New species of Oppiidae from New Zealand

(Acari, Oribatida)

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Two new species of oribatid mites of the family Oppiidae are described from the Mt Richmond Forest Park in New Zealand. Lanceoppia (Lanceoppia) operta sp. nov. differs from Lanceoppia (Lanceoppia) willmanni Hammer, 1968 by the smaller body length, minute interlamellar setae, well-developed bothridial heads and presence of notogastral setae c. Tripiloppia parafrigida sp. nov. differs from Tripiloppia frigida Ermilov & Minor, 2015 by the smaller body size, costulae in distal part curved medially, lamellar setae inserted in median part of costulae, and developed humeral tubercles.

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Introduction

During taxonomic identification of oribatid mites from the Mt Richmond Forest Park in New Zealand, we found two new species of the family Oppiidae, one belonging to the genus Lanceoppia Hammer, 1962, the nominative subgenus, the other to Tripiloppia Hammer, 1968. The main goal of the paper is to describe these new species.

Lanceoppia was proposed by Hammer (1962) with Lanceoppia hexapili Hammer, 1962 as type species. The genus comprises six subgenera and 62 species (Subías 2004, updated 2018). The subgenus Lanceoppia (Lanceoppia) comprises 27 species which are distributed in the tropics, subtropics and the Australian region (Subías 2004, updated 2018). The subgeneric traits were listed in the key to superspecies taxa in Subías & Balogh (1989) and summarized by Hugo-Coetzee (2014). An identification key to many species of Lanceoppia (Lanceoppia) was given by Balogh & Balogh (2002).

Tripiloppia was proposed by Hammer (1968) with Tripiloppia aokii Hammer, 1968 as type species. The genus comprises 9 species, which are distributed in the Australian region (Subías 2004, updated 2018). The generic traits and an identification key to known species of Tripiloppia were presented by Ermilov & Minor (2015).

Material and methods

Material examined

The detailed collection locality and habitat for each new species is given in the “Material examined” sections.

Methods

Soil cores were collected using a stainless steel corer (5 × 5 cm); the volume collected included the ground vegetation plus 5 cm of the substrate depth. Samples were kept in the refrigerator until delivered to the lab. Mites were extracted into 75 % ECOH in modified Berlese extractors for a minimum of 7 days, or longer if the soil was not fully dry.

Specimens were mounted in lactic acid on temporary cavity slides for identification of all taxa and for measurement and illustration of the new species. Body length was measured in lateral view, from the tip of the
rostrum to the posterior edge of the notogaster. Notogastral width refers to the maximum width of notogaster in dorsal view. 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.

Drawings were made with a camera lucida using a Leica transmission light microscope “Leica DM 2500”.

General morphological terminology used in this paper mostly follows that of F. Grandjean; see Travé & Vachon (1975) for references, Norton (1977) for leg setal nomenclature, and Norton & Behan-Pelletier (2009) for overview.

The following abbreviations are used: cos – costula; tcos – transcostula; r – lateral ridge of prodorsum; ro, le, in, bs, ex – rostral, lamellar, interlamellar, bothridial and exobothridial setae, respectively; c, la, lm, lp, h, p – notogastral setae; ia, im, lp, ih, ips – notogastral lyrifissures; gla – opisthonal gland opening; h, m, a – subcapitular setae; or – adoral seta; v, l, d, cm, acm, ul, sul, vt, lt – palp setae; ω – palp and leg solenidion; cha, chb – cheliceral setae; Tg – Trågårdh’s organ; Pd I – pedotecta I; 1a, 1b, 1c, 2a, 3a, 3b, 3c, 4a, 4b, 4c – epimeral setae; dis – discidium; g, ag, an, ad – genital, aggenital, anal and adanal setae, respectively; iad – adanal lyrifissure; p.o. – preanal organ; Tr, Fe, Ge, Ti, Ta – leg trochanter, femur, genu, tibia and tarsus, respectively; σ, φ – leg solenidia; ε – tarsus I famulus; v, ev, bv, l, d, ft, tc, it, p, u, a, s, po, pl – leg setae.
**Descriptions**

*Lanceoppia (Lanceoppia) operta* sp. nov.

**Figs 1–10**


**Description**

Integument (Fig. 3). Body colour light brown. Body surface microfoveolate (visible under high magnification in dissected specimens). Lateral parts of body between bothridia and acetabula I–III tuberculate (diameter of tubercles up to 2).

Prodorsum (Figs 1, 3). Rostrum rounded. Cos- tulae completely absent. Transcostula distinct, located anterior to insertions of lamellar setae. One pair of arch-like ridges present on lateral sides of prodorsum. Rostral (49–53) and lamellar (61–73) setae setiform, barbed. Interlamellar (4–6) and exobothridial (10–12) setae setiform, thin, smooth. Bothridial setae (77–82) spindle-shaped, with long stalk and elongated barbed head with well-developed erect setiform tip. Interbothridial tubercles absent. Interbothridial region with two pairs of muscle sigillae. Postbothridial tubercles slightly developed. Longitudinal rows of muscle sigillae anteriad to bothridia poorly visible.

