

## First report of satellite males during breeding in *Leptodactylus latrans* (Amphibia, Anura)

Gabriel Laufer<sup>1</sup>, Noelia Gobel<sup>1</sup>, José M. Mautone<sup>1</sup>, María Galán<sup>2</sup>, Rafael O. de Sá<sup>3</sup>

<sup>1</sup> Area Biodiversidad y Conservación, Museo Nacional de Historia Natural, 25 de mayo 582, Montevideo, Uruguay

<sup>2</sup> Los Ceibos manzana 81, solar 14, San José de Carrasco, Ciudad de la Costa, Uruguay

<sup>3</sup> Department of Biology, University of Richmond, Richmond, VA 23173, U. S. A.

Individual males can adopt alternative mating tactics. The occurrence of satellite males is a common behaviour across anuran taxa (e.g., *Lithobates clamitans*, Wells, 1977; *Anaxyrus cognatus*, Krupa, 1989; *Dendropsophus ebraccatus*, Miyamoto and Cane, 1980; *Rhinella crucifer*, Forester and Lynken, 1986). Satellite males take peripheral positions to calling males, and adopt alternate mating tactics in an attempt to intercept females that are attracted to calling males (Wells, 2007) to increase their own mating success. Satellite males could have an inexpensive form of mate-locating, avoiding predators, and saving energy (Arak, 1983). Furthermore, this strategy could play an important role in the genetic structure of populations (Lodé and Lesbarrères, 2004).

The genus *Leptodactylus* (Heyer, 1969) consists of approximately 70 described species that are widely distributed in South America. The literature on the biology of this genus is extensive (Heyer *et al.*, 2009a,b); however, we found only two reports on the existence of multi-male mating behavior (*L. chaquensis* and *L. podicipinus*, Prado and Haddad, 2003). Herein, we report a field observation on intrasexual competition in the form of satellite behavior in *Leptodactylus latrans* (Steffen, 1815), where multiple satellite males were observed in close vicinity to a calling male.

Observations were made at Aceguá, Departamento de Cerro Largo, in NE Uruguay (31°54'58"S; 54°07'59"W) on October 21, 2012, at 11.30 pm. *Leptodactylus latrans* was calling from a semi-natural permanent, elliptical, and shallow pond (ca. 34.1x16.0 m; maximum depth 1.5 m), that had a water temperature of 32.4°C, pH 9.92 and conductivity 79.64 µS/cm (measured on October 20, 2012, 4.00 pm). Aquatic vegetation covered approximately 30% of the surface area of the pond. Other anurans reported at the locality are: *Dendropsophus minutus*, *D. sanborni*, *Leptodactylus latinasus*, *Odontophrynus*

*americanus*, *Phyllomedusa iheringii*, *Pseudis minuta*, *Pseudopaludicola falcipes*, *Scinax granulatus*, *S. squarilirostris*, *S. uruguayus* (Gobel *et al.*, 2013).

A male *Leptodactylus latrans* was observed calling within a foam nest located at about 40 cm from the edge of the pond. The male was collected (voucher deposited at the Herpetological Collection of the Museo Nacional de Historia Natural, Montevideo, Uruguay, MNHN 9476). Ten minutes after the calling male was removed, we observed an amplexic *L. latrans* pair laying eggs in the same nest (Fig. 1A). In addition, a third male was at the edge of the foam nest and sporadically swam under the amplexic pair (Fig. 1B). We observed a fourth male about 20 cm away from the foam nest (Fig. 1C) and a fifth male was approaching toward the edge of the pond. We did not observe satellite males calling; they were silent on the periphery and relatively close to the nest. Different strategies were reported for *Leptodactylus* species. While the simultaneous mating of two males with a single female was reported for *L. podicipinus*, the occurrence of satellite males, not attempting to grasp the female or the amplexic pair, was reported for *L. chaquensis* (Prado and Haddad, 2003). However, release of sperm by multiple males in the surrounding area of an amplexic pair in a foam nest was observed in *Leptodactylus chaquensis* (Prado and Haddad, 2003). We did not observe in *L. latrans* any behaviors, such as male movements, that would indicate the release of sperm by the satellite males. The testicular evolution theory predicts that a species with a low testicular mass (relative to body weight), such as *L. latrans* (Prado and Haddad, 2003), should not display sperm competition (Hosken and Ward, 2001). Our observations point to satellite males in *L. latrans* with a more active role in intrasexual competition where they wait for the opportunity of amplex with the female. Additional field research is needed to assess: if satellite males in *L. latrans* at-



