

Kentropyx calcarata (Squamata: Teiidae): Mating behavior in the wild

Henrique Caldeira COSTA^{1,*}, Leandro de Oliveira DRUMMOND²,
João Filipe Riva TONINI³ and Jaime ZALDÍVAR-RAE⁴

1. Universidade Federal de Viçosa, Campus Florestal, Instituto de Ciências Biológicas. CEP 35690-000, Florestal, MG, Brazil.

2. Autonomous Researcher. Rua Chaves Faria, 534/202, Bairro São Cristóvão. CEP CEP 20910-140. Rio de Janeiro RJ, Brazil.

3. University of Richmond, Department of Biology, 28 Westhampton Way, Richmond, VA 23173.

4. Universidad Anáhuac Mayab, Desarrollo Académico e Investigación, A.P. 96
Cordemex, C.P. 97310 Mérida, Yucatán, México.

* Corresponding author, H.C. Costa, E-mail: ccostah@yahoo.com.br

Received: 31. July 2012 / Accepted: 17. November 2012 / Available online: 04. January 2013 / Printed: June 2013

Abstract. There are few descriptions of the reproductive behavior of South American teiid lizards and none for the genus *Kentropyx*. We describe the behavior of a free-ranging pair of *K. calcarata* in the Amazonian region of northern Brazil. Other than the male following the female, there were no conspicuous signs of courtship during 13 min between encountering the pair and the onset of a consensual copulation, which lasted five minutes. The copulatory behavior of this *K. calcarata* pair was very similar to that of teiids like *Ameiva*, but lacks the bite-hold of the female's torso, which is common in genera like *Aspidoscelis* and *Cnemidophorus*.

Key words: Copulation, lizards, teiid, Brazil.

Kentropyx calcarata (Spix, 1825) is a lizard which occurs in central and eastern Amazonia and in the coastal Atlantic Forest (Gallagher & Dixon 1992, Avila-Pires 1995), inhabiting forest interiors, edges and natural clearings (Vitt 1991, Avila-Pires 1995, Vitt et al. 1997), where it forages for arthropod prey, mostly moving around on leaf litter (Vitt 1991, Vitt et al. 1997). Although information on the natural history of *Kentropyx* species has increased over the last years (Vitt 1991, Vitt & Carvalho 1992, Avila-Pires 1995, Vitt et al. 1995, Vitt et al. 1997, Vitt et al. 2001), to the best of our knowledge there is no data about mating behavior in this genus.

Our observations took place on a sunny day on April 09, 2011 (end of the rainy season) at the edge of a dense submontane umbrophylous forest on the right margin of the Jamanxim River (a tributary of the Tapajós River) in the municipality of Itaituba (06°12'18.67"S, 55°41'30.55"W), state of Pará, northern Brazil.

At 12:30h, we found two adult *Kentropyx calcarata* apparently foraging on a dirt road at the edge of the forest. Both lizards were similar in size (about 100 mm SVL), and although their sex could not be confirmed by direct inspection, one of them (henceforth, K2) had the large faceted head, hypertrophied jaw muscles and thick tail base (hemipenile pouches) typical of male teiids, while the other (K1) had a comparatively smaller, rounder head and the characteristically enlarged abdomen

of peri-ovulatory female teiids (e.g. Anderson & Vitt 1990, Censky 1995, 1997, Zaldívar-Rae & Drummond, 2007, Zaldívar-Rae, 2008). Hence, we assume K2 and K1 were a male and a female, respectively. Upon encounter, K1 was foraging (tongue flicking, probing and rooting among leaf litter), while K2 walked about 20 cm behind. The lizards did not seem disturbed by the observers, who stood two meters away. Soon after, the pair walked 5 m into the forest, followed by one of us (HCC). K1 continued actively foraging on the leaf litter, and K2 kept walking after K1, seemingly also foraging (Fig. 1). Sometimes the lizards remained side by side, about 10 cm away from each other. There was no apparent visual signaling behavior among them.

