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New records of rare water mites from New Zealand, with the description of a new genus (Acari: Hydrachnidia)

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Original research

ABSTRACT

New records of rare water mites mostly from interstitial habitat of New Zealand are presented. One new genus, *Zelandostygolimnochares* **n. gen.** (Piersigiidae) with the type species *Z. curtipalpis* **n. sp.** is described. *Zelandobates occidentalis* Smit & Pešić, 2020 is synonymized with Z. *tongariro* Smit & Pešić, 2020. The male is for the first time described for *Zelandotonia orion* Cook, 1992, and the female is for the first time described for *Aciculacarus amalis* Cook, 1983. New records of a number of rare species are presented.

Keywords new species; taxonomy; hyporheic mites; new records; New Zealand
Zoobank http://zoobank.org/2252EB7D-D384-4900-822D-9A6C21E8879B

Introduction

Water mites are an important macroinvertebrate group in interstitial waters (Davids *et al.* 2007; Pešić *et al.* 2023). In regard to the species richness water mites are the most diverse faunistic group in interstitial waters of New Zealand (Scarsbrook *et al.* 2003). Interstitial water mites of New Zealand were treated by Hopkins (1966, 1967, 1969), Hopkins & Schminke (1970), Imamura (1977, 1978, 1979), Cook (1983, 1991, 1992), Schwoerbel (1984), Pesic *et al.* (2010), Smit (1996, 2015, 2017, 2019), Smit and Pešić (2024). Pešić *et al.* (2010) listed 70 species known from interstitial waters in New Zealand. After that, another 16 interstitial water mite species have been described (Pesic *et al.* 2010; Smit 2015, 2017, 2019; Smit and Pešić 2024), reaching the number to 86 species, which is more than 60% of New Zealand's groundwater biodiversity estimated to about 130 species (Fenwick and Scarsbrook 2004).

As pointed out by Fenwick and Scarsbrook (2004), such great diversity is due to the fact that groundwater, compared to other habitat types such as lakes and rivers, lies beneath a very large part of New Zealand, as well as to New Zealand's turbulent geological history which has led to the presence of a diverse range of types of underground habitats and enabled the long-term separation of their groundwater-dwelling populations.

In this paper new records of water mites, mainly from interstitial habitat are presented based on a collection trip of the first author in 2022-2023 to South Island.

Material and methods

Water mites were collected by hand netting, sorted alive in the field, and preserved in Koenike fluid. The interstitial sampling was done by the Karaman-Chappuis method. Unless stated

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otherwise, all material was collected by the first author. Holotype of the new species will be lodged in the Museum of New Zealand, Wellington (NMNZ), paratypes and all non-type material in Naturalis Biodiversity Center, Leiden (RMNH).

The following abbreviations are used: Ac–1-3 – first to third acetabula; asl – above sea level; Cx-IV – fourth coxae; Cxgl-4 – coxoglandularia 4; P1-5 – palp segments 1-5; IV-leg-2-6 – second to sixth segment of fourth leg; Vgl-1 – Ventroglandularium 1. All measurements are in µm, measurements of palp and leg segments are of the dorsal margins. Ventral length is measured from the tip of Cx-I to posterior idiosoma margin. The photographs of selected structures were made using a camera on a Samsung Galaxy smartphone. The coordinates are taken with a GPS, but those given as degrees, minutes and seconds are taken from Google Earth and are by approximation. Numbers are given as male/female/deutonymph or adult/deutonymph. The distribution data are from Smit (2020) unless stated otherwise.

Taxonomy

Family Piersigiidae Oudemans

Subfamily Stygolimnocharinae Cook, 1967

The water mite family Piersigiidae contains two subfamilies, the Piersigiinae and the Stygolimnocharinae. The Stygolimnocharinae, with the genera *Stygolimnochares* Cook, 1967 and *Parawandesia* E. Angelier, 1951 are known from interstitial habitats of India, Australia and Europe (Cook 1967, 1986; Smit 2020). Following Cook (1986) and Smit (2020) the members of the latter subfamily are characterized by a vermiform elongate idiosoma with a single dorsal sclerite with the postocularia. In the new species from New Zealand described here as the type of a new genus, in addition to the unpaired medial sclerite with the postocularia, the dorsum also has a series of symmetrically distributed platelets, which induced us to give a revised diagnosis of this subfamily.