**Figure 1.** *Leptodactylus latrans* satellite male position, ten minutes after extraction of the male that was previously vocalizing at the foam nest. The letters at the picture identifies each male mentioned at the text.

tempt to dislodge the amplexic male, the occurrence of multiple males amplexing a single female, the occurrence of smaller males inserting themselves between an amplexic pair, or other strategies.

#### Literature cited

Arak, A. 1983. Male-male competition and mate choice in anuran amphibians. *In*: Bateson, P. (ed.), 181–210. *Mate Choice*. Cambridge University Press. New York.

- Gobel, N.; Cortizas, S.; Mautone, J.M.; Borteiro, C. & Laufer, G. 2013. Predation of *Pseudis minuta* Günther 1858, by *Lethocerus annulipes* (Heteroptera: Belostomatidae). *Cuadernos de Herpetología* 27: 63.
- Heyer, W.R. 1969. Studies on the genus *Leptodactylus* (Amphibia, Leptodactylidae). 3. A redefinition of the genus *Leptodactylus* and a description of a new genus of Leptodactylid frogs. *Contributions in Science, Los Angeles County Museum of Natural History* 155: 1–14.
- Heyer, M.H.; Heyer, W.R. & de Sá, R.O. 2009a. Bibliography of frogs of the *Leptodactylus* clade (Amphibia, Anura, Leptodactylidae – *Adenomera*, *Hydrotaetare*, *Leptodactylus*, *Lithodytes*). I. Bibliography. Smithsonian Herpetological Information Series.
- Heyer, M.H.; Heyer, W.R. & de Sá, R.O. 2009b. Bibliography of frogs of the *Leptodactylus* clade (Amphibia, Anura, Leptodactylidae – *Adenomera*, *Hydrotaetare*, *Leptodactylus*, *Lithodytes*). II. Indices. Smithsonian Herpetological Information Series.
- Hosken, D.J. & Ward, P.I. 2001. Experimental evidence for testis size evolution via sperm competition. *Ecology Letters* 4: 10–13.
- Forester, D.C. & Lynken, D.V. 1986. Significance of satellite males in a population of spring peepers, *Pseudacris crucifer*. *Copeia* 1986: 719–724.
- Krupa, J.J. 1989. Alternative mating tactics in the Great plains toad (*Bufo cognatus*). *Animal Behaviour* 37: 1035–1043.
- Lodé, T. & Lesbarrères, D. 2004. Multiple paternity in *Rana dalmatina*, a monogamous territorial breeding anuran. *Naturwissenschaften* 91: 44–47.
- Miyamoto, M.M. & Cane, J.H. 1980. Behavioral observations of non-calling males in Costa Rican *Hyla ebraccata*. *Biotropica* 12: 225–227.
- Prado, C.P.A. & Haddad, C.F.B. 2003. Testes size in leptodactylid frogs and occurrence of multimale spawning in the genus *Leptodactylus* in Brazil. *Journal of Herpetology* 37: 354–362.
- Wells, K.D. 1977. Territoriality and male mating success in the green frog (*Rana clamitans*). *Ecology* 58: 750–762.
- Wells, K.D. 2007. *The Ecology and Behavior of Amphibians*. University of Chicago Press. Chicago.

Recibida: 26 Marzo 2013

Revisada: 29 Abril 2013

Aceptada: 25 Julio 2013

Editor Asociado: M. Vaira

© 2014 por los autores, licencia otorgada a la Asociación Herpetológica Argentina. Este artículo es de acceso abierto y distribuido bajo los términos y condiciones de una licencia Atribución-No Comercial 2.5 Argentina de Creative Commons. Para ver una copia de esta licencia, visite <http://creativecommons.org/licenses/by-nc/2.5/ar/>