



<http://dx.doi.org/10.11646/zootaxa.3796.1.5>

<http://zoobank.org/urn:lsid:zoobank.org:pub:31C2F235-AAC7-4BBE-ABEB-793AFF63C80C>

A new species of *Tityus* (Scorpiones, Buthidae) from El Edén Cave, Colombia

RICARDO BOTERO-TRUJILLO^{1,2} & EDUARDO FLÓREZ D.³

¹División Aracnología, Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Avenida Ángel Gallardo 470, CP: 1405DJR, C.A.B.A., Buenos Aires, Argentina. E-mail: rbt@macn.gov.ar

²Associate researcher. Laboratorio de Entomología, Unidad de Ecología y Sistemática–UNESIS, Departamento de Biología, Pontificia Universidad Javeriana, Bogotá, Colombia

³Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, Colombia. E-mail: aeflorezd@unal.edu.co

Abstract

A new scorpion species, *Tityus (Tityus) grottoedensis* **sp. nov.**, is herein described based on male and female specimens collected in El Edén Cave and its vicinities (Tolima department, Colombia). The new species, which becomes the first scorpion described from a Colombian cave, is probably a eutroglophile or subtroglophile element; however, additional studies are needed to determine the degree of association of the species to the cave. Among other features, the new species is characterized by having a relatively thin body, a yellow-to-chestnut coloration, sternites IV to VI with visible lateral longitudinal carinae, and the basal piece of the middle lamella of the pectines dilated in male and female.

Key words: Scorpion, *Tityus grottoedensis* **sp. nov.**, taxonomy, cave, Tolima, Colombia

Resumen

Se describe a *Tityus (Tityus) grottoedensis* **sp. nov.**, una nueva especie de escorpión, con base en machos y hembras colectados en la Cueva El Edén y sus alrededores (departamento Tolima, Colombia). La nueva especie, que se constituye en el primer escorpión descrito para una cueva Colombiana, es probablemente un elemento eutroglófilo o subtroglófilo; sin embargo, estudios adicionales son necesarios para determinar el grado de asociación de la especie con la cueva. Entre otras cosas, la nueva especie se caracteriza por ser relativamente delgada, presentar una coloración amarilla a castaño, esternitos IV a VI con carena longitudinal lateral visible, y la pieza basal de la lámina media de las pectinas dilatada en macho y hembra.

Palabras clave: Escorpión, *Tityus grottoedensis* **sp. nov.**, taxonomía, cueva, Tolima, Colombia

Introduction

The first synthesis on cave scorpions was performed by Lourenço & Francke (1985). This was followed afterwards by the compilation of Lourenço (1994a), and since, this topic has been the subject of several contributions (Lourenço *et al.* 2004a; Francke & Savary 2006; Lourenço 2007; Volschenk & Prendini 2008; Francke 2009a, 2009b; Prendini *et al.* 2009; Sissom & Reddell 2009; Vignoli & Prendini 2009; Lourenço & Duhem 2010; Lourenço & Pham 2010, 2013). Even though truly troglobiont [*sensu* Sket (2008)] scorpions, with pronounced ecomorphological adaptations to cave-dwelling life have been described since the 1960's, scorpions found in caves are most often troglóphiles or troglóxenes (Pinto-da-Rocha 1995; Lourenço *et al.* 2004a; Volschenk & Prendini 2008; Sissom & Reddell 2009). A comprehensive summary of the current knowledge of cave scorpions was provided in the contributions of Volschenk & Prendini (2008), Prendini *et al.* (2009) and Vignoli & Prendini (2009).

The family Buthidae is quite commonly found inside caves (Lourenço *et al.* 2004a; Lourenço & Duhem 2010; Lourenço & Pham 2013); however, Volschenk & Prendini (2008) considered only one species, *Troglophalurus*

collected under scientific research authorization (N° 007-14 IC-FAU-DNB/MA) of the Ministry of Environment of Ecuador to the author (R.B.T.) and José A. Ochoa.

