REPTILES & AMPHIBIANS

Range Extension of the Highlands Long-legged Swamp Froglet, *Pseudopaludicola murundu* (Anura, Leptodactylidae), in the Highlands of Serra da Mantiqueira, Minas Gerais, Brazil

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Twenty-six species of swamp froglets in the genus *Pseudopaludicola* are currently recognized (Frost 2023; Silva et al. 2023). These small frogs are associated with swampy areas in open habitats in many different ecoregions and are distributed throughout South America (Lynch 1989). All phylogenetic hypotheses recovered the genus as monophyletic, and the long-legged species belonging to the monophyletic *P. saltica* group (Veiga-Menoncello et al. 2014; Andrade et al. 2020, 2016; Silva et al. 2023). Currently, this group comprises three allopatric species: Common Long-legged Swamp Froglet (*P. saltica*), Jared's Long-legged Swamp Froglet (*P. jaredi*), and Highlands Long-legged Swamp Froglet (*P. murundu*). The known distribution of *P. murundu* coincides with grasslands in the Cerrado and Atlantic Forest ecoregions in the states of São Paulo, Minas Gerais, and Goiás (Andrade et al. 2020, 2016). It differs from other species in the genus (except *P. saltica* and *P. jaredi*), by having very long hindlimbs, with tibio-tarsal articulation reaching beyond the end of the snout. It differs morphologically from *P. saltica* by having longitudinal folds in a darker vocal sac, larger and clearer nuptial pads in adults, and nostrils closer to the apex of the snout (Toledo et al. 2010), and from *P. jaredi* by shorter shank length and a narrower head (Andrade et al. 2016).

During recent fieldwork in the northern Serra da Mantiqueira in southern Minas Gerais, we collected long-legged froglets that, based on external morphology, we identified as *Pseudopaludicola murundu*. On 14 January 2020, we found three male *P. murundu* (Fig. 1) in a rural property in the municipality of Bom Jardim de Minas (-21.99669, -44.16780), Minas Gerais. The area is characterized by marshy habitat adjacent to a larger pond with anthropogenic alterations and cattle trails. The froglets were euthanized with a 2% lidocaine chlorhydrate solution, fixed in 10% formalin, and preserved in 70% alcohol. Voucher specimens are housed in the Coleção Zoológica da Universidade Federal de Mato Grosso do Sul (ZUFMS-AMP19383–5), Campo Grande, Mato Grosso do Sul, Brazil. Collection permits for this study were issued by ICMBIO (SISBio 73975-1 and 72874-1). This newly discovered population extends the species' known distribution 96 km southeast from the closest known record in São João del Rei, Minas Gerais, and 352 km east of the type locality in Rio Claro, São Paulo (Fig. 2).

Although *P. murundu* is found in the Cerrado and Atlantic Forest ecoregions and has been recorded in additional localities of Minas Gerais (Toledo et al. 2010; Andrade et al. 2016, 2020), the current record is the closest to the state of Rio de Janeiro (ca. 20 km away). It also is noteworthy that this is the first record of *P. murundu* in the Serra da Mantiqueira and at about 1,300 m asl establishes a new elevational record for the species. Previous elevational records of *P.*

Figure 1. A male Long-legged Swamp Froglet (*Pseudopaludicola murundu*) from Bom Jardim de Minas, Minas Gerais, Brazil (ZUFMS-AMP19383). Photograph by Diego J. Santana.

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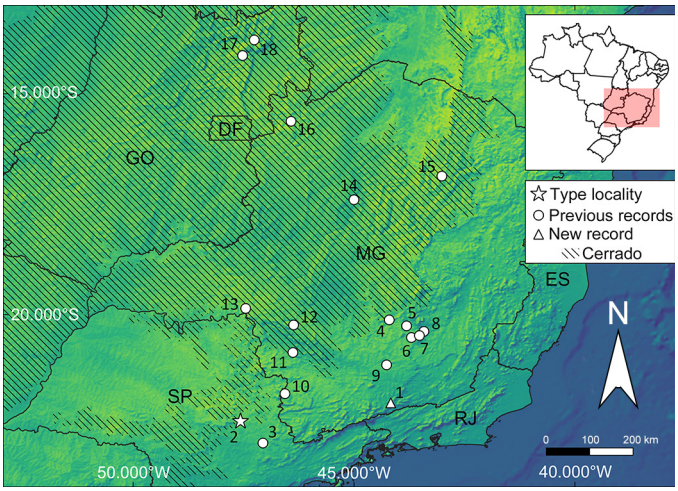