Revised diagnosis —- (after Smit 2020, p. 62) — Idiosoma vermiform elongate, dorsum with a medial elongated sclerite with the postocularia and a series of symmetrically arranged platelets. Eyes absent. Glandularia sclerites completely surrounding the glandularia. Coxae in four groups, the coxae in each group either only lightly fused, somewhat separated or completely fused. Acetabula on two pairs of genital plates or in two rows parallel to the gonopore, acetabula either stalked or not stalked.

Genus *Zelandostygolimnochares* n. gen.

Zoobank: FA8703A8-C78B-4447-9A69-FB758BF12C1B

Diagnosis — Characters of the subfamily Stygolimnocharinae. Dorsum with a series of symmetrically arranged platelets; unpaired elongated medial plate with the postoculara with a short anterior extension. Glandularia platelets enlarged. Coxae in four groups, the anterior groups well separated from the posterior group, coxae in each group somewhat separated. Acetabula on two pairs of genital platelets, not stalked.

Type species — *Zelandostygolimnochares curtipalpis* **n. sp.**

Etymology — The new genus refers to its occurrence in New Zealand and the similarity with the genus *Stygolimnochares*.

Remarks — The new genus shares many characters with the genus *Stygolimnochares* which includes two species, *S. indica* Cook, 1967 (Maharasthra State, India; Cook 1967) and *S. australica* Cook, 1986 (Queensland, Australia; Cook 1986). From the latter genus, the new genus from New Zealand differs noticeably in the presence of symmetrically arranged plates on the dorsum (absent in *Stygolimnochares*) and an unpaired medial dorsal plate with the postocularia on a short anterior extension (anterior extenson lacking in *Stygolimnochares*).

Zelandostygolimnochares curtipalpis n. sp.

Zoobank: 46EE3BC0-8088-4206-97F2-C2420A7EA9A3

Figure 1

Material examined — Holotype female, South Island, Simpson Creek, interstitial, crossing Haupiri Road, Moana, 42°32.852′ S 171°39.594′ E, 259 m asl, 15.ii.2023 (NMNZ).

Diagnosis — As given for the genus.

Description — *Female* — Body soft and greatly elongated (Figure 1A), idiosoma 1060 long and 506 wide, eye pigment reduced, integument lineated; elongated medial plate with the postocularia 206 long, with a short anterior and a long posterior extension, with two pairs of setae as illustrated in Figure 1B. Postocularia probably located on the anterior extension of the frontal plate. Dorsum with three pairs of symmetrically arranged elongated dorsal platelets, anterior pair of platelets 213 long, second pair of platelets 147 long, posterior pair of platelets 128 long. Coxae confined to anterior part of the body, anterior coxal groups 189 long, well separated from the posterior group, a pair of narrow sclerites extending posteriorly from posterolateral corners of Cx-II (Figure 1E); posterior coxal group 358 long; coxae in each group touching but separated (Figure 1F); a pair of narrow sclerites extending posteriorly from Cx-IV; coxal setae reduced in number, Cx-I with four setae, Cx-II with two pairs; Cx-III with two pairs, Cx-IV with three pairs. Genital field 188 long and 119 wide, located between Cx-IV; acetabula on two pairs of genital platelets, anterior platelets with 13–15 acetabula on each side, posterior platelets with 13–14 acetabula on each side (Figure 1F). Excretory pore sclerotized.

Palp as illustrated in Figure 1C: dorsal length/height (ratio given in parentheses): P1, 18/30 (0.62); P2, 46/36 (1.28); P3, 31/39 (0.8); P4, 38/36 (0.98); P5, 42/27 (1.55); P2 with two heavy ventral and two serrated dorsodistal setae; P3 with a strong pinnate ventrodistal seta and a long hair-like dorsodistal seta; P4 with a strongly serrated ventrodistal seta, a long hair-like dorsodistal seta and two stout pinnate lateral setae; P5 stout, ending with several relatively long setae (Figures 1C-D). Gnathosoma 142 long and 103 wide. Dorsal lengths of I–leg-2-5: 61, 50, 56, 67, 106; I–leg-6 greatly expanded distally, maximum height 63; dorsal length of IV–leg-2-6: 80, 61, 84, 99, 133.