References

- Amado, G., Morales, A., Sket, B. & Juberthie, C. (1994) Colombie. In: Juberthie, C. & Decu, V. (Eds.), *Encyclopaedia Biospeologica I*. Société de Biospéologie, ISSN 0398-7973, 3e trimestre 1994, en français, 3 fig. dont 1 carte, 58 réf., pp 545–549.
- Botero-Trujillo, R. (2008) Redescription of *Tityus (Tityus) gaffini* Lourenço, 2000 (Scorpiones: Buthidae) and new locality records. *Revista Ibérica de Aracnología*, 16, 29–34.
- Brignoli, P.M. (1980) La valeur biogeographique des araignees cavernicoles. *Eigth Internationaler Arachnologen-Kongreß*, 1980, pp. 427–432.
- Cabrera, W.O. (1970) La Cueva de Cunday. *Boletín de la Sociedad Geográfica de Colombia*, 27 (12), 1–11.
- Casallas-Pabón, D., Medellín-Ruiz, M.C., Martínez-Torres, S.D. & Murcia-López, M.A. (in press) Artrópodos: Filo Arthropoda. In: Muñoz-Saba, Y., González-Sánchez, I. & Calvo-Roa, N. (Eds.), *Cavernas de Santander, Colombia: Guía de campo*. Serie de Guías de Campo del Instituto de Ciencias Naturales No. 13, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá D.C., Colombia, pp. 157–240.
- Castañeda, E., Cadena, A., Aguilera, A., Sanin, L.H., Ajello, L., Weeks, R., Corredor, V. & Restrepo, M. (1981) Histoplasmosis epidémica. II. Hallazgos en la Cueva del Edén, Cunday, Tolima. *Biomédica*, 1 (4), 208–212.
- Decu, V., Bordón, C. & Linares, O. (1987) Sinopsis de los invertebrados citados de las cuevas de Venezuela. In: Decu, V. et al. (Eds.), *Fauna hipogea y hemiedáfica de Venezuela y de otros países de América del Sur*. Academiei Republicii Socialiste România, Bucarest, I, pp. 47–60.
- Dessen, E.M.B., Eston, V.R., Silva, M.S., Temperini-Beck, M.T. & Trajano, E. (1981) Communication on a preliminary survey of the fauna of caves in some regions of Brazil. In: Beck, B.F. (Ed.), *Proceedings of the Eighth International Congress of Speleology*. Vol. I & II; July 18–24; Bowling Green, Kentucky, U.S.A., pp. 123–125.
- Fet, V. & Lowe, G. (2000) Family Buthidae C. L. Koch, 1837. In: Fet, V., Sissom, W.D., Lowe, G. & Braunwalder, M.E. (Eds.), *Catalog of the Scorpions of the World (1758-1998)*. The New York Entomological Society, New York, NY, pp 54–286.
- Flórez, E. (1996) *Tityus lourençoi*, a new species of scorpion from the Cordillera Oriental, Colombia (Scorpiones, Buthidae). *Revista de Biología Tropical*, 44 (2), 683–685.
- Flórez, E. (2001a) Escorpiones de la familia Buthidae (Chelicerata: Scorpiones) de Colombia. *Biota Colombiana*, 2 (1), 25–30.
- Flórez, E. (2001b) *Sinopsis de los escorpiones de la familia Buthidae en Colombia*. Magister Thesis. Universidad Nacional de Colombia, Bogotá, Colombia, 102 pp.
- Francke, O.F. (2009a) Description of a new species of troglophile *Pseudouroctonus* (Scorpiones: Vaejovidae) from Coahuila, México. *Texas Memorial Museum Speleological Monographs*, 7. *Studies on the cave and endogean fauna of North America*, V, 11–18.
- Francke, O.F. (2009b) A new species of *Alacran* (Scorpiones: Typhlochactidae) from a cave in Oaxaca, Mexico. *Zootaxa*, 2222, 46–56.
- Francke, O.F. & Savary, W.E. (2006) A new troglobitic *Pseudouroctonus* Stahnke (Scorpiones: Vaejovidae) from northern México. *Zootaxa*, 1302, 21–30.
- González-Sponga, M.A. (1974) Dos nuevas especies de alacranes del género *Tityus* en las cuevas Venezolanas (Scorpionida: Buthidae). *Boletín de la Sociedad Venezolana de Espeleología*, 5 (1), 55–72.
- Griswold, C.E., Audisio, T. & Ledford, J.M. (2012) An extraordinary new family of spider from caves in the Pacific Northwest (Araneae, Trogloraptoridae, new family). *ZooKeys*, 215, 77–102.
<http://dx.doi.org/10.3897/zookeys.215.3547>
- Howarth, F.G. (1983) Ecology of cave arthropods. *Annual Review of Entomology*, 28, 365–389.
<http://dx.doi.org/10.1146/annurev.en.28.010183.002053>
- Howarth, F.G. & Stone, F.D. (1982) The conservation of Hawaii's cave resources. In: Smith, C.W. (Ed.), *Proceedings of the Fourth Conference in Natural Sciences, Hawaii Volcanoes National Park*; 1982 June 2–4; Honolulu. Honolulu (HI): University of Hawaii at Manoa, Department of Botany, pp. 94–99.
- Lourenço, W.R. (1981) Scorpions cavernicoles de l'Équateur: *Tityus demangei* n. sp. et *Ananteris ashmolei* n. sp. (Buthidae); *Troglotayosicus vachoni* n. gen., n. sp. (Chactidae), scorpion troglobie. *Bulletin du Muséum national d'Histoire Naturelle Paris (Zoologie, Biologie et Écologie Animale)*, 3, 635–662.
- Lourenço, W.R. (1994a) Scorpions. In: Juberthie, C. & Decu, V. (Eds.), *Encyclopaedia Biospeologica I*. Société de Biospéologie, ISSN 0398-7973, 3e trimestre 1994, en français, 3 fig. dont 1 carte, 1 tab., 16 réf., pp. 181–184.
- Lourenço, W.R. (1994b) Scorpions Chelicerata de Colombie. VI. Quatre nouvelles espèces de Buthidae des régions amazonienne, sud-pacifique et de la Cordillère orientale. *Revista de la Academia Colombiana de Ciencias*, 19 (73), 387–392.
- Lourenço, W.R. (1997) Synopsis de la faune de scorpions de Colombie, avec des considérations sur la systématique et la biogéographie des espèces. *Revue Suisse de Zoologie*, 104 (1), 61–94.

