

A NEW LARVAL SPECIES OF THE GENUS *SMARIS* (SMARIDIDAE, PARASITENGONA) FROM A BRAZILIAN CAVE

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ABSTRACT: Here, we describe a new smaridid species, *Smaris hajiqanbari* sp. n., based on the larva. This is the first description of a *Smaris* species from Brazil and the fourth larval *Smaris* ever described. An identification key to larval *Smaris* is also provided.

KEY WORDS: Key to species, Parasitengona, Neotropical

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INTRODUCTION

Smarididae Kramer, 1878 is a widely distributed family of Parasitengona (Małkol and Wohltmann 2012), found in forest litter and caves in tropical and temperate regions. Parasitengona usually have life cycles with three active instars: ectoparasitic larvae, free-living predaceous deutonymphs and adults (Wharton and Fuller 1952; Johnston and Wacker 1967; Robaux 1974; Wohltmann 2000). Due to the major ecological and morphological differences between larval and postlarval instars, most terrestrial Parasitengona are known only from either larvae or deutonymphs/adults (Costa *et al.* 2019; Małkol and Wohltmann 2012).

Currently, *Smaris* includes 16 described species. Two of them (*Smaris maraghehiensis* Saboori and Bagheri, 2011 and *Smaris arenicola* Southcott, 1997) are based on larvae; 13 species are known from postlarval stages; and a single species—*Smaris prominens* (Banks 1916)—is known from both larval and postlarval stages (Małkol and Wohltmann 2012). The hosts of smarididids are poorly known, with a single record of larval *Smaris prominens* found on Psocoptera (Womersley and Southcott, 1941).

Notably, adult *Calorema* Southcott, 1963 are also found in leaf litter and caves. In both taxa, post larval instars are morphologically similar, differing in the presence of a ventral scutum between coxae I and II in *Smaris* (vs. absent in *Calorema*) and in a wider dorsal scutum in *Smaris*, including the eyes (vs. scutum narrow and not reaching the eyes in *Calorema*). The larvae of *Calorema* have never been described, hence they cannot be compared to *Smaris*.

Here, we describe a new larval smaridid species, *Smaris hajiqanbari* sp. n. collected from the soil in a cave. This is the first description of a *Smaris* from Brazil and the fourth-ever description of a larval species of *Smaris*. The identification key to larval *Smaris* is provided. It must be kept in mind, however, that the assignment to genera among smaridid may change as new associations between larvae and post-larval stages are generated, as illustrated by a recent study where genera were synonymized and new combinations proposed (Costa *et al.* 2021).

MATERIALS AND METHODS

A single specimen of the new species was found free on the cave floor, by a naked-eye search, collected using a brush, and placed in a vial with 70% ethanol. After being mounted on a microscope slide using Hoyer's medium (Walter and Krantz 2009) and identified to the family level, the specimen was donated to us by Dr. Lepoldo Bernadi (Universidade Federal de Lavras and Ativo Ambiental Co., Lavras, Minas Gerais, Brazil). The type is kept at the Acarological Collection at the Centro de Coleções Taxonômicas da Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil (UFMG AC).

Photos were taken using a Leica DM750 compound microscope with a Leica ICC50W camera. Drawings were made in the software On Top Replica v. 3.5.1. The artwork was finalized in Adobe Illustrator CC 2015 and Adobe Photoshop CC 2015. All measurements are given in micrometers (µm). The terminology and abbreviations were adapted

from Grandjean (1947), Goff *et al.* (1982) and Southcott (1961, 1992). For clarity, setae on the legs are represented only by their bases in the drawings.

Our nomenclatorial act was registered in the ZooBank*.

SYSTEMATICS

Smaris hajiqaanbari sp. n.

(Figs. 1–3)

Diagnosis (*larva*). Gnathosoma dorsally striated. Two solenidia on genu I and one on genu II and III (Fig. 2A). Setae *2a* present (Fig. 1B). Relative lengths of ventral idiosomal setae: $3a = 2a > 1a$. Eight ventral barbed setae situated posterior to coxae III in two rows of four setae each. Palpal setal formula: fPp=0-0-B-B-BBN-3N,1B,1ζ,1ω, with one branched seta with long barbs (B) on the palp tarsus (Fig. 1D). Setation of leg tibiae: fnTi= 16-14-14. Idiosoma with 32 dorsal setae. Post larval stages unknown.