Etymology — Named for its stocky P5.

Distribution — Known from the type locality only on South Island.

Family Hydryphantidae Piersig, 1896

Genus *Euwandesia* André & Naudo, 1962

Diagnosis — Smit 2020, p. 131.

One species known from New Zealand.

Euwandesia tenebrio Hopkins & Schminke, 1970

New records — South Island. 1/0/0, Peg Leg Creek, interstitial, Arthurs Pass NP, 42°53.704′ S 171°33.575′ E, 826 m asl, 24.xii.2022; 0/1/0, Cascade Creek, interstitial, Longwood Forest, 46°15.58′2 S 167°54.575′ E, 91 m asl, 1.ii.2023; 0/1/0, Waipohatu Stream, Catlins Forest Park, 46°36.883′ S 169°00.890′ E, 33 m asl, 3.ii.2023; 0/0/1, Weionepu Creek, Catlins Forest Park, 46°36.448′ S 168°58.715′ E, 70 m, 3.ii.2023 ; 0/1/0, Matai stream downstream falls, Catlins Forest Park, 46°30.185′ S, 169°29.288′ E, 134 m asl, 7.ii.2023; 0/0/1, Highest tributary of Warbeck Stream, interstitial, crossing Maruia Saddle Road, 42°01.880′ S 172°17.695′ E, 535 m asl, 17.ii.2023.

Distribution — Previously known from four localities from North and South Island, and one locality from Stewart Island (Smit and Pešić 2020).

Family Anisitsiellidae Koenike, 1910

Genus *Zelandatonia* Cook, 1992

Diagnosis — Smit 2020, p. 193.