- Lourenço, W.R. (2000) Synopsis of the Colombian species of *Tityus* Koch (Chelicerata, Scorpiones, Buthidae), with descriptions of three new species. *Journal of Natural History*, 34, 449–461.
<http://dx.doi.org/10.1080/002229300299561>
- Lourenço, W.R. (2006) Nouvelle proposition de découpage sous-générique du genre *Tityus* C.L. Koch, 1836 (Scorpiones, Buthidae). *Boletín Sociedad Entomológica Aragonesa*, 39, 55–67.
- Lourenço, W.R. (2007) Complements to the morphology of *Troglokhammouanus steineri* Lourenço, 2007 (Scorpiones: Pseudochactidae) based on scanning electron microscopy. *Euscorpius*, 59, 1–6.
- Lourenço, W.R., Cerqueira Baptista, R.L. & Giupponi, A.P.L. (2004a) Troglobitic scorpions: a new genus and species from Brazil. *Comptes Rendus Biologies*, 327, 1151–1156.
<http://dx.doi.org/10.1016/j.crv.2004.09.001>
- Lourenço, W.R., Cabral, B.C. & Bruehmueller-Ramos, E.C. (2004b) Confirmation of *Tityus confluens* Borelli, 1899 (Scorpiones, Buthidae) in Brazil and description of a new subspecies from the State of Mato Grosso do Sul. *Boletín Sociedad Entomológica Aragonesa*, 34, 27–30.
- Lourenço, W.R. & Duhem, B. (2010) Buthid scorpions found in caves; a new species of *Isometrus* Ehrenberg, 1828 (Scorpiones, Buthidae) from southern Vietnam. *Comptes Rendus Biologies*, 333, 631–636.
<http://dx.doi.org/10.1016/j.crv.2010.05.005>
- Lourenço, W.R. & Flórez, D.E. (1990) Scorpions (Chelicerata) de Colombie. III. The scorpion fauna of the Pacific region (Choco), with some biogeographic considerations. *Amazoniana*, 11 (2), 119–134.
- Lourenço, W.R. & Francke, O.F. (1985) Révision des connaissances sur les scorpions cavernicoles (troglobies) (Arachnida, Scorpiones). *Memoires de Biospéléologie*, 11, 3–7.
- Lourenço, W.R. & Pham, D.S. (2010) A remarkable new cave scorpion of the family Pseudochactidae Gromov (Chelicerata, Scorpiones) from Vietnam. *ZooKeys*, 71, 1–13.
<http://dx.doi.org/10.3897/zookeys.71.786>
- Lourenço, W.R. & Pham, D.S. (2013) First record of a cave species of *Euscorpiops* Vachon from Viet Nam (Scorpiones, Euscorpiidae, Scorpiopinae). *Comptes Rendus Biologies*, 336, 370–374.
<http://dx.doi.org/10.1016/j.crv.2013.06.005>
- Muñoz-Saba, Y., Andrade, G.I., Baptiste, L.G., Salas, D., Villarreal, H. & Armenteras, D. (1998) Conservación de los ecosistemas subterráneos en Colombia. *Biosíntesis. Boletín del Instituto de Investigación de Recursos Biológicos Alexander von Humboldt*, 10, 1–4.
- Muñoz-Saba, Y., González-Sánchez, I. & Calvo-Roa, N. (Eds.) (in press) *Cavernas de Santander, Colombia: Guía de campo*. Serie de Guías de Campo del Instituto de Ciencias Naturales No. 13, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá D.C., Colombia, 325 pp.
