

Filling the gap in distribution of the genus *Sonotetranychus* (Acari: Tetranychidae) with a description of a new species from New Zealand

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Abstract

The genus *Sonotetranychus* Tuttle, Baker & Abbatiello, 1976 (Acari: Tetranychidae), previously known from the Americas, Africa and Asia, is for the first time recorded from Australasia. *Sonotetranychus tawhairauriki* sp. nov. collected on *Nothofagus solandri* var. *cliffortioides* (Nothofagaceae) is described from Ngatimoti, New Zealand. This mite genus is for the first time recorded from plant hosts of the family Nothofagaceae.

Key words: Acari, Tetranychidae, new species, *Sonotetranychus*

Introduction

The family Tetranychidae is a diverse group of over 1,200 described species of phytophagous mites of great importance in agriculture and forestry (Bolland *et al.* 1998). About 30 species of the Tetranychidae are recorded from New Zealand (Zhang & Rhode 2003). Most of these need redescriptions or revision and many new species in New Zealand are waiting to be described, according to a study led by the senior author with funding from New Zealand Ministry of Agriculture and Forestry. This is the second of a series of papers on New Zealand species of the family Tetranychidae. The first one was on the genera *Schizotetranychus*, *Yezonychus* and *Tribolonychus* (Zhang & Martin 2001). This paper concerns the genus *Sonotetranychus* Tuttle, Baker & Abbatiello, 1976.

The genus *Sonotetranychus* belongs to the subfamily Tetranychinae which has two sets of duplex setae on tarsus I and one on tarsus II, bare empodial claws and two pairs of para-anal setae (h_{2-3}) (Tuttle *et al.* 1976). Six species (see Table 1) have been described from Africa (Yemen), the Americas (Brazil, Costa Rica, Mexico, USA) and Asia (Iran, Pakistan and Taiwan) (Tuttle & Baker 1968; Chaudhri *et al.* 1974; Tuttle *et al.* 1976; Tseng 1990; Meyer *et al.* 1992; Feres & Flechtmann 1995; Meyer 1996; Khodayari *et al.* 2008). This paper reports the discovery of this genus in New Zealand. A new species, *Sonotetranychus tawhairauriki* sp. nov., is herein described from Nothofagaceae. Previous records of host plants for *Sonotetranychus* are Asteraceae, Berberidaceae, Boraginaceae, Caesalpiniaceae, Convolvulaceae, Fabaceae, Lamiaceae, Moraceae, Verbenaceae and lichen (see Table 1).

Terminology used in this paper follows that of Lindquist (1985). All measurements are in micrometers and refer to lengths unless otherwise stated. If the measurements differ for paired setae and other structures, a range is presented for those on the left and right side of the mite.

Sonotetranychus tawhairauriki sp. nov.

(Figs 1–20)

Description

Female (holotype). Specimen slightly engorged. Length of idiosoma 360; length of body from posterior end of idiosoma to anterior end of gnathosoma 488; maximum width 314 between levels of setae *c* and *d*.

Medial striae on dorsal prodorsum longitudinal anteriorly and gradually divergent toward posterior; striae on opisthosoma generally transverse (Figs 1, 17 & 19). Striae dotted sparsely with oblong lobes.

