ACTA ENTOMOLOGICA
MUSEI NATIONALIS PRAGAE
ISSN 1804-6487 (online) – 0374-1036 (print)

2024
64(2): 455–500
doi: 10.37520/aemnp.2024.031
www.aemnp.eu

RESEARCH PAPER

Revision of flightless New Zealand Picrotini (Coleoptera: Cryptophagidae): phylogeny of *Thortus*, eye reduction, and rarity

Richard A. B. LESCHEN[1)], Yandong CHEN[2)] & Aaron M. T. HARMER[3)]

[1)] New Zealand Arthropod Collection, Manaaki – Whenua Landcare Research, Private Bag 92170, Auckland, New Zealand; e-mail: leschenr@landcareresearch.co.nz
[2)] Hangzhou Xiaoshan Minshengtonghui Rural Revitalization Center, Hangzhou 311256, China; email: wolfecyd@gmail.com
[3)] New Zealand Arthropod Collection, Manaaki – Whenua Landcare Research, Private Bag 92170, Auckland, New Zealand; e-mail: harmera@landcareresearch.co.nz

Accepted:
25th November 2024

Published online:
26th December 2024

Abstract. The apterous New Zealand genera *Picrotus* Sharp, 1886 and *Thortus* Broun, 1893 are revised to include two species and 13 species, respectively, with 12 new species: *Picrotus wairarapa* sp. nov., *Thortus bullerensis* sp. nov., *T. crowsoni* sp. nov., *T. helmorei* sp. nov., *T. latus* sp. nov., *T. lobatus* sp. nov., *T. luscus* sp. nov., *T. michauxi* sp. nov., *T. parallelus* sp. nov., *T. simplex* sp. nov., *T. sulcatus* sp. nov. and *T. tioripatea* sp. nov. One species previously thought to be a member of *Picrotus* is transferred to a new genus: *Callichrotus gimmeli* gen. & sp. nov. The largest species, *T. michauxi,* is endemic to the subantarctic islands while the rest are mainland. Four species of *Thortus* have eyes consisting of a single ommatidium. We determined the origin of microphthalmy and attempt to reconstruct the biogeography of *Thortus* with a morphological cladistic analysis that included *Callichrotus* and *Picrotus* as outgroups. *Thortus michauxi* was sister to remaining species with largely unresolved relationships and included two monophyletic clusters. *Thortus amoenus* (Broun, 1912), *T. lobatus*, and *T. sulcatus* formed a group based on the presence of a complete parasutural striae, and within it, the latter two species have parameres with posterior membranous extensions, which supports them as sister species. In some trees, *T. bullerensis*, *T. parallelus*, and *T. ovalis* are supported by a narrowly constricted frons, a character that is variable within the genus. Microphthalmy evolved multiple times in *Thortus*. Eye reduction in other New Zealand beetles is reviewed. Based on number of collection events and specimen counts, most species would be considered as rare, with six newly described species known from single locations, three species of which are known from singletons. Despite classed as rare, it is likely that most species may be protected from extinction because they live in reserves or national parks.

Key words. Coleoptera, Cucujoidea, Cryptophagidae, Picrotini, biogeography, conservation, flightlessness, key to species, morphology, new genus, new species, ommatidia, rarity, taxonomy, New Zealand

Zoobank: http://zoobank.org/urn:lsid:zoobank.org:pub:4EA436B1-1BCB-405E-B4F6-7F4D285C9713

Introduction

The Picrotini are a south temperate group of cryptophagine Crypotophagidae, which includes 22 genera and 45 described species distributed in Australia, Papua New Guinea, South America, and New Zealand (Gimmel & Leschen 2022). Adults are 1.5 mm to 3.0 mm, typically brown to red brown and usually covered with a vestiture of setae. Most adults are probably mycophagous, though some feed on pollen and fern spores (Leschen & Lawrence 1991, Leschen & Gimmel 2012). Larvae are rarely encountered (Leschen 1996) and most are probably saproxylic. The New Zealand flightless species treated here are edaphic and saproxylic, collected by sifting leaf litter and coarse woody debris.

Apart from a taxonomic revision of the fauna of the Juan Fernández Islands, Chile (Leschen & Lawrence 1991) and descriptions of a few type species for newly described genera (Gimmel & Leschen 2022), no modern treatment exists for species of Picrotini (Leschen & Gimmel 2012,

Gimmel & Leschen 2022). Here we revise the New Zealand endemic genera *Picrotus* Sharp, 1886 and *Thortus* Broun, 1893. These two genera have, on occasion, been referred to as the *Picrotus* group by Leschen (2001, 2010) and constitute the tribe as originally proposed by Crowson (1980) by having flightless adults and larvae lacking ocelli.

Thortus was erected for a single species, *T. ovalis* Broun, 1893. A second species, *T. amoenus* (Broun, 1912), was placed in the genus by Gimmel & Leschen (2022). Broun (1912) had considered this species a member of a new genus with the manuscript name '*Pithortus*', though he placed it in *Cryptophagus* Herbst, 1792 (see Leschen & Gimmel 2012). Crowson, too, had labelled specimens from the Auckland Islands and the Catlins with the name '*Pithortus*', though others he labelled as new species of *Thortus*. These actions suggest that *Thortus,* as recognized presently, may be paraphyletic.

Picrotus was erected for the single species *P. thoracicus* Sharp, 1886. Gimmel & Leschen (2022) alluded to *Picrotus* having two new species, one of which is shown in their Fig. 69 (p. 95). However, we consider this illustrated species as a member of a new, monotypic genus. In addition, Gimmel & Leschen (2022) alluded to nine new species of *Thortus* to which we have two additional new species described herein.

Gimmel & Leschen (2022) noted that most new species of *Thortus* are range-restricted and included the presence of a comparatively large-bodied new species from the subantarctic Auckland Islands. They did not mention that adults of some of the new species of *Thortus* are microphthalmic, having the eye reduced to a single ommatidium (Fig. 19D). We reconstruct the phylogeny of *Thortus* to confirm its monophyly to include those species referred to in collections as '*Pithortus*', test the monophyly of the microphthalmic species, and reconstruct its biogeographic history.

Making species known via formal names (e.g., Page 2016) and producing works that facilitate accurate identifications for biodiversity monitoring (e.g., Egli et al. 2020) are paramount to ongoing conservation management. Rare species are of conservation interest (Prendergast et al. 1993) because a low abundance may lead to their extinction (Gilpin & Soulé 1986); moreover, certain traits, like body size, narrow distribution, and flightlessness may contribute to species rarity (Chichorro et al. 2019). We consider rarity of flightless picrotines and the implications for their conservation in New Zealand.

Material and methods

We examined a total of 957 specimens from 226 collecting events for 16 species. Specimens were examined from the following collections:

AMNZ Auckland War Memorial Museum (John Early);
ANIC Australian National Insect Collection, Canberra (Adam Ślipiński);
BMNH Natural History Museum, London (Maxwell V. L. Barclay and Keita Matsumoto);
BPMN Bishop Museum, Honolulu (Jeremy Frank);
FMNH Field Museum of Natural History (Alfred F. Newton);
FRNZ Scion, Forest Research Institute of New Zealand, Rotorua (Carl Wardhaugh);
LUNZ Lincoln University Entomology Research Collection, Canterbury (John Marris);
NZAC New Zealand Arthropod Collection, Auckland (Richard A. B. Leschen);
OMNZ Otago Museum, Dunedin (Brian Patrick).

