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Scientific Note

Telebasis vulcanoae (Machado, 1980) (Odonata: Coenagrionidae): discovery of a population in Northeastern Brazil and potential distribution in South America

Antonio B. S. Farias, Thiago C. Gomes, Henrique Venâncio, Jean C. Santos

Universidade Federal de Sergipe, São Cristóvão, SE, Brazil.
Corresponding author: jcsantosbio@gmail.com

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Abstract. In this study, we report the first record of *Telebasis vulcanoae* (Machado, 1980) (Odonata: Coenagrionidae) in the state of Sergipe, Northeastern Brazil, expanding its known distribution, which was previously restricted to Minas Gerais and Bahia. Specimens were collected on the campus of the Federal University of Sergipe in areas with temporary rainwater pools and small, semi-deciduous forest fragments. We also investigated the potential distribution of species in South America using a niche modelling procedure that adopted the described occurrence records and bioclimatic variables. Eighteen specimens (10 females and eight males) were sampled. Geographic distribution modelling revealed that *T. vulcanoae* has high environmental suitability in the northern and central-western regions of Brazil, mainly in coastal and forested areas. Our study contributes to future research on the conservation status of *T. vulcanoae,* which is currently classified as Data Deficient in the IUCN Threatened Species List.

Keywords: Atlantic Forest, Damselfly, Species Distribution, Northeast Brazil, Neotropical Region.

The genus *Telebasis* Selys, 1865 (Odonata: Coenagrionidae), which is predominantly Neotropical, currently comprises 62 species (Paulson et al. 2025) distributed from North America to Argentina (Bota-Sierra et al. 2022; Lencioni 2023). The genus distribution is concentrated in the Neotropical region, predominantly preferring lentic habitats (Garrison 2009), with 18 species recorded in Colombia and at least 31 species documented in Brazil (Guillermo-Ferreira & Bispo 2013; Bota-Sierra et al. 2022; Lencioni 2023; ICMBio 2025), highlighting the significant biodiversity of the genus, which has undergone several taxonomic revisions. Seven new species have been described in Brazil (Machado 2010), *Telebasis pallida* Machado, 2010 was re-described (Pinto & Carvalho 2012), and new state records have been reported. Significant changes include the synonymization of *Telebasis coccinata* (Calvert, 1909) with *Telebasis coccinea* (Selys, 1876), *Telebasis limoncocha* (Bick & Bick, 1995), *Telebasis griffinii* (Martin, 1896), *Telebasis pareci* (Machado, 2010), and *Telebasis lenkoi* Machado, 2010 (Garrison 2009; Pinto & Carvalho 2012). Although Bick & Bick (1995) maintained the separation of the species originally described by Machado (1980) under *Helveciagrion* [for example, *Helveciagrion vulcanoae* (Machado, 1980)] because of uncertainties regarding their generic placement, *Helveciagrion* was later synonymized with *Telebasis* by Garrison (2009). In 2009, Garrison revised the generic diagnosis and formally synonimized *Helveciagrion* with *Telebasis* (Garrison 2009; Garrison & von Ellenrieder 2024), reflecting major advances in the understanding of the taxonomy and distribution of *Telebasis*.

Therefore, our study aimed to provide new geographic distribution data for *T. vulcanoae* (Machado 1980) in northeastern Brazil, model its potential distribution, and expand our understanding of its distribution patterns in Brazil. Illustrations and distribution maps of this species are also provided.

Individuals were collected near the Center for Biological and Health Sciences at the Universidade Federal de Sergipe (CCBS–UFS, in Portuguese) (10°55'21.82"S, 37°6'7.04"W), Sergipe, Brazil. The sampling area included small gardens where temporary rainwater pools form during the rainy season. In addition, near the collection site, there was a small fragment of semi-deciduous forest (Farias & Santos 2024), which is likely the source habitat of the specimens. Two researchers opportunistically sampled the specimens using an entomological net and identified them with the aid of a Tecnival SQF-F series stereomicroscope based on the specialized literature (Garrison 2009; Lencioni 2017). Damselflies were photographed using digital cameras, and image processing was performed using Adobe Photoshop Lightroom©. Specimens were deposited in the Odonatological Collection of the Laboratory of Ecology and Biodiversity (COLEBIO) at the Universidade Federal de Sergipe, São Cristóvão Campus.