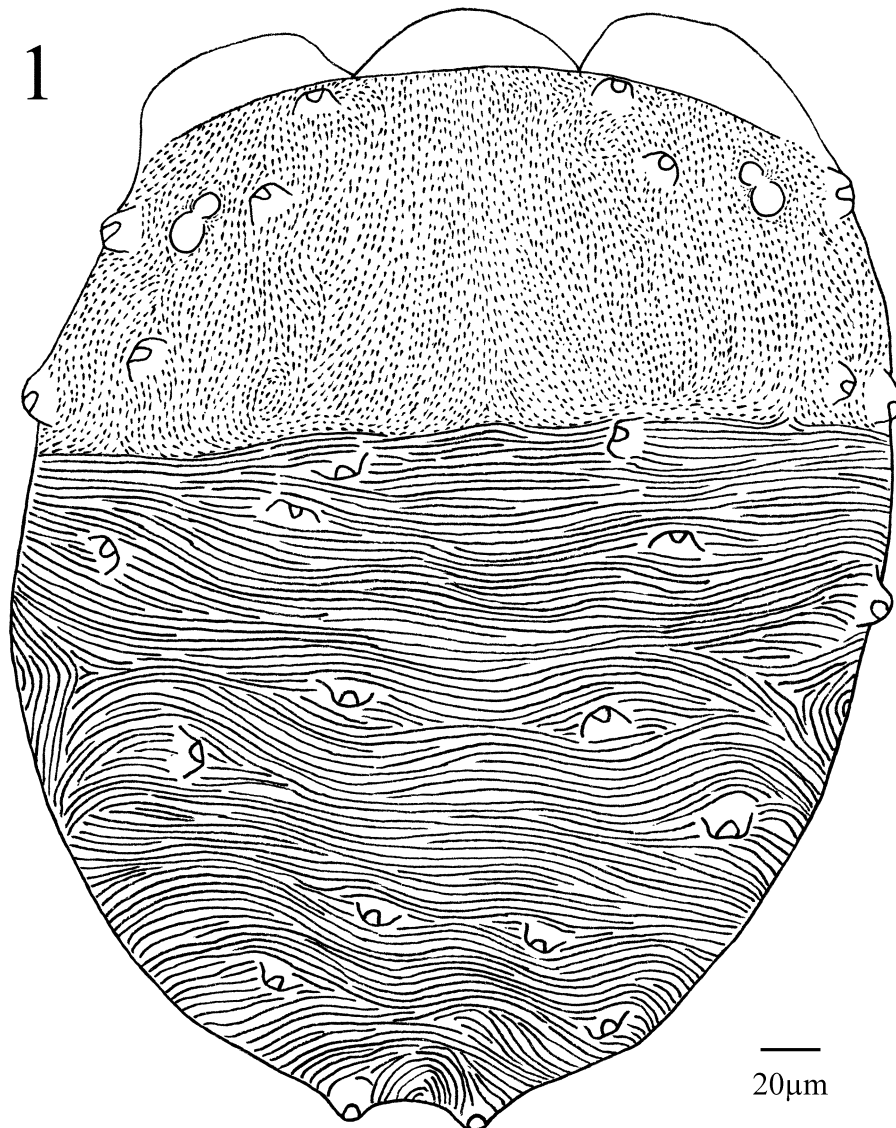
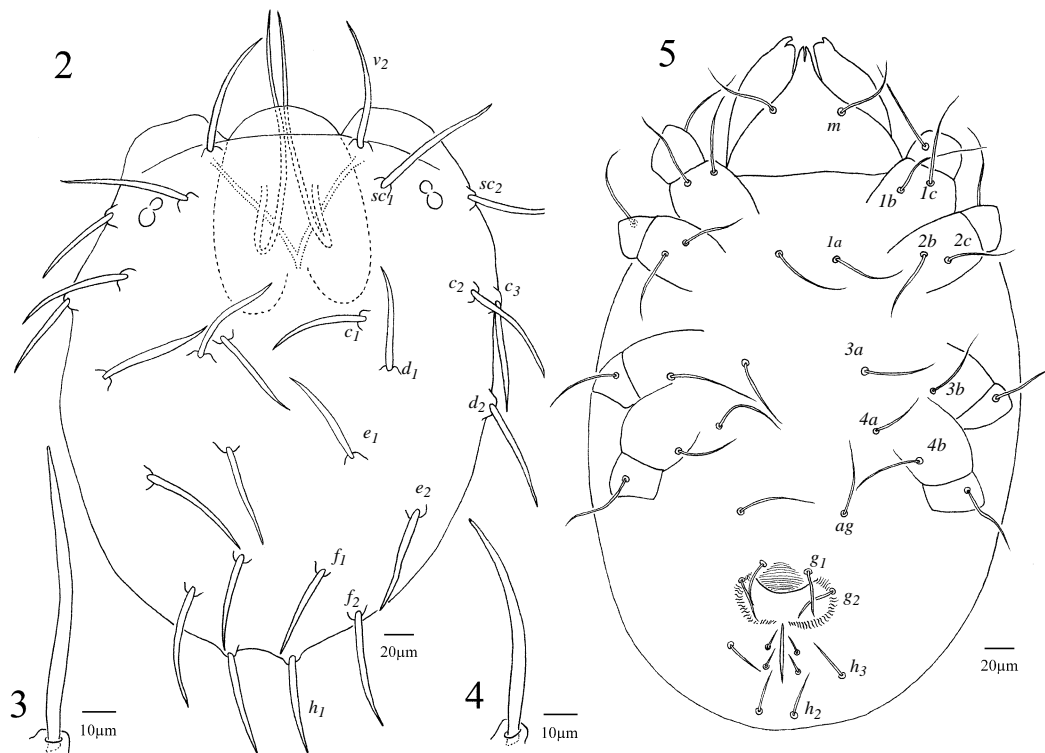


FIGURE 1. *Sonotetranychus tawhairauriki* sp. nov. (female), dorsal view of idiosoma, omitting setae to show the striae.