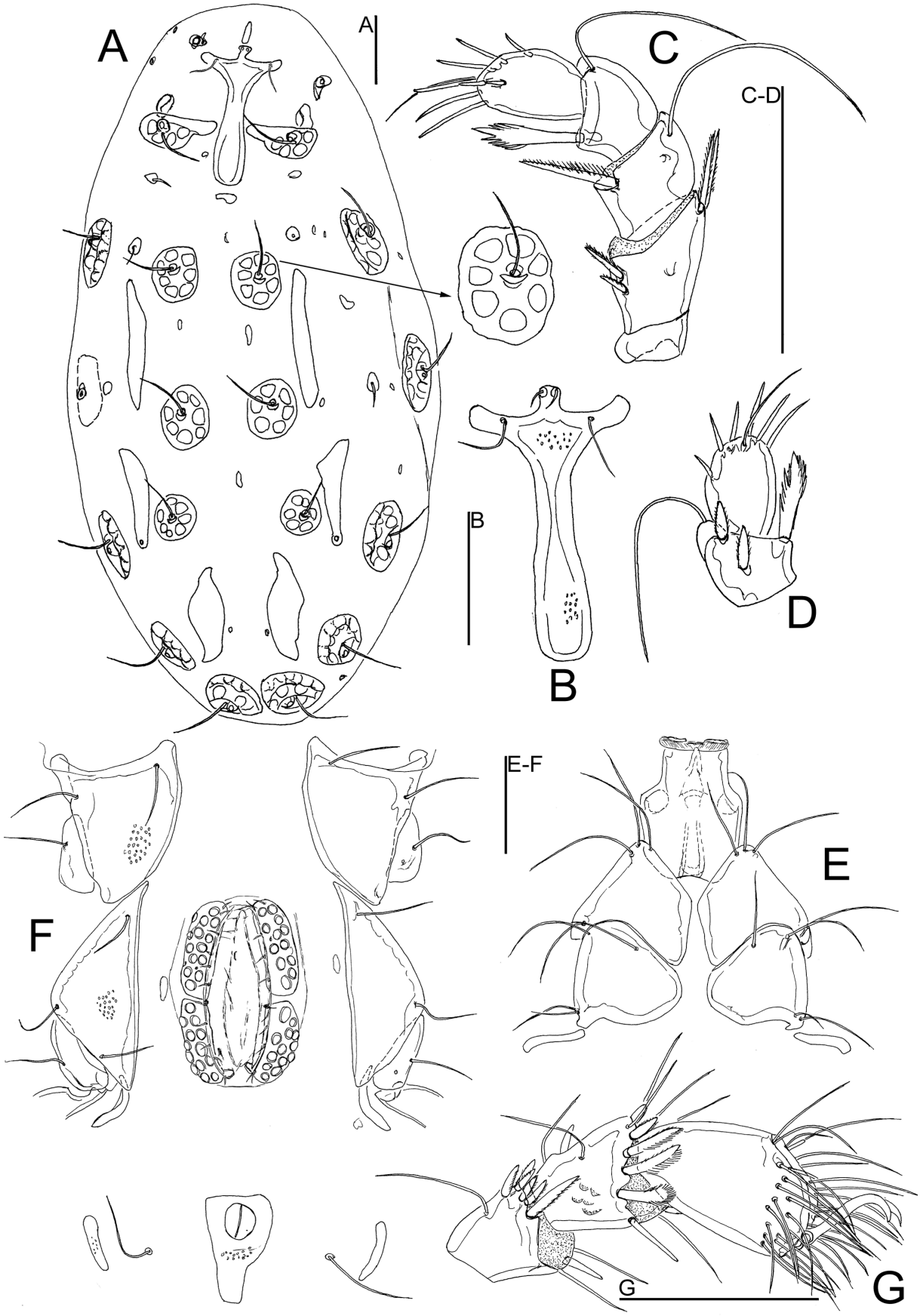

Figure 1 *Zelandostygolimnochares curtipalpis* **n. sp.**, holotype female, Simpson Creek. A – idiosoma, dorsal view (inset: glandularium, 2x enlarged); B – frontal plate; C – palp; D – terminal palp segments (P-4 and P5); E – gnathosoma and anterior coxal group; F – posterior coxal group, genital field and excretory sclerite; G – I-leg-4-6. Scale bars = 100 μm.

Zelandatonia orion Cook, 1992

Figure 2

Material examined — South Island. 2/1/0, Camp Creek, interstitial, Lake Kaniere Scenic Reserve, 42°50.313′ S, 171°09.910′ E, 156 m asl, 13.ii.2023, one male, dissected and slide mounted (RMNH), one female partly dissected (palp, I-leg and IV-leg from one side dissected) and slide mounted (RMNH).

Remarks — This species was described by a single female collected from a driven well near Nelson, South Island (Cook 1992). Thus far, the male was unknown, and therefore a description is given below. Our specimens generally matches the original description except in the dorsum with three pairs of sclerites, instead of the two pairs in the female, postocularia and the most posterior pair, as illustrated by Cook (1992).

Description — *Male* — Integument soft and lineated, 894 long and 644 wide; dorsum with three pairs of sclerites, anterior pair with postocularia (Figure 2A). Coxal groups close together but not fused, anterior coxal group much smaller than posterior coxal group; gnathosomal bay relatively shallow and V-shaped, 125 long; Cx-III/IV suture line incomplete; glandularia of Cx-III near anterior margin; Cx-IV expanded, enclosing genital field (Figure 2B); a pair of small setae fused with posterior margin of Cx-IV. Genital field with three pairs of acetabula, 178 long and 128 wide, length of Ac–1-3: 50, 53, 39. Ejaculatory complex 222 long. Excretory pore on a small rounded sclerite.

Palp as illustrated in Figures 2C-D: dorsal length/height (ratio given in parentheses): P1, 25/44 (0.57); P2, 106/97 (1.1); P3, 59/78 (0.76); P4, 100/41 (2.46); P5, 31/16 (2.0); palpal segments, especially P2 and P3 stocky; P2 ventral seta distanced from the margin of the segment; P4 without ventral tubercles. Gnathosoma 134 long; chelicera (Figure 2E) 172 long. Dorsal lengths of I-leg: 69, 88, 109, 166, 175, 181; dorsal lengths of IV-leg: 116, 114, 134, 206, 228, 206; III-leg-4 with one two swimming seta; III-leg-5 with two short swimming setae; IV-leg-4 with two swimming setae; IV-leg-5 with five swimming setae as illustrated in Figure 2G.

Distribution — Previously known from the type locality on South Island (Cook 1992).

Family Hygrobatidae C.L. Koch, 1842

Genus *Aciculacarus* Hopkins, 1975

Diagnosis — Smit 2020, p. 455.

A small genus with two species known from New Zealand.

