

ORIGINAL ARTICLE

A new species of the genus *Neoribates* (*Neoribates*) (Acari: Oribatida: Parakalummidae) from China

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Abstract A new species, *Neoribates* (*Neoribates*) *cupulatus* **sp. nov.** is described from Yunnan, China. It can be easily distinguished from other known congeners by the following combination of morphological characters: body size small; sensilli cupped, with a short stalk and rounded clavated head, bothridium lamellate; adanal setae *ad*₃ inserted laterally to the anal plates, positioned from *iad* at a large distance, and in a line with *an*₂.

Key words Oribatida, Parakalummidae, *Neoribates* (*Neoribates*), new species, China.

1 Introduction

The genus *Neoribates* was established by Berlese (1914) with *Oribata roubali* Berlese, 1910 as the type species. Currently, this genus comprises two subgenera and 48 species, which have a cosmopolitan distribution except Antarctica (Subías, 2004, electronic version 2014), but only 6 species in 2 subgenera have been found in China (Chen *et. al.*, 2010; Liang & Yang, 2013).

In the present work, a new species of the subgenus *Neoribates* (*Neoribates*) was found, based on adult specimens from Yunnan, China. The type specimens of new species are deposited in Institute of Entomology, Guizhou University, Guiyang, Guizhou, China (GUGC).