FIGURES 2–5. *Sonotetranychus tawhairauriki* sp. nov. (female), 2, dorsal view of idiosoma omitting striae to show setae, also showing tracheal trunks, cheliceral capsule and stylets; 3, enlarged sc_1 ; 4, enlarged c_1 ; 5, ventral view of body showing setae.

Each dorsal seta set on an elevated small tubercle (Figs 1–4, 17–19). All dorsal setae slender, weakly plumose, gradually tapering in distal half, but bluntly pointed. Length of setae v_2 (84–87) slightly shorter than distance v_2 – v_2 (102). Setae sc_1 subequal to v_2 in length; distance between setal bases sc_1 – sc_1 135; sc_2 (68) shorter than sc_1 . Setae c_1 (68–70) much less than distance c_1 – c_1 (100). Setae c_2 (82–92) longer than setae c_3 (64–66). Setae d_1 (70) slightly longer than half of distance d_1 – d_1 (130). Setae d_2 (82) longer than d_1 . Setae e_1 (70–73) only slightly shorter than distance e_1 – e_1 (83) and setae e_2 (78). Setae f_1 (64–68) longer than distance f_1 – f_1 (55), but shorter than setae f_2 (78–80). Setae h_1 terminal on idiosoma, 64 long, with distance between setal bases 42. Setae h_2 located at level of posterior end of anus, much thinner and shorter than h_1 , attenuate, finely plumose and pointed as other ventral setae; length as long as distance h_2 – h_2 (24). Para-anal setae h_3 similar to h_2 in length.

Medial striae on ventral idiosoma (anterior to genital opening) transverse (Figs 5 & 19), without lobes as seen on dorsal striae. Intercoxal setae $1a$ (46–48) slightly longer than distance between their bases (38). Intercoxal setae $3a$ (50–66) much shorter than distance between their bases (80). Intercoxal setae $4a$ (50) less than half the distance between their bases (106). Coxal setae $1b$ and $1c$ subequal in length (55–60). Coxal setae $2b$ and $2c$ (52–54). Distances $1b$ – $1c$ and $2b$ – $2c$ on each coxa less than 1/3 of respective setal length. Coxal setae $3b$ subequal to $4b$ in length (50–55).

Aggenital setae ag (43–46) shorter than distance ag – ag (67). Genital setae g_1 about as long as distance g_1 – g_1 (30). Genital setae g_2 slightly shorter than g_1 . Both pairs of pseudanal setae (ps_{1-2}) about half as long as genital setae (Fig. 5).

TABLE 1. Hosts and distribution of *Sonotetranychus* species of the world.

<i>Sonotetranychus</i> species	Hosts plants	Distribution	References
<i>albiflorae</i> (Tuttle & Baker, 1968)	<i>Brickellia</i> sp. (Asteraceae)	Mexico	Tuttle, Baker & Abbatiello, 1974
	<i>Ipomoea</i> sp. (Convolvulaceae)	Mexico	Tuttle, Baker & Abbatiello, 1974
	<i>Dalea albiflora</i> (Fabaceae)	Mexico	Tuttle, Baker & Abbatiello, 1974
	<i>Dalea albiflora</i> (Fabaceae)	USA	Tuttle & Baker, 1968
	<i>Dalea tuberculata</i> (Fabaceae)	Mexico	Tuttle, Baker & Abbatiello, 1974
	<i>Cordia</i> sp. (Boraginaceae)	Mexico	Tuttle, Baker & Abbatiello, 1976
	<i>Dalea bicolor</i> (Fabaceae)	Mexico	Tuttle, Baker & Abbatiello, 1976
	<i>Salvia ballotaeflora</i> (Lamiaceae)	Mexico	Tuttle, Baker & Abbatiello, 1976
	<i>Lantana camara</i> (Verbenaceae)	Mexico	Tuttle, Baker & Abbatiello, 1976
<i>angiopenis</i> Feres & Flechtmann, 1995	<i>Bauhinia</i> sp. (Caesalpiniaceae)	Brazil	Feres & Flechtmann, 1995
<i>daleae</i> (Tuttle & Baker, 1968)	<i>Dalea formosa</i> (Fabaceae)	USA	Tuttle & Baker, 1968
	<i>Dalea emoryi</i> (Fabaceae)	Mexico	Tuttle, Baker & Abbatiello, 1974
	<i>Acacia arabica</i> (Fabaceae)	Pakistan	Chaudhri, Akbar & Rasool, 1974
	Lichen	Taiwan	Tseng, 1990
<i>kermanensis</i> Khodayari, Kamali & Fathipour, 2008	<i>Ficus carica</i> (Moraceae)	Iran	Khodayari, Kamali & Fathipour, 2008
<i>tawhairauriki</i> sp. nov.	<i>Nothofagus solandri</i> var. <i>cliffortioides</i> (Nothofagaceae)	New Zealand	This paper
<i>vaneyndhoveni</i> Meyer, Ochoa & Aguilar, 1992	<i>Diphysa americana</i> (Fabaceae)	Costa Rica	Meyer, Ochoa & Aguilar, 1992
<i>wadicolus</i> Meyer, 1996	Unidentified plants	Yemen	Meyer, 1996