Aciculacarus amalis Cook, 1983

Figure 3

New record — South Island. 1/2/0, Small stream moss forest crossing track to Fox Glacier, 43°28.954′ S, 170°01.236′ E, 209 m asl, 12.ii.2023, 1 female dissected and slide mounted (RMNH).

Remarks — Thus far, the female was unknown, and therefore a description is given below.

Description — *Female* — Idiosoma soft and without muscle attachment sclerites (Figure 3D), dorsally 547 long, ventrally 625 long and 456 wide. Coxal field 348 long, Cx-III wide 328, Cx-I separated medially, gnathosomal bay V-shaped, approximately 84 long; Cxgl-4 near medial margin of Cx-IV and well posterior to the Cx-III/IV suture line, posterior margin of Cx-IV evident. Genital field with three pairs of acetabula, length of Ac–1-3: 30–34, 28–30, 25–27, respectively, pregenital sclerite 94 wide, gonopore 128 long, genital plates fused at posterior end to each other and with postgenital sclerite, surrounded by a well-developed strip of a secondary sclerotization which includes also Vgl-1 and -2 (Figure 3E); excretory pore terminal in position.

Palp as illustrated in Figure 3A: dorsal length/height (ratio given in parentheses): P1, 30/31 (0.97); P2, 68/44 (1.55); P3, 70/39 (1.81); P4, 102/30 (3.42); P5, 42/16 (2.62). Gnathosoma