Notogaster (Figs 1, 3). Ten pairs of notogastral setae present: c (4) setiform, thin, smooth, others (la, lm, lp, h2, h3, 61–69; h1, p1–p3, 32–41) setiform, barbed. Lyri fissures ia located in humeral parts, im anterolateral to h3 and distanced from them, ip between p1 and p2, ih and ips on lateral parts of notogaster. Opisth onotal gland openings located posterolateral to h5.


Figs 7–8. Lanceoppia (Lanceoppia) operta sp. nov., adult: 7. leg I, right, antiaxial view; 8. leg II, without tarsus, right, antiaxial view. Scale bar 50 μm.
Epimeral and lateral podosomal regions (Figs 2, 3). Epimeral setal formula 3–1–3–3. Setae (1a, 2a, 3a, 16–20; 1c, 3c, 36–41, others 24–28) setiform, sparsely barbed. Discidia triangular, pointed distally.

Anogenital region (Figs 2, 3). Six pairs of genital setae (g2, g3, 8–10; others 14–16) setiform, thin, smooth. One pair of aggenital (24–28), three pairs of adanal (24–28) and two pairs of anal (14–16) setae setiform, sparsely barbed. Adanal lyrifissures distinct, in typical inverse apoanal position.

Legs (Figs 7–10). Claw of each leg smooth. Porose areas on femora I–IV and on trochanters III, IV poorly visible. Trochanters III with one or two teeth posteriorly. Formulas of leg setation and solenidia: I (1–5–2–4–20) [1–2–2], II (1–5–2–4–16) [1–1–2], III (2–3–1–3–15) [1–1–0], IV (1–2–2–3–12)

Table 1. Leg setation and solenidia of adult Lanceoppia (Lanceoppia) operta sp. nov. and Tripiloppia parafrigida sp. nov. Roman letters refer to normal setae, Greek letters to solenidia (except ε = famulus). Single prime (’) marks setae on anterior and double prime (‘’) setae on posterior side of the given leg segment. Parentheses refer to a pair of setae.

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Figs 9–10. Lanceoppia (Lanceoppia) operta sp. nov., adult: 9. leg III, without tarsus, left, ventroantiaxial view; 10. leg IV, left, antiaxial view. Scale bar 50 μm.
[0–1–0]; homology of setae and solenidia indicated in Table 1. Famulus of tarsi I short, setiform, erect, located between solenidia \( \omega_1 \) and \( \omega_2 \). Solenidia \( \omega_1 \) on tarsi I, \( \omega_1 \) and \( \omega_2 \) on tarsi II bacilliform, \( \phi \) on tibiae I, \( \phi \) on tibiae II and III and \( \sigma \) on genua III thickened, blunt-ended, erect, other solenidia setiform.

**Material examined.** Holotype (female) and 4 paratypes (2 females and 2 males): New Zealand, South Island, Tasman region, Mount Richmond Forest Park, high alpine zone of Ben Nevis peak, 1616 m a.s.l., 41°33.000' S, 173°04.491' E, in soil under carpet grass *Chionochloa australis* (Buchanan) Zotov and some *Lycopodium fastigiatum* R.Br., sample BNA T3–5, 24 January 2017 (collected by M. Minor).

**Type deposition.** The holotype (ethanol with a drop of glycerol) and one paratype are deposited in the New Zealand National Arthropod Collection, Auckland, New Zealand. Three paratypes (ethanol with a drop of glycerol) are deposited in the Tyumen State University Museum of Zoology, Tyumen, Russia.

**Etymology.** The specific name *operta*, gender feminine, means “hidden, concealed”, in Latin referring to the dense layer of carpet grass under which the newly described species lives.

**Remarks.** *Lanceoppia (Lanceoppia) operta* sp. nov. is morphologically most similar to *Lanceoppia (Lanceoppia) willmanni* Hammer, 1968 from New Zealand in having spindle-shaped bothridial setae, well-developed transcOSTula and long rostral and lamel-

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**Figs 11–12.** *Tripiloppia parafrigida* sp. nov., adult: 11. dorsal view (legs not shown); 12. ventral view (gnathosoma and legs except left trochanters III, IV not shown). Scale bar 50 \( \mu \)m.
lar setae. However, the new species differs from
L. (L.) willmanni by the smaller body length (398–431
versus 530–570 in L. willmanni), minute interlamellar
setae (versus medium size), well-developed both-
ridial heads (versus less developed, narrow) and
notogastral setae c present (versus absent).

