

NOTES ON GEOGRAPHIC DISTRIBUTION

Amphibia, Anura, Cycloramphidae, *Zachaenus carvalhoi* Izecksohn, 1983 and *Z. parvulus* (Girard, 1853): Filling gap and geographic distribution map for the genus

Vanessa Kruth Verdade*, José Cassimiro, and Miguel Trefaut Rodrigues

*Universidade de São Paulo, Instituto de Biociências, Departamento de Zoologia.
Caixa Postal 11.461. CEP 05422-970. São Paulo, SP, Brazil.*

* Corresponding author. E-mail: vverdade@usp.br

Frogs of the genus *Zachaenus* are leaf-litter inhabitants of the Atlantic rainforest of southeastern Brazil currently allocated in Cycloramphinae, family Cycloramphidae (Frost et al. 2006; Grant et al. 2006). The genus includes two species: *Z. carvalhoi* Izecksohn, 1983 (Figure 1) and *Z. parvulus* (Girard, 1853) (Figure 2). The latter is widely distributed throughout the state of Rio de Janeiro, reaching the North portion of the state of São Paulo (Cochran 1955; van Sluys et al. 2001). Its biology is reasonably known: the reproductive season is prolonged, the eggs are laid

among leaves on the humid forest floor, from which terrestrial endotrophic tadpoles hatch (Lutz 1944; van Sluys et al. 2001). *Zachaenus carvalhoi*, on the other hand, is poorly known and restricted to the type locality, in municipality of Santa Tereza (ca. 800 m elev.), state of Espírito Santo, and municipality of Pedra Dourada (ca. 630 m elevation), state of Minas Gerais (Dayrell et al. 2006). The species is classified under the "Data Deficient" category of IUCN due to the lack of information on its occurrence and ecological requirements (IUCN 2008).



Figure 1. *Zachaenus carvalhoi* from Parque Nacional do Caparaó, state of Espírito Santo, Brazil. Photo by Miguel T. Rodrigues.



Figure 2. *Zachaenus parvulus* from *Reserva Biológica Poço das Antas*, state of Rio de Janeiro, Brazil. Photo by Sérgio P. Carvalho-e-Silva.

While collecting at the *Parque Nacional do Caparaó* (permit number 030/2005–CGFAU/LIC) we were fortunate to find three specimens of *Z. carvalhoi* at the state of Espírito Santo, municipality of Ibitirama, district of Santa Marta, *Fazenda Pico da Bandeira, Córrego do Calçado* (20°28'02" S, 41°44'02" W; elevation 1135 m; datum: WGS 84; GPS Magellan MAP-330) in two different occasions. These specimens are deposited at the *Museu de Zoologia da Universidade de São Paulo* (MZUSP 139102, field number MTR 12613; MZUSP 140431–140432, field numbers MTR 15805–15806), and were collected using small pitfall traps made of plastic cups buried into the forest floor in October 31, 2006, and found on the forest floor by active search on 4 November 2008. The months of collection of exemplars are congruent to those when specimens were obtained at Santa Teresa: March, April, August, October, and November (Izecksohn 1983). The specimens collected in 2008 were vocalizing around 10:00 h during a downpour. The frogs were hidden under the leaf-litter, and called intensively during the rainstorm, but very sporadically when the rain decreased or ceased. Their advertisement call was not recorded.

The new record is 50 km NE straight line from Pedra Dourada, state of Minas Gerais, the closest known locality, and 130 km SW from the type locality, Santa Tereza, state of Espírito Santo. The new record also increases the upper altitudinal range for this species from ca. 800 to ca. 1135 m. We present in Figure 3 an updated map with the geographical distribution of *Z. carvalhoi*, including also a record for *Reserva Biológica Duas Bocas*, municipality of Cariacica, state of Espírito Santo, reported along with a photograph at the web site of the reserve (Leone 2008). For comparison we present the distributional range of *Z. parvulus* based on literature (Cochran 1955; Giaretta and Sawaya 1996; Lutz 1944; Rocha et al. 1998; van Sluys et al. 2001), specimens deposited at MZUSP, and locality records found at *Universidade Federal do Rio de Janeiro* (S. Potsch, pers. comm.), and *Universidade Federal Rural do Rio de Janeiro* (H.R. Silva, pers. comm.) collections. *Z. parvulus* is associated to the Atlantic Forest of *Serra do Mar* mountain range at the states of São Paulo and Rio de Janeiro, and *Z. carvalhoi* to the mountain complexes covered by Atlantic Forest south of *rio Doce* at the states of Minas Gerais and Espírito Santo. The two species seem to be separated by the *rio Paraíba do Sul*.