Length of leg segments. Femur I 133–140; genu I 60–62; tibia I 80–82; tarsus I 102. Femur II 90–94; genu II 52; tibia II 60–62; tarsus II 82–84. Femur III 84–86; genu III 46–48; tibia III 64; tarsus III 90–93. Femur IV 94–100; genu IV 53–54; tibia IV 74–76; tarsus IV 96–100 (Figs 6–13).

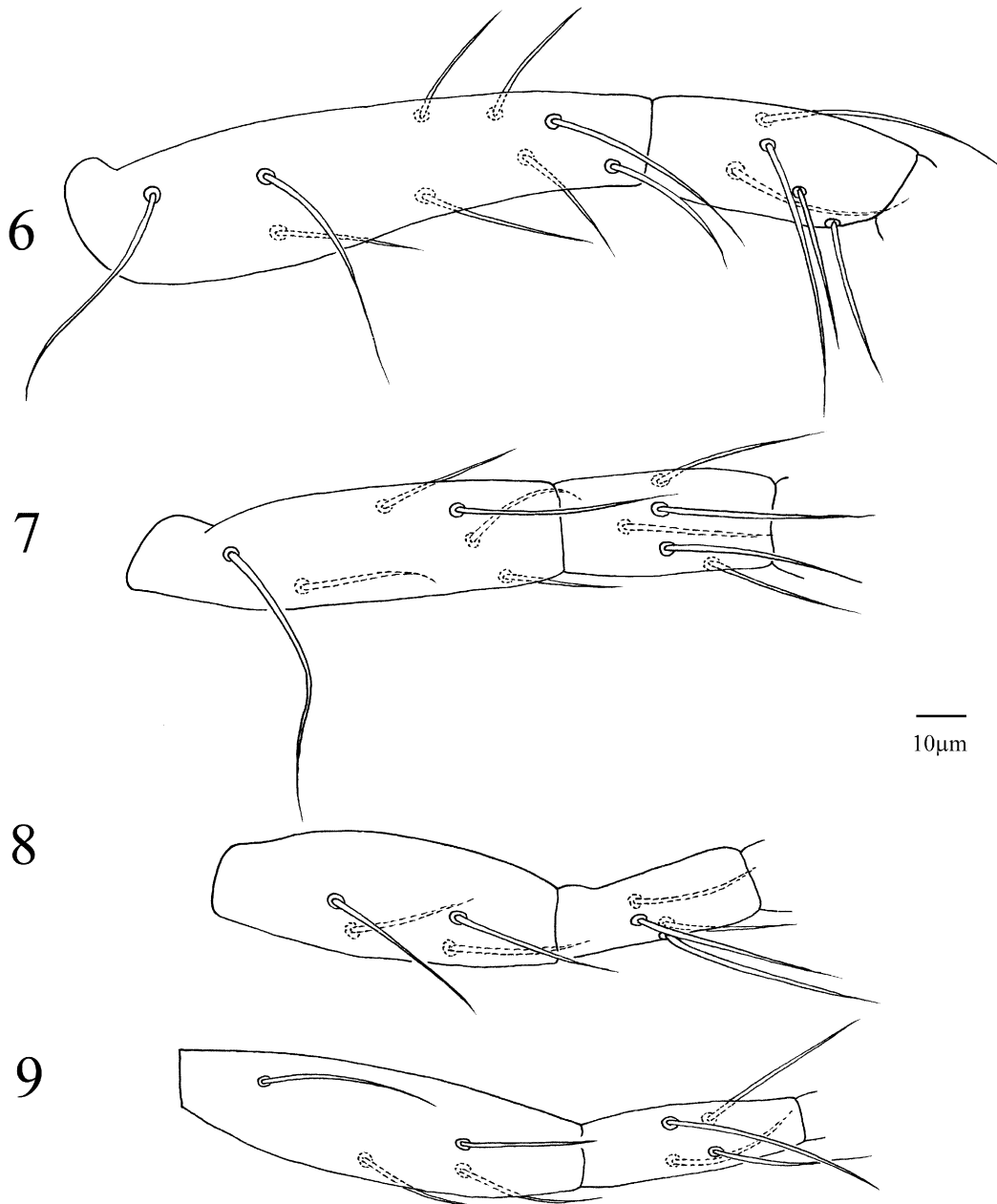
Number of tactile setae (including eupathidia on tarsus) and solenidia (in parentheses) on legs I–IV as follows: coxae 2-2-1-1; trochanters 1-1-1-1; femora 9-6-4-4 or 3; genua 5-5-4-4; tibiae 9(1)-9-7-8; tarsi 16(3)-14(1)-10(1)-10(1). Tarsus I with 7 tactile setae and 1 solenidion proximal to proximal duplex setae; tarsus II with 7 tactile setae and 1 solenidion proximal to duplex setae (Figs. 10–11). Tarsi I and II each with three eupathidial setae with blunt tips ($p'\zeta$, $p''\zeta$ and $s\zeta$).

