



<http://dx.doi.org/10.11646/zootaxa.3915.3.3>

<http://zoobank.org/urn:lsid:zoobank.org:pub:58747B95-71E8-4713-8D43-C33DFE3365D1>

## ***Brasilacarus cocaris* (Acari: Opilioacaridae), a new genus and species from Amazonia, Brazil**

MA. MAGDALENA VÁZQUEZ<sup>1</sup>, MARCEL SANTOS DE ARAÚJO<sup>2</sup> & REINALDO JOSÉ FAZZIO FERES<sup>3</sup>

<sup>1</sup>Universidad de Quintana Roo, División de Ciencias e Ingenierías, Chetumal, Quintana Roo, México.

E-mail: [marvazqu@uqroo.edu.mx](mailto:marvazqu@uqroo.edu.mx)

<sup>2</sup>Programa de Pós-Graduação em Biologia Animal, Departamento de Zoologia e Botânica, IBILCE, Universidade Estadual Paulista (UNESP) Rua Cristóvão Colombo 2265, CEP 15054-000, São José do Rio Preto, SP, Brazil. E-mail: [marcelsantosa@gmail.com](mailto:marcelsantosa@gmail.com)

<sup>3</sup>Departamento de Zoologia e Botânica, Instituto de Biociências, Letras e Ciências Exatas (IBILCE), Universidade Estadual Paulista (UNESP), Rua Cristóvão Colombo 2265, São José do Rio Preto CEP 15054-000, Brazil. CNPq – Brazil researcher.

E-mail: [reinaldo@ibilce.unesp.br](mailto:reinaldo@ibilce.unesp.br)

### **Abstract**

A new genus and species of Opilioacaridae, *Brasilacarus cocaris* n. gen., n. sp., is described from adult females and males from Manaus, Brazil. Brief descriptions of damaged tritonymphs and deutonymphs are also provided. The new genus appears to be related to *Caribeacarus* but possess a unique group of additional strongly modified setae on the tibiotarsus.

**Key words:** mites, Parasitiformes, South America, Neotropical, taxonomy

### **Introduction**

The order Opilioacarida and its single family Opilioacaridae is considered the most primitive group of parasitiform mites (Grandjean 1936), although recent studies disputes this notion (Murrell *et al.* 2005; Klompen *et al.* 2007; Klompen 2010). The family comprises 12 extant genera distributed throughout the world: *Amazonacarus* Vázquez *et al.*, 2014, *Caribeacarus* Vázquez & Klompen, 2009 and *Neocarus* Chamberlin & Mulaik, 1942 from the Americas; *Adenacarus* Hammen, 1966 from the Arabian Peninsula; *Indiacarus* Das & Bastawade, 2007, *Paracarus* Chamberlin & Mulaik, 1942, *Siamacarus* Leclerc, 1989 and *Vanderhammenacarus* Leclerc, 1989 from Asia; *Opilioacarus* With, 1902 from the Mediterranean region; and *Panchaetes* Naudó, 1963, *Phalangiacarus* Coineau & Hammen, 1979, and *Salfacarus* Hammen, 1977 from Africa. Undescribed specimens are also known from Australia (Walter & Proctor 1998), and fossil species from Baltic and Burmese amber are known for *Paracarus* and *Opilioacarus* (Dunlop *et al.* 2004; Dunlop *et al.* 2010; Dunlop & Bernardi 2014).

*Neocarus*, *Caribeacarus* and *Amazonacarus* occur in South America, and the genera are represented by five, one and two species, respectively (Bernardi *et al.* 2013a, b, 2014; Lehtinen 1980; Silvestri 1905; Vázquez *et al.* 2014). Herein we present the description of a new species of Opilioacaridae that requires a new genus to accommodate it.

### **Material and methods**

The specimens were collected by hand in a region around Manaus, in *terra-firme* forest type (where there is no period of flooding), near Negro river and Taruma-Mirim stream (Fig. 1), and were preserved in 70% ethanol. Most specimens were cleared in lactophenol, dissected, and the legs, mouthparts, body and ovipositor of each specimen mounted on 3–4 slides in Hoyer's medium.