Holotype. Larva, *Smaris hajiqaanbari* sp. n. (UFMG AC 210357), Brazil, Minas Gerais, Itabirito municipality, cave MP-29, 20°13'21"S, 43°50'56"W. Col. *Ativo Ambiental* Co. May 6th 2021.

Description. Larva: Idiosoma nearly oval, bearing 32 dorsal barbed setae arranged in irregular rows (Fig. 1A). Scutum wider than long, with two pairs of scutella and two pairs of sensilla; both with barbs on their whole extension (Fig. 1A). Two pairs of eyes situated on a weakly sclerotized eye plate (Fig. 3A). Idiosoma ventrally with three pairs of intercoxala (*1a*, *2a* and *3a*, with relative lengths: $3a = 2a > 1a$, Fig. 1B), and eight barbed setae situated posterior to coxae III in two rows of four setae each (Fig. 1B). A pair of “dots” present between coxae II and I (Fig. 3B).

Gnathosoma dorsally striated, bearing two pairs of smooth ventral hypostomal setae (*as* and *bs*) and one dorsal pair of smooth galealae (*cs*); seta *bs* much longer than *as*. Odontus with four prongs. Cheliceral blades short, screw-shaped and pointed sideways (Fig. 1C, D). Palps relatively long and curved. Palp tibia extending beyond gnathosomal tip (Fig. 1C, D). Palp tibia with one ventral, one dorsal barbed seta, and one poorly visible internal smooth seta. Palp genu and femur each with single, much wider and barbed setae (Fig. 1C). Palpal

setal formula: fPp=0-0-B-B-BBN-3N,1B,1ζ,1ω (Fig. 1C, D).

Legs short. Each tarsus bears a claw-like empodium and pair of enlarged claws without a terminal hook (Fig. 2). Coxae I to III with one barbed seta each, seta on coxa II near its posterior margin, seta on coxa III near its anterior margin (Fig. 1B). Legs covered by thick barbed setae (Fig. 3A, B), except for dorsal side of tibia I and tarsus I with few thin, distally barbed setae in addition to thick barbed setae (Fig. 2A). Tarsi I with a Trichobothridial pit bearing large trichobothria, short seta “*x*” and companion seta (Cp), one long solenidion (ω) close to trichobothridial pit’s margin and one distal euphatidium (ζ) (Fig. 2A). Three solenidia on tibia I, two on genu I and one on genu II and III (Fig. 2). Leg III > leg I > leg II. Measurements summarized in Table 1.

Leg chaetotaxy: Leg I: Ta—25B, 1Cp, 1ζ, 1ω, 1ta, 1x; Ti—14B, 1Cp, 1k, 3φ; Ge—8B, 2σ; TFe—5B; BFe—2B; Tr—1B; Cx—1B. Leg II: Ta—20-21B, 1ω, 1ζ; Ti—14B, 2φ; Ge—8B, 1σ; TFe—5B; BFe—2B; Tr—1B; Cx—1B. Leg III: Ta—22B, 1ζ; Ti—14B, 1φ; Ge—8B, 1σ; TFe—5B; BFe—1B; Tr—1B; Cx—1B.

Remarks

Smaris hajiqaanbari sp. n. differs from *S. prominens* (Banks 1916), *S. arenicola* Southcott, 1997 and *S. maraghehiensis* Saboori and Bagheri, 2011 in the presence of two (vs. one) solenidia on genu I. It also differs from *S. prominens* and *S. arenicola* in the presence (vs. absence) of setae *2a*.

Etymology

The new species is dedicated to Dr. Hamidreza Hajiqaanbar (University of Tehran, Iran) for his substantial contribution to systematic acarology.