**Tripiloppia parafrigida** sp. nov.

Figs 11–20

**Diagnosis.** Body size: 315–332 × 166–182. Rostrum
tripartite, median part rounded. Costulae long, with
ends curved and directed medially. Rostral, lamellar
and interlamellar setae setiform, slightly barbed, in
longest, le shortest and thinnest. Bothridial setae
with lanceolate head having 3 to 5 cilia. Notogaster
anteriorly with short cristae and medial and humeral
tubercles. Notogastral setae of medium size, setiform,
c longest, sparsely barbed, others smooth. Epimeral
and anogenital setae short, setiform, smooth.

**Description**

Measurements. Body length: 315 (holotype, male),
315–332 (3 paratypes: 2 females and 1 male); noto-
gaster width: 166 (holotype), 166–182 (3 paratypes). No difference between females and males in body size.
Integument (Fig. 13). Body colour light brown. Body surface microfoveolate (visible under high magnification in dissected specimens). Lateral parts of body between bothridia and acetabula I–III tuberculate (diameter of tubercles up to 2).

Prodorsum (Figs 11, 13). Rostrum tripartite, median part rounded, two deep incisions well visible. Costulae strong, parallel, their ends curved and directed medially. Rostral (20–24), lamellar (10–12), interlamellar (36–41) and exobothridial (24–28) setae setiform, slightly barbed, le thinnest. Bothridial setae (57–61) with long stalk, lanceolate head, having 3 to 5 cilia of different lengths. Interbothridial and postbothridial tubercles present. Interbothridial region without muscle sigillae. Longitudinal rows of muscle sigillae anteriad to bothridia poorly visible.

Notogaster (Figs 11, 13). Trapezoid protrusion, crista, medial and humeral tubercles well-developed in anterior part of notogaster. Ten pairs of notogastral setae setiform, c (41–45) sparsely barbed, others (la, lm, lp, h, h, 32–36; h, p, p, 24–32) smooth. Lyrifissures in located in humeral parts, im anterolateral to h, and distanced from them, ip between p, and p, ih and ips on lateral parts of notogaster. Opisthontotal gland openings located posterolateral to h.


Figs 17–18. Tripiloppia parafrigida sp. nov., adult: 17. leg I, left, paraxial view; 18. leg II, without tarsus, right, antiaxial view. Scale bar 20 μm.
Anogenital region (Figs 12, 13). Five pairs of genital (10–12), three pairs of aggenital (10–12), three pairs of anal (10–12) setae setiform, smooth. Adanal lyrifissures distinct, in typical paraanal position.

Legs (Figs 17–20). Claw of each leg smooth. Porose areas on femora I–IV and on trochanters III, IV poorly visible. Formulas of leg setation and solenidia: I (1–5–2–4–20) [1–2–2], II (1–5–2–4–16) [1–1–2], III (2–3–1–3–15) [1–1–0], IV (1–2–2–3–12) [0–1–0]; homology of setae and solenidia indicated in Table 1. Famulus of tarsi I long, setiform, located posterior to seta ft". Solenidia φ1 and φ2 on tarsi I, II, φ3 on tibiae I, φ on tibiae II and III and σ on genua III bacilliform or thickened, blunt-ended, other solenidia setiform.

Material examined. Holotype (male) and 3 paratypes (2 females and 1 male): New Zealand, South Island, Tasman region, Mount Richmond Forest Park, high alpine zone of Ben Nevis peak, 1616 m a.s.l., 41°33.000’S, 173°04.491’E, in soil under carpet grass Chionochloa australis (Buchanan) Zotov and some Lycopodium fastigiatum R.Br., sample BNA T3–5, 24 January 2017 (collected by M. Minor).

Type deposition. The holotype (ethanol with a drop of glycerol) and one paratype are deposited in the New Zealand National Arthropod Collection, Auckland, New Zealand. Two paratypes (ethanol with a drop of glycerol) are deposited in the Tyumen State University Museum of Zoology, Tyumen, Russia.

Etymology. The specific name parafrigida refers to the similarity between the new species and Tripiloppia frigida Ermilov & Minor, 2015.

Remarks. Tripiloppia parafrigida sp. nov. is morphologically most similar to Tripiloppia frigida Ermilov & Minor, 2015 from New Zealand in having the bothridial setae with lanceolate head, short lamellar setae, five pairs of genital setae and notogastral setae of medium size. However, the new species differs by smaller body size (315–332 × 166–182 versus 415–
448×215–249 in *T. frigida*), distal end of costulae curved medially, lamellar setae inserted close to distal part of costulae (versus costulae straight, not curved distally; lamellar setae inserted in the median part of costulae), and humeral tubercles developed (versus absent).

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**References**