Empodium claw-like, with a minute dorsal hair (Fig. 14).

Stylophore striated longitudinally on dorsum. Peritremes tube-like, simple, without hooks distally. Subcapitular setae m (40) shorter than distance $m-m$ (48). Two pairs of adoral setae minute (3). Palpal setae dPF_e whip-like, as long as palp. Seta $l''PGe$ about 50 long. Setae dPT_i longer than lateral setae $l'PT_i$ and $l''PT_i$; close and slightly anterior to dPT_i , a short fine seta present. Palptarsus much shorter than its diameter; solenidion ω on palptarsus smallest of all setae (about 4); setae a and b about 3 times as long as solenidion; spinneret $su\zeta$ 11 long, twice as thick as solenidion, tapering gradually to a bluntly pointed tip; eupathidia $ul\zeta''$ (10) longer than $ul\zeta'$; palptibial claw strongly curved with a divided tip (Fig. 16).

Deutonymph (*paratype*). Specimen not fully extended (possibly not well fed). Length of

idiosoma 174; length of body from posterior end of idiosoma to anterior end of gnathosoma 244; maximum width 180 between levels of setae *c* and *d*. Similar to adult female but generally smaller with the following differences.

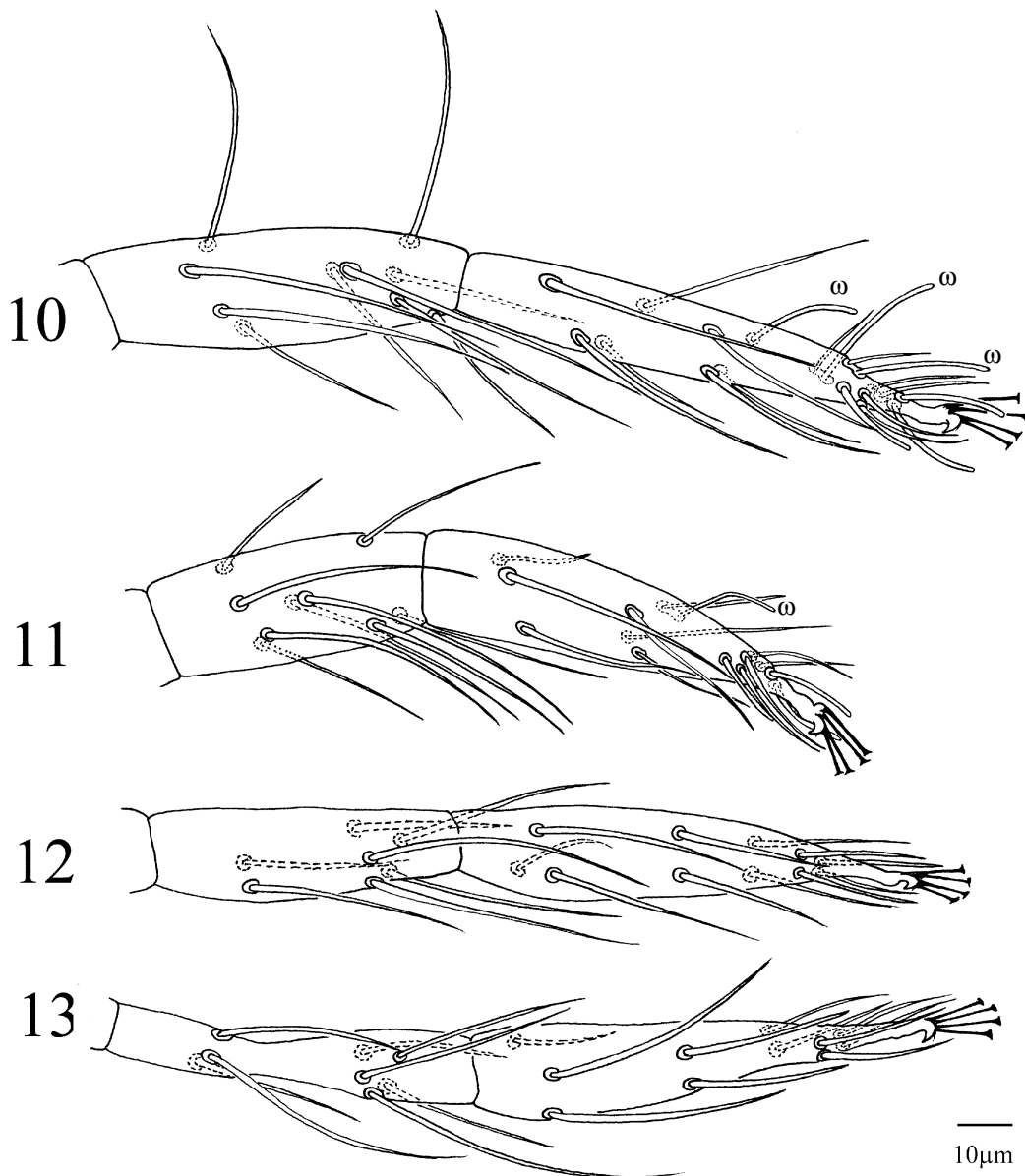


FIGURES 6–9. *Sonotetranychus tawhairauriki* sp. nov. (female), 6, femur and genu I; 7, femur and genu II; 8, femur and genu III; 9, femur and genu IV.