Examined material is listed geographically by area code (Crosby et al. 1998). Label information on type specimens for previously described species was provided by Leschen & Gimmel (2012). Label information on holotypes of new species is quoted verbatim with double forward slashes '//' separating labels. All remaining label information was standardized and georeferenced to degrees-minutes of latitude and longitude, provided in brackets '[]' if not on original labels. Barcodes were listed sequentially for NZAC and AMNZ material for multiple specimens from a single collecting event.

Several species are known from singletons or a limited number of specimens. Apart from one species, all of these were imaged and subsequently dissected for study. Genitalia were extracted from specimens by soaking the entire body in cold 10% potassium hydroxide (KOH) to macerate soft tissue. The genitalia, along with the remaining cleared body, were examined in glycerin on microslides and observed by light microscopy. The aedeagi of picrotines are extremely fragile and some were damaged while separating the tegmen from the penis. In the descriptions questionable characteristics of the male genitalia marked with a '?' refer to these damaged or lost parts.

Length was measured from the anterior margin of the pronotum to the apex of the elytra. Terminology in the descriptions was based on Harris (1979), Lawrence et al. (2010) and Gimmel & Leschen (2022). The length of the gena was gauged from the posterior edge of the antennal fossa to the anterior tip relative to the length of antennomere 1. In smaller specimens, male tenent setae may be scarcely modified with spoon-shaped apices; these must be examined with high magnification and in dissections. Postcoxal lines present on abdominal ventrite 1 are referred to as abdominal postcoxal lines.

Images were taken with either a Canon EOS 5D Mark III digital camera in conjunction with Nikon Plan Apo 10X/0.45 objective attached to a Canon EF 75–300 f4–5.6 III Lens or a Canon EOS RP with Mitotuyo M Plan APO 5X or 10X objective lens. Microstructures were photographed with a Zeiss Axio Scope A1 microscope equipped with a Canon 5d3 digital camera. All images were focus stacked using Helicon Focus 6.8.0 and adjusted in Adobe Photoshop CC 2018 or 2024.

Distribution maps were generated in R (R Core Team 2024) using the ggplot2 (Wickham 2016) and sf (Pebesma 2018) packages. Department of Conservation administered public conservation land and Crosby code shape files were added as map layers.

We examined the phylogenetic distribution of microphthalmy and the biogeography of *Thortus* with a morphological cladistic analysis that included *Callichrotus* and *Picrotus* as outgroups (see method in Nixon & Carpenter 1993). These three genera taxa share the absence of hindwings, which indicates that they may potentially be related; however, a more robust sampling is required to determine

if these New Zealand taxa form a monophyletic group within the Picrotini. Lastly, the two species referred to as '*Pithortus*' by Broun and Crowson placed within *Thortus*, would confirm the monophyly of the described genus.

The following 20 adult characters and entered in Mesquite (Maddison & Maddison 2011) with unknown, inapplicable, or missing states coded as '?' (Table 1):

1. Body form: 0, elongate (over 2 times longer than wide); 1, ovoid (about 2 times longer than wide).
2. Frons: 0, not constricted; 1, constricted to form a ridge. The frons is not constricted in *Callichrotus* and *T. michauxi*.
3. Width of constricted frons (most slender part) compared to the width of antennomere 1 (A1): 0, frons narrower than A1; 1, frons greater or equal to A1.
4. Antennal ridge: 0, absent; 1, present. This is a distinct ridge that may surround the antennal fossa. It is absent in *T. michauxi*.
5. Posterior angle of pronotum: 0, weak or not projecting (Fig. 2A); 1, strongly projecting (Fig. 4C).
6. Bead on frons: 0, absent (Fig. 9C); 1, present (Fig. 11D). A bead at the edge of the frons is present in *T. amoenus, T. lobatus,* and *T. sulcatus.*
7. Crenulate line on frons: 0, absent (Fig. 13C); 1, present (Fig. 10C). A transverse crenulate line is present in several *Thortus* species.
8. Vertexal line: 0, distinct (Fig. 16B); 1, absent (Fig. 4A). A vertexal line, a key feature of many cucujoids, is absent in *Picrotus* spp.
9. Gena: 0, relatively short (Fig. 15C);1, relatively long and well-developed (Fig. 4B). The length of the gena varies; which is long in *Picrotus* spp. and in *T. amoenus, T. lobatus,* and *T. sulcatus*.
10. Gular line on submentum: 0, present; 1, absent.
11. Number of facets in eye: 0, > 10; 1, one; 2, six or seven. C11-2 only for *T. latus.*
12. Number of antennomeres in club: 0, three; 1, two.
13. Width of lateral pronotal bead compared to width of antennal club: 0, narrower; 1, wider.
14. Greatest width of prothorax: 0, at or near middle; 1, in the anterior third; 2, at base.
15. Basomedial macropuncture on the pronotum: 0, absent; 1, present.
16. Scutellar shield: 0, not reduced; 1, reduced.
17. Elytral parasutural stria: 0, incomplete or absent; 1, complete to base of elytron.
18. Postcoxal lines on abdominal ventrite 1: 0, absent; 1, present.
19. Parameral shape: 0, conical; 1, broad; 2, reduced. Typical picrotine parameres are more or less conical (Gimmel & Leschen 2022). The parameres of *Picrotus* spp. are broad, plate-like, and reduced in *T. michauxi.* Males are unknown for *T. crowsoni, T. tioripatea,* and *T. parallelus*.
20. Apex of paramere: 0, normal; 1, with a membranous extension. Males are unknown for *T. crowsoni, T. tioripatea,* and *T. parallelus*.

Table 1. Data matrix for cladistic analysis.

	1	2
Taxon	12345678901234567890	
Callichrotus gimmeli	10110000000112000100	
Picrotus thoracicus	11111001110110110110	
P. wiararapa	11111001110110010110	
Thortus amoenus	01010100100000001000	
T. lobatus	01110100100000001001	
T. sulcatus	01110100100000001001	
T. michauxi	00100000000000100120	
T. bullerensis	01010010000001100000	
T. simplex	01110010000001100000	
T. helmorei	01110010001001000100	
T. parallelus	01010010000000010000??	
T. latus	01110010002000100000	
T. crowsoni	01110000001000000??	
T. luscus	01110010001000100000	
T. tioripatea	01110010000000000??	
T. ovalis	01010010000000100000	

Tree reconstructions were done by heuristic searches in PAUP* (Swofford 2002, version 4.0a169) with settings as follows: swapping on all trees, random addition sequences with 10,000 replicates, 25 trees held at each step, steepest descent activated. Unambiguous characters were optimized onto the 50% majority-rule consensus tree manually rooted between *Callichrotus* and *Picrotus* in Mesquite to determine character support.

Empirical measure of species rarity requires meticulous experimental design (e.g., Crisfield et al. 2024). However, qualitative, anecdotal evidence for rarity can be established by the number of species contained in natural history collections (Daru et al. 2018), and particularly those specimens treated in taxonomic studies. We described rarity by plotting the mean number of specimens per date of collection by species. Any species falling below the median were considered rare.

