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A new species of the genus Paralycus from Fujian, China

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Original research

ABSTRACT

A new oribatid mite species of the family Pediculochelidae, Paralycus nortoni sp. nov., is described and illustrated based on adult specimens collected from barks of dead Pinus massoniana Lamb. infested by Monochamus alternatus in Fuzhou city, China. This new species described here is the fourth species of the genus Paralycus in China. An updated key to the species of the genus Paralycus is provided.

Keywords taxonomy; oribatid mite; Pediculochelidae; Acari; morphology

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Introduction

The family Pediculochelidae has been associated with two mite suborders Prostigmata and Astigmata. It was erected by Lavoipierre (1946) and placed in the family Tarsonomidae (Prostigmata), and then proposed to be a member of Astigmata by Baker and Wharton (1952). Krantz (1978) suggested that it belonged to the primitive Pachygnathoidea but didn’t provide supportive discussion. Norton et al. (1983) proposed based on a cladistic analysis that it represented a sister-group of the Haplochthoniidae and belonged to the superfamily Cosmochthonioidea (Oribatida). To date, one genus and seven species have been described (Schatz et al. 2011): Paralycus chongqingensis Fan, Li & Xuan, 1996 from Auricularia sp. in China, P. lavoipierrei (Price, 1973) from soil in California, P. longior Fan, Li & Xuan, 1996 from lily fruits in China, P. parasiti Zhang & Li, 2001 from Coccinella septempunctata in China, P. parvulus (Price, 1973) from soil in California, P. pyrigerus (Berlese, 1905) from soil in Italy, and P. raulti (Lavoipierre, 1946) from bees in South Africa (Norton et al. 1983). In this paper, we describe and illustrate a new species of this family, which is the fourth record in Chinese fauna. An updated key to the species of the genus Paralycus is also provided.

Materials and methods

Barks of Pinus massoniana Lamb. attacked by Monochamus alternatus were collected in Minhou country, Fuzhou city, Fujian province, China. The specimens were extracted from the barks using a Berlese funnel and separated under a stereomicroscope. All mites removed were cleared in lactic acid, and afterwards mounted in Hoyer’s medium. Specimens were examined at 400x magnification by using differential interference contrast of a Leica DM5000B compound microscope. The studied materials were deposited in the National Zoological Museum of China, Institute of Zoology, Chinese Academy of Sciences, Beijing, China (NZMC) and the Department of Plant Protection, Fujian Agriculture and Forestry University (FAFU), Fuzhou, China (Zhang 2018). All measurements are given in micrometers (μm). The morphological terminology used in this paper is mostly based on that developed by Norton & Behan-Pelletier (2009).
Family Pediculochelidae Lavoipierre, 1946

Genus Paralycus Womersley, 1944

Paralycus Womersley, 1944. Type species: Alicus pyrigerus (Berlese, 1905); Norton, O’Connor & Johnston, 1983.


Paralycus nortoni sp. nov.

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(Figures 1–3)

Diagnosis — Adult female. Minute and elongate, weakly sclerotized. Idiosoma with a distinct humeral sulcus; propodosoma with 5 pairs of setae and a single pair of clavate bothridial organs; notogaster divided into 4 regions by 3 transverse dorsal sutures, covered with fine longitudinal striae. Venter each with one pair of setae between coxae I, coxae II, coxae III and without setae between coxae IV. Genital region with 2 pairs of discs and five pairs of genital setae. Setae \( g_1, g_2 \) and \( g_3 \) minute and subequal in length, \( g_4 \) and \( g_5 \) subequal in length and about twice as long as \( g_1 \). Claws absent on all tarsi, each tarsus with a minute empodial remnant and caruncle-like membrane.

Type material — Holotype Female, China, Minhou county, Fuzhou city, Fujian province, 17 Apr. 2019, by Yu-Zhen Zhu, Jie-Qin Wu and Yun Xu, ex. the barks of Pinus massoniana Lamb attacked by Monochamus alternatus. Paratypes: 1 female, same data as holotype.