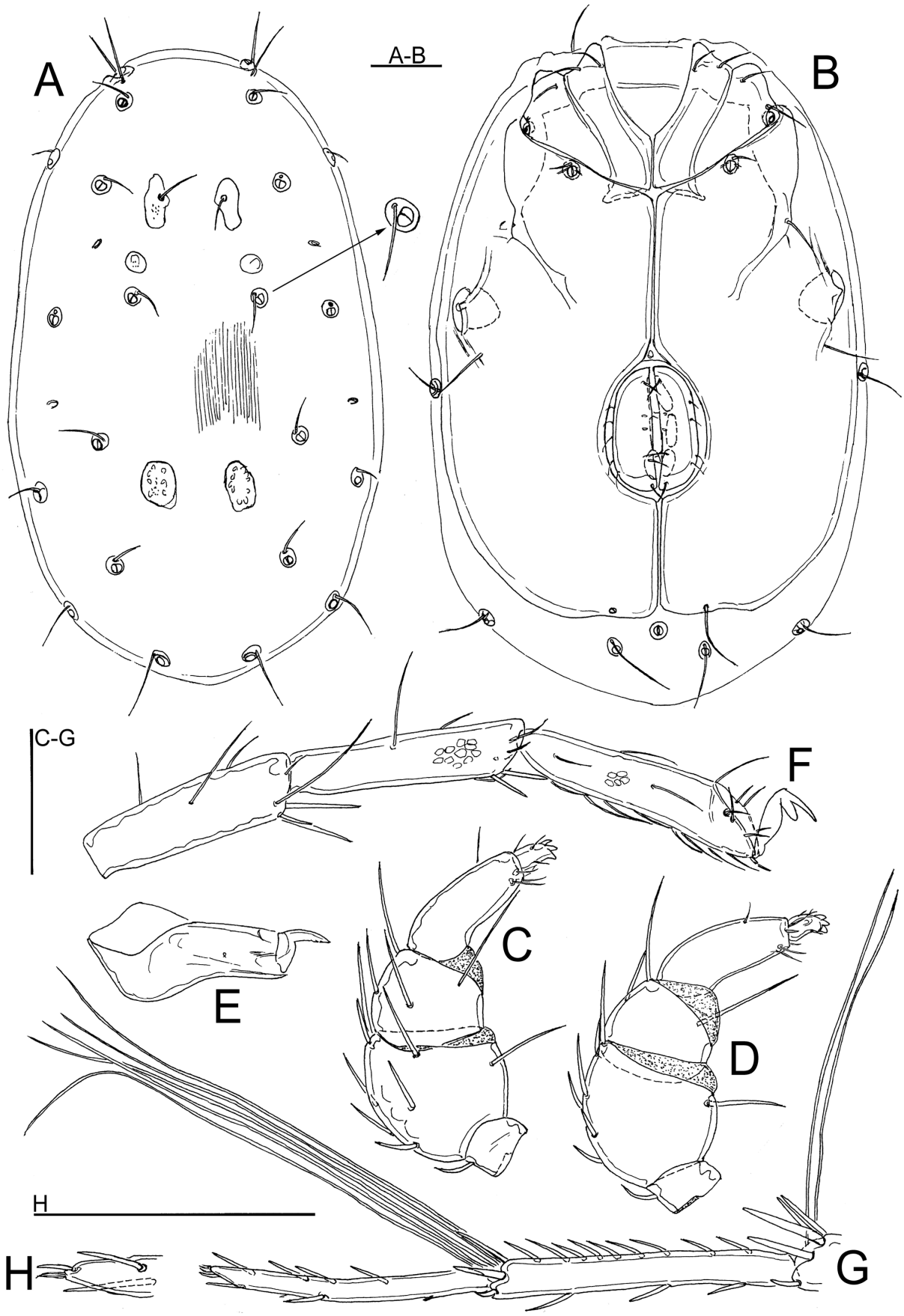

Figure 2 *Zelandatonia orion* Cook, 1992, male, Camp Creek. A – idiosoma, dorsal view (inset: glandularium, 2x enlarged); B – idiosoma, ventral view; C-D – palp; E – chelicera; F – I-leg-4-6; G – IV-leg-5 and -6; H – terminal part of IV-leg-6. Scale bars = 100 µm.

