# Basking in shadows and climbing in the darkness: microhabitat use, daily activity and thermal ecology of the gecko *Phyllopezus periosus* RODRIGUES, 1986

The period of activity and habitat use are crucial aspects in lizard ecology, since environmental and substrate temperatures are closely related to season and time of the day. As a result, the period of activity and the selection of microhabitats are essentials to the establishment and maintenance of adequate thermal requirements for lizards (BOGERT 1949). Although the knowledge on ecology of Brazilian lizards has increased in the last three decades, most of the studies focused on diurnal species, and the ecology of nocturnal lizards remained relatively little understood (ROCHA et al. 2009).

Nocturnal lizards have a relatively lower array of heat sources when compared with diurnal ones, due to the fact that night period provides limited opportunities to thermoregulate (PIANKA & PIANKA 1976). Thus, nocturnal lizards generally tend to tol-

Fig. 1: Dorsolateral (above) and ventral views, of live adult *Phyllopezus periosus* RODRIGUES, 1986 from the municipality of São João do Jaguaribe, state of Ceará, northeastern Brazil, illustrating the typical color pattern of the species.

erate a broad range of body temperatures and to be thigmothermic, regulating their body temperature mainly by heat conduction from previously warm substrates (GARRICK 2008).

In the present study, the authors investigated some ecological aspects of the nocturnal lizard *Phyllopezus periosus* RODRIGUES, 1986 (Phyllodactylidae), endemic to relictual Caatinga habitats from northeastern Brazil (Fig. 1). Information on the ecology of this species is currently scarce and limited to anecdotal data on parasite infection (ALMEIDA et al. 2008) and reproduction (LIMA et al. 2011). Thereby, data on species daily activity, microhabitat use and thermal ecology is provided.

The study was carried out in April 2012, at Fazenda Veneza, in the municipality of São João do Jaguaribe, state of Ceará, northeastern Brazil (05°20'65''S; 38°12' 46''W), a typical semi-arid Caatinga area. The observers searched for *P. periosus* throughout the habitat and assigned the captures to one-hour intervals along a 24-hour period. Sampling was done at 72 transects of 30 min walking duration each, totaling 36 hours of search on three days. Lizards were captured manually and marked individually and temporarily with non-toxic ink to avoid pseudoreplications. For each individual, we recorded the snout-vent length (using a digital caliper of 0.1 mm precision), the time of activity, the type of microhabitat, and the height above ground (using a measuring tape to the nearest 1 cm), at its first sighting. Immediately after capture, we took body ($T_b$), substrate ($T_s$) and air ($T_a$) temperatures with a Schultheis quick-reading cloacal thermometer (Miller & Weber, Inc., 0.2 ºC precision). Daily activity was described by the frequency of active individuals within each hourly interval. Microhabitat use was classified by the frequency of categories used. The sexual differences in snout-vent length (SVL), and body temperature were evaluated by one-way ANOVA. The effect of gender on perch height (PH) was tested by Kruskal-Wallis ANOVA, and the effect of environmental temperatures ($T_s$ and $T_a$) on $T_b$ was investigated by multiple linear regression analysis (ZAR 1999).

Data on 31 individuals of *P. periosus* was collected, seven males, nine females and 15 juveniles that could not be assigned to their gender. The overall mean SVL was 89.6 ± 21.3 mm, varying from 63.9 to 126.3 mm. Males (108.8 ± 11.2 mm; range: 94.7 to 126.3 mm; $n$ = 7) and females (109.0 ± 6.5 mm; range: 97.0 to 117.4 mm; $n$ = 9) did not differ significantly in SVL (ANOVA; $F_{1,14} = 0.002$; $P = 0.97$), indicating probable similarity in some ecological aspects among the sexes. These morphometric data demonstrated that *P. periosus* is probably the largest known Brazilian gecko, together with the Amazonian *Thecadactylus rapicauda* (HOUTTUYN, 1782), which reaches a similar size (VITT & ZANI 1997).