- Pinto-da-Rocha, R. (1995) Sinopse da fauna cavernícola do Brasil (1907-1994). *Papéis Avulsos de Zoologia, São Paulo*, 39 (6), 61–173.
- Pocock, R.I. (1894) Notes on the Pedipalpi of the family Tarantulidae contained in the collection of the British Museum. *Annals and Magazine of Natural History*, 6 (14), 273–298.
- Pocock, R.I. (1902) A contribution to the systematics of scorpions. I. Some corrections in nomenclature. II. Notes on some species of *Parabuthus* contained in the British Museum. III. Descriptions of some new and old species. *Annals and Magazine of Natural History*, 7 (10), 364–380.
- Prendini, L. (2000) A new species of *Parabuthus* Pocock (Scorpiones: Buthidae), and new records of *Parabuthus capensis* (Ehrenberg), from Namibia and South Africa. *Cimbebasia*, 16, 201–214.
- Prendini, L. (2004) The systematics of Southern African *Parabuthus* Pocock (Scorpiones, Buthidae): revisions to the taxonomy and key to the species. *Journal of Arachnology*, 32, 109–186.
<http://dx.doi.org/10.1636/h03-17>
- Prendini, L., Francke, O.F. & Vignoli, V. (2009) Troglomorphism, trichobothriotaxy and typhlochactid phylogeny (Scorpiones, Chactioidea): more evidence that troglobitism is not an evolutionary dead-end. *Cladistics*, 25, 1–24.
<http://dx.doi.org/10.1111/j.1096-0031.2009.00277.x>
- Shorthouse, D.P. (2010) SimpleMappr, a web-enabled tool to produce publication-quality point maps. Available from: <http://www.simplemappr.net> (accessed 10 October 2013)
- Sissom, W.D., Polis, G.A. & Watt, D.D. (1990) Field and laboratory methods. In: Polis, G.A. (Ed.), *The Biology of Scorpions*. Stanford University Press, Stanford, pp. 445–461.
- Sissom, W.D. & Reddell, J.R. (2009) Cave scorpions of Mexico and the United States. *Texas Memorial Museum Speleological Monographs*, 7. *Studies on the cave and endogean fauna of North America*, V, 19–32.
- Sket, B. (2008) Can we agree on an ecological classification of subterranean animals? *Journal of Natural History*, 42 (21–22), 1549–1563.
<http://dx.doi.org/10.1080/00222930801995762>
- Stahnke, H.L. (1970) Scorpion nomenclature and mensuration. *Entomological News*, 81 (12), 297–316.
- Teruel, R. & García, L.F. (2008) Rare or poorly known scorpions from Colombia. I. Redescription of *Tityus macrochirus* Pocock, 1897 (Scorpiones: Buthidae). *Euscorpius*, 63, 1–11.
- Teruel, R. & Roncallo, C.A. (2010) Rare or poorly known scorpions from Colombia. IV. Additions, synonymies and new records (Scorpiones: Buthidae, Scorpionidae). *Euscorpius*, 105, 1–15.