Length of setae v_2 (54–58) less than distance v_2-v_2 (74). Setae sc_1 (61–64) longer than sc_2 (48–50); distance between setal bases sc_1-sc_1 94. Setae c_1 (51–54) less than distance c_1-c_1 (60). Setae c_2 (58–62) longer than setae c_3 (48–50). Setae d_1 (47–50) longer than half of distance d_1-d_1 (70). Setae d_2 (58) longer than d_1 . Setae e_1 (60–63) only slightly longer than distance e_1-e_1 (52) and setae

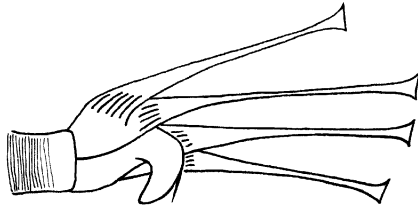
e_2 (56). Setae f_1 (42–45) longer than distance f_1-f_1 (34), but shorter than setae f_2 (52). Setae h_1 (40) terminal on idiosoma, twice the distance h_1-h_1 (20). Setae h_2 located at level of posterior end of anus, much thinner and shorter than h_1 , attenuate, finely plumose and pointed as other ventral setae; length about twice as long as distance h_2-h_2 (10). Para-anal setae h_3 similar to h_2 in length.

Intercoxal setae $1a$ (35) slightly longer than distance between their bases (32). Intercoxal setae $3a$ (34) much shorter than distance between their bases (58). Intercoxal setae $4a$ (32) about half the distance between their bases (62). Coxal setae $1b$ and $1c$ subequal in length (50). Coxal $2b$ and $2c$ (40). Distances $1b-1c$ and $2b-2c$ on each coxa less than 1/3 of respective setal length. Coxal setae $3b$ 34 long. Coxal seta $4b$ absent.

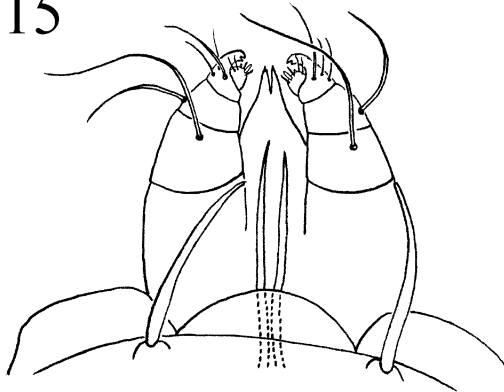


FIGURES 10–13. *Sonotetranychus tawhairauriki* sp. nov. (female), 10, tibia and tarsus I; 11, tibia and tarsus II; 12, tibia and tarsus III; 13, tibia and tarsus IV.