Type deposition — The holotype and paratype were deposited in the National Zoological Museum of China, Institute of Zoology, Chinese Academy of Sciences, Beijing (NZMC) and the Department of Plant Protection, Fujian Agriculture and Forestry University (FAFU), respectively.

Female (n=2)

Gastronomic region (Fig. 1A): Body minute and elongate, colorless when alive. Length of gastronomic region 210–215, width 55–65. Prodorsum covered with shield-shaped plate in middorsal region, bearing 2 pairs of setae (ro and le); 3 pairs of setae (exa, exp and in) and one pair of clavate bothridial organs ss in the dorsolateral area of prodorsum. Setae le about twice as long as ro, in about twice as long as exa, and exp minute, lengths ro 13–14, le 30–31, exa 22–23, exp 5, in 42–44, ss 17. Notogaster divided into 4 regions by 3 transverse dorsal sutures. Notogaster covered with fine longitudinal striae, bearing 4 pairs of setae (c1, c2, c3 and cp) in the region of segment C, 4 pairs of setae (d1, d2, e1 and e2) in the region of segment DE, 2 pairs of setae (f1 and f2) in the region of segment F, and 6 pairs of setae (h1, h2, h3, 3ps1, 3ps2 and 3ps3) in the region of segment H and PS. Lengths of notostral setae c1 22–24, c2 28–29, c3 34–35, cp 29–34, d1 17–18, d2 24–26, e1 22–23, e2 24–27, f1 32–34, f2 32–39, h1 32–39, h2 37–39, h3 32–35, ps1 27, ps2 53–56, ps3 14–15.

Gnathosoma (Figs. 1B, 2A). Gnathobase with rutella and 4 pairs of setae along midventral line plus one seta proximal to trochanter on coxal base of palp. Palp simple, with 4 free segments, setal formula: 0, 2, 1, 7.

Ventral region (Figs. 1B, 2B). Venter each with one pair of setae between coxae I, coxae II, coxae III and without setae between coxae IV; setae between coxae II about twice as long as setae between coxae I, setae between coxae III minute. Venter of opisthosoma with 2 pairs of acatabula, 5 pairs of genital setae (g1, g2, g3, g4 and g5), 3 pairs of adanal setae (ad1, ad2 and ad3). Setae g1, g2, g3 minute and subequal in length, g4 and g5 subequal and about twice as long as g1. Lengths: g1 3, g2 3–4, g3 3–4, g4 7–8, g5 8, ad1 14–15, ad2 53–58, ad3 11–13.

Legs (Fig. 3). Legs relatively short, measurements (total length from trochanter to tarsus, pretarsus excluded): I 50–55, II 45–48, III 45–48, and IV 50–52. Leg structure simple with highly visible segments, as shown in the Fig. 3. Claws absent on all tarsi, each tarsus with a minute empodial remnant and caruncle-like membrane. Setation of legs I–IV (from trochanter
**Figure 1** *Paralycus nortoni* sp. nov. (adult female). A – dorsal view; B – ventral view.

(Unguinal setae on tarsi I–IV simple. Solenidion ω on tarsi I–II elongate, attenuate, on tibia III baculiform. Unguinal setae *u* and proral setae *p* on tarsi I–IV simple. Only *p"* on tarsus I; seta *s* on tarsus I simple. Solenidion ω on tarsi I–II baculiform, ω on I about twice the length to tarsus, solenidia in brackets): leg I 0-2-4-3 (1)-8 (1); leg II 0-2-3-3 (1)-7 (1); leg III 1-2-0-3(1)-5 and leg IV 0-2-0-2-5. Dorsal, ventral and lateral setae on trochanter, femora, genua and tibiae I–IV simple and filiform. Solenidion *φ* on tibiae I–II elongate, attenuate, on tibia III baculiform. Unguinal setae *u* and proral setae *p* on tarsi I–IV simple. Only *p"* on tarsus I; seta *s* on tarsus I simple. Solenidion ω on tarsi I–II baculiform, ω on I about twice the length
Figure 2 Paralycus nortoni sp. nov. (adult female). A – ventral view of gnathosoma; B – genital-anal region.

of that on II.

