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Subscriptions: Year 2020 (Volume 60): 450 €
http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php
Previous volumes (2010-2018): 250 € / year (4 issues)
Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France
ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under
the reference ID 1500-024 through the « Investissements d’avenir » programme
(Labex Agro: ANR-10-LABX-0001-01)

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Two new species of the genus Ausoribula (Acari, Oribatida, Oribatulidae) from termitaries of South Africa

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(Received 08 December 2016; accepted 19 January 2017; published online 16 May 2017; edited by Ekaterina Sidorshuk)

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ABSTRACT — Two new species of oribatid mites of the previously monotypic genus Ausoribula Lee, 1992 (Oribatulidae) are described from termite nests of South Africa. Ausoribula termitophila n. sp. has a pointed rostrum, elongately fusiform, bothridial setae, a weak anterior notogastral margin which only slightly protrudes into the prodorsum, notogastral setae c2 similar in length to other setae (except shorter c1) and three or four pairs of genital setae. In contrast, A. quagesetosa Lee, 1992 has a rounded rostrum, bothridial setae clavate, and the anterior notogastral margin interrupted and strongly protruding into the prodorsum. Ausoribula bloemfonteinensis n. sp. has a pointed rostrum, clavate bothridial setae, the anterior notogastral margin distinct and only slightly protruding, notogastral setae c2 shorter than other setae (except the shorter c1) and three pairs of genital setae. The genus Ausoribula is recorded in the Ethiopian region for the first time.

KEYWORDS — mites; Oripodoidea; termitary; new species; morphology; systematics; Ethiopian region; generic traits; South Africa

ZOOBANK — 7C2A6F01-8339-4D8B-86AE-7136FC9536B9

INTRODUCTION

The monotypic oribatid mite genus Ausoribula (Acari, Oribatida, Oribatulidae) was proposed by Lee (1992) with Ausoribula quagesetosa Lee, 1992 as type species from sand and litter under Banksia ornata amongst brown stringy bark of Eucalytus bacteria in Australia.

Among the mite material collected from termitaries in South Africa, we found two new species of Ausoribula. The goal of this paper is to describe and illustrate Ausoribula termitophila n. sp. and A. bloemfonteinensis n. sp. These are the first oribatid mites reported from the termitaries of South Africa.

The main generic traits of Ausoribula are (based on data from Lee 1992, with our additions): Oribatulidae (Norton and Behan-Pelletier 2009) with rostrum rounded or pointed; rostral, lamellar, interlamellar and exobothridial setae of medium size, setiform; bothridial setae well-developed, clavate or fusiform; lamellae long, thin, ridge-like; translamella and prolamellae absent; sublamellae present; notogaster usually sculptured; anterior notogastral margin slightly or strongly protruding, medially developed or not; dorsophragmata not visible; 11 pairs of setiform notogastral setae; setae c1 and c2 erect, inserted close to each other in humeral positions, the latter longer than the former; four...
pairs of notogastral porose areas small, rounded, without distinct borders; three or four pairs of genital setae; adanal lyrifissures not visible; adanal setae $ad_3$ inserted between genital and anal aperture; legs heterotridactylous.

Subías (2004, online version 2008, and subsequent versions) included Ausoribula as a junior synonym in the genus Phauloppiella Subías, 1977 without explanation. However, all species of Ausoribula differ from the representatives of Phauloppiella, in which the well-developed, triangular anterior notogastral margin extends far on to prodorsum, surpassing the insertions of the interlamellar setae, reaching or almost reaching the lamellar setae (Subías 1977; Mahunka 1987). Furthermore, species of Phauloppiella have 13 pairs of notogastral setae, with setae $c_2$ in humeral regions, while $c_1$ are located medially. Thus, we tentatively support the initial generic status of Ausoribula. However, additional research is necessary for a better understanding of its status.

**Materials and Methods**

Material — The collection locality and habitat for each newly described species are given in the respective ”Material examined” sections.