Cladistic analysis

The analysis produced 425 trees (tree length 32, consistency index 0.72, retention index 0.81). The high number of trees relates to the ratio of taxa to characters (16:20). Reducing the number of trees may be possible if males were known for more species and, potentially, if continuous characters were studied and coded for (e.g., length and coverage of vestiture and punctation, shape of the pronotum). In the majority-rule consensus tree (Fig. 20), with the root placed between *Callichrotus* and *Picrotus* at node A, *Picrotus* and *Thortus* have the greatest width of prothorax at or near middle (14-0). *Picrotus* and *Thortus* are each rendered monophyletic as follows: node B (*Picrotus*); posterior angle of pronotum strongly projecting (5-1; Figs 4C,D), vertexal line absent (8-1; Fig. 4A), gena relatively long and well-developed (9-1; Fig. 4B), gular line on submentum absent (10-1; Fig. 4B), scutellar shield reduced (16-1; Fig. 3A), parameral shape broad (19-1; Fig. 3F); node C (*Thortus*): body form elongate (1-0; Fig. 6A), club with three antennomeres (12-0; Fig. 15A), width of lateral pronotal bead narrower than width of antennal club (13-0; Fig. 19D). There is a lower percentage of trees in majori-

ty-rule consensus that support the basal divergence of *T. michauxi* (node C), with the remaining species grouped in a large polytomy based on one character (postcoxal lines on abdominal ventrite 1 absent [18-1; Fig. 9B]). One group, consistently recovered as monophyletic at node G, is the *lobatus* group that includes *T. amoenus*, *T. lobatus*, and *T. sulcatus*. It is supported by three characters (bead on frons present [6-1; Fig. 6C], gena relatively long and well-developed [9-1; Fig. 11C], parasutural stria complete to base of elytron [17-1; Fig. 13A]) with *T. lobatus* and *T. sulcatus* rendered as sister species by having parameres with membranous extensions (20-1; Figs 11G,H, 18G,H). Supported in most trees, node F includes *T. bullerensis*, *T. ovalis*, and *T. parallelus*, which is united by a single character (width of constricted frons narrower than antennomere [3-0]), a variable character within the genus. *Thortus helmorei* and *T. simplex* are resolved together in about half of the trees, based on the width of the prothorax widest in the anterior third (13-2; Fig. 7A), a character that is also present in *T. bullerensis*. The *Thortus* with unifacetted eyes do not form a monophylum.

All species that had been referred to in collections as '*Pithortus*' are confirmed as members of *Thortus.*

Taxonomy

Callichrotus gen. nov.

(Figs 1–2)

Type species. *Callichrotus gimmeli* sp. nov., by present designation.

Diagnosis. The ovate, glabrous body form and antennal club of 2 antennomeres distinguish this genus from most Picrotini apart from *Picrotus*, which also has a broad lateral bead along the prothoracic carina with an abrupt inner margin with a furrow running parallel at the margin of the pronotal disc. It can be distinguished from *Picrotus* by its colouration, the widely separated antennal insertions with the frons between antennal insertions not strongly constricted and wider than length of antennal club, presence of a ridge on the vertex of the head, posterolateral angles of pronotum obtuse, prothoracic hypomeron separated from the pronotum by a suture, and abdominal ventrites 1 and 2 connate. The characters marked by an asterisk (*) in the description distinguish *Callichrotus* from *Picrotus*.

Description. Body form extremely short and stout, ovate, surfaces shining with extremely short, extremely sparse, inconspicuous, decumbent setae dorsally, erect or suberect setae totally absent; bicoloured. Head without tempora; vertex with ridge, temporal depression immediately anterior to ridge lacking; band of reticulate sculpture lacking. Frontoclypeus not projecting laterally anterior to antennal insertions; raised portion of frons between antennal insertions not strongly constricted, wider than length of antennal club. Transverse ridge above antennal insertions absent. Eye small, conical, not contacting antennal cavity; consisting of about 18 facets; interfacetal setae absent. Antenna inserted into large cavity on head; antennal club consisting of 2 antennomeres; antennomere 9 equal in width to antennomere 8 or almost imperceptibly wider. Mandible with apex bifid, subapical serrations present. Maxillary palpomere 4 subequal in length to 3; palpomere 4 conical but not subulate. Gena without antennal groove; genal spines broadly to narrowly rounded, right to obtuse. Gular sutures present, incomplete, not reaching occipital foramen. Pronotum not explanate, not constricted at base, equal in width to base of elytra, widest in basal half, distinctly transverse; anterior angles weakly to strongly projecting anteriorly (extending anterior to cervical foramen of prothorax), without a distinct platform; lateral carina present and complete, not bearing setigerous tubercles, lateral bead along the prothoracic carina broad, about as wide as antennal club, with an abrupt inner margin and furrow running parallel at the margin of the pronotal disc; disc without transverse basal impression extending across width of pronotum; paramedial carinae and paralateral plicae absent; posterolateral angles obtuse. Prothoracic hypomeron separated from pronotum by suture. Prosternum with anterior margin on same plane as disc; prosternal process with lateral marginal beads weakly present, parallel-sided, connected across apex, process without narrow longitudinal depression medially, process expanded apically, apex truncate and not crenulate, lacking setae; procoxal cavity with anterolateral notch. Scutellar shield clearly visible and transverse. Elytron lacking humeral tooth, lacking subbasal and subapical impressions; subapical gape present; punctation coarse, densely concentrated in scutellar region; vestiture originating in punctures, uniformly short and recumbent. Hind wing vestigial. Mesoventrite with mesoventrital cavity bowl-like, glabrous, flanked by sharp carinae. Mesanepisternal pit absent. Metaventrite with short, crenulate postcoxal lines; discrimen absent, posterior notch of metaventrite absent. Metendosternite with anterior tendons widely separated or absent. Tarsi 5-5-5 in female, 5-5-4 in male; tarsi compact, tarsomere 5 wider than preceding tarsomeres in lateral view; pro- and mesotarsomere 4 asetose; mesotarsomere 3 not lobed, with few setae; mesotarsomeres 1–3 of subequal to equal lengths with 1 longer than 2, 3 and 4 equal, 4 slightly shorter than 3, mesotarsomere 5 as wide as tarsomeres 1–4 combined. Abdominal ventrites 1–3 solidly fused with sutures nearly obliterated, with medial calli absent, lateral calli present or absent, intersegmental crenulations absent; ventrite 1 with intercoxal process broadly rounded, with postcoxal lines absent; medio-basal thickenings of ventrites 3–5 absent; apex of ventrite 5 with crenulations. Abdominal spiracles on segment VII with openings present and not larger in diameter than spiracle VI, texture smooth and atrium rounded and saclike. Aedeagus with tegminal strut absent, tegminal arms contiguous; parameres separate and articulated to phallobase with inner surface concave, fused parameres combined about 3 times longer than wide; apices multisetose; attachment point to phallobase not constricted, interparameral process present; basipenis 4 times longer than distipenis, without median carina; distipenis rectangular and elongate and about 2 times longer than wide, outer rims not crenulate, lateral lobes narrowly separated, symmetrical; internal sac with a single arrow-shaped plate.