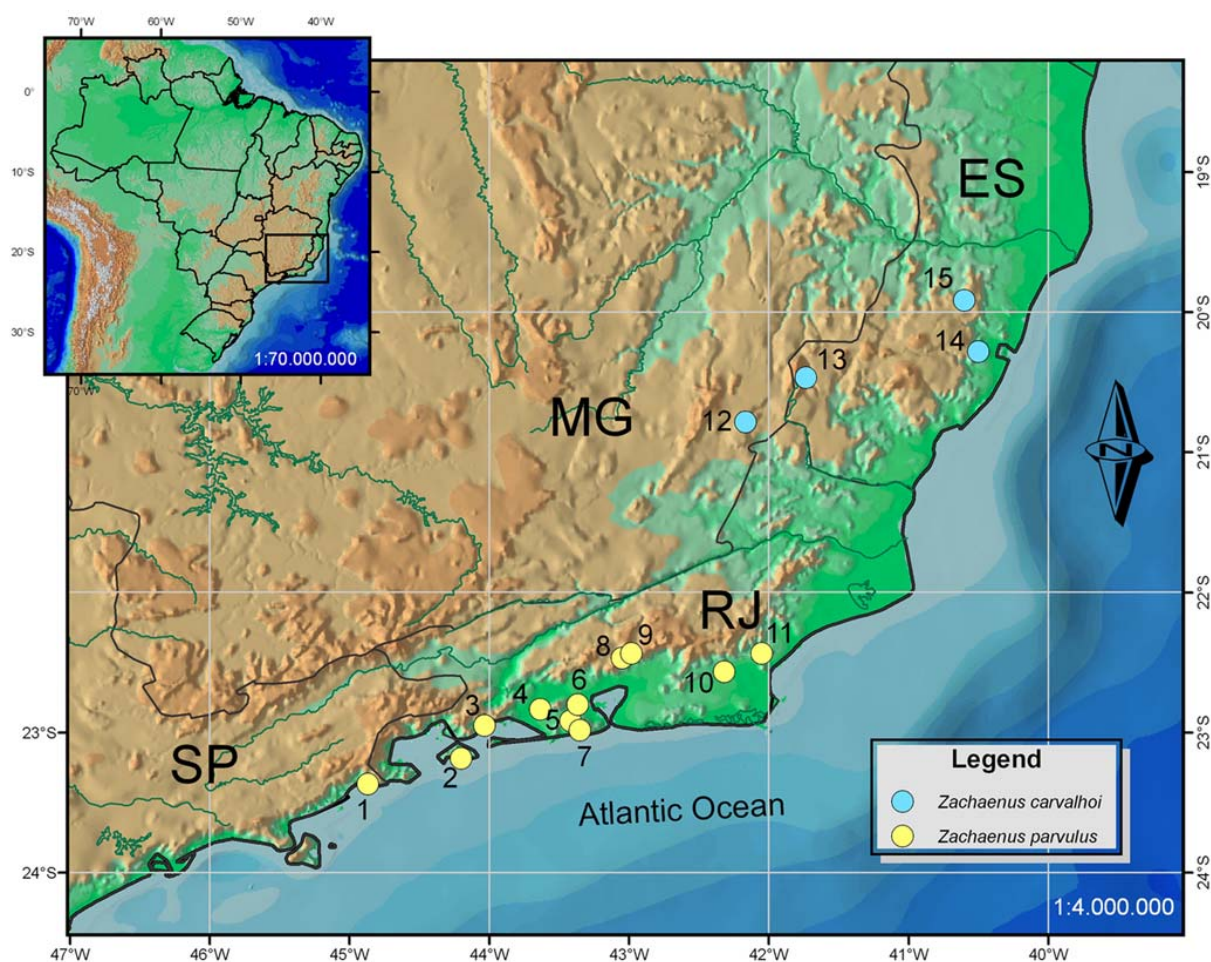


Figure 3. Distribution of *Zachaenus carvalhoi* and *Z. parvulus*. Localities: 1. Picinguaba, municipality of Ubatuba, SP; 2. Ilha Grande, municipality of Angra dos Reis, RJ; 3. Municipality of Mangaratiba, RJ; 4. *Represa do Mendanha*, municipality of Nova Iguaçu, RJ; 5. *Represa Rio Grande*, municipality of Rio de Janeiro, RJ; 6. *Parque Nacional da Tijuca*, municipality of Rio de Janeiro, RJ; 7. *Represa Camurim*, municipality of Rio de Janeiro, RJ; 8. *Parque Nacional da Serra dos Órgãos*, municipality of Teresópolis, RJ; 9. *Alto do Soberbo*, municipality of Teresópolis, RJ; 10. *Reserva Biológica Poço das Antas*, municipality of Silva Jardim, RJ; 11. *Reserva Biológica União*, municipality of Rio das Ostras, RJ; 12. *Fazenda Floresta*, municipality of Pedra Dourada, MG; 13. *Parque Nacional do Caparaó*, district of Santa Maria, municipality of Ibitirama, ES; 14. *Reserva Biológica Duas Bocas*, municipality of Cariacica, ES; 15. Municipality of Santa Teresa, ES. State abbreviations: SP = São Paulo, RJ = Rio de Janeiro, MG = Minas Gerais and ES = Espírito Santo.