Methods — Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. Body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. Notogastral width refers to the maximum width in dorsal aspect. Lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometers. Formulas for leg setation are given in parentheses according to the sequence trochanter–femur–genu–tibia–tarsus (famulus included). Formulas for leg solenidia are given in square brackets according to the sequence genu–tibia–tarsus. Morphological terminology used in this paper follows that of F. Grandjean: see Travé and Vachon (1975) for general references, Norton (1977) for leg setal nomenclature, and Norton and Behan-Pelletier (2009), for overview. Drawings were made with a camera lucida using a Carl Zeiss transmission light microscope “Axioskop-2 Plus”.

**Systematics**

**Family Oribatulidae**

**Genus Ausoribula Lee, 1992**

Type species: Ausoribula quagesetosa Lee, 1992

**Ausoribula termitophila** n. sp. (Figures 1-2)

Zoobank: 1E3B726C-172D-4CDA-B504-7E1A771B0EA5

Diagnosis — Body size: 196–213 × 98–118. Notogaster sculptured. Rostrum pointed. Rostral setae distinctly longer than lamellar and interlamellar setae. Bothridial setae with short stalks and longer, elongate fusiform heads. Anterior notogastral margin barely visible. Notogastral setae $c_2$ similar in length to other setae (except shorter $c_1$). Four or rarely three pairs of genital setae present.

Description — Measurements – Small species: length 213 (holotype: female), 196–205 (six paratypes: one female and five males); notogastral width 106 (holotype), 98–118 (six paratypes). No clear size difference between females and males.

Integument (Figs 1A, C, 2A) — Body color light brownish. Body surface punctate (visible under high magnification in dissected specimens). Notogaster with sculpture, represented by short ridges. Lateral parts of prodorsum and basal part of subcapitular mentum striate.

Prodorsum (Figs 1A–C) — Rostrum protruding, pointed. Lamellae (lam) located dorso-laterally, half as long as prodorsum. Sublamellae (slam) one third as long as lamellae, very thin. Sublamellar porose areas (Al, 4 × 2) oval, located basally to sublamellae. Rostral (ro, 20), lamellar (le, 14–16) and interlamellar (in, 14) setae setiform, barbed, ro thickest, le thinnest. Exobothridial setae (ex, 10–12) thin, slightly barbed. Bothridial setae (bs, 36–41) with short, smooth stalks and with longer, elongate fusiform, barbed heads.

Notogaster (Figs 1A, C) — Anterior notogastral margin present, but barely visible, medially truncate. Eleven pairs of notogastral setae setiform,
FIGURE 1: Ausoribula termitophila n. sp.: A – dorsal view (legs not illustrated); B – ventral view (gnathosoma and legs except trochanters III and IV not illustrated); C – lateral view (gnathosoma and legs not illustrated). Scale bar 50 µm.
**FIGURE 2**: *Auseribula termitophila* n. sp.: A – subcapitulum, ventral view; B – palp, right, antiaxial view; C – chelicera, right, antiaxial view; D – leg I, right, antiaxial view; E – leg IV, left, antiaxial view; F – trochanter, femur and genu of leg III, left, antiaxial view. Scale bars 15 µm (A–C), 20 µm (D–F).
Table 1: Leg setation and solenidia of adult *Ausoribula termitophila* n. sp. and *A. bloemfonteinensis* n. sp.

| Leg  | Tr | Fe | Ge | Ti | Ta |
|------|----|----|----|----|----|
| I    | ν’ | d, l’, br, ν” | (l), (ν), φ1, φ2 | (ft), (tc), (it), (p), (u), (a), s, (pv), (pl), ε, ω1, ω2 |
| II   | ν’ | d, l’, br, ν” | (l), (ν), φ | (ft), (tc), (it), (p), (u), (a), s, (pv), ω1, ω2 |
| III  | l’, ν’ | d, l’, ev’ | l’, σ | l’, (ν), φ | (ft), (tc), (it), (p), (u), (a), s, (pv) |
| IV   | ν’ | d, ev’ | d | l’, (ν), φ | φ”, (tc), (p), (u), (a), (pv) |

Note: Roman letters refer to normal setae, Greek letters to solenidia (except ε = famulus). Single prime (’) marks setae on the anterior and double prime (”) setae on the posterior side of a given leg segment. Parentheses refer to a pair of setae. Tr – trochanter, Fe – femur, Ge – genu, Ti – Tibia, Ta – tarsus.