At 12:43h, K2 suddenly straddled K1 on its right side, encircling her torso with his forelimbs and the base of her tail with his left hind limb and tail. K1 did not try to flee, and both lizards remained motionless until 12:48h. During this time, K2 remained mounted on K1 with his body curved leftward, while the body of K1 was curved rightward, with her tail base lifted, allowing cloacal apposition (Fig. 2). No everted hemipenis could be seen; however, since K2 remained motionless and given the direction of K2's tail, we believe that he had inserted his left hemipenis (Crews 1978, Tokarz 1988, Tokarz & Slowinski 1990, Zaldívar-Rae & Drummond 2007).

At 12:48h, K2 broke contact with K1, who



Figure 1. Two adult *Kentropyx calcarata* (indicated by the white arrows) found in Pará, Northern Brazil. On the basis of anatomical features (see text), subjects on the left (K1) and right (K2) are, respectively, a female and a male.



Figure 2. Subject K2 (top) straddles and presumably copulates with subject K1 (below, head facing right).

walked to the forest edge, tongue flicking and foraging. Soon she crossed the dirt road and entered another forest fragment across the road. K2 followed K1 to the forest edge, stopped and basked there until 13:00h, then walked back and reentered the forest where the mating occurred.

Our observations are very similar to those of copulations in *Ameiva ameiva* and *Ameiva plei* (Quesnel, 1978, Censky, 1995, Manata & Nascimento, 2005), in that the male did not bite the female's back or flank during copulation, but differ from those of *Ameiva auberi* (Alfonso & Torres 2012) and other teiid genera, such as *Aspidoscelis* and *Cnemidophorus* (e.g. Carpenter 1962, Anderson & Vitt 1990, Zaldívar-Rae & Drummond 2007, Ribeiro et al. 2011) where copulation involves bite

holds. The facts that K2 did not bite K1 to hold her and K1 did not try to escape when mounted, nor run away after being released by K2, are indicative of a consensual copulation (Censky 1995, Zaldívar-Rae & Drummond 2007). The apparent lack of courtship behavior between the lizards could be an artifact, since our observation started when their interaction was already in course. However, other than the male circling the female and engorging his gular region, courtship among other teiids does not seem to involve conspicuous displays (e.g. Quesnel, 1978, Censky, 1995, Zaldívar-Rae & Drummond, 2007).

Male teiids usually accompany females after consensual copulation (e.g. Censky 1995, Zaldívar-Rae & Drummond 2007, Zaldívar-Rae et al. 2008),

possibly benefitting through copulatory access, post-copulatory courtship, sperm loading or preventing extra-pair copulations (Zaldívar-Rae & Drummond 2007). During accompaniment (which on average lasts 2 days), copulation is frequent between pair members (Censky 1995, Zaldívar-Rae & Drummond 2007). There are also instances of females consensually copulating with males without prior or subsequent accompaniment (*Aspidoscelis costata*, Zaldívar-Rae, personal observations). Our anecdotal observation, however, does not allow us to establish whether this copulation was linked or not to an accompaniment event. Future work with free-living and captive specimens may bring new valuable information on the reproductive behavior of *K. calcarata*.

Acknowledgments: We thank Fernanda Werneck for kindly reviewing a first draft of this work; Teresa C. S. Avila-Pires and Istvan Sas for reviewing the final version.