14



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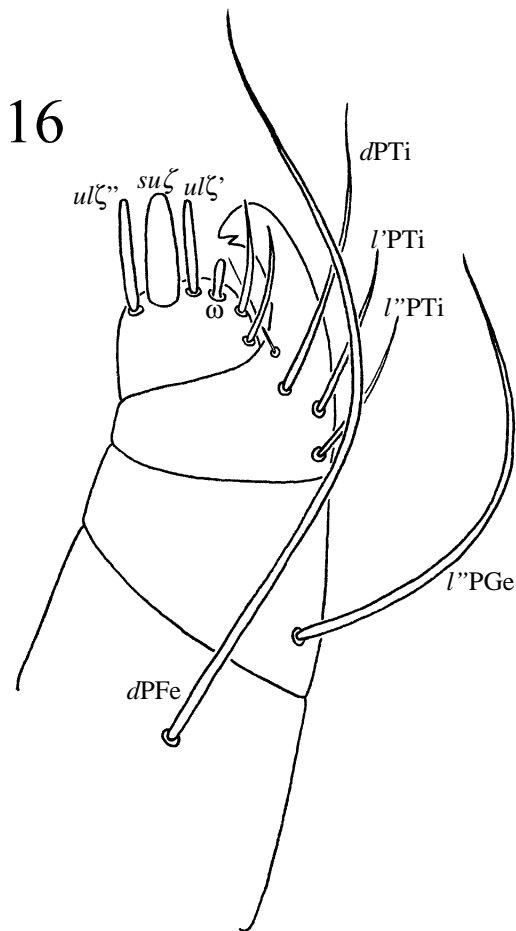


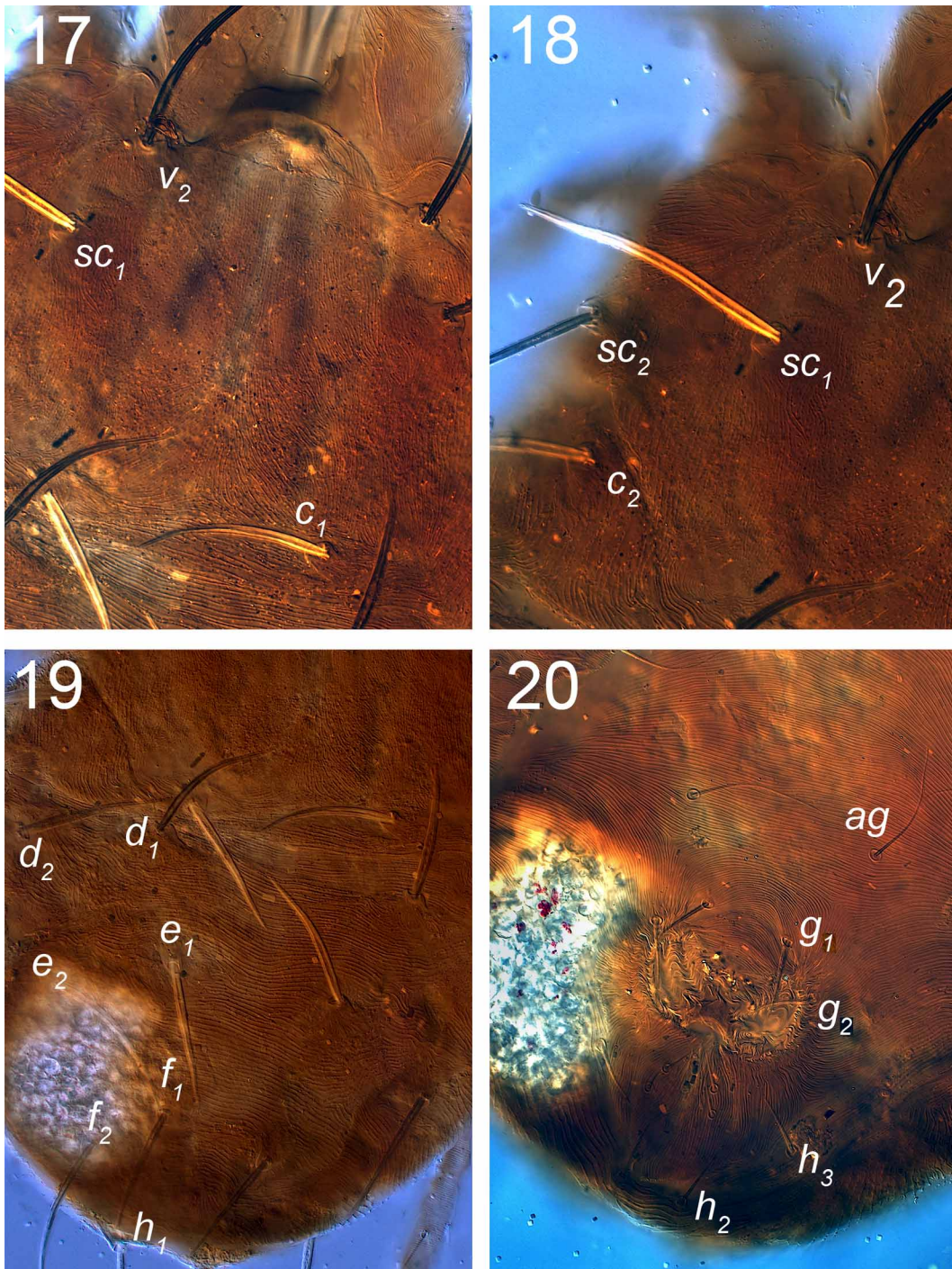
FIGURE 14–16. *Sonotetranychus tawhairauriki* sp. nov. (female), 14, tarsal apotele; 15, gnathosoma and palps; 16 palp (enlarged view).