The potential distribution of *T. vulcanoae* was estimated using ecological niche modeling, employing the Maxent algorithm – Maximum Entropy Modeling (Phillips et al. 2006). Based on the estimated niche, we projected the potential distribution of the species across South America. This approach is widely used to predict species distribution based on occurrence records and environmental variables. The confirmed occurrence coordinates for *T. vulcanoae* were obtained from field collections and literature sources (Machado 1980; Garrison 2009; Lencioni 2017; 2023). All geographic points were reviewed and standardized to decimal degrees (latitude/longitude), and duplicate records within the same spatial cell (pixels) were removed. Environmental variables were derived from the WorldClim v2.1 database (Fick & Hijmans 2017) at a spatial resolution of 10 arc-minutes (~18 km). All 19 bioclimatic variables (bio1–bio19) were initially considered; however, only those deemed ecologically relevant to the species were retained (bio1, annual mean temperature; bio5, maximum temperature of the warmest month; bio6, minimum temperature of the coldest month; bio12, annual precipitation; and bio15, precipitation seasonality [coefficient of variation]). The selection of the most relevant variables was carried out in two stages: (i) we used an analysis of Variance Inflation Factor (VIF) to reduce multicollinearity, that is, the exclusion of highly correlated environmental variables (VIF > 3); and (ii) verification of the variables selected in the previous step based on the group's ecological knowledge, where temperature and precipitation are critical factors for odonate distribution. The model

was trained using 75% of the data, with 25% used for validation and 10,000 randomly generated pseudo-absence points. The model performance was assessed using the area under the ROC curve (AUC). The resulting AUC value was 0.89, indicating a good predictive performance. Modeling was conducted using Maxent v3.4.1 via the '*dismo*' package (Hijmans et al. 2023) in R software (R Core Team 2024).

Examined Material: Brazil, Sergipe, São Cristóvão. 1 #male, 14.v.2025, 10°55'21.82"S, 37°6'7.04"W, Entomological net, Gomes, T.C. & Venâncio, H. col.; and 1 #male 26.v.2025, 10°55'22.55"S, 37°6'5.39'W, Entomological net, Silva, M.M.S. col; 6 #males and 7 #females, 29.v.2025, 10°55'20.52"S, 37°5'57.62"W, Entomological net, Farias, A.B.S. col; 3 #females, 29.v.2025, 10°55'26.88"S, 37°5'58.99"W, Entomological net, Gomes, T.C. & Santos, S.A. col. COLEBIO.

The species was identified by its predominantly blue coloration, the medial and superior margins of the cercus forming a raised ridge, and the medial ridge of the cercus being reduced, dorsally directed, and slightly visible in the lateral view (Fig. 1).

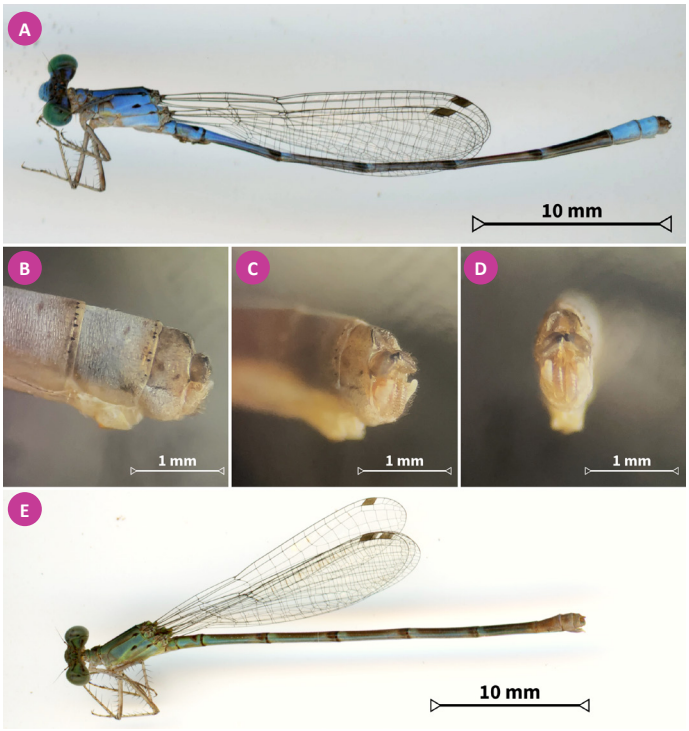

Figure 1. *Telebasis vulcanoae* (Machado, 1980) (Odonata: Coenagrionidae) from Sergipe. A – *T. vulcanoae* habitus (male); B – S9, S10 and cerci in lateral view; C – Cerci in latero-dorsal view; D – Cerci in frontal view; and E – *T. vulcanoae* habitus (female).

The first individual was collected in the afternoon, at around 1:00 p.m., inside a bathroom; it is believed that it may have been attracted by artificial light and was unable to exit the bathroom. The second specimen was collected at night at approximately 6:40 p.m., but it was already dead at the time of collection, likely attracted by the light, and subsequently trapped in spider webs. Regarding the specimens collected on May 25, five females were captured at 3:30 p.m., and the remaining individuals were collected at approximately 4:40 p.m. The region has two well-defined seasons (dry and rainy), and the collection period occurs during the rainy season.