Barbed, c1 (6–8) shorter than other setae (12–14). Four pairs of porose areas (Aa, A1, A2, A3) poorly visible, rounded, similar in diameter (4–6). Lyrifissures ia, im, ip and ips and opisthonal gland openings (gla) distinct, lyrifissures il not visible.

Gnathosoma (Figs 2A–C) — Subcapitulum longer than wide (41–45 × 32–36). Subcapitular setae (h, m, a) similar in length (8–10), setiform, slightly barbed. Two pairs of adoral setae (or1, or2, 2) minute, slightly barbed. Palps (length 32) with setation 0–2–1–3–9(+ω). Chelicerae (length 41–45) with two setiform, barbed setae, cha (16–20) longer than chb (10–12). Trägårdh’s organs (Tg) elongate triangular, distally rounded.

Epimeral and lateral podosomal regions (Figs 1B, C) — Epimeral setal formula: 3–1–3–3. Setae setiform, thin, slightly barbed. Sometimes three pairs (one posterior pair absent) of genital setae present.

Anogenital region (Figs 1B, C) — Four pairs of genital (g1–g4, 6), one pair of aggenital (ag, 8–10), two pairs of anal (an1, an2, 6–8) and three pairs of anal (ad1–ad3, 8–10) setae setiform, thin, slightly barbed. Discidia (dis) triangular. Circumpedal carinae (cp) distinct, reaching pedotecta II.

Type deposition — The holotype and two paratypes are deposited in the collection of the National Museum, Bloemfontein, South Africa; two paratypes are deposited in the collection of the Senckenberg Institute, Görlitz, Germany; two paratypes are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia.

Etymology — The specific name *termitophila* refers to the occurrence of the new species in the termitary.

Differential diagnosis — The new species differs from the type species, *Ausoribula quagesetosa* Lee, 1992, from Australia (Lee 1992) by the presence of a pointed rostrum (vs. rounded), elongate fusiform bothridial setae with short stalks (vs. clavate, with long stalks) and a slightly protruding anterior notogastral margin (vs. strongly protruding).
Ausoribula bloemfonteinensis n. sp.  
(Figure 3)

Zoobank: B3517529-D2E2-4F57-8B42-20611391DB7F

Diagnosis — Body size: 237–258 × 135–147. Notogaster and ventral side sculptured, humeral regions, subcapitular mentum, adanal region and lateral parts of prodorsum striate. Rostrum pointed. Rostral setae distinctly longer than lamellae and interlamellar setae. Bothridial setae clavate, stalks and heads similar in length. Anterior notogastral margin distinctly visible. Notogastral setae c₂ shorter than other setae (except shortest c₁). Three pairs of genital setae present.

Description — Measurements – Small species: length 237 (holotype: male), 237–258 (seven paratypes: two females and five males); notogastral width 135 (holotype), 135–147 (seven paratypes). No clear size difference between females and males.

Integument (Figs 3A–C) — Body color brown. Body surface punctate (visible under high magnification in dissected specimens). Notogaster and ventral side with sculpture, represented by short ridges. Humeral regions, subcapitular mentum, adanal region and lateral parts of prodorsum striate.

Prodorsum (Figs 3A–C) — Rostrum protruding, pointed. Lamellae located dorso-laterally, half as long as prodorsum. Sublamellae (slam) one third as long as lamellae, very thin. Sublamellar porose areas (4 × 2) oval, located basally under sublamellae. Rostral (28–32), lamellar (24–28) and interlamellar (16–20) setae setiform, barbed, ro thickest. Exobothridial setae (16–20) thin, slightly barbed. Bothridial setae (36–41) clavate, barbed, stalks and heads similar in length.