Aggenital setae *ag* (26) longer than distance *ag–ag* (23). Genital setae *g*₁ (12) shorter than distance *g*_{1–g}₁ (20). Genital setae *g*₂ absent. Both pairs of pseudoanal setae (*ps*_{1–2}) about half as long as para-anal setae *h*₃.

Length of leg segments. Femur I 90; genu I 34–38; tibia I 42–46; tarsus I 66. Femur II 68–70; genu II 33–35; tibia II 32–36; tarsus II 55–56. Femur III 50–57; genu III 26–39; tibia III 30; tarsus III 56–58. Femur IV 52–56; genu IV 26–27; tibia IV 33–36; tarsus IV 53–58.

Number of tactile setae (including eupathidia on tarsus) and solenidia (in parentheses) on legs I–IV as follows: coxae 2-2-1-0; trochanters 1-1-1-1; femora 6-3-2-2; genera 5-5-3-3; tibiae 7(1)-5-5-5; tarsi 13(3)-11(1)-8(1)-8. Tarsus I with 4 tactile setae and 1 solenidion proximal to proximal duplex setae; tarsus II with 3 tactile setae proximal to duplex setae. Tarsi I and II each with three eupathidial setae with blunt tips (*p'ζ*, *p''ζ* and *sζ*).

Subcapitular setae *m* (30) about as long as distance *m–m*. Two pairs of adoral setae minute (3–4). Palpal setae *dPFe* whip-like, as long as palp. Seta *l''PGe* about 40 long. Setae *dPTi* (26) slightly longer than lateral setae *l'PTi* and *l''PTi*. Palptarsal solenidion *ω* smallest of all setae (about 3); setae *a* and *b* both about 3 times as long as solenidion; spinneret *suζ* 8 long, twice as thick as solenidion, tapering gradually to a bluntly pointed tip; eupathidia *ul''ζ* (10) longer than *ul'ζ* (6).



FIGURES 17–20. *Sonotetranychus tawhairauriki* **sp. nov.** (female), photomicrographs of female. 17, part of gnathosoma, prodorsum and anterior hysterosoma, mainly showing setae v_2 , sc_1 and c_1 and the striae; 18, one side of prodorsum and anterior hysterosoma, showing setae v_2 , sc_{1-2} and c_2 ; 19, dorsal hysterosoma, showing striae and setae d_1-h_1 ; 20, posterior ventral opisthosoma showing anus and genital opening.

Male. Not known.

Type material

New Zealand, NN, Ngatimoti, 25 Feb. 1965, E. Collyer, holotype female and paratype deutonymph, from *Nothofagus solandri* var. *cliffortioides* (Nothofagaceae). Both specimens are on the same slide (holotype labeled A and paratype labeled B; slide no. ZQZ 20020412-1 with also a female of *Panonychus* sp. A, which is labeled as C) and deposited in New Zealand Arthropod Collection (NZAC), Auckland.

Etymology

Named after the host plant, mountain beech *Nothofagus solandri* var. *cliffortioides* —tawhai rauriki is the Maori name for this plant and is used here as a noun in apposition.

Remarks

Khodayari *et al.* (2008) provided a key to species of *Sonotetranychus*. This new species keys to *S. wadicolous* Meyer, 1996, to which the new species is most similar. However, the new species differs obviously from *S. wadicolous* Meyer in (1) prodorsal median striae being divergent posteriorly (U-shaped in *S. wadicolous*) and (2) the lack of widely V-shaped striae between setae e_1 on dorsal hysterosoma. The new species also differs from *S. wadicolous* in leg chaetotaxy (normal tactile setae) in the female: femora 9-6-4-4(3) in the new species but 8-7-3-2 in *S. wadicolous*; genua 5-5-4-4 in the new species but 5-5-4-3 in *S. wadicolous*; tibiae 9-9-7-8 in the new species but 9-5-5-5 in *S. wadicolous*.

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