

Parasitism in the endemic and saxicolous lizard *Tropidurus pinima* (Squamata: Tropiduridae) from the Caatinga domain, Brazil

M. Aldenise Xavier^{1,2*}, Tainara Lima-Silva², Gabriel D. dos Santos-Carvalho²,
Ingrid B. Machado³, Luciano A. dos Anjos⁴, and Eduardo J.R. Dias²

Lizards are hosts to a wide variety of parasites, which can be acquired by ingestion of prey, active penetration by endoparasites larvae (Anderson, 2000), or direct contact with ectoparasites (Carvalho et al., 2006; Menezes et al., 2011). In addition, ectoparasites, such as lice, mites, and fleas, can act as vectors of biopathogens (hemoparasites) (Leal et al., 2009; Sabagh et al., 2015). Several studies have addressed parasitism in tropidurid lizards (Cunha-Barros and Rocha, 2000; Cunha-Barros et al., 2003; Carvalho et al., 2006; Rocha et al., 2008; Delfino et al., 2011; Menezes et al., 2011), but little is known about the parasite fauna associated with lizard species endemic to the Caatinga (Rocha et al., 2008; Menezes et al., 2011; Lambertz et al., 2012; Alcantara et al., 2018), including *Tropidurus pinima* (Rodrigues, 1984).

Tropidurus pinima is a diurnal, endemic, saxicolous lizard occurring in the Caatinga of Bahia State, Brazil (Rodrigues, 1996; Passos et al., 2011). It is a member of the *T. semitaeniatus* group, which comprises four species (Passos et al., 2011): *T. semitaeniatus*, *T. helenae*, *T.*

jaguaribanus, and *T. pinima*. Since its description three decades ago, little has become known about the biology and ecology of *T. pinima* (Xavier and Dias, 2017). In this study we describe the endo- and ectoparasite fauna of *T. pinima* from a semi-arid ecosystem site located at Serra de Santo Inácio, Bahia State, Brazil.

During June and November 2016, we collected five individuals of *T. pinima*, including one male of 68.5 mm snout–vent length (SVL) and four females of 64.7 mm, 64.5 mm, 59.9 mm, and 44.7 mm SVL, respectively, from a site in Santo Inácio, Gentio do Ouro Municipality, Bahia State, Brazil (11.12089°S, 42.73719°W; Datum WGS 84; elevation 364 m; Fig. 1). This region is characterized by large rock outcrops and white sandy soils with herbaceous shrub and cacti (Arias et al., 2011). Lizards were captured using the rubber band technique (Franco and Salomão, 2002), measured using digital callipers (to the nearest 0.01 mm), and euthanized in accordance with the protocols of the Conselho Nacional de Controle de Experimentação Animal (Brasil, 2013). Specimens have been deposited in the lizard collection of the Laboratório de Biologia e Ecologia de Vertebrados (LABEVL), Universidade Federal de Sergipe, under accession numbers LABEVL 764, 766–67, 785–86).

Lizards were checked for the presence of ectoparasites via whole body surface examination, while endoparasites were sampled in the coelomic cavity, gastrointestinal tract, lungs, and liver. Parasites were removed, counted, preserved in 70% ethanol, and subsequently identified. Endoparasites were assembled on slides with Aman's lactophenol (Andrade, 2000) and were later analysed via light microscopy using a DM 2500-Leica microscope with an interferential phase contrast system, equipped with an LAS V4 (Leica Application Suite) computerized image analysis system. To identify mite superfamilies and families we used optical microscopy and the identification key of Krantz and Walter (2009). *Eutrombicula alfreddugesi* (Oudemans, 1910) mites were identified

¹ Instituto de Biologia, Universidade Federal da Bahia, Campus de Ondina, Rua Barão de Jeremoabo 147, Salvador, BA 40170-290, Brazil.

² Laboratório de Biologia e Ecologia de Vertebrados, Departamento de Biociências, Universidade Federal de Sergipe, Campus Professor Alberto Carvalho, Avenida Vereador Olímpio Grande s/n, Itabaiana, SE 49500-000, Brazil.