Identification and drawings of the specimens were done with a Leica DM2500 phase contrast microscope equipped with a drawing tube. Measurements were taken using an ocular micrometer, and are presented in

## Discussion

Many characteristics present in this new genus are shared with or resemble those found in species described from Madagascar (Vázquez & Klompen 2010) and from North Africa (With 1904), especially the serrated projections on the ovipositor of *S. antsiranensis* and *S. kirindiensis*. The palp tibial setae *s* are strongly modified on *B. cocaris*, but also resemble those on *S. kirindiensis*.

The unique group of setae on the palp are additional, i.e., they do not represent modified setae found in other Opilioacaridae. This species presents all other setae described by Grandjean (1936), with the exception of the *sm3* setae present on males of *C. vanderhammeni* (Juvara-Bals & Baltac 1977) and *Neocarus nohbecanus* (Vázquez & Klompen 2002). Unfortunately, the juveniles (5 specimens) collected in the same survey do not have legs or palps. Future studies could verify if the number of modified setae increases on each instar and if the presence of all groups of setae is constant.

The number of different types of setae on the palps (especially the tibiotarsus) of Opilioacaridae is striking, but unfortunately little is known about possible variation in function. Histological and biochemical studies may help to better interpret the variation between these setae.

Camin *et al.* (1958) examined several species of opilioacarid mites by means of polarized light and found that the claws of the legs and palps are birefringent, but the setae are not. Examining the group of shiny, bright setae on the palp of *Brasilacarus* by means of polarized light (Fig. 33–36), we confirm that the claws of the palp (but not the setae) show birefringence, which could be caused by the presence of resilin.

The variation in the position and form of the palpal claws in Opilioacaridae was observed in an undescribed species from Puerto Rico (Camin *et al.* 1958), which has the strongly modified claws laterally displaced (Fig. 11). Described species possess a pair of typical ambulacral claws at the tip of each palpal tarsus, but in *Brasilacarus cocaris*, the claws are further down the lateral side but do not match with the palp of the Puerto Rican undescribed species.

## Acknowledgments

The authors would like to thank Dr. Pekka Lehtinen and Dr. Ritva Penttinen, of Zoological Museum of Turku for sending the specimens to study, and Prof. Dr. Sebastião Roberto Taboga, Departamento de Biologia, IBILCE, UNESP, for the use of their light polarized microscope, and Dr. Owen Seeman for their valuable comments.

This work was supported by research grant (MSA) #2012/23824-6, São Paulo Research Foundation (FAPESP), Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and (RJFF) Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq, Proc. No 303435/20135). The stay of Ma. Magdalena Vázquez in Brazil was supported by research grants from Consorcio de Universidades Mexicanas (CUMEX).

## References

- Bernardi, L.F.O., Klompen, H. & Ferreira, R.L. (2014) *Neocarus caipora*, a new mite species (Parasitiformes: Opilioacarida: Opilioacaridae) from Brazilian Amazon caves. *Acarologia*, 54 (1), 47–56.  
<http://dx.doi.org/10.1051/acarologia/20142113>
- Bernardi, L.F.O., Klompen, H., Zacarias, M.S. & Ferreira, R.L. (2013a) A new species of *Neocarus* Chamberlin & Mulaik, 1942 (Opilioacarida, Opilioacaridae) from Brazil, with remarks on its postlarval development. *ZooKeys*, 358, 69–89.  
<http://dx.doi.org/10.3897/zookeys.358.6384>
- Bernardi, L.F.O., Silva, F.A.B., Zacarias, M.S., Klompen, H. & Ferreira, R.L. (2013b) Phylogenetic and biogeographic analysis of the genus *Caribeacarus* (Acari: Opilioacarida), with description of new South American species. *Invertebrate Systematics*, 27, 294–306.  
<http://dx.doi.org/10.1071/IS12041>
- Camin, J.H., Clark, G.M. & Bourdeau, F.G. (1958) The palpal “tined seta” in the Mesostigmata, a homologue of the palpal claw in the Onychopalpida (Acarina). In *Proceedings of the 10th International Congress of Entomology*, pp. 903–908.
- Dunlop, J.A. & Bernardi, L.F. de O. (2014) An opilioacarid mite in Cretaceous Burmese amber. *Naturwissenschaften*, (4549).  
<http://dx.doi.org/10.1007/s00114-014-1212-0>
- Dunlop, J.A., Sempf, C. & Wunderlich, J. (2010) A new opilioacarid mite in Baltic amber. In: Nentwig, W., Entling, M. &