Twenty-eight lizards were captured at night, all of them active; three inactive individuals were captured during the daylight period. The first active individual was captured at 19:20 p.m., and the last one at 03:10 a.m. Daily activity was unimodal, starting just after sunset, with a peak around 21:00 p.m., decreasing steadily afterwards until

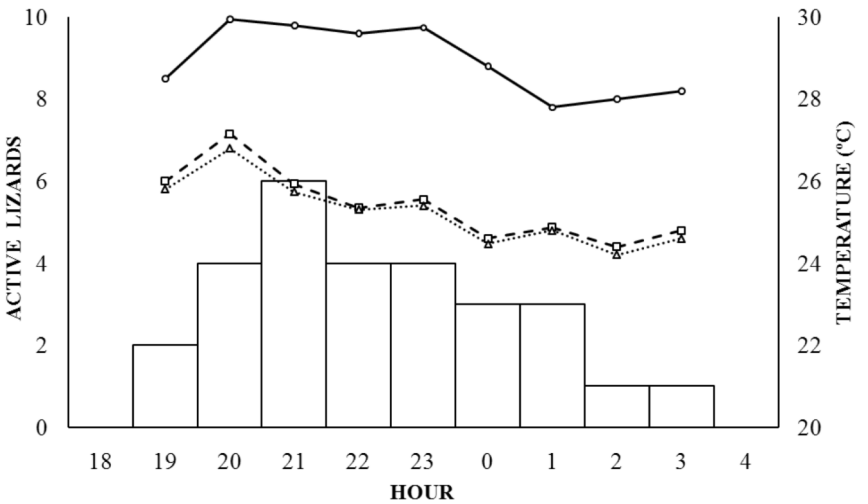


Fig. 2: Frequency of active individuals of *Phyllopezus periosus* RODRIGUES, 1986 (bars) and mean body (——○——), substrate (----□----) and air (·····△·····) temperatures (ºC) indicated per one-hour interval. Study site: Fazenda Veneza, municipality of São João do Jaguaribe, state of Ceará, Brazil.

considerably before sunrise (Fig. 2). Data indicated that *P. periosus* is strictly nocturnal in the study area which is in accordance with observations reported in the species description (RODRIGUES 1986).

*Phyllopezus periosus*, at Fazenda Veneza, used three microhabitat categories. The main microhabitat category used by active individuals was rock surfaces (18 of 28), followed by rock crevices (8 of 28) and live tree trunks (2 of 28), which demonstrated that *P. periosus* was essentially saxicolous preferring rocky microhabitats (93%) in a similar way as reported for a congeneric species, *P. pollicaris* (SPIX, 1825) (RECODER et al. 2012). All captured lizards were perched. The overall mean PH was 64.8 ± 41.9 cm, varying from 24 to 183 cm. The mean PH for males (68.4 ± 36.2; range: 36 to 145 cm; $n$ = 7) did not differ from that of females (69.7 ± 52.0; range: 26 to 183 cm; $n$ = 9) (Kruskal-Wallis; $U$ = 27.0; $P$ = 0.96; $n$ = 16), indicating absence of sexual segregation in vertical use of microhabitat.

Overall mean $T_b$ of active *P. periosus* in the study area was 29.4 ± 1.2 °C (range: 27.8 to 31.0 ºC), with mean $T_b$ of males (29.5 ± 1.4 °C; range: 28.0 to 31.0 ºC; $n$ = 6) not differing from that of females (29.3 ± 1.1 °C; range: 27.8 to 30.8 ºC; $n$ = 9) (ANOVA; $F_{1,13}$ = 0.10; $P$ = 0.75), indicating that sexes tended to operate under similar body temperatures. Concerning environmental temperatures, lizards were often ca. 4 ºC warmer than both $T_s$ (25.6 ± 1.3 ºC; range: 23.8 – 29.2 ºC; $n$ = 28) and $T_a$ (25.5 ± 1.3 ºC; range: 23.6 – 28.8 ºC; $n$ = 28). Furthermore, $T_b$ was influenced by the interaction of both $T_s$ and $T_a$ (multiple regression; $R^2$ = 0.30; $F_{2,25}$ = 5.37; $P$ = 0.01). However, neither $T_s$ ($P$ = 0.90) nor $T_a$ ($P$ = 0.81) alone had an effect on $T_b$. The gain of heat from direct contact with rocks has been shown an efficient way of thermoregulation for most lizards, and especially nocturnal ones (KEARNEY 2002). Probably for *P. periosus*, the predominant use of rocky outcrops seems to constitute a thermally suitable strategy. However, our data do not explain how these lizards regulate their temperatures relative to the environment. An adequate experimental design is required to test if these lizards regulate their temperature during the daylight period, as suggested for other *Phyllopezus* (VITT 1995), and if they are thermoconformers at night.

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