Acknowledgements: We are grateful to Valdemar Moraes, Lilian Duarte, Renato S. Recoder, and Mauro Teixeira Jr. for field assistance. We thank the *Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis* and Estevão José Marchesini Fonseca, director of the *Parque Nacional do Caparaó*, for lodging facilities and collection permits; Hussam Zaher and Carolina Castro-Mello for access to specimens at *Museu de Zoologia da Universidade de São Paulo*; Hélio R. Silva and Sérgio P. de Carvalho-e-Silva made valuable suggestions and provided locality records, S. P. Carvalho-e-Silva also provided the photograph of *Zachaenus parvulus*.

Literature Cited

- Cochran, D.M. 1955. Frogs of Southeastern Brazil. *Bulletin of the United States National Museum* 201: 1-423.
- Dayrell, J.S., C.P. Neves, C.S. Cassini and R.N. Feio. 2006. *Zachaenus carvalhoi* (Carvalho's Bug-eyed Frog). *Herpetological Review* 37: 360.
- Frost, D.R., T. Grant, J. Faivovich, R.H. Bain, A. Haas, C.F.B. Haddad, R. de Sá, A. Channing, M. Wilkinson, S.C. Donnellan, C.J. Raxworthy, J.A. Campbell, B.L. Blotto, P. Moler, R.C. Drewes, R.A. Nussbaum, J.D. Lynch, D.M. Green, and W.C. Wheeler. 2006. The amphibian tree of life. *Bulletin*

- of the American Museum of Natural History 297: 1-370.
- Giaretta, A.A. and R.J. Sawaya. 1996. *Zachaenus parvulus* (Rio bug-eyed frog). *Herpetological Review* 27: 210.
- Girard, C. 1853. Descriptions of new species of reptiles, collected by the U. S. Exploring Expedition, under the command of Capt. Charles Wilkes, U. S. N. Second part. — Including the species of batrachians, exotic to North America. *Proceedings of the Academy of Natural Sciences of Philadelphia* 6: 420-424.
- Grant, T., D.R. Frost, J.P. Caldwell, R. Gagliardo, C.F.B. Haddad, P.J.R. Kok, D.B. Means, B.P. Noonan, W. Schargel, and W.C. Wheeler. 2006. Phylogenetics systematics of dart-poison frogs and their relatives (Anura: Athesphatanura: Dendrobatidae). *Bulletin of the American Museum of Natural History* 299: 1-262.
- IUCN. 2008. IUCN Red List of Threatened Species. Electronic Database accessible at <http://www.iucnredlist.org>. Captured on 10 February 2009.
- Izecksohn, E. 1983. Uma nova especie de *Zachaenus* Cope, do Estado do Espírito Santo, Brasil (Amphibia, Anura, Leptodactylidae). *Arquivos da Universidade Federal Rural do Rio de Janeiro* 5: 7-11.
- Leone, M.F. 2008. Guia virtual da fauna da Reserva Biológica de Duas Bocas. Electronic Database accessible at <http://www.ufes.br/~dio/lamab/duasbocas>. Laboratório de Mastozoologia e Biogeografia, Departamento de Ciências Biológicas, Universidade Federal do Espírito Santo, Vitória, ES. Captured on 10 February 2008.
- Lutz, B. 1944. Biologia e taxonomia de *Zachaenus parvulus*. *Boletim do Museu Nacional, Nova Série, Zoologia* 17: 1-66.
- Rocha, C.F.D., M. van Sluys, H.G. Bergallo, M.A.S. Alves, and D. Vrcibradic. 1998. *Zachaenus parvulus* (Leaf frog). Defensive behavior and color pattern. *Herpetological Review* 29: 232-234.
- van Sluys, M., C.F.D. Rocha and M.B. Souza. 2001. Diet, reproduction, and density of the leptodactylid litter frog *Zachaenus parvulus* in an Atlantic rain forest of Southeastern Brazil. *Journal of Herpetology* 35: 322-325.

Received: February 2009

Revised: August 2009

Accepted: September 2009

Published online: October 2009

Editorial responsibility: Marcelo N. de C. Kokubum