Key to *Smaris* species (larvae) (Updated from Southcott, 1997)

1. Setae *2a* present (Fig. 1B).....2
— Setae *2a* absent.....3
2. Two solenidia present on genu I. Brazil.....
.....*S. hajiqaanbari* sp. n.
— One solenidion present on genu I. Iran.
.....*S. maraghehiensis* Saboori and Bagheri, 2011
3. Setae *1a* and *3a* with different shapes (*1a* with longer setules than observed in *3a*), scutellae AL blunt-ended. Australia.....
.....*S. prominens* (Banks, 1916)
— Setae *1a* and *3a* with similar shape, scutellae AL pointed. Australia.....*S. arenicola* Southcott, 1997

* <http://zoobank.org/urn:lsid:zoobank.org:pub:88EB4FAB-DBA6-423C-BEB8-C9B176E4F3FA>

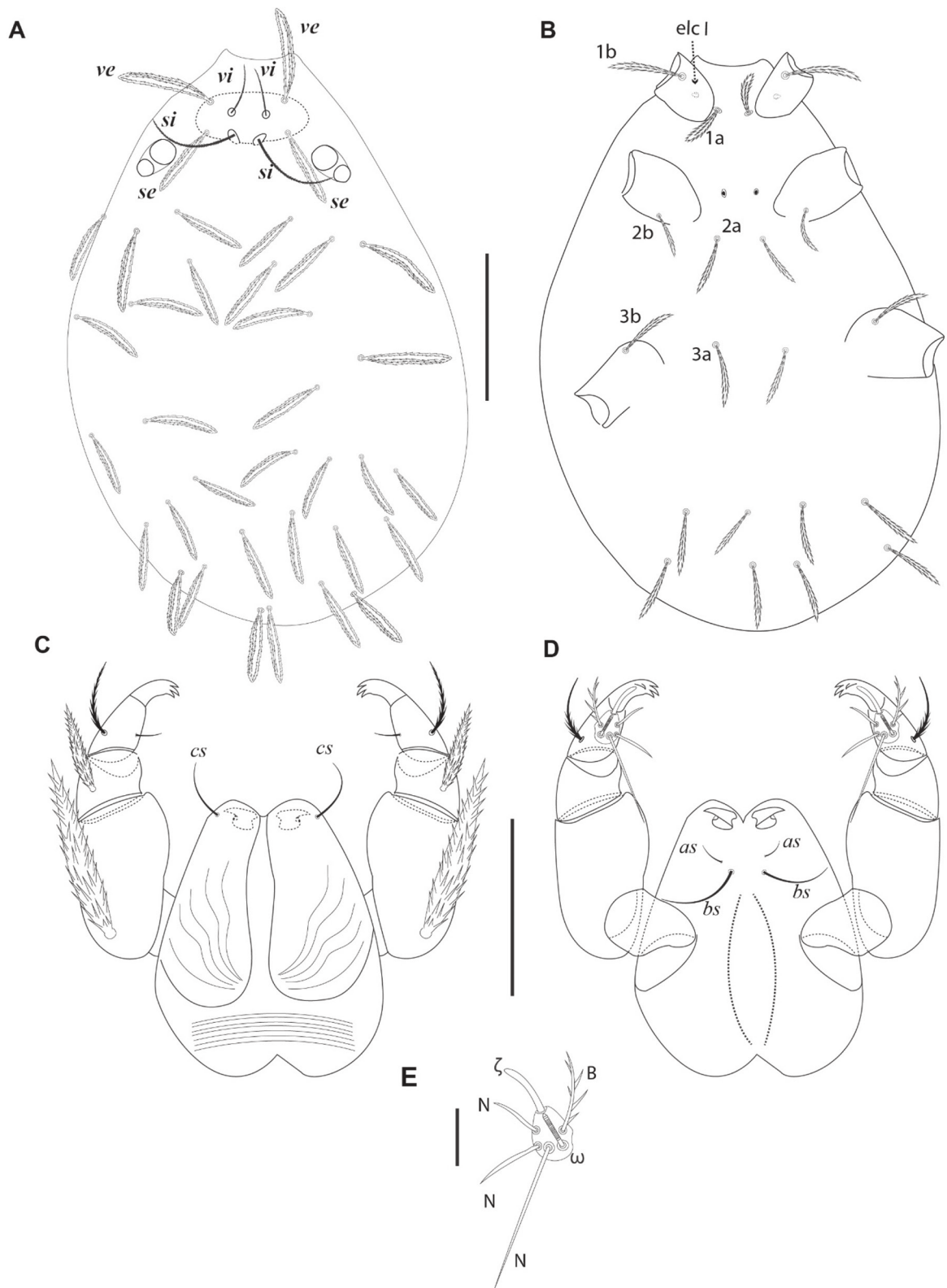


Fig. 1. *Smaris hajiqanbari* sp.n. A—dorsal view. B—ventral view. C—dorsal view of gnathosoma. D—ventral view of gnathosoma. E—Palp tarsus. Scales: A–D 50 μ m, E 10 μ m.