³ Serviço de Referência Nacional em Vetores das Riquetsioses, Fundação Oswaldo Cruz, Instituto Oswaldo Cruz, Avenida Brasil 4365, Pavilhão Lauro Travassos, Anexo Posterior/Sala 08, Rio de Janeiro, RJ 21045-900, Brazil.

⁴ Laboratório de Ecologia do Parasitismo, Departamento de Biologia e Zootecnia, Faculdade de Engenharia, Universidade Estadual Paulista, Avenida Brasil 56, Ilha Solteira, SP 15385-000, Brazil.

* Corresponding author; e-mail: aldenisexavier@hotmail.com

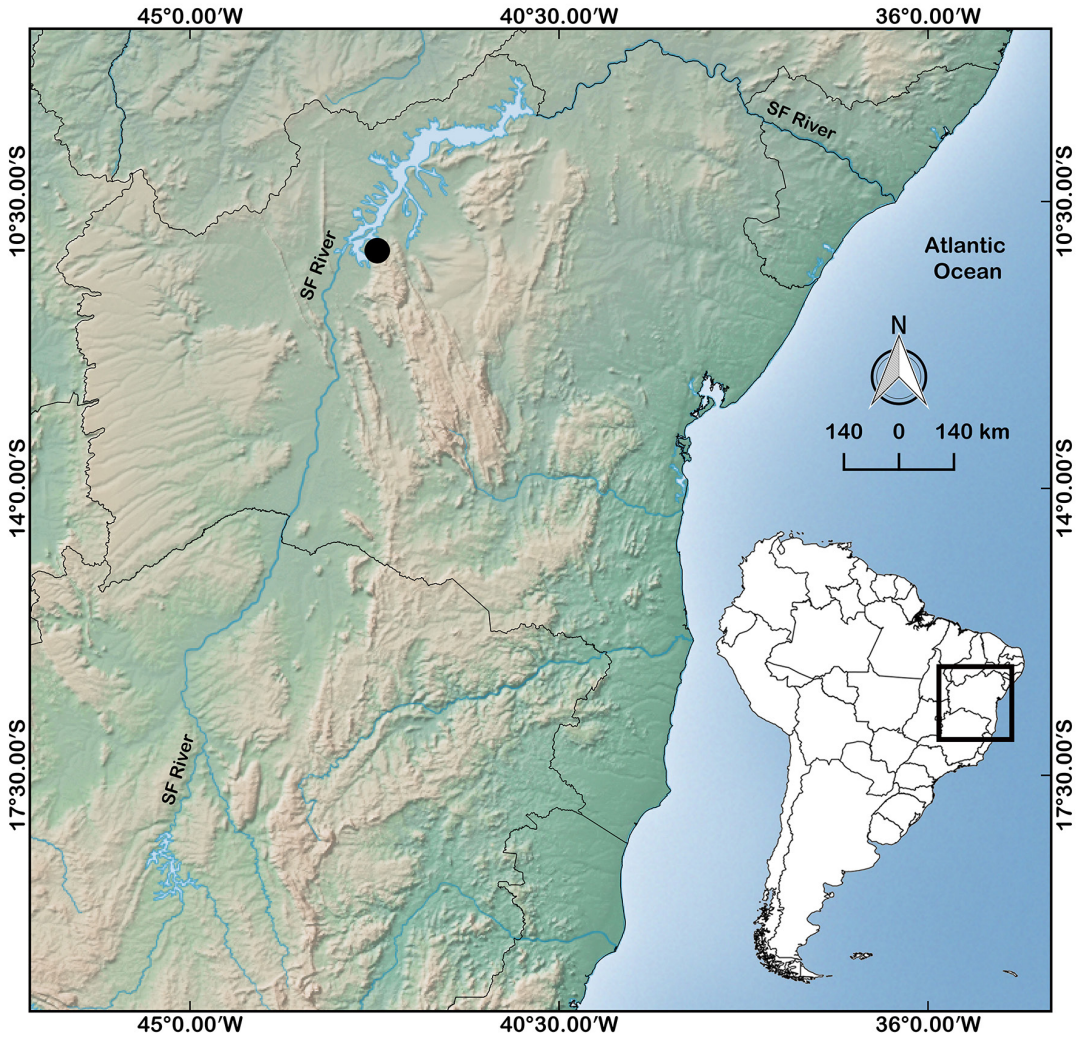


Figure 1. Location of the study site (black circle) in Bahia State, Brazil. SF River = São Francisco River.