Etymology. The generic name is derived from a combination of the Latin prefix '*calli*-', meaning beautiful,

in reference to its striking colouration and '*-chrotus*', a genus ending used in one other cryptophagid. The gender is masculine.

Remarks. The species upon which this genus is based was originally considered an undescribed member of *Picrotus* by Gimmel & Leschen (2022: fig. 69) mainly by the presence of a broad lateral pronotal bead shared by both genera, and not present elsewhere in the tribe.

Distribution. New Zealand.

Included species. *Callichrotus gimmeli* sp. nov.

Callichrotus gimmeli sp. nov.

(Figs 1–2)

Type material. Holotype: ♂ (NZAC), labelled: 'NEW ZEALAND, WD, Mt Aspiring NP Haast Hwy, Bridle Tk, Davis Flat end footbridge from hwy. 15 Jan 2019, K. Marske / Mixed beech forest Sifted leaf and woody litter in moss free areas. -44.12639, 169.34029, 403 m, L siftate. KM360 / NZ Arthropod Collection Private Bag 92170 Auckland New Zealand NZAC04254545'. Paratypes (11; FMNH, NZAC). **South Island: NN:** 1 (FMNH), Arthur Range, W side Flora Saddle, 1 Jan 1985, leaf log litter forest floor, *Nothofagus* sp. mossy forest, A. Newton, M. Thayer, [41°11.399′S,172°44.474′E], NZAC04234533; 1, Nelson, Canaan, 13 Sep 1964, litter, L.P. Merchant, [40°56.580′S,172°53.574′E], NZAC04234454; 1, Nelson, Mount Arthur, Flora Track, 19 May 1966, moss, J.I. Townsend, [41°11.567′S,172°44.067′E], NZAC04272529. **BR:** 1, Boatmans Creek, 4 Oct 1971, Beech forest, litter, G. Kuschel, [42°1.333′S,171°52.117′E], NZAC04272530; 1, Boatmans Creek, 4.5km SE Cronadun, Nov 1971, litter, J. McBurney, [42°2.682′S,171°53.729′E], NZAC04234473; 2, Buller, Capleston, 6 Nov 1971, moss, J.C. Watt, [42°4.054′S,171°55.326′E], NZAC04234439, NZAC04272549; 1, Buller, Capleston, Redman Creek, 8 Nov 1972, moss, J.C. Watt, [42°2.692′S,171°53.015′E], NZAC04234465; 1, Lewis Pass, 12 Nov 1964, moss, G. Kuschel, [42°22.712′S,172°23.967′E], NZAC04235177. **NC:** 1, Arthurs Pass, 2 Mar 1966, moss tussock, J.I. Townsend, [42°54.439′S,171°33.566′E], NZAC04234498. **WD:** 2, WD, Mount Aspiring National Park, Haast Highway, Bridle Track, Davis Flat end footbridge from highway, 15 Jan 2019, mixed beech forest sifted leaf and woody litter in moss free areas, K. Marske, [44°7.583′S,169°20.417′E], NZAC04254530, NZAC04254538; 1, Fantail Falls, 3 km NE Haast Pass, sifted wood mould and litter, 84/20, J.C. Watt, [44°04.69′S 169°23.25′E], NZAC04272550. **OL:** 1, Makarora, McKerrow Range, 23 Jan 1978, sifted litter, G. Kuschel, [44°14.096′S,169°14.061′E], NZAC04234623.

Description. Length 1.30–1.50 mm. Colour of body dark to light reddish-brown and tan, legs, and sometimes the antennae and elytra lighter; and each elytron with broad maculation that reaches the suture in some specimens. Dorsal setae uniformly silver, pronotum and base of elytra with long, decumbent setae, lacking on posterior surfaces of the pronotal disc and maculation of the elytron. Ventral surfaces with recumbent setae, slightly shorter in length compared with those on dorsum; finely to densely punctate on most surfaces, punctation of the vertex of the head dense but not areolate, punctation of metaventrite denser than that of prosternum and more uniform, punctation of abdominal ventrites 1 to 4 less dense and impressed than metaventrite, and on ventrite 5 denser and smaller towards apex, which lacks a patch of posteriorly-directed setae. Head rugose-punctate, with smooth and shiny interspaces, punctures not forming transverse rows; vertex with ridge; transverse ridge above antennal insertions absent. Eye wider than long. Antennomere 2 globular, as long as wide, antennomere 3 conical, longer, as wide as 2, antennomere 4 subequal in width to 3, shorter than 3 and similar in length to 5, antennomeres 6–8 similar, antennomere 9 distinctly larger than antennomere 8 and narrower than antennomeres 10 and 11, antennomere 10 weakly transverse, about as wide as antennomere 11, antennomere 11 about 1.2 times length of than 10, slightly shorter than 9 and 10 combined. Pronotum transverse, pronotal length/width ratio ~0.73, widest at middle or slightly widest at base (some specimens from BR); lateral edges parallel and convergent anteriorly; pronotal punctation similar to that of frons but more irregular over much of the disc, punctures separated by about one puncture diameter or less, with smooth and shiny interspaces; anterior part of the lateral furrow pinched; posterior margin weakly sinuate without weak scutellar lobe. Prosternal process about 0.5 times wide as prosternal length. Elytra about 1.14 times as long as combined widths, about 1.16 times width of pronotum at greatest width, about 1.81 times length of pronotum length; punctation extremely sparse, fine to coarse, densely concentrated in scutellar region where punctures are separated by up to 2 puncture diameters, denser and becoming fused towards midline, sparser on disc and absent from macula; parasutural stria absent, apical gape present. Abdominal ventrite 1 with broad, truncate intercoxal process; intercoxal process wider than mesoventrital process. Aedeagus with apices with 4 primary setae distinctly longer than parameres.

Etymology. The epithet honors a colleague and friend of the first author, Matthew Gimmel, for his collaborative work on cryptophagids and contribution towards beetle systematics.

Distribution. South Island: NN, BR, NC (Fig. 21).

Remarks. This species is known from 12 specimens collected in the South Island. Half were taken in moss samples, a significantly higher proportion of all other species treated in this paper, including species of *Picrotus* that were collected three times from moss.

Picrotus Sharp, 1886

(Figs 3–5)

Type species. *Picrotus thoracicus* Sharp, 1886, by monotypy.

Diagnosis. *Picrotus* is easily distinguished from most Picrotini by having a broad body form with a glabrous body surface, an antennal club of 2 antennomeres, and a wide lateral bead along the prothoracic carina, which it shares with *Callichrotus*. It can be distinguished from *Callichrotus* by the narrower frons between the antennal insertion and free abdominal ventrites. A full description of this genus is available in Gimmel & Leschen (2022).

Included species. *Picrotus thoracicus* Sharp, 1886; *P. wairarapa* sp. nov.

Picrotus thoracicus Sharp, 1886

(Figs 3–4)

Picrotus thoracicus Sharp, 1886: 395.

= *Picrotus sanguineus* Broun, 1893: 1098. Synonymy by Leschen (1996: 606).

= *Picrotus pensus* Broun, 1910: 40. Synonymy by Leschen (1996: 606).

