

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

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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 c_2 similar in length to other setae (except shorter c_1) 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 c_2 shorter than other setae (except the shorter c_1) 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](https://zoobank.org/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 baxteri* 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 c_1 and c_2 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](https://zoobank.org/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 μ m.

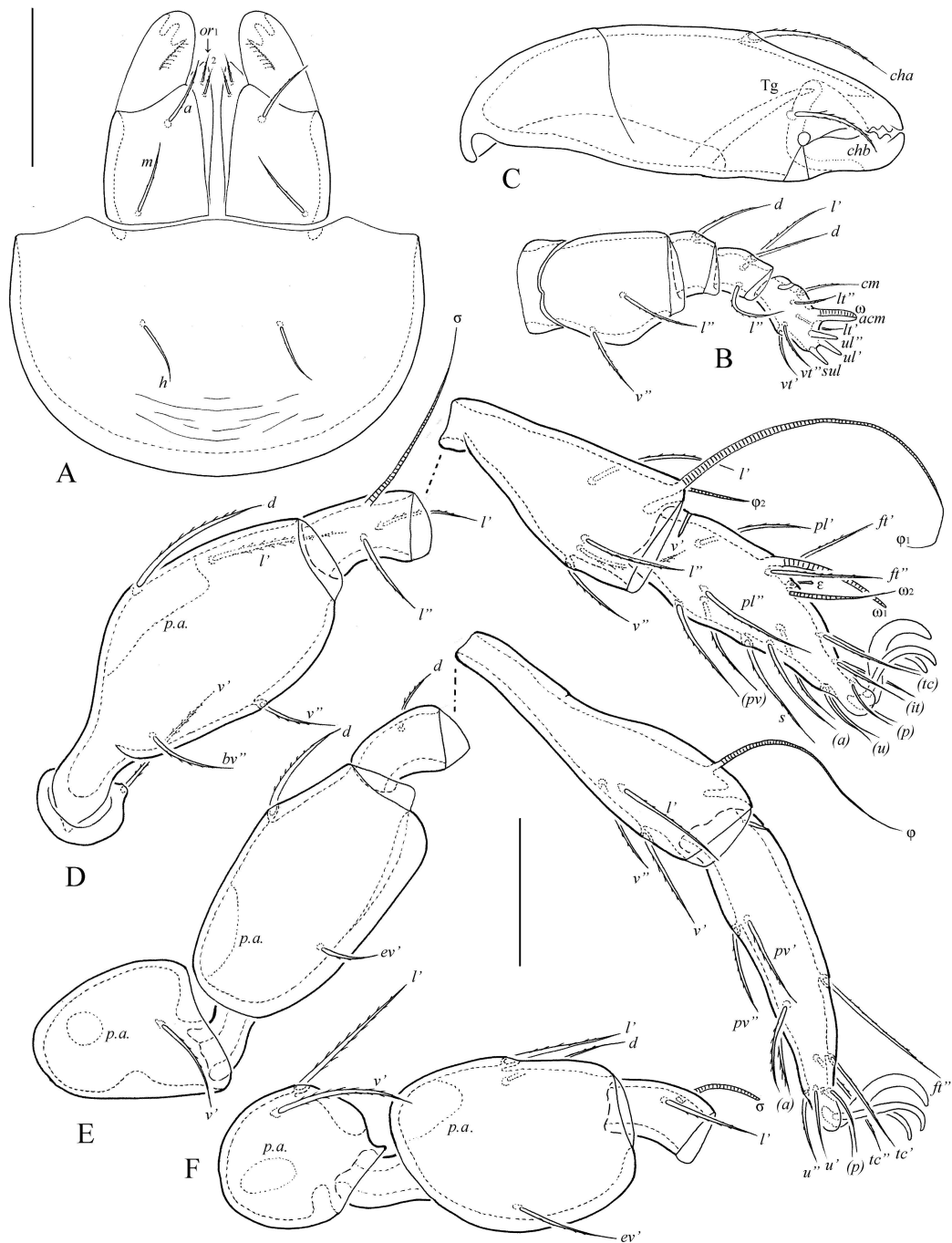


FIGURE 2: *Ausoribula termitophila* n. sp.: A – subcapitulum, ventral view; B – palp, right, antiaxial view; C – chelicera, right, antiaxial view; D – leg I, right, antiaxial view; E – leg IV, left, antiaxial view; F – trochanter, femur and genu of leg III, left, antiaxial view. Scale bars 15 µm (A–C), 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	v'	d, l', bv'', v''	$(l), \sigma$	$(l), (v), \varphi_1, \varphi_2$	$(ft), (tc), (it), (p), (u), (a), s, (pv), (pl), \varepsilon, \omega_1, \omega_2$
II	v'	d, l', bv'', v''	$(l), \sigma$	$(l), (v), \varphi$	$(ft), (tc), (it), (p), (u), (a), s, (pv), \omega_1, \omega_2$
III	l', v'	d, l', ev'	l', σ	$l', (v), \varphi$	$(ft), (tc), (it), (p), (u), (a), s, (pv)$
IV	v'	d, ev'	d	$l', (v), \varphi$	$ft'', (tc), (p), (u), (a), (pv)$

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, c_1 (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 opisthonotal gland openings (gla) distinct, lyrifissures ih 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 ($or_1, or_2, 2$) 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, barbed, $1c, 3c$ and $4c$ (12–14) longer than $1b, 3b, 4a$ and $4b$ (8–10) and $1a, 2a$ and $3a$ (6). Pedotecta I (Pd I) and II (Pd II) represented by small laminae. Discidia (dis) triangular. Circumpedal carinae (cp) distinct, reaching pedotecta II.

Anogenital region (Figs 1B, C) — Four pairs of genital (g_1 – $g_4, 6$), one pair of aggenital ($ag, 8$ – 10), two pairs of anal ($an_1, an_2, 6$ – 8) and three pairs of adanal (ad_1 – $ad_3, 8$ – 10) setae setiform, thin, slightly barbed. Sometimes three pairs (one posterior pair absent) of genital setae present.