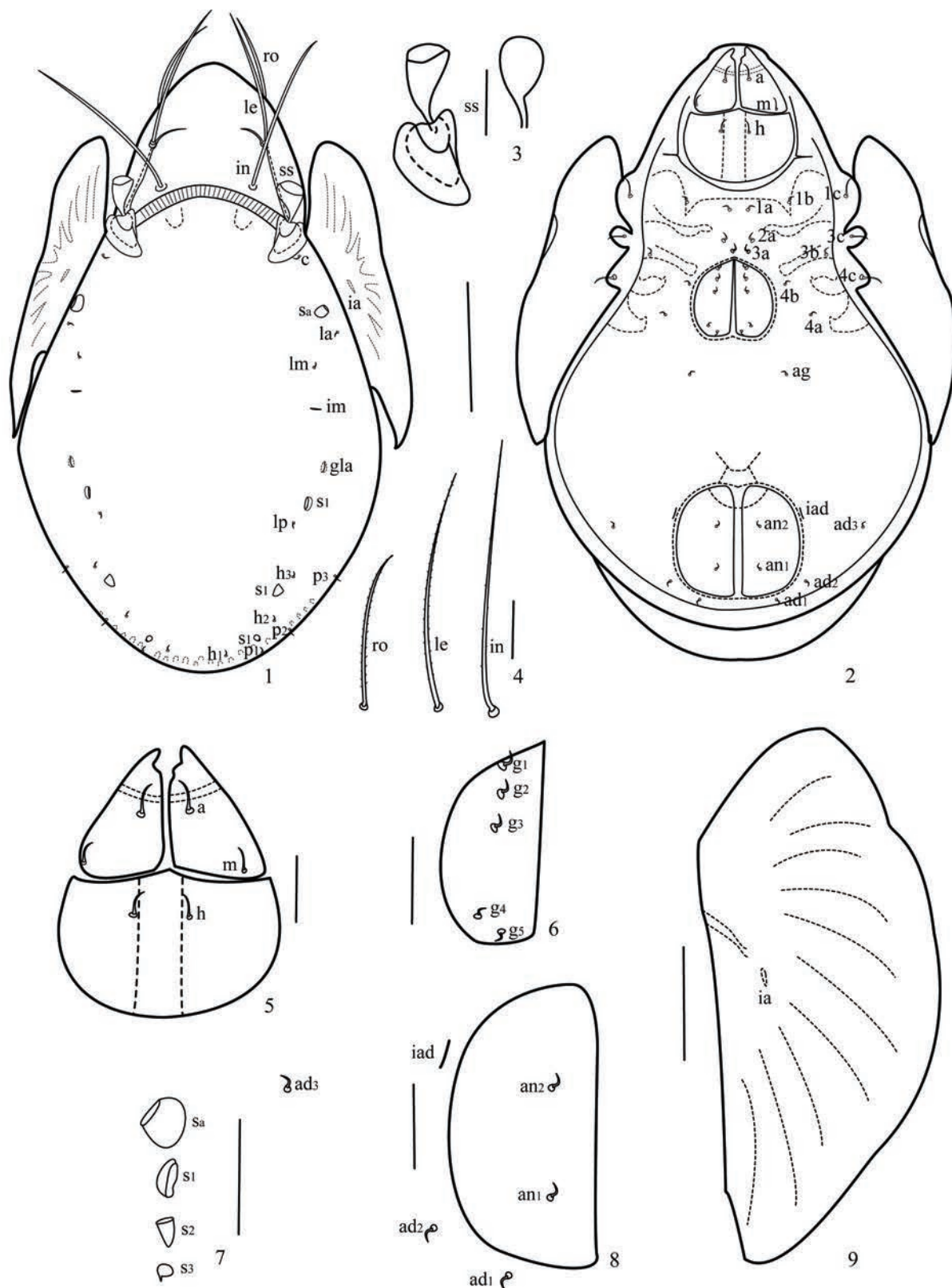
2 Material and methods

The collection locality and habitat of the new species are given in the “Type material examined” sections. Specimens were mounted and examined in temporary cavity slides with lactic acid, then stored in vials in 75% alcohol. Measurements are presented in micrometers (mm). Body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate, to avoid discrepancies caused by notogastral distension. Notogastral width refers to the maximum width in dorsal aspect. Lengths of body setae were measured in lateral aspect. Formulae for leg setation are given in parentheses according to the sequence trochanter–femur–genu–tibia–tarsus (femulus included). Formulae for leg solenidia are given in square brackets according to the sequence genu–tibia–tarsus. General terminology used in this article follows that of Grandjean (summarized by Norton & Behan-Pelletier, 2009).

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Figs 1–9. *Neoribates (Neoribates) cupulatus* sp. nov. 1. Dorsal view. 2. Ventral view. 3. Sensillus. 4. Rostral, lamellar and interlamellar setae. 5. Subcapitulum. 6. Genital plate. 7. Notogastral saccules. 8. Anal plates and adanal setae ad_1 , ad_2 , ad_3 and lyrifissure iad . 9. Pteromorpha. Scale bars: 1–2= 100 μ m, 3–8= 25 μ m, 9= 50 μ m.

3 *Neoribates* Berlese, 1914

Neoribates (Neoribates) cupulatus sp. nov. (Figs 1–9)

Diagnosis. Body size 480–490 × 290–295. Body surface smooth. Rostral setae setiform, with slightly barbed at high magnification. Lamellar and interlamellar setae setiform, smooth or indistinctly barbed. Sensilli cupped, with short stalk and rounded clavated head distinct, bothridium lamellate. Five pairs of genital setae. Leg tarsi with three claws.

Measurements. Body length 480 (holotype, female), 480–490 (two paratypes, female); width 290 (holotype), 290–295 (two paratypes, female).

Integument. Body colour light brown. Body surface smooth. Pteromorphs with thin wrinkles.

Prodorsum (Figs 1, 3–4). Rostrum rounded in dorsal view. Rostral (*ro*, 68) setae setiform, with slightly barbed at high magnification. Lamellar (*le*, 106) and interlamellar (*in*, 117) setae setiform, long, smooth or slightly barbed. Exobothridial setae not evident. Sensilli (*ss*, 34) slightly cupped, with a short stalk and rounded clavated head. Bothridium lamellate. Lamellae (*Lam*) thin, extending forwards from bothridia for a short distance, relative lengths and distances: $in > le > ro > ss$; $(le-le) > (ro-ro) > (in-in)$.

Notogaster (Figs 1, 7, 9). Dorsosejugal furrow convex, conspicuous. Notogaster oval, longer than wide distinctly. Ten pairs of notogastral setae smooth. Four pairs of sacculi (*Sa*, *S*₁–*S*₃), lyrifissures and opisthonotal gland openings (*gla*) located typical for genus.

Gnathosoma (Figs 2, 5). Morphology typical for *Neoribates* (e.g. Travé, 1972; Grishina & Vladimirova, 2009; Nakamura, 2009).

Epimeral region (Fig. 2). Epimeral setal formula: 3–1–3–3. All setae setiform, smooth. The distance of setae 3a–3a shorter than 2a–2a, distinctly shorter than the half of genital pore.

Anogenital region (Figs 2, 6, 8). Five pairs of genital (*g*₁–*g*₅, 4–8), one pair of aggenital (*ag*, 6–8), three pairs of adanal (*ad*₁–*ad*₃, 8–10) and two pairs of anal (*an*₁, *an*₂, 6–8) setae thin and smooth. Lyrifissures *iad* located in paraanal position. Adanal setae *ad*₃ inserted laterally to the anal plates, positioned from *iad* at a large distance, and in a line with *an*₂.