Material examined (127; AMNZ, LUNZ, NZAC). **North Island: WO:** 1, Maungatautari, 20 Nov - 17 Dec 2010, C. Watts, 37°58.133′S, 175°33.683′E, AMNZ86125; 1 (AMNZ), Mount Maungatautari track, Tari Road end, 1 Sept 2003, rotten wood, S.E. Thorpe, [38°0′S,175°34.8′E];

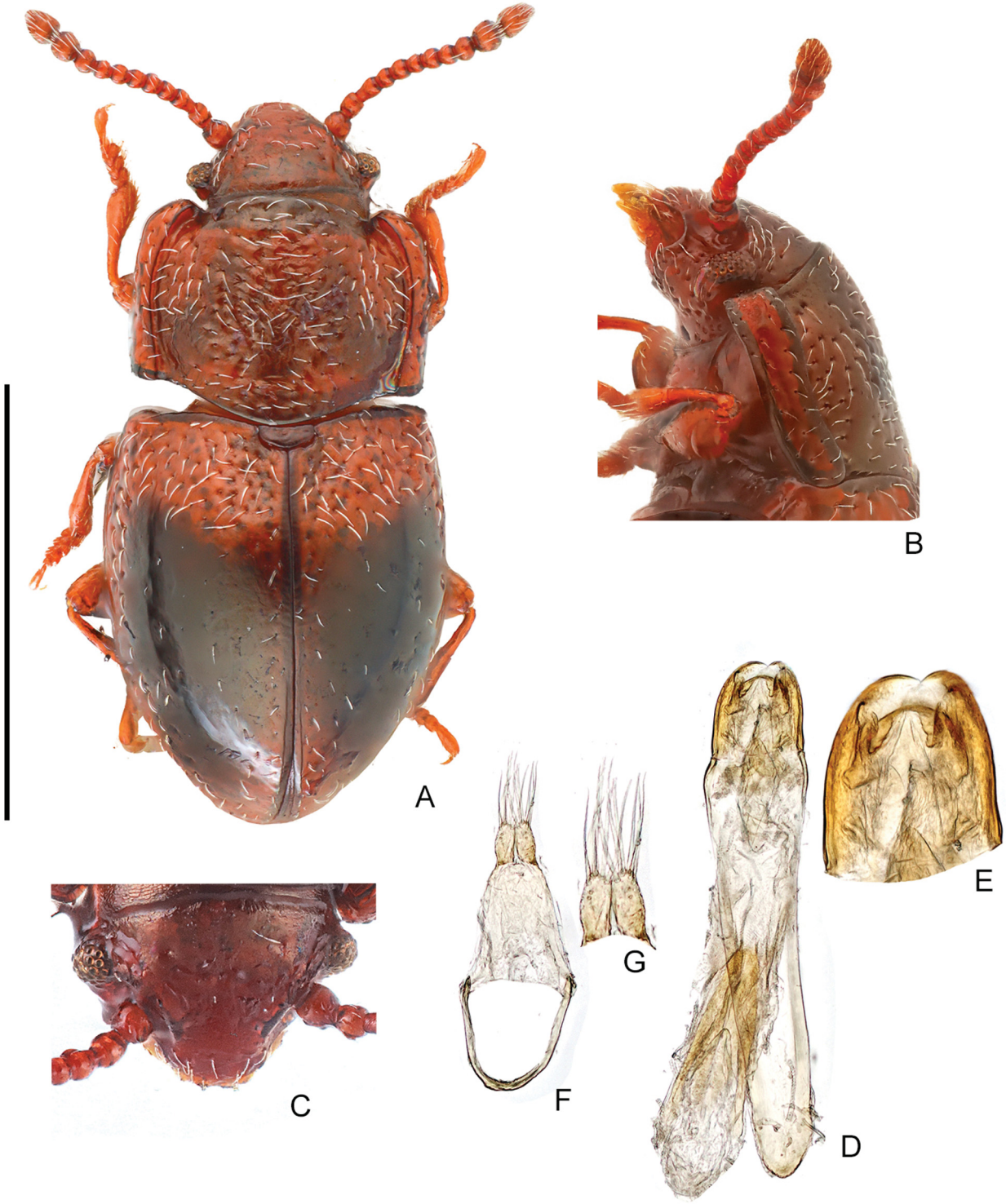

Fig. 1. *Callichrotus gimmeli* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – head and prothorax, lateral view; C – head, dorsal view; D – aedeagus, dorsal view; E – distipenis, dorsal view; F – tegmen, dorsal view; G – parameres, dorsal view.

1, Mount Pirongia, Grey Road track, 30 Jan 2003, on underside of log, S.E. Thorpe, [37°58.145′S,175°8.826′E], NZAC04234610; 1, Mount Pirongia, Mahaukura Track, 18 Nov 2005, J. Nunn Collection, [37°59.552′S,175°7.282′E], NZAC04234525 2 (LUNZ), Mount Pirongia, track at end of Waite Road, 6 Jan 2006, under bark dead branch on ground, S.E. Thorpe, [37°57.628′S,175°8.162′E]; 7, Mount Pirongia, track from end of Waite Road, 8 Jan 2002, under bark of dead branch on ground, S.E. Thorpe, 37°58.2′S,175°7.8′E, AMNZ47938, AMNZ47939, AMNZ47940, AMNZ47941, AMNZ47942, AMNZ47943, AMNZ47944; 1, Mount Pirongia, Waite Road track, 13 Dec 2004, under logs, S.E. Thorpe, 37°57.867′S,175°8.067′E, AMNZ67397; 1, W of Otorohanga, 6 Sep 1942, C.E. Clarke, 38°11.1′S,175°9.017′E, AMNZ30942. **TK:** 1, Tahora Scenic Reserve, west end of road tunnel, sifted wood and leaf litter, K. Marske, R. Leschen, T. Buckley, 39°1.218′S,174°47.968′E, KM196, NZAC03019739. **TO:** 1, Mt Ruapehu, Rangataua Forest, 15 Dec 1981, beech leaf litter, K.A.J. Wise, 39°25.6598S,175°27.207′E, AMNZ38132; 1, Waituhi Saddle, 2 Sep 1993, decayed wood, J. Nunn Collection, [38°51.859′S,175°32.733′E], NZAC04114151. **GB:** 1 (FRNZ),

