



<http://dx.doi.org/10.11646/zootaxa.3926.1.5>

<http://zoobank.org/urn:lsid:zoobank.org:pub:78FAB512-1F6D-46A4-9D8F-A6B1C84E3C23>

## Two new species of *Rykellus* (Acari: Mesostigmata: Ologamasidae) from Brazil and a key to the world species of the genus

JANDIR C. SANTOS<sup>1</sup>, RAPHAEL C. CASTILHO<sup>1</sup>, EDMILSON S. SILVA<sup>2</sup> & GILBERTO J. DE MORAES<sup>3</sup>

<sup>1</sup> Departamento de Fitossanidade, FCAV – UNESP Jaboticabal, 14884-900 Jaboticabal, São Paulo, Brazil.

E-mail: [jandir\\_jc@hotmail.com](mailto:jandir_jc@hotmail.com); [rcastilho@outlook.com](mailto:rcastilho@outlook.com)

<sup>2</sup> Laboratório de Entomologia e Acarologia, Universidade Federal de Alagoas, 57309-005 Arapiraca, Alagoas, Brazil.

E-mail: [silva\\_es@yahoo.com.br](mailto:silva_es@yahoo.com.br)

<sup>3</sup> CNPq Researcher, Departamento de Entomologia e Acarologia, ESALQ-Universidade de São Paulo, 13418-900 Piracicaba, São Paulo, Brazil. E-mail: [moraesg@usp.br](mailto:moraesg@usp.br)

### Abstract

*Rykellus anibali* n. sp. and *Rykellus mineiroi* n. sp. are described from adult females and males collected from litter and soil in the state of São Paulo, Brazil. A key for the identification of females of the eight recognisable world species of *Rykellus* is provided.

**Key words:** soil mites, Rhodacaroidea, taxonomy

### Introduction

The Ologamasidae Ryke (Mesostigmata: Rhodacaroidea) are edaphic mites commonly found in the top few centimetres of soils, mainly in the tropics (Lindquist *et al.*, 2009). The family contains about 460 described species (Beaulieu *et al.*, 2011; Castilho *et al.* 2012; Marchenko, 2013a, 2013b; Santos *et al.*, 2013; Rueda *et al.*, 2013; Karg & Schorlemmer, 2013), 17 of which have been collected from Brazil. They are some of the most common Mesostigmata in the soils of State of São Paulo, Brazil, from where 15 species have been described (Hirschmann, 1966; Mineiro & Moraes, 2001; Silva *et al.*, 2004; Karg & Schorlemmer, 2009; Castilho *et al.* 2010; Karg & Schorlemmer, 2011; Castilho *et al.* 2012).

Six species have been described in the genus *Rykellus* Lee, two of them from the Brazilian state of São Paulo, two from South Africa, one from Chile and one from Paraguay. The objective of this paper is to provide descriptions of two new species of this genus, based on specimens collected in the State of São Paulo and a key to separate the presently known *Rykellus* species.

### Material and methods

Soil and litter samples were collected in different parts of the State of São Paulo and taken to a laboratory where mites were extracted using a modified Berlese funnel. The mesostigmatids mites were mounted in Hoyer's medium and later separated into families. Ologamasids were separated into morphospecies and examined under phase contrast microscopy for species identification, using the world taxonomic literature.

Taxonomically relevant structures of these mites were illustrated with the use of a camera lucida and measured with the use of a graded ocular, both attached to the microscope. Setal nomenclature is based on Lindquist & Evans (1965), as adapted to the Ologamasidae by Silva *et al.* (2007) and Castilho *et al.* (2010). Leg chaetotaxy is based on Evans (1963). For each structure, the mean and the corresponding range (for variable measurements) are given in micrometres.

Four species were mentioned by Karg & Schorlemmer (2013) in *Rykellus* (*R. brevipellitus*, *R. darglensis*, *R. nkandhlaensis* and *R. ovalis*). Two species previously placed in *Hydrogamasellus* were recently transferred to *Rykellus* because they have the typical characteristics of species of this genus, including the distinct, complete and V-shaped line of fusion between podonotal and opisthonotal shields (Santos *et al.*, 2013). These are *R. ubatubaensis* and *R. longopilus*. The former had been placed in *Hydrogamasellus* for convenience by Lee (1970), but the author considered it a species *incertae sedis*.

Sufficient information is presently available in the literature to allow the recognition of all species attributed to this genus. These can be separated with the use of the following key.