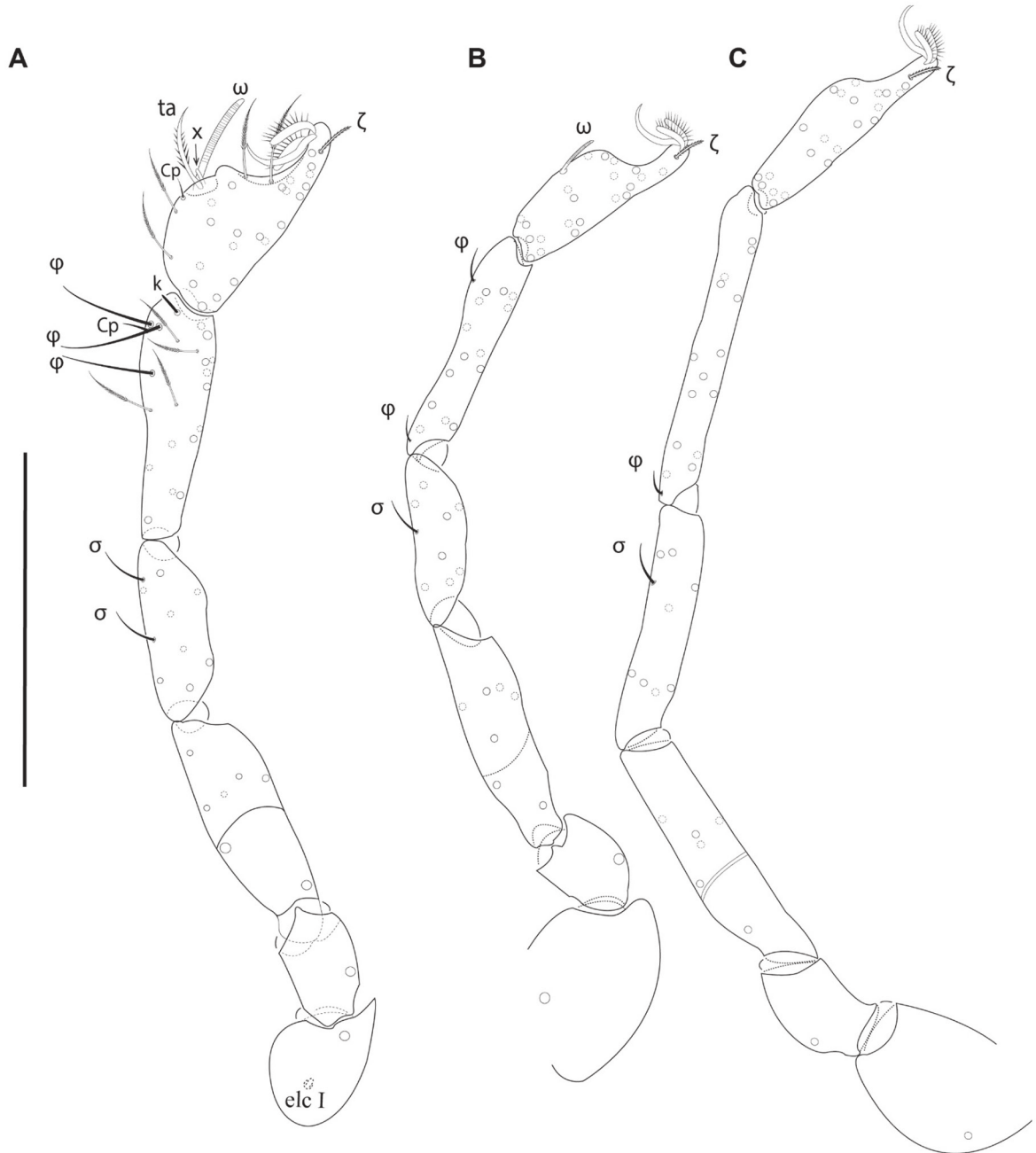


Fig. 2. *Smaris hajiqaqbari* sp.n. A—leg I. B—leg II. C—leg III. Scale 50 μ m.