Legs. Morphology of leg segments, setae and solenidia typical for *Neoribates* (e.g. Travé, 1972; Grishina & Vladimirova, 2009; Nakamura, 2009). All legs tridactylous with strong median and slender lateral claws. Formulae of leg setation and solenidia: I (1–5–3–4–20) [1–2–2], II (1–5–3–4–15) [1–1–2], III (2–3–1–3–15) [1–1–0], IV (1–2–2–4–12) [0–0–0]; homology of setae and solenidia indicated in Table 1.

Table 1. Leg setation and solenidia of *Neoribates (Neoribates) cupulatus* sp. nov.

Legs	Trochanters	Femora	Genua	Tibiae	Tarsi
I	<i>v'</i>	<i>d</i> , (<i>l</i>), <i>bv''</i> , <i>v''</i>	(<i>l</i>), <i>v'</i> , σ	(<i>l</i>), (<i>v</i>), ϕ_1 , ϕ_2	(<i>ft</i>), (<i>tc</i>), (<i>it</i>), (<i>p</i>), (<i>u</i>), (<i>a</i>), <i>s</i> , (<i>pv</i>), <i>v'</i> , (<i>pl</i>), <i>l''</i> , <i>e</i> , ω_1 , ω_2
II	<i>v'</i>	<i>d</i> , (<i>l</i>), <i>bv''</i> , <i>v''</i>	(<i>l</i>), <i>v'</i> , σ	(<i>l</i>), (<i>v</i>), ϕ	(<i>ft</i>), (<i>tc</i>), (<i>it</i>), (<i>p</i>), (<i>u</i>), (<i>a</i>), <i>s</i> , (<i>pv</i>), ω_1 , ω_2
III	<i>l'</i> , <i>v'</i>	<i>d</i> , <i>l'</i> , <i>ev'</i>	<i>l'</i> , σ	<i>l'</i> , (<i>v</i>), ϕ	(<i>ft</i>), (<i>tc</i>), (<i>it</i>), (<i>p</i>), (<i>u</i>), (<i>a</i>), <i>s</i> , (<i>pv</i>)
IV	<i>v'</i>	<i>d</i> , <i>ev'</i>	<i>d</i> , <i>l'</i>	<i>d</i> , <i>l'</i> , (<i>v</i>)	<i>ft''</i> , (<i>tc</i>), (<i>p</i>), (<i>u</i>), (<i>a</i>), <i>s</i> , (<i>pv</i>)

Note. Roman letters refer to normal setae (e–famulus), Greek letters refer to solenidia. A prime (') marks anterolateral setae and a double prime (") posterolateral setae of the given leg segment. Parentheses refer to a pair of setae.

Holotype ♀, China, Cangshan (25°37'N, 100°08'E; elev. 2 300 m), Dali, Yunnan, 8 July 2009, coll. Guan-Xu Ma and Zi-Zhong Yang. **Paratypes** 2♀, same data as holotype.

Distribution. China (Yunnan).

Etymology. The specific name is derived from Latin “*cupulatus*”, meaning cupped, referring to the cupped sensilli.

Remarks. The new species is similar to *Neoribates (N.) flagellum* (Balogh, 1970) from Nueva Guinea, but the latter has extraordinarily longer interlamellar setae (versus medium long in new species), sensilli fusiform, apex rounded, with a long stalk (versus cupped, with short stalk and rounded clavated head distinct in new species), adanal setae *ad*₃ located in the anterior of anal (adanal setae *ad*₃ inserted laterally to the anal plates, positioned from *iad* at a large distance, and in a line with *an*₂ in new species).

The morphology of pteromorpha of the new species is also similar to *N. (N.) erecta* (Balogh & Mahunka, 1969) from Brazil, *N. (N.) jacoti* (Balogh & Mahunka, 1967) from Vietnam, *N. (N.) punctulatus* (Balogh, 1970) and *N. (N.) szabadosi*

(Balogh, 1970) from Nueva Guinea. However, *N. (N.) erecta* is smaller in body size ($363\text{--}382 \times 270\text{--}294$ vs $480\text{--}490 \times 290\text{--}295$ in new species), sensilli slightly fusiform, with long stalk; *N. (N.) jacoti* much bigger in body size (641.9×431.2), sensilli short, fusiform, with acute apex; *N. (N.) punctulatus* biggest in body size (725×549), sensilli slightly fusiform, rostral, lamellar and interlamellar setae very short, lamellae well developed with a projecting cuspis and a medially interrupted translamelloid crest; *N. (N.) szabadosi* also bigger in body size (573×402), sensilli slightly fusiform, interlamellar setae short, rostral and lamellar setae elongate, setiform, longer than interlamellar setae (versus interlamellar setae distinctly longer than rostral and lamellar setae in new species).

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