References

- Alfonso, Y.U., Torres, J. (2012): Courtship Behavior in the Cuban Ameiva (*Ameiva auberi ustulata*, Squamata: Teiidae) from the Siboney-Juticí Ecological Reserve in Eastern Cuba. *IRCF Reptiles & Amphibians* 19(2): 85-89.
- Anderson, R.A., Vitt, L.J. (1990): Sexual selection versus alternative causes of sexual dimorphism in teiid lizards. *Oecologia* 84: 145-157.
- Avila-Pires, T.C.S. (1995): Lizards of Brazilian Amazonia (Reptilia: Squamata). *Zoologische Verhandlungen* 299: 1-706.
- Carpenter, C.C. (1962): Patterns of behavior in two Oklahoma lizards. *American Midland Naturalist* 67(1): 132-151.
- Censky, E. (1995): Mating strategy and reproductive success in the teiid lizard, *Ameiva plei*. *Behaviour* 132: 529-557.
- Censky, E. J. (1997): Female mate choice in the nonterritorial lizard *Ameiva plei* (Teiidae). *Behavioral Ecology and Sociobiology* 40: 221-225.
- Crews, D. (1978): Hemipenile Preference: Stimulus Control of Male Mounting Behavior in the Lizard *Anolis carolinensis*. *Science* 199(4325): 195-196.
- Gallagher, D.S., Dixon, J.R. (1992): Taxonomic revision of the South American lizard genus *Kentropyx* Spix (Sauria, Teiidae). *Museo Regionale di Scienze Naturali Bollettino*, Torino 10: 125-171.
- Manata, F.P., Nascimento, L.B. (2005): *Ameiva ameiva* (calango verde). Courtship behavior. *Herpetological Review* 36(1): 62.
- Quesnel, V.C. (1978): The reproductive behaviour of the lizard, *Ameiva ameiva tobagana*. *Living World* 1978-1979: 16-17.
- Ribeiro, L.B., Gogliath, M., Sales, R.F.D., Freire, E.M.X. (2011): Mating behavior and female accompaniment in the whiptail lizard *Cnemidophorus ocellifer* (Squamata, Teiidae) in the Caatinga region of northeastern Brazil. *Biota Neotropica* 11(4): 363-368.
- Tokarz, R.R. (1988): Copulatory behaviour of the lizard *Anolis sagrei*: alternation of hemipenis use. *Animal Behaviour* 36(5):1518-1524.
- Tokarz, R.R., Slowinski, J.B. (1990): Alternation of hemipenis use as a behavioural means of increasing sperm transfer in the lizard *Anolis sagrei*. *Animal Behaviour* 40(2): 374-379.
- Vitt, L.J. (1991): Ecology and life-history of the widely foraging lizard *Kentropyx calcarata* (Teiidae) in Amazonian Brazil. *Canadian Journal of Zoology* 69: 2791-2799.
- Vitt, L.J., Carvalho, C.M. (1992): Life in the trees: the ecology and life history of *Kentropyx striatus* (Teiidae) in the lavrado area of Roraima, Brazil, with comments on tropical teiid life histories. *Canadian Journal of Zoology* 70: 1995-2006.
- Vitt, L.J., Zani, P.A., Caldwell, J.P., Carrillo, E.O. (1995): Ecology of the lizard *Kentropyx pelviceps* (Sauria: Teiidae) in lowland rain forest of Ecuador. *Canadian Journal of Zoology* 73: 691-703.
- Vitt, L.J., Zani, P.A., Lima, C.M. (1997): Heliotherms in tropical rain forest: the ecology of *Kentropyx calcarata* (Teiidae) and *Mabuia nigropunctata* (Scincidae) in the Curua-Una of Brazil. *Journal of Tropical Ecology* 1997(13): 199-220.
- Vitt, L.J., Sartorius, S.S., Avila-Pires, T.C.S., Espósito, M.C. (2001): Life at the river's edge: ecology of *Kentropyx altamazonia* in Brazilian Amazonia. *Canadian Journal of Zoology* 79: 1855-1865.
- Zaldívar-Rae, J. (2008): Funciones del acompañamiento de hembras por machos de la lagartija rayada, *Aspidoscelis costata* (Lacertilia: Teiidae). Ph.D. thesis, Instituto de Ecología, Universidad Nacional Autónoma de México.
- Zaldívar-Rae, J., Drummond, H. (2007): Female accompaniment by male whiptail lizards: is it mate guarding? *Behaviour* 144: 1383-1402.
- Zaldívar-Rae, J., Drummond, H., Ancona-Martínez, S., Manríquez-Moran, N.L., Méndez De La Cruz, F.R. (2008): Seasonal breeding in the western Mexican whiptail lizard *Aspidoscelis costata* on Isla Isabel, Nayarit, Mexico. *Southwestern Naturalist* 53: 175-184.