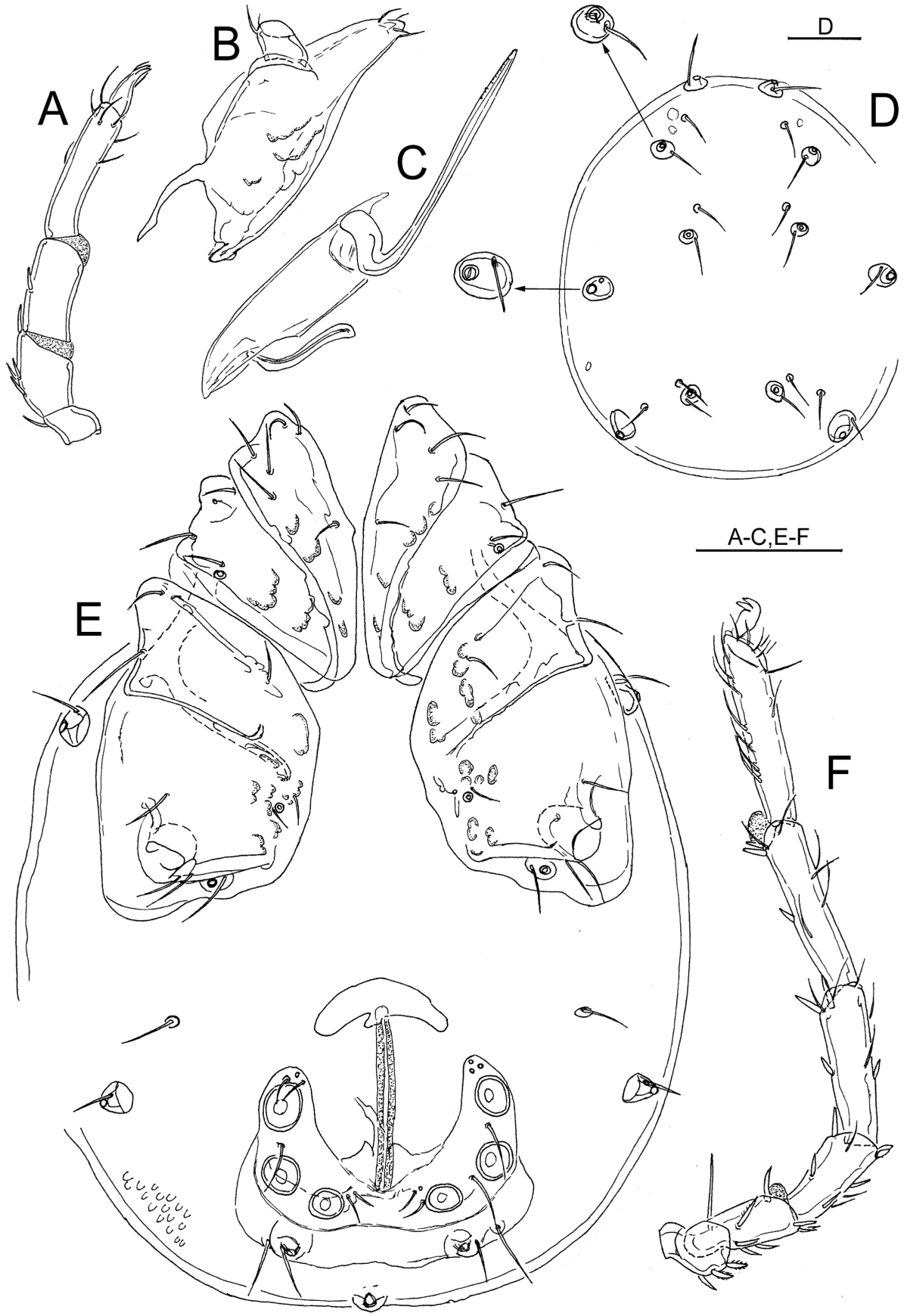

Figure 3 *Aciculacarus amalis* Cook, 1983, female, stream crossing track to Fox Glacier. A – palp; B – gnathosoma; C – chelicera; D – idiosoma, dorsal view (inset: glandularium, 2x enlarged); E – idiosoma, ventral view; F – I-leg. Scale bars = 100 μm.

elongated, pointed at anterior end (Figure 3B), 211 long; chelicera (Figure 3C) 322 long, cheliceral claw elongated and needle-like, 184 long. Dorsal lengths of I-leg (Figure 3F): 47, 56, 75, 109, 119, 138; dorsal lengths of IV-leg: 110, 80, 113, 156, 181, 175; swimming setae absent.

Distribution — Previously known from one locality on North Island, and reported here for the first time from South Island.

Moanabates Smit & Pešić, 2020

An endemic genus of New Zealand, with only one species known.

Moanabates moanaensis Smit & Pešić, 2020

New records — South Island. 0/1/0, Camp Creek, Lake Kaniere Scenic Reserve, 42°50.313′ S, 171°09.910′ E, 156 m asl, 13.ii.2023; 0/1/0, Janice Creek, crossing Haupiri Road, Moana, 42°34.443′ S 171°42.731′ E, 212 m asl, 15.ii.2023; 0/2/0, Simpson Creek crossing Haupiri Road, Moana, 42°32.852′ S 171°39.594′ E, 259 m asl, 15.ii.2023.

Distribution — Thus far, only known from the type locality near Moana. All but one records are from the Moana area, but the record from Camp Creek shows that the species has a wider distribution.

Genus *Zelandobates* Hopkins, 1966

Diagnosis — Smit 2020, p. 539.

A genus with six species known from New Zealand (Smit and Pešić 2020).

