum of Natural History* **1**, 1-29.

Vitt, L. J. & Blackburn, D. G. (1991). Ecology and life history of the viviparous lizard *Mabuya bistriata* (Scincidae) in the Brazilian Amazon. *Copeia* **1991**, 918-927.

Vitt, L. J. & Zani, P. A. (1998). Ecological relationships among sympatric lizards in a transitional forest in the Amazon of Brazil. *Journal of Tropical Ecology* **14**, 63-86.

Vitt, L. J., Zani, P. A. & Marinho-Lima, A. C. (1997). Heliotherms in tropical rain forest: the ecology of *Kentropyx calcarata* (Teiidae) and *Mabuya nigropunctata* (Scincidae) in the Curuá-Una of Brazil. *Journal of Tropical Ecology* **13**, 199-220.

Vrcibradic, D. & Rocha, C. F. D. (1995). Ecological observations on the scincid lizard *Mabuya agilis* in a Brazilian restinga habitat. *Herpetological Review* **26**, 129-131.

Vrcibradic, D. & Rocha, C. F. D. (1996). Ecological differences in tropical sympatric skinks (*Mabuya macrorhyncha* and *Mabuya agilis*) in southeastern Brazil. *Journal of Herpetology* **30**, 60-67.

Vrcibradic, D. & Rocha, C. F. D. (1998*a*). Ecology of the skink *Mabuya frenata* in an area of rock outcrops in

southeastern Brazil. *Journal of Herpetology* **32,** 229-237.

Vrcibradic, D. & Rocha, C. F. D. (1998*b*). Reproductive cycle and life-history traits of the viviparous skink *Mabuya frenata* in southeastern Brazil. *Copeia* **1998,** 612-619.

Vrcibradic, D. & Rocha, C. F. D. (2002*a*). Use of cacti as heat sources by thermoregulating *Mabuya agilis* (Raddi) and *Mabuya macrorhyncha* Hoge (Lacertilia, Scincidae) in southeastern Brazil. *Revista Brasileira de Zoologia* **19,** 77-83.

Vrcibradic, D. & Rocha, C. F. D. (2002*b*). Ecology of *Mabuya agilis* (Raddi) (Lacertilia, Scincidae) at the restinga of Grumari, Rio de Janeiro, southeastern Brazil. *Revista Brasileira de Zoologia* **19 (Supl. 2),** 19-29.

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