according to Brennan and Reed (1974) and Fuller (1952), while *Tyrophagus putrescentiae* (Schrank, 1781) mites were identified according to Colloff and Spijksma (1992), Fan and Zhang (2007), and Fayaz et al. (2016).

Two of the examined *T. pinima* had endo- or ectoparasites, but neither had both types of parasites. The male was infected by an intestinal nematode (Fig. 2) of the genus *Parapharyngodon* (Pharyngodonidae), and one of the females (SVL = 59.9 mm) was infested with two species of ectoparasitic mites, *Tyrophagus putrescentiae* (Acaridae) ($n = 1$; Fig. 3) and *Eutrombicula alfreddugesi* (Trombiculidae) ($n = 26$; Fig. 4).

Parapharyngodon is considered a generalist helminth (Bezerra et al., 2016) and relatively common in

tropidurid lizards, including *Eurolophosaurus amathites*, *E. nanuzae*, *T. hispidus*, *T. itambere*, *T. jaguaribanus*, *T. semitaeniatus* and *T. torquatus* (Van Sluys et al., 1994; Fontes et al., 2003; Lopes et al., 2007; Pereira et al., 2011; Lambertz et al., 2012; Bezerra et al., 2016; Alcantara et al., 2018).

Eutrombicula alfreddugesi has a low host specificity (Menezes et al., 2011), and can parasitize different species, including *Ameivula ocellifera*, *A. nigrigula*, *Brasiliscincus agilis*, *Glaucomastix littoralis*, *Psychosaura macrorhyncha*, *T. cocorobensis*, *T. erythrocephalus*, *T. semitaeniatus*, *T. itambere*, *T. oreadicus*, *T. hispidus*, and *T. torquatus* (Cunha-Barros and Rocha, 2000; Cunha-Barros et al., 2003; Carvalho et