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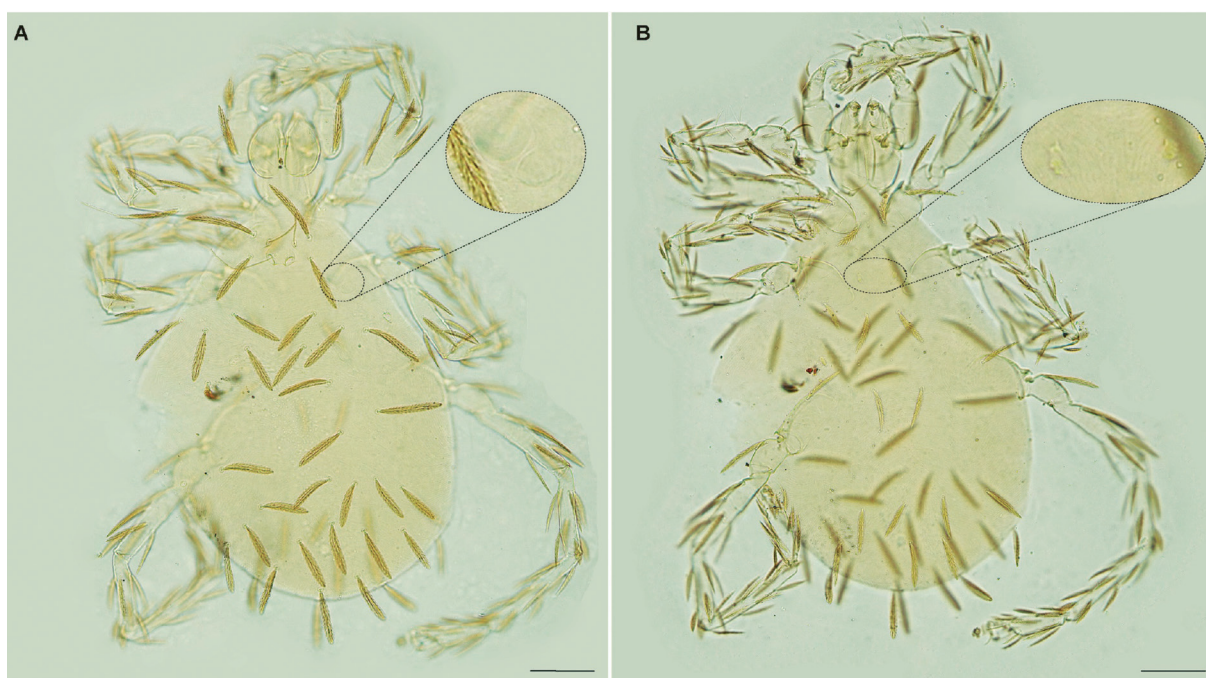


Fig. 3. *Smaris hajiqanbari* sp.n. A—dorsal view, detailed view of the eyes. B—ventral view, detailed view of two ventral dots of unknown nature. Scale 50 μm.

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Table 1
Measurements of *Smaris hajiqaqbari* sp.n. UFMG AC 210357 (Holotype).

Measurement	<i>S. hajiqaqbari</i>	Measurement	<i>S. hajiqaqbari</i>
IL	365	TFe I	45.7
IW	267	BFe I	33
AW	50.5	Tr I	30.5
PW	54	CX I	45
Sba	23	Leg I	315.1
Sbp	11.3	Ta II	62
A-P	18.5	Ti II	76.3
AL	62	Ge II	57.8
PL	52	TFe II	36
ASE	31.5	BFe II	37
PSE	67	Tr II	34
Scutum_L	81.5	Cx II	61
Scutum_W	41.5	Leg II	303.1
ISD	13	Ta III	75
1a	30	Ti III	89
2a	38	Ge III	79
3a	39	TFe III	49
Ta I (L)	68.1	Bfe III	30
Ta I (H)	29.3	Tr III	39
Ti I	73.3	Cx III	55
Ge I	64.5	Leg III	361