Male unknown.

Etymology — The species is named after Dr. Roy A. Norton, a distinguished acarologist who made significant contributions to the systematics of Oribatida.

Remarks — Paralycus nortoni sp. nov. is easily distinguishable from other species by the following features: Venter without setae between coxae IV (vs. with one pair of setae between
Figure 3 *Paralycus nortoni* sp. nov. (adult female, right side legs in dorsal view). A – leg I; B – leg II; C – leg III; D – leg IV.
coxae IV in *P. chongqingensis*, *P. lavoipierrei*, *P. longior*, *P. parasiti* and *P. raulti*); venter of opisthosoma with 5 pairs of genital setae (vs. with 3 pairs of genital setae in *P. chongqingensis*, *P. lavoipierrei* and 4 pairs of genital setae in *P. parasiti*, *P. parvulus* and *P. raulti*); trochanters 0-0-0-0 vs. 0-0-1-0 (vs. 0-0-0-0 in *P. parvulus*); genua 4-3-0-0 (vs. 4-2-0-0 in *P. lavoipierrei* and *P. parvulus*); tarsi 7+6+6+5 vs. 9+6+6+5 in *P. chongqingensis* and *P. longior*). The identification characters of *P. pyrigerus* are not listed because the morphological details were not given by Berlese (1905), but the differences in size (213 μm for *P. nortoni* sp. nov. vs. 170 μm for *P. pyrigerus*); habitat (barks of pine for *P. nortoni* sp. nov. vs. soil for *P. pyrigerus*); and collection locality (China for *P. nortoni* sp. nov. vs. Italy for *P. pyrigerus*). There are no significant morphological body adaptations to aid in phoresy, such as attachment devices (hook-like claws on legs), were found neither on this new species, nor on *P. parasiti* and *P. raulti*. With that said, it remains an interesting topic whether this new species is phoretic on beetles or share the same host preference with beetles.

**Notes** — In the holotype, one seta *h₃* was duplicated (*h₃* and *h₃*₄ in Fig. 1B and 2B)

### Key to species of the genus *Paralycus*

The incompletely described species *P. pyrigerus* (Berlese, 1905) is not included.

1. Venter without setae between coxae IV ...................................................... 2
   — venter with one pair of setae between coxae IV ........................................ 3

2. Venter of opisthosoma with 5 pairs of genital setae; trochanters with 0-0-1-0 setae; genua with 4-3-0-0 setae ...................................................... *Paralycus nortoni* sp. nov.
   — Venter of opisthosoma with 4 pairs of genital setae; trochanters with 0-0-0-0 setae; genua with 4-2-0-0 setae ........................................ *P. parvulus* (Price, 1973)

3. Tarsi with 9+6+6+5 setae ................................................................................. 4
   — Tarsi with 7+6+6+5 setae ............................................................................. 5

4. Venter of opisthosoma with 3 pairs of genital setae, without setae *g₁* and *g₃*; setae *g₂* about half of the length of *g₄* and *g₅* ................................. *P. chongqingensis* Fan, Li & Xuan, 1996
   — Venter of opisthosoma with 5 pairs of genital setae; setae *g₂* about half of the length of *g₄* and two-thirds of *g₅* ............................................... *P. longior* Fan, Li & Xuan, 1996

5. Venter of opisthosoma with 3 pairs of genital setae, without setae *g₁* and *g₃*; genua with 4-2-0-0 setae ...................................................... *P. lavoipierrei* (Price, 1973)
   — Venter of opisthosoma with 4 pairs of genital setae, without setae *g₁*; genua with 4-3-0-0 setae ................................................................. 6

6. Setae *2a* between coxae II elongate, reaching the base of setae *1a* between coxae I; setae *2a* about twice as long as *1a* ........................................ *P. parasiti* Zhang & Li, 2001
— Setae 2a between coxae II short, not reaching the base of setae 1a between coxae I; setae 2a as long as 1a ...................................................P. raulti (Lavoipierre, 1946)

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