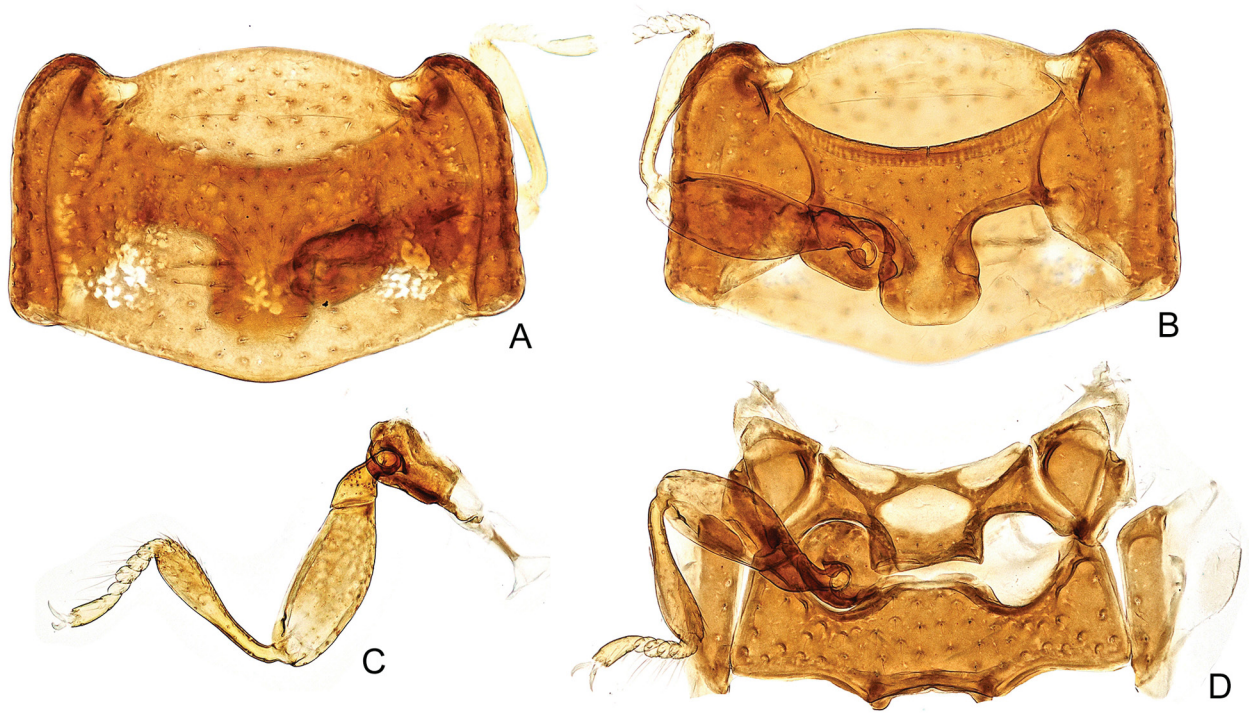

Fig. 2. *Callichrotus gimmeli* sp. nov., parts cleared in KOH. A – prothorax, dorsal view; B – prothorax, ventral view; C – hind leg; D – meso- and metaventrites.

Putere, Site 8495 – W, 16 Jan 13 - 13 Feb 2013, M. Scott, 38°56.39′S,176°55.004′E; 1 (FRNZ), Putere, Site 8661- 16 Jan 13 - 13 Feb 2013, E M. Scott 39°1.835′S,177°9.439′E. **RI:** 1, Kahuterawa, 27 Apr 1961, R.A. Cumber, [40°30.023′S,175°35.268′E], NZAC04238382; 1, Mataroa near Taihape, Paengaroa Scientific Reserve, 30 Mar 2006, T. Buckley, D. Seldon, R. Hoare, [39°38′S,175°43′E], RL1106, NZAC04114145; 1, Mataroa near Taihape, Paengaroa Scientific Reserve, 30 Mar 2006, T. Buckley, D. Seldon, R. Hoare, 39°38′S,175°43′E, RL1105, NZAC04234436; 1, Ruahine State Forest Park, Oroua River, 19 Jan 2008, leaf litter, K. Marske, R. Leschen, T. Buckley, [39°57.66′S,176°0.841′E], KM211, NZAC04136820; 6, RI, Ruahine State Forest Park, Oroua River, 19 Jan 2008, sifted leaf litter, K. Marske, R. Leschen, T. Buckley, 39°57.66′S,176°0.841′E, KM211, NZAC03018640, NZAC04114148, NZAC04114150, NZAC04234441, NZAC04234520, NZAC04234534; 1, Wharite Summit, 23 Oct 1994, litter, J. Nunn Collection, [40°15.274′S,175°51.454′E], NZAC04234523. **HB:** 1, Wairarapa, Waewaepa Range, 4 Sep 1965, litter, J.I. Townsend, [40°25.859′S,176°3.157′E], NZAC04238601. **WI:** 4, Manawatu, Pohangina Field Centre, 13 Jan - 10 Feb 2004, I. Johnston, 40°2.917′S, 175°57.317′E, AMNZ72127, AMNZ72129, AMNZ72130, AMNZ72131, AMNZ72132; 3, Manawatu, Pohangina Field Centre, 16 Dec 2003 - 13 Jan 2004, I. Johnston, 40°2.917′S,175°57.317′E, AMNZ72126, AMNZ72128. **WN:** 2, Akatarawa Saddle, 17 Mar 1978, litter, S.B. Peck, [40°56.907′S,175°6.502′E], NZAC04238561, NZAC04238623; 3, Akatarawa Saddle, 7 Mar 1978, litter, S.B. Peck, J. Peck, [40°56.851′S,175°6.485′E], NZAC04234519, NZAC04234524, NZAC04234539; 1, Akatarawa, Kakanui Park, 9 Mar 1978, bracket fungi, S.B. Peck, J. Peck, [40°57.891′S,175°8.123′E], NZAC04114157; 6, Kaitoke Regional Park, Pakuratahi Forks, 15 Apr 2005, leaf litter, R. Leschen, C. McGuiness, [41°3.374′S,175°11.698′E], RL975, NZAC04134363, NZAC04224147, NZAC04224217, NZAC04233895, NZAC04234035, NZAC04272539; 2, Kapiti Island, Wilkinson Track, 21 Jan 2008, under/in dead wood, K. Marske, R. Leschen, T. Buckley, 40°51.145′S,174°55.722′E, KM226, NZAC03018789, NZAC03019129; 1, Levin, Waiopehu Scientific Reserve, 16 Nov 2015, in tawa litter, J. Nunn, [40°38.338′S,175°19.771′E], NZAC04235146; 1, Lower Hutt, Woburn Reserve, 10 Sep 1994, J. Nunn Collection, [41°13.176′S,174°51.817′E], NZAC04234576; 3, Manawatu District Balance Bridge, 19 Dec 1948, leaf mould, A.E. Brookes Collection, [40°20.244′S,175°49.1′E], NZAC04238331, NZAC04238384, NZAC04238504; 1, Rimutaka Forest Park, Graces Stream Track, 15 Aug 1983, litter, J. Nunn Collection, [41°20.482′S,174°55.779′E], NZAC04234545; 6, Rimutuka Hill, Rimutuka Summit Track, 23 Jan 2008, sifted wood and leaf litter, K. Marske, R. Leschen, T. Buckley, [41°6.897′S,175°13.7′E], KM240, NZAC03018933, NZAC04233873, NZAC04233952, NZAC04233923, NZAC04233960, NZAC04233970; 4, Rimutuka Summit Track, 15 Apr 2005, leaf litter, R. Leschen, C. McGuiness, [41°6.897′S,175°13.7′E], RL974, NZAC04233533, NZAC04233539, NZAC04233548, NZAC04234023; 2, Summit Akatarawa Road, 27 Mar 1983, litter, J. Nunn Collection, [40°56.851′S,175°6.485′E], NZAC04114149, NZAC04234452; 2, Summit Akatarawa Road, 19 Aug 1991, J. Nunn Collection, [40°56.851′S,175°6.485′E], NZAC04234444, NZAC04234455; 1, Tararua Forest Park 4 km along Waiotauru Road, 16 Oct 1991, J. Nunn Collection, [40°56.765′S,175°6.907′E], NZAC04234448; 2, Tararua Forest Park Track, Akatarawa Saddle, 17 Jan 1984, litter, H.P. McColl, [40°56.902′S,175°6.487′E], NZAC04238347, NZAC04238503; 1, Tararua Forest Park Track, Akatarawa Saddle, 8km from SH, 17 Jan 1984, litter, H.P. McColl, [40°56.851′S,175°6.485′E], NZAC04235251; 1, Tararua Forest Park, Akatarawa Saddle, 22 Jan 2008, sifted leaf litter, K. Marske, R. Leschen, T. Buckley, 40°56.9′S,175°6.577′E, KM231, NZAC03020463; 1, Tararua Forest Park, Kakanui, 21 Aug 1976, J. Nunn Collection, [40°57.868′S,175°8.151′E], NZAC04234447; 4, Tararua Forest Park, Mount Holdsworth, 29 Jan 2008, sifted wood and leaf litter, K. Marske, R. Leschen, T. Buckley, [40°54.408′S,175°28.432′E], KM273, NZAC03020609, NZAC04135036, NZAC04136059, NZAC04138921; 1, Tararua Forest Park, Waiohine Gorge, Totara Flats Track, 25 Jan 2008, sifted wood and leaf litter, K. Marske, R. Leschen, T. Buckley, 40°59.628′S,175°23.28′E, KM255, NZAC03019253; 1, Tararua Forest Park, Waiotauru Road, 5 Jul 1999, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04238619; 1, Tararua Forest Park, Waiotauru Road, 11 Jul 2000, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04230219; 1, Tararua Forest Park, Waiotauru Road, 22 Oct 1991, in litter under silver beech, J. Nunn Collection, [40°58.179′S,175°15.647′E], NZAC04234679; 1, Tararua Range, Mangaore, Mangahao, 20 Jan 2008, dead wood, K. Marske, R. Leschen, T. Buckley, [40°34.456′S,175°26.961′E], KM223,