Legs (Figs 2D–F) — Median claw thicker than laterals, all smooth. Dorso-paraxial porose areas ($p.a.$) on all femora and trochanters III and IV well visible. Formulas of leg setation and solenidia: I (1–4–2–4–18) [1–2–2], II (1–4–2–4–15) [1–1–2], III (2–3–1–3–15) [1–1–0], IV (1–2–1–3–11) [0–1–0]; homology

of setae and solenidia as indicated in Table 1. Setae l' on genua IV and s on tarsi IV absent. Famuli minute, slightly swollen distally. Solenidia ω_1 on tarsi I, ω_1 and ω_2 on tarsi II and σ on genua III bacilliform, other solenidia setiform.

Material examined — Holotype (female) and six paratypes (one female and five males): South Africa, Bloemfontein, Franklin Game Reserve on Naval Hill, 29°05'58.4"S, 26°14'03.2"E, 1451 m a.s.l., in the nest of termites *Trinervitermes trinervoides* (Sjöstedt), sample #2, 9.XI.2016 (A.A. Khaustov, S.G. Ermilov, E.A. Hugo-Coetzee).

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](https://zoobank.org/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 lamellar and interlamellar setae. Bothridial setae clavate, stalks and heads similar in length. Anterior notogastral margin distinctly visible. Notogastral setae c_2 shorter than other setae (except shortest c_1). 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, c_1 (6–8) shorter than c_2 (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 opisthonotal gland openings distinct, lyrifissures *ih* 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 (or_1 , or_2 , 4) minute, slightly barbed. Palps (length 36) with setation 0–2–1–3–9(+ω). 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. Circumpedial carinae distinct, reaching pedotecta II.

Anogenital region (Figs 3B, C) — Three pairs of genital (g_1 – g_3 , 8–10), one pair of aggenital (*ag*, 12–14), two pairs of anal (an_1 , an_2 , 8–10) and three pairs of adanal (ad_1 – ad_3 , 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-Coetzee).

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 c_2 shorter than other setae (except c_1)



(vs. similar in length) and larger body size ($237 - 258 \times 135 - 147$ vs. $196 - 213 \times 98 - 118$).

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*).

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