1. Sternal shield fused with section of endopodal shield near coxae IV; exopodal shields totally fused with peritrematic shield . 2
  - Sternal shield not fused with section of endopodal shield near coxae IV; only posterior end of exopodal shield fused with peritrematic shield . . . . . 3
2. Seta Z5 about 1.1 times as long as J5; ventrianal shield with the two most anterior setae in longitudinal line . . . . . *Rykellus darglensis* (Ryke, 1962), South Africa
  - Seta Z5 about 8 times as long as J5; ventrianal shield with the two most anterior setae in transverse line . . . . . *Rykellus nkandhlaensis* (Ryke, 1962), South Africa
3. Podonotal region of dorsal shield with 19–20 pairs of setae . . . . . 4
  - Podonotal region of dorsal shield with 22 pairs of setae . . . . . 5
4. Podonotal region of dorsal shield with 19 pairs of setae; opisthogaster with seven pairs of setae (*Jv1–Jv3*, *Jv5* and *Zv1–Zv3*; *Jv4* absent) . . . . . *Rykellus brevipellitus* Karg & Schorlemmer, 2009, Brazil
  - Podonotal region of dorsal shield with 20 pairs of setae; opisthogaster with eight pairs of setae (*Jv1–Jv5* and *Zv1–Zv3*) . . . . . *Rykellus ovalis* Karg & Schorlemmer, 2013, Paraguay
5. Setae *J2*, *J3* and *J4* at least as long as distance between their bases and bases of respective subsequent setae of *J* series . . . . . 6
  - Setae *J2*, *J3* and *J4* at most half as long as distance between their bases and bases of respective subsequent setae of *J* series . 7
6. Opisthonotal region of dorsal shield with 21 pairs of setae (*J1–J5*, *Z1–Z5*, *S1–S5*, *R1–R5* and *UR5*); ventrianal shield with six pairs of setae (*Zv3* on unsclerotised integument along margins of the shield) . . . . . *Rykellus ubatubaensis* (Hirschmann, 1966), Brazil
  - Opisthonotal region of dorsal shield with 18 pairs of setae (*J1–J5*, *Z1–Z5*, *S1–S5* and *R2–R4*); ventrianal shield with seven pairs of setae (*Zv3* on the shield) . . . . . *Rykellus longopilus* (Karg, 1976), Chile
7. Anterolateral extensions of epistome rounded distally; with a platelet between presternal plates; ventrianal shield with anterolateral reticulation . . . . . *Rykellus anibali* n. sp., Brazil
  - Anterolateral extensions of epistome sharp-tipped; without platelet between presternal plates; ventrianal shield without anterolateral reticulation . . . . . *Rykellus mineiroi* n. sp., Brazil

## Discussion

All known *Rykellus* species have a Gondwanan distribution, suggesting them to be a relict lineage. Although the genus has been reported from four countries, each species seems to have a narrow distribution within that paleogeographic region. However, this pattern could be influenced by the reduced effort dedicated to the study of this mite group. There are few studies about the biology of ologamasid mites, and nothing has been published about the biology of *Rykellus* species.

## References

- Beaulieu, F., Dowling, A.P.G., Klompen, H., Moraes, G.J. de & Walter, D.E. (2011) Superorder Parasitiformes Reuter, 1909. In Zhang, Z.-Q. (ed.) Animal biodiversity: An outline of higher level classification and taxonomic richness. *Zootaxa*, 3148, 123–128.
- Castilho, R.C., Moraes, G.J. de & Narita, J.P.Z. (2010) A new species of *Gamasiphis* (Acari: Ologamasidae) from Brazil, with a key to species from the Neotropical Region. *Zootaxa*, 2452, 31–43. <http://dx.doi.org/10.1080/00222933.2012.700336>
- Castilho, R.C., Narita, J.P.Z. & Moraes, G.J. de (2012) Three new species of *Gamasiphis* (Acari: Mesostigmata: Ologamasidae) from Brazil, with complementary information about *Gamasiphis plenosoetosus* Karg and a key to the world species of the genus. *Journal of Natural History*, 46, 1969–1998.
- Evans, G.O. (1963) Observations on the chaetotaxy of the legs in the free-living Gamasina (Acari: Mesostigmata). *Bulletin of the Natural History Museum Zoology*, 10, 277–303.
- Hirschmann, W. (1966) Gangsystematik der Parasitiformes. Teil 11. Die Gattung *Hydrogamasus* Berlese 1892 nov. comb. und die neuen Untergattungen *Hydrogamasus* (*Austrohydrogamasus* nov. subgen.) und *Gamasellus* (*Hydrogamasellus* nov.