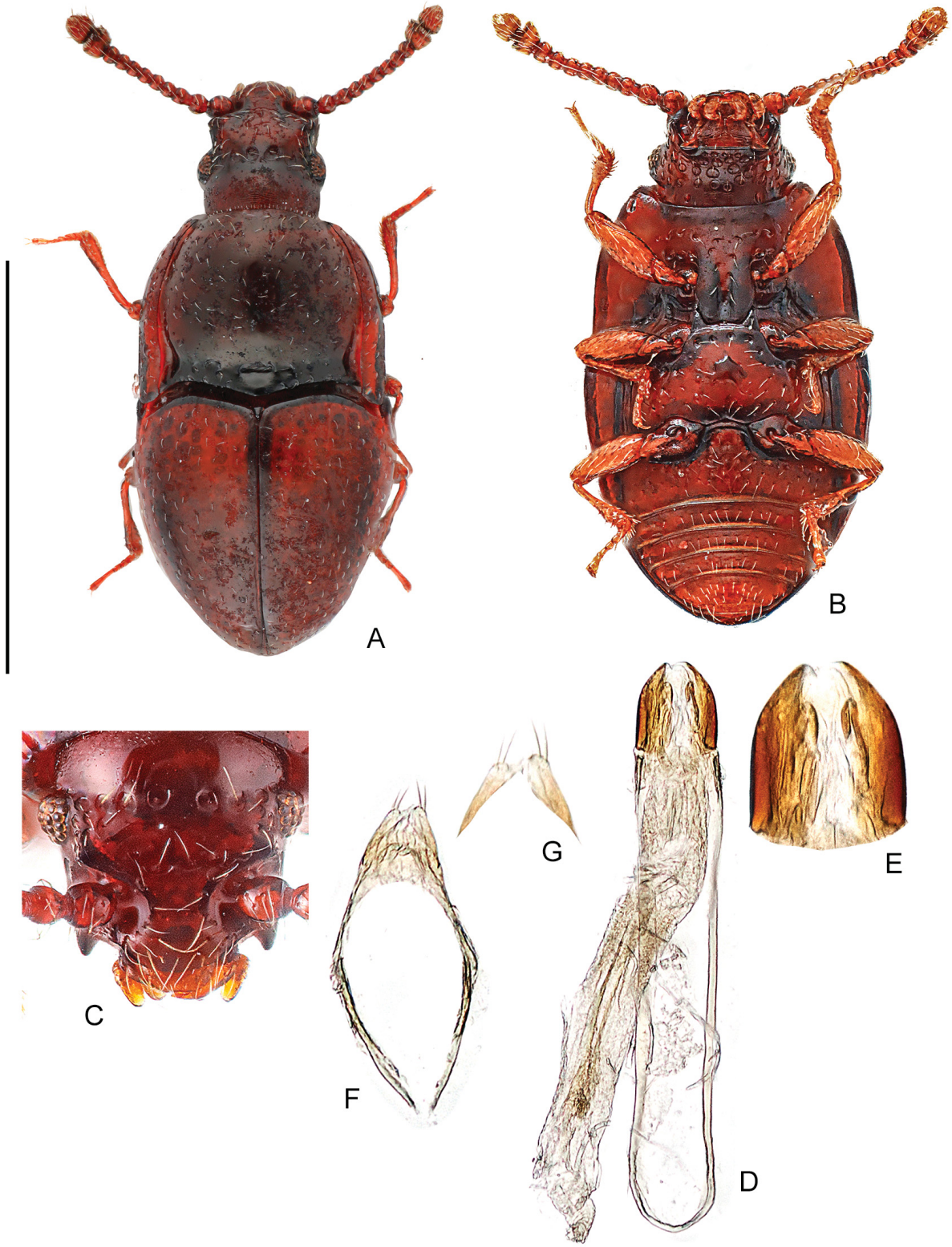

Fig. 3. *Picrotus thoracicus* Sharp, 1886. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – aedeagus, dorsal view; E – distipenis, dorsal view; F – tegmen, dorsal view; G – parameres, dorsal view.

NZAC04139573; 1, Tararua Range, Mount Holdsworth, 16 Apr 2005, leaf litter, R. Leschen, [40°52.46′S,175°25.043′E], RL976, NZAC04224175. **WA:** 2, Fensham Scenic Reserve, Carterton, 27 Jan 2008, ex freshly dead pohutukawa, at night, K. Marske, R. Leschen, T. Buckley, [40°59.594′S,175°30.141′E], KM265, NZAC04137404, NZAC04138376; 6, Puketoi Range, near Mount Butters, 28 Jan 2008, forest patch in gully below road, sifted leaf litter and rotten wood, K. Marske, R. Leschen, T. Buckley, [40°33.723′S,176°3.364′E], KM271, NZAC03018630, NZAC04135012, NZAC04137696, NZAC04137789, NZAC04139191, NZAC04139996; 1, S Rimutaka, White Stone Trig, 12 July 1992, black beech litter, K. Stokes, [41°19.383′S,175°6.069′E], NZAC04114155. **South Island: NN**: N Nelson nr Riwaka, Takaka Hill, 5 Mar 1957, *Nothofagus* bark, R. Crowson, [41°0′18”S,172°53′26”], NZAC04272527; 1, Nelson, 14 Apr 1943, E.S. Gourlay, [41°16.355′S,