Figure 2. The geographic distribution of Long-legged Swamp Froglets (*Pseudopaludicola murundu*). Municipalities: 1: Bom Jardim de Minas (MG; new record); 2: Rio Claro (SP; type locality); 3: Campinas (SP); 4: Brumadinho (MG); 5: Itabirito (MG); 6: Ouro Branco (MG); 7: Lavras Novas (MG); 8: Mariana (MG); 9: São João Del Rei (MG); 10: Poços de Caldas (MG); 11: Alpinópolis (MG); 12: São Roque de Minas (MG); 13: Sacramento (MG); 14: Buritizeiro (MG); 15: Botumirim (MG); 16: Buritis (MG); 17: Alto Paraíso de Goiás (GO); 18: Teresina de Goiás (GO). Brazilian States: DF - Distrito Federal; GO - Goiás; MG - Minas Gerais; SP - São Paulo; RJ - Rio de Janeiro; ES - Espírito Santo.

murundu and of other members of the *P. saltica* group were at about 1,000 m asl (Andrade et al. 2020). In addition, the higher-elevation, open-grassland formations known as "campos de altitude" in the Serra da Mantiqueira are biotically similar to the "campos rupestres" in the Cerrado (Neves et al. 2018; Carvalho et al. 2021) that are occupied by *P. murundu*.

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Literature Cited

Andrade, F.S. de, F. de M. Magalhães, C.H.L. Nunes-de-Almeida, A.C.P. Veiga-Menoncello, D.J. Santana, A.A. Garda, D. Loebmann, S.M. Recco-Pimentel, A.A. Giaretta, and L.F. Toledo. 2016. A new species of long-legged *Pseudopaludicola* from northeastern Brazil (Anura, Leptodactylidae, Leiuperinae). *Salamandra* 52: 107–124.

Andrade, F.S., I.A. Haga, M.L. Lyra, T. Gazoni, V. Zaracho, C.F.B. Haddad, L.F. Toledo, and A.A. Giaretta. 2020. Geographic distributions of *Pseudopaludicola boliviana* and congeneric long-legged species (Anura: Leiuperinae). *Studies on Neotropical Fauna and Environment* 57: 66–82. https://doi.org/10.1080/01650521.2020.1814619.

Carvalho, T.R., K.R. Seger, F.M. Magalhaes, L.B. Lourenco, and C.F. Haddad. 2021. Systematics and cryptic diversification of *Leptodactylus* frogs in the Brazilian campo rupestre. *Zoologica Scripta* 50: 300–317. https://doi.org/10.1111/zsc.12470.

Frost, D.R. 2023. *Amphibian Species of the World: An Online Reference*. Version 6.2. American Museum of Natural History, New York, New York, USA. https://doi.org/10.5531/db.vz.001. <https://amphibiansoftheworld.amnh.org/index.php>.

Lynch, J.D. 1989. A review of the Leptodactylid frogs of the genus *Pseudopaludicola* in northern South America. *Copeia* 1989: 577–588. https://doi.org/10.2307/1445483.

Neves, M.O., E.A. Pereira, J.L.M.M. Sugai, S.B. Rocha, R.N. Feio, and D.J. Santana. 2018. Distribution pattern of anurans from three mountain complexes in southeastern Brazil and their conservation implications. *Anais da Academia Brasileira de Ciências* 90: 1611–1623. https://doi.org/10.1590/0001-3765201820170203.

Silva, L.A., F.S. Andrade, E.P. Neto, S.P. Dantas, I.A. Haga, and A.A. Garda. 2023. A new species of *Pseudopaludicola* Miranda-Ribeiro, 1926 (Anura, Leptodactylidae) from Tocantins State, Brazil. *Journal of Herpetology* 57: 297–314. https://doi.org/10.1670/22-062.

Toledo, L.F., S. Siqueira, T.C. Duarte, A.C.P. Veiga-Menoncello, S.M. Recco-Pimentel, and C.F.B. Haddad. 2010. Description of a new species of *Pseudopaludicola* Miranda-Ribeiro, 1926 from the state of São Paulo, southeastern Brazil (Anura, Leiuperidae). *Zootaxa* 2496: 38–48. https://doi.org/10.11646/zootaxa.2681.1.4.

Veiga-Menoncello, A.C., L.B. Lourenco, C. Strussmann, D.C. Rossa-Feres, G.V. Andrade, A.A. Giaretta, and S.M. Recco-Pimentel. 2014. A phylogenetic analysis of *Pseudopaludicola* (Anura) providing evidence of progressive chromosome reduction. *Zoologica Scripta* 43: 261–272. https://doi.org/10.1111/zsc.12048.