Distribution. The species distribution is restricted to two Brazilian states, Minas Gerais and Bahia (Machado 1980; Garrison 2009; Lencioni 2017). Here, we expand its occurrence to the state of Sergipe, approximately 250 km from the nearest known locality (Lauro de Freitas, Bahia). The potential distribution model generated for *T. vulcanoae* showed good predictive performance, with an AUC value of 0.89, indicating that the model has a strong ability to discriminate between suitable and unsuitable areas for the species. Regions with higher environmental suitability (> 0.7) were mainly concentrated in the northern and central-western regions of Brazil, coinciding with the known occurrence areas of the species (Fig. 2). *Telebasis vulcanoae* has high environmental suitability in the coastal and forested areas of eastern Brazil. The model indicated that the potential occurrence was limited to humid tropical zones, with low suitability in the Andean, southern, and deep Amazonian regions (Fig. 2).

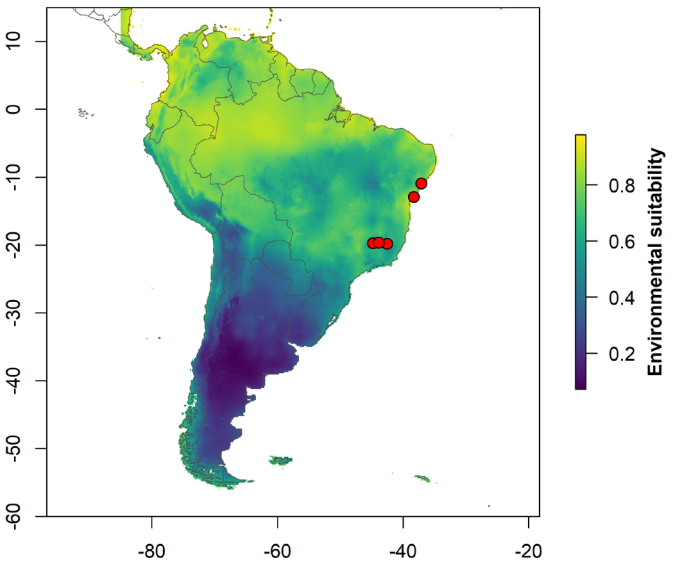

Figure 2. The potential distribution of *Telebasis vulcanoae* (Machado, 1980) (Odonata: Coenagrionidae) in South America was generated using a species distribution model (SDM). Red dots represent the observed occurrences of the species (Bahia, Minas Gerais, and Sergipe).

The resulting map showed a high probability of occurrence in these regions, suggesting that the environmental conditions are favorable for the persistence of the species. After fitting the MaxEnt model, the minimum temperature of the coldest month (bio6) was identified as the variable with the highest relative contribution to species distribution prediction, accounting for 73.1% of the model's importance, followed by bio5 (14.2%) and bio1 (11.5%) (Supplementary Material). Variables bio12 and bio15 contributed only 1.1% and 0.07%, respectively.

Although the generic discussion of *T. vulcanoae* is recent, the last recorded collection dates back to 2006 (Garrison 2009), exactly 19 years ago. The species is currently classified as Least Concern (LC) by SALVE (ICMBio 2025) and Data Deficient (DD) by the IUCN (IUCN 2025). The record of *T. vulcanoae* in Sergipe may contribute to reassessing its conservation status, as its presence may suggest greater connectivity between populations and environmental plasticity superior to that previously estimated. Furthermore, it can be used as a basis for the species to be correctly categorized on the red lists, removing it from the obscurity of the data deficient (DD) category, which is essential to guarantee its legal protection and conservation of its habitats.

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Authors' Contributions

ABSF: Conceptualization, Investigation, Methodology, Formal

Analysis, Validation, Writing – original draft, Writing – review and editing; TCG: Investigation, Methodology, Validation, Writing – review and editing; HV: Conceptualization, Investigation, Methodology, Validation, Writing – review and editing; JCS: Methodology, Validation, Writing – review and editing.

Conflict of Interest Statement

The authors declare that they have no conflict of interests.

Ethical Approval

One of the co-authors of the paper, Jean Carlos Santos, holds a valid collection license (28398–11) for the collection of Insect, ensuring that all sampling conducted in the study complies with current environmental regulations.

Supplementary Material

Supplementary data for this article be accessed at doi: https://doi.org/10.5281/zenodo.17674714.

Data Availability

The original data presented in this study are included in the article and Supplementary Materials. Further inquiries can be directed to the corresponding author.

Generative AI Statement

The authors used Paperpal software to assist in reviewing the translation of the manuscript. After using this tool, the authors thoroughly revised the content as needed and assumed full responsibility for the content of the publication.

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