Notogaster (Figs 3A, C) — Anterior notogastral margin well-developed, slightly convex or truncate medially. Eleven pairs of notogastral setae setiform, barbed, c₁ (6–8) shorter than c₂ (10–12) other setae (14–16). Four pairs of porose areas (Aa, A₁, A₂, A₃) poorly visible, rounded, similar in diameter (4–6). Lyrifissures ia, im, ip and ips and opisthonal gland openings distinct, lyrifissures ib not visible.

Gnathosoma — Generally similar to Ausoribula termitophila n. sp. Subcapitulum longer than wide (49 × 36–41). Subcapitular setae (h, m, a) similar in length (12), setiform, slightly barbed. Two pairs of adoral setae (or₁, or₂, 4) minute, slightly barbed. Palps (length 36) with setation 0–2–1–3–9(+a). Chelicerae (length 49) with two setiform, barbed setae, cha (20–22) longer than chb (12–14). Trägårdh’s organs elongate triangular, rounded distally.

Epimeral and lateral podosomal regions (Figs 3B, C) — Epimeral setal formula: 3–1–3–3. Setae setiform, barbed, 1c, 3c and 4c (14–16) longer than 1b, 3b, 4a and 4b (10–12) and 1a, 2a and 3a (8). Pedotecta I and II represented by small laminae. Discidia triangular. Circumpedal carinae distinct, reaching pedotecta II.

Anogenital region (Figs 3B, C) — Three pairs of genital (g₁–g₃, 8–10), one pair of aggenital (ag, 12–14), two pairs of anal (an₁, an₂, 8–10) and three pairs of adanal (ad₁–ad₃, 12–14) setae setiform, thin, slightly barbed.

Legs — As in Ausoribula termitophila n. sp.

Material examined — Holotype (male) and seven paratypes (two females and five males): South Africa, Bloemfontein, Franklin Game Reserve on Naval Hill, 29°05’57.3”S, 26°14’03.0”E. 1445 m a.s.l., in the nest of termites Trinervitermes trinervoides (Sjöstedt), sample #4, 9.XI.2016 (A.A. Khaustov, S.G. Ermilov, E.A. Hugo-Coetsee).

Type deposition — The holotype and two paratypes are deposited in the collection of the National Museum, Bloemfontein South Africa; two paratypes are deposited in the collection of the Senckenberg Institute, Görlitz, Germany; three paratypes are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia.

Etymology — The specific name bloemfonteinensis refers to the city, Bloemfontein, where the type material was collected.

Differential diagnosis — The new species is morphologically similar to Ausoribula termitophila n. sp., but differs from the latter by the clavate bothridial setae with long stalks (vs. bothridial setae elongate fusiform with short stalks), sculpturing in epimeral and anogenital regions (vs. sculpturing absent), striate humeral and adanal regions (vs. not striate), notogastral setae c₂ shorter than other setae (except c₁)
FIGURE 3: *Acuribula bloemfonteinensis* n. sp.: A – dorsal view (legs not illustrated); B – ventral view (gnathosoma and legs except trochanters III and IV not illustrated); C – lateral view (gnathosoma and legs not illustrated). Scale bar 50 µm.
(vs. similar in length) and larger body size (237 – 258 × 135 – 147 vs. 196 – 213 × 98 – 118).

Also, the new species differs from *A. quagesetosa* by the presence of a pointed rostrum (vs. rounded), a slightly protruding anterior notogastral margin (vs. strongly protruding), sculpturing in epimeral and anogenital regions (vs. sculpturing absent), striate humeral regions (vs. not striate) and larger body length (237–258 vs. 167–191).

**CONCLUSION**

The genus *Ausoribula* comprises now three species. One species (*A. quagesetosa*) was recorded from South Australia (Tamboore Homestead, near Mt. Rescue Conservation Park, Mallee-heath, sand and litter) and two species (described above) were recorded from South Africa (Bloemfontein, Franklin Game Reserve on Naval Hill, in the nest of termites *Trinervitermes trinervoides*).

**ACKNOWLEDGEMENTS**

We cordially thank Dr. Ekaterina A. Sidorchuk (Paleontological Institute, Russian Academy of Sciences, Moscow, Russia) and two anonymous reviewers for the valuable comments.

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