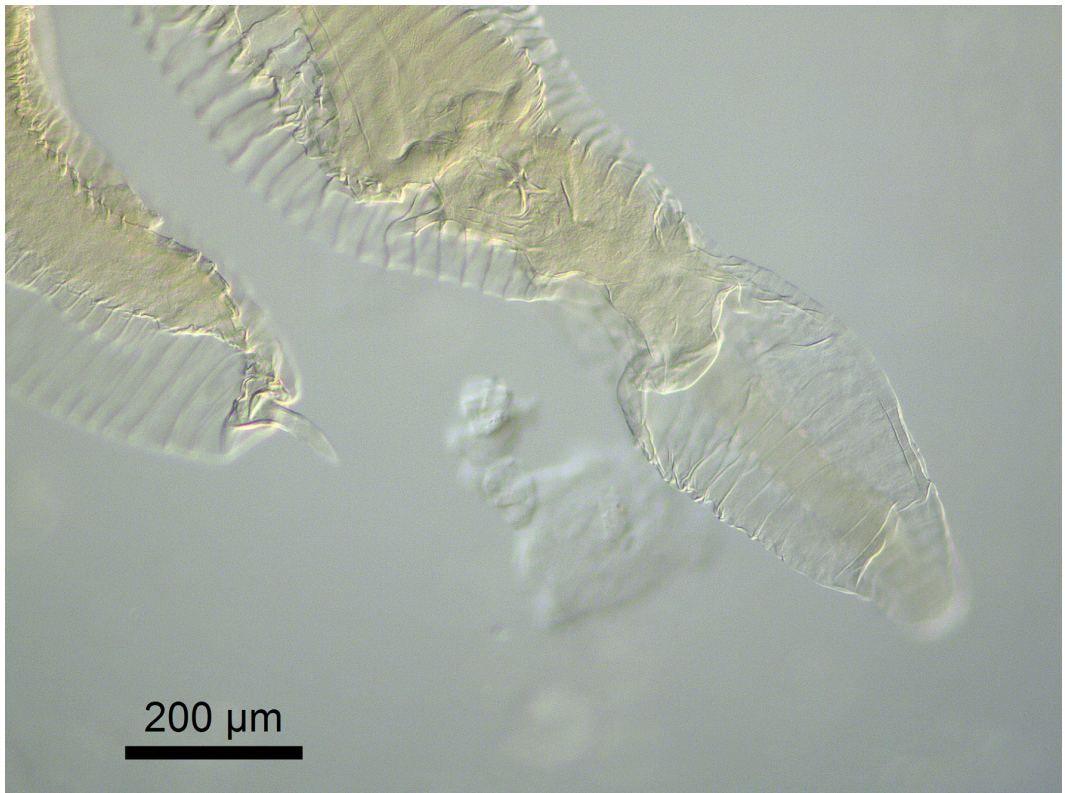


Figure 2. Photomicrograph of the anterior and posterior ends of an endoparasitic helminth, genus *Parapharyngodon* (Oxyuroidea: Pharyngodonidae), from the lizard *Tropidurus pinima* captured in Caatinga habitat of Gentio do Ouro Municipality, Bahia State, Brazil.

al., 2006; Rocha et al., 2008, 2020; Delfino et al., 2011; Menezes et al., 2011; Xavier et al., 2019). The imbricate scales of *Tropidurus* contribute to the intensity of a mite infestation (Cunha-Barros and Rocha, 1995; Menezes et al., 2011). In addition, *Tropidurus* species have mite pockets that are suitable habitats for ectoparasites (Menezes et al., 2011), favouring the mite attachment and affording them protection from exposure to wind and temperature (Rodrigues, 1987; Cunha-Barros and Rocha, 2000). This study is the first account of the helminth and ectoparasite fauna of *T. pinima*.

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Figure 3. A specimen of ectoparasitic mite, *Tyrophagus putrescentiae* (Acaridae), from the lizard *Tropidurus pinima* captured in Caatinga habitat of Gentio do Ouro Municipality, Bahia State, Brazil. (A) Dorsal view. (B) Ventral view.

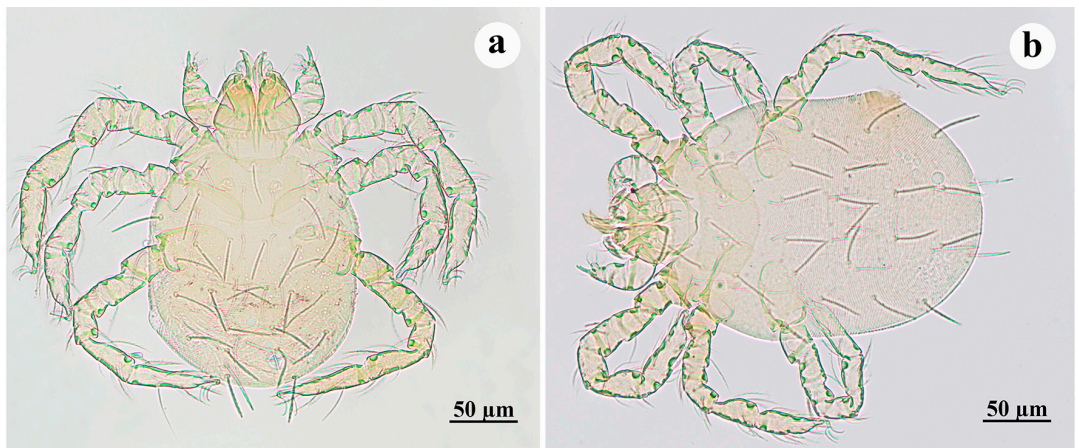


Figure 4. A specimen of ectoparasitic mite, *Eutrombicula alfreddugesi* (Trombiculidae), obtained from the lizard *Tropidurus pinima* captured in Caatinga habitat of Gentio do Ouro Municipality, Bahia State, Brazil. (A) Dorsal view. (B) Ventral view.

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