- Kropf, C. (Eds.), *European Arachnology 2008*, Bern: Natural History Museum. pp. 59–70.
- Dunlop, J.A., Wunderlich, J. & Poinar, G.O. Jr. (2004) The first fossil opilioacariform mite (Acari: Opilioacariformes) and the first Baltic amber camel spider (Solifugae). *Transactions of the Royal Society of Edinburgh: Earth Sciences*, 94, 261–273.
- Grandjean, F. (1936) Un acarien synthétique: *Opilioacarus segmentatus* With. *Bulletin de La Société d'Histoire Naturelle de l'Afrique Du Nord*, 27, 413–444.
- Hammen, L. van der. (1966) Studies on Opilioacarida (Arachnida) I. Description of *Opilioacarus texanus* (Chamberlin & Mulaik) and revised classification of the genera. *Zoologische Verhandlungen*, 86, 3–80.
- Juvara-Bals, I. & Baltac, M. (1977) Deux nouvelles espèces d'*Opilioacarus* (Acarina: Opilioacarida) de Cuba. In Orghidan, T., Jiménez, A.N., Decou, V., Negrea, S. & Bayés, N.V. (Eds.), *Résultats des Expéditions Biospéologiques Cubano-Roumaines à Cuba*, Bucaresti: Academici Republicii Socialiste Romania. pp. 169–185.
- Klompen, H. (2010) Holothyrids and ticks: new insights from larval morphology and DNA sequencing, with the description of a new species of *Diplothyridus* (Parasitiformes: Neothyridae). *Acarologia*, 50 (2), 269–285.  
<http://dx.doi.org/10.1051/acarologia/20101970>
- Klompen, H., Lekveishvili, M. & Black, W.C. (2007). Phylogeny of parasitiform mites (Acari) based on rRNA. *Molecular Phylogenetics and Evolution*, 43 (3), 936–51.  
<http://dx.doi.org/10.1016/j.ympev.2006.10.024>
- Lehtinen, P.T. (1980) A new species of Opilioacarida (Arachnida) from Venezuela. *Acta Biologica Venezuelica*, 10 (2), 205–214.
- Murrell, A., Dobson, S.J., Walter, D.E., Campbell, N.J.H., Shao, R. & Barker, S.C. (2005) Relationships among the three major lineages of the Acari (Arthropoda: Arachnida) inferred from small subunit rRNA: paraphyly of the Parasitiformes with respect to the Opilioacariformes and relative rates of nucleotide substitution. *Invertebrate Systematics*, 19 (5), 383–389.  
<http://dx.doi.org/10.1071/IS05027>
- Silvestri, F. (1905) Note Aracnologiche I-III. *Redia*, 2, 239–261.
- Vázquez, M.M., Araújo, M.S., & Feres, R.J.F. (2014) A new genus and two new species of Opilioacaridae (Acari: Parasitiformes) from Amazonia, Brazil with a key to world genera. *Zootaxa*, 3814 (2), 151–176.  
<http://dx.doi.org/10.11646/zootaxa.3814.2.1>
- Vázquez, M.M. & Klompen, H. (2002) The family Opilioacaridae (Acari: Parasitiformes) in north and central America, with description of four new species. *Acarologia*, 42 (4), 299–322.
- Vázquez, M.M. & Klompen, H. (2009) New species of New World Opilioacaridae (Acari: Parasitiformes) with the description of a new genus from the Caribbean region. *Zootaxa*, 2061, 23–44.
- Vázquez, M.M. & Klompen, H. (2010) The genus *Salfacarus* (Acari: Opilioacarida) in Madagascar. *Zootaxa*, 2482, 1–21.
- With, C.J. (1904) The Notostigmata, a new suborder of Acari. *Videnskabelige Meddelelser Fra Dansk Naturhistorisk Forening I Kjobenhavn*, 137–191.