- subgen.) (Gamasellini, Eugamasinae). *Acarologie. Schriftenreihe für Vergleichende Milbenkunde*, 9, 6–11.
- Karg, W. (1976) Revision der Milbengattung *Hydrogamasellus* Hirschmann, 1966 (Acarina Parasitiformes). *Deutsche Entomologische Zeitschrift*, 23, 37–55.  
<http://dx.doi.org/10.1002/mmnd.19760230104>
- Karg, W. & Schorlemmer, A. (2009) New insights into predatory mites (Acarina, Gamasina) from tropical rain forests with special reference to distribution and taxonomy. *Zoosystematics and Evolution*, 85, 57–91.  
<http://dx.doi.org/10.1002/zoos.200800016>
- Karg, W. & Schorlemmer, A. (2011) New insights into the systematics of Parasitiformes (Acarina) with new species from South America. *Acarologia*, 51, 3–29.  
<http://dx.doi.org/10.1051/acarologia/20111995>
- Karg, W. & Schorlemmer, A. (2013) Origin of five unique mite-genera in geological periods compared to other group of Gamasina (Acarina, Parasitiformes) and description of two new species of *Rykellus* Lee and *Oloopticus* Karg. *Zoosystematics and Evolution*, 89, 193–207.  
<http://dx.doi.org/10.1002/zoos.201300006>
- Lee, D.C. (1970) Rhodacaridae (Acari: Mesostigmata); classification, external morphology and distribution of genera. *Records of the South Australian Museum*, 16, 1–219.
- Lindquist, E.E. & Evans, G.O. (1965) Taxonomic concepts in the Ascidae, with a modified setal nomenclature for the idiosoma of the Gamasina (Acarina: Mesostigmata). *Memoirs of the Entomological Society of Canada*, 97 (Supplement S47), 5–66.  
<http://dx.doi.org/10.4039/entm9747fv>
- Lindquist, E.E., Krantz, G.W. & Walter, D.E. (2009) Mesostigmata. In: Krantz, G.W. & Walter, D.E. (Eds.), *A Manual of Acarology. Third Edition*. Texas Tech University Press, Lubbock, Texas, pp. 124–232.
- Marchenko, I. (2013a) A new species of *Gamasiphis* Berlese (Acari: Ologamasidae) from North Asia, with a key to the Eurasian species. *Zootaxa*, 3626 (3), 381–390.  
<http://dx.doi.org/10.11646/zootaxa.3626.3.6>
- Marchenko, I. (2013b) A new species of *Gamasiphis* Berlese (Acari: Ologamasidae) from Russia (Sakhalin and Kuril Islands) with a key to the Asian species. *Zootaxa*, 3741 (1), 172–180.  
<http://dx.doi.org/10.11646/zootaxa.3741.1.6>
- Mineiro, J.L.C. & Moraes, G.J. de (2001) Gamasida (Arachnida: Acari) edáficos de Piracicaba, Estado de São Paulo. *Neotropical Entomology*, 30, 379–385.  
<http://dx.doi.org/10.1590/s1519-566x2001000300007>
- Rueda-Ramirez, D., Castilho, R.C. & Moraes, G.J. de (2013) Mites of the superfamily Rhodacaroidea (Acari: Mesostigmata) from Colombia, with a key for the world species of *Desectophis* Karg (Ologamasidae). *Zootaxa*, 3734 (5), 521–535.  
<http://dx.doi.org/10.11646/zootaxa.3734.5.2>
- Ryke, P.A.J. (1962) A revision of the subgenera *Cyrtolaelaps* Berlese and *Gamasellus* Berlese of the genus *Cyrtolaelaps* Berlese and descriptions of new species (Acarina: Rhodacaridae). *Memoirs of the Entomological Society of Southern Africa*, 7, 1–59.
- Santos, J.C., Castilho, R.C., Silva, E.S. & Moraes, G.J. de (2013) A new species of *Hydrogamasellus* (Acari: Mesostigmata: Ologamasidae) from Brazil, with a key to the world species of the genus. *Zootaxa*, 3718 (1), 81–88.  
<http://dx.doi.org/10.11646/zootaxa.3718.1.7>
- Silva, E.S., Moraes, G.J. de & Krantz, G.W. (2004) Diversity of edaphic rhodacaroid mites (Acari: Mesostigmata: Rhodacaroidea) in natural ecosystems in the state of São Paulo, Brazil. *Neotropical Entomology*, 33, 547–555.  
<http://dx.doi.org/10.1590/s1519-566x2004000500002>
- Silva, E.S., Moraes, G.J. de & Krantz, G.W. (2007) A new species of *Ologamasus* (Acari: Ologamasidae) from Brazil. *Zootaxa*, 1462, 61–68.