- Trajano, E. & Bichuette, M.E. (2006) *Biologia Subterrânea. Introdução*. RedeSpeleo Brasil, São Paulo, Brasil, 92 pp.
- Vachon, M. (1963) De l'utilité, en systématique, d'une nomenclature des dents des chélicères chez les scorpions. *Bulletin du Muséum national de Histoire naturelle Paris*, Série 2e, 35 (2), 161–166.
- Vachon, M. ["1973" (1974)] Étude des caractères utilisés pour classer les familles et les genres de scorpions (Arachnides). 1. La trichobothriotaxie en arachnologie. Sigles trichobothriaux et types de trichobothriotaxie chez les scorpions. *Bulletin du Muséum national d'Histoire Naturelle Paris*, Série 3e Zoologie, 140, 857–958.
- Vachon, M. (1975) Sur l'utilisation de la trichobothriotaxie du bras des pédipalpes des scorpions (Arachnides) dans le classement des genres de la famille des Buthidae Simon. *Comptes Rendus des séances de l'Académie des Sciences, Paris*, Série D, 281, 1597–1599.
- Valdez-Mondragón, A. & Francke, O.F. (2011) Four new species of the genus *Pseudocellus* (Arachnida: Ricinulei: Ricinoididae) from Mexico. *Journal of Arachnology*, 39, 365–377.
<http://dx.doi.org/10.1636/ha11-02.1>
- Valdez-Mondragón, A. & Francke, O.F. (2013) Two new species of ricinuleids of the genus *Pseudocellus* (Arachnida: Ricinulei: Ricinoididae) from southern Mexico. *Zootaxa*, 3635 (5), 545–556.
<http://dx.doi.org/10.11646/zootaxa.3635.5.4>
- Vignoli, V. & Prendini, L. (2009) Systematic revision of the troglomorphic North American scorpion family Typhlochactidae (Scorpiones: Chactoidea). *Bulletin of the American Museum of Natural History*, 326, 1–94.
<http://dx.doi.org/10.1206/570.1>
- Volschenk, E.S. & Prendini, L. (2008) *Aops oncodactylus*, gen. et sp. nov., the first troglobitic urodacid (Urodacidae: Scorpiones), with a re-assessment of cavernicolous, troglobitic and troglomorphic scorpions. *Invertebrate Systematics*, 22, 235–257.
<http://dx.doi.org/10.1071/is06054>