Zelandobates tongariro Smit & Pešić, 2020

Figure 4

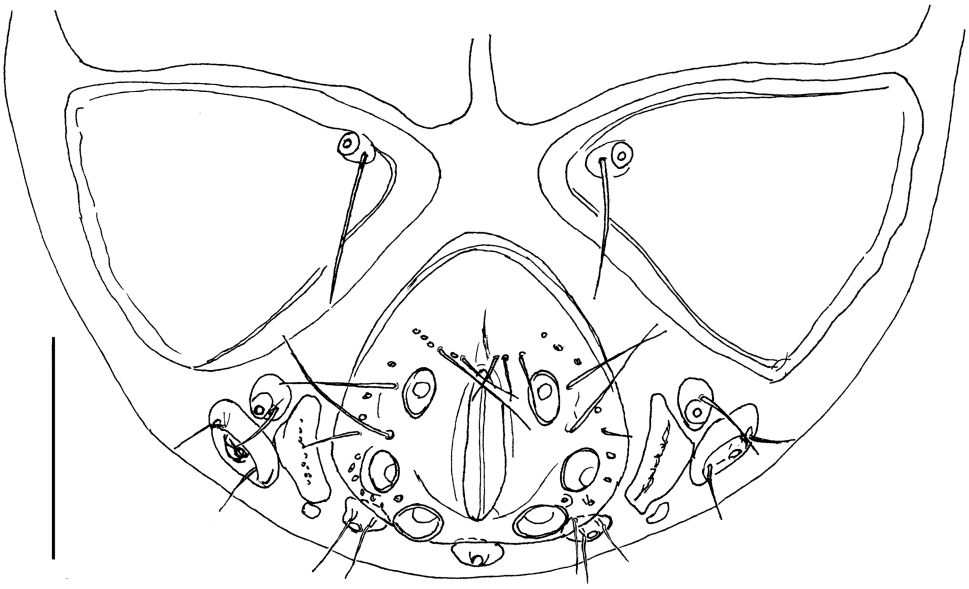

Figure 4 *Zelandobates tongariro* Smit & Pešić, 2020, male, Lewis River at Deer Valley Campsite: posterior part of the ventrum. Scale bar = 100 µm.

Zelandobates occidentalis Smit & Pešić, 2020 — n. syn.

New records — South Island. 1(juv.)/0/0, Ten Mile Creek, Paparoa NP, N of Greymouth, 42°20.370′ S, 171°16.350′ E, 16 m asl, 22.xii.2022; 1/0/0, Jackson River, S of Haast, 44°06.734′ S 168°35.635′ E, 53 m asl, 28.xii.2022; 1(juv.)/0/1, Hollyford River, Fiordland NP, 44°48.614′ S, 168°02.229′ E, 550 m asl., 4.i.2023; 0/1/0, Upper course Acheron River, interstitial, crossing Lyndon Road, Kurowai Torlese Tussocklands Park, 43°19.733′ S 171°40.478′ E, 795 m asl, 13.i.2023; 1(juv.)/0/0, Lewis River at Deer Valley Campsite along Lewis Pass Road, 42°24.278′ S, 172°23.814′ E, 806 m asl, 20.i.2023. 2/0/0, Lewis River, interstitial, at Deer Valley Campsite, 42°24.278′ S, 172°23.814′ E, 806 m asl, 20.i.2023; 1/0/0, Caution Creek, Fox Glacier Track, 43°29.584′ S 170°01.690′ E, 277 m asl, 12.ii.2023.

Remarks — Recently Smit and Pešić (2010) described two *Zelandobates* species from New Zealand, *Z. tongariro,* from a single male from North Island, and *Z. occidentalis* from South Island. Following the original description of the latter species, *Z. tongariro* differs by (1) anterolateral platelets located lateral to anterodorsal plate and a pair of glandularia at the anterior margin of anterodorsal plate separated, not fused with the latter plate as in *occidentalis*, (2) a pair of small, elongated platelets and two pairs of glandularia located lateral on each side of genital field separated, not fused to each other as in *occidentalis*, (3) Vgl-2 and excretory pore situated immediately posterior to genital field, not fused with posterior margin of the genital field as in *occidentalis*. Newly collected material from this study reveals a significant variability in the degree of dorsal and ventral sclerotization. Most of the collected specimens have a dorsum with a large unpaired anterior plate with the postocularia and three pairs of glandularia as described in the original description of *Z. occidentalis* (see Figure 10A in Smit and Pešić 2020). In one male from Lewis stream, found together with an individual which has a large unpaired anterior plate with three pairs of glandularia, the anterolateral platelets lateral to the anterodorsal plate and a pair of glandularia at the anterior margin of the anterodorsal plate were not fused with the latter plate matching the condition found in type of *T. tongariro* (see Figure 8A, D in Smit and Pešić 2020). In all specimens we checked in this study (which were generally smaller than the specimens from the original descriptions of *tongariro* and *occidentalis*), a pair of small, elongated platelets and two pairs of glandularia located lateral on each side of genital field were separated, and Vlg2 and the excretory pore were not fused with the genital field (see Figure 4). Therefore, based on the new evidence and taking into account page priority in the descriptions of the abovementioned species, we propose to synonymize *Z. occidentalis* with Z. *tongariro.*

Distribution — Known from North and South Island.

Family Mideopsidae Koenike

Genus *Guineaxonopsis* Imamura, 1983

From New Zealand three species are known

Diagnosis — Smit 2020, p. 698.

Guineaxonopsis ramsayi (Cook, 1983)

New records — South Island. 0/1/0, Lewis River at Deer Valley Campsite, interstitial, 42°24.278′ S, 172°23.814′ E, 806 m asl, 20.i.2023, dissected and slide mounted (RMNH).

Distribution — Previously known from five localities (North and South Island).

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