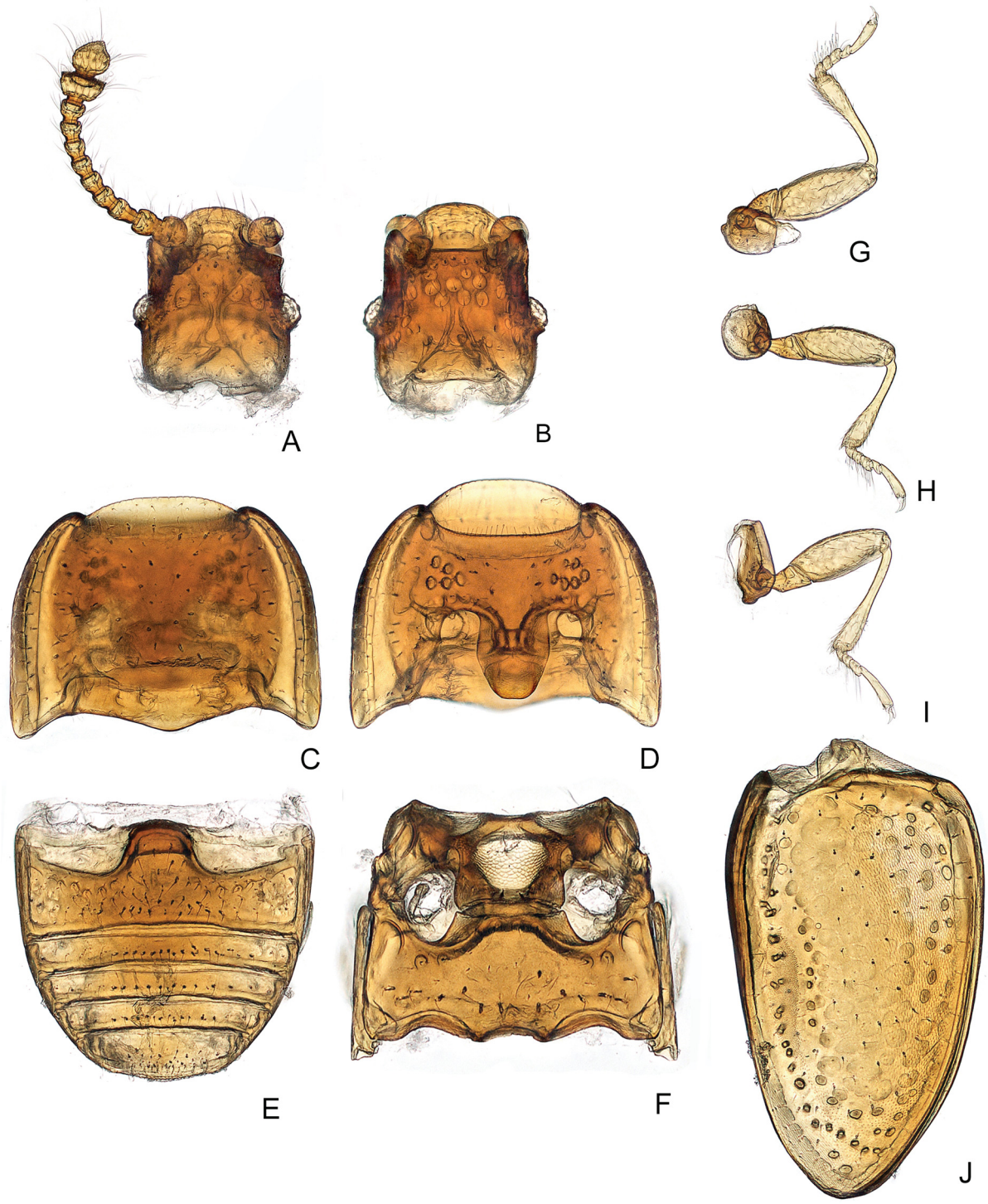

Fig. 4. *Picrotus thoracicus* Sharp, 1886; parts cleared in KOH. A – head, dorsal view; B – head, ventral view; C – prothorax, dorsal view; D – prothorax, ventral view; E – abdomen, ventral view; F – meso- and metaventrites, ventral view; G – front leg; H – middle leg; I – hind leg; J – left elytron, ventral view.

173°17.884′E], NZAC04238498; 1, Nelson, Canaan, 18 Apr 1966, under bark *Nothofagus menziesii*, J.C. Watt, [40°56.582′S,172°53.349′E], NZAC04238616; 11, Takaka, near Riwaka, 5 Mar 1957, *Nothofagus* bark, R. Crowson, [41°2.875′S,172°55.359′E], NZAC04182083, NZAC04238615, NZAC04238342, NZAC04238344, NZAC04238373, NZAC04238383, NZAC04238603, NZAC04238607, NZAC04238609, NZAC04238614; 2, Upper Maitai, 14 Feb 1943, E.S. Gourlay, [41°17.583′S,173°22.157′E], NZAC04182057, NZAC04238341; 1, Maitai, Wooded Park, Roadge S Branch, 14 Feb 1943, dead beech, [41°20.135′S,173°20.895′E], NZAC04238372. **SD:** 3, SD, Maud Island, 4-6 Mar 1953, E.S. Gourlay, [41°1.498′S,173°53.694′E], NZAC04238545, NZAC04238604, NZAC04238617; 3, Mount Stokes Track, Mount Stokes Scenic Reserve., 19 Feb 2009, sifted leaf litter and rotten wood, K. Marske, R. Leschen, 41°5.253′S,174°7.994′E, KM320, NZAC03019183, NZAC04234445, NZAC04234446; 1, Port Underwood Saddle, 3 Dec 1969, litter, J.I. Townsend, [41°17.359′S,174°6.637′E], NZAC04238339; 1, Port Underwood Saddle, 3 km SSE Curious Cove, sifted litter, R. Leschen, M. Anderson, T. Buckley, Y. Chen, 41°16.423′S,174°7.195′E, RL2241, NZAC03038715; 1, Port Underwood Saddle, 3 km SSE Curious Cove, 15 Nov 1999, sifted leaf litter, R. Leschen, 41°17′S,174°5′E, RL480, NZAC04114152; 1, Stephens Island, 14-28 Jan 1933, E.S. Gourlay, [40°40.056′S,174°0.019′E], NZAC04238602.

Diagnosis. *Picrotus thoracicus* is easily distinguished from *P. wairarapa* sp. nov. by the presence of a row of foveolate punctures with a broad medial puncture at the base of the pronotal disc and the prosternal process which narrows and is apically truncate.

Redescription. Length 1.25–1.35 mm. Colour of body dark to light reddish-brown, mouthparts, legs, and antennae lighter. Surfaces of body glabrous. Dorsal setae golden, sparse, decumbent. Ventral surfaces with sparse, recumbent and semi-recumbent setae, longer in length compared with those on dorsum; finely to shallowly punctate on most surfaces, punctation of head dense, areolate, central disc of metaventrite glabrous with large punctures similar to those of prosternum, punctation of abdominal ventrites 1 to 4 more dense and impressed than metaventrite, on ventrite 5 denser and smaller towards apex, which lacks a patch of posteriorly-directed setae. Head smooth with large, ovate punctures with shiny interspaces, punctures above eye forming a transverse row; vertex without ridge; transverse ridge above antennal insertions present, clypeal constriction about as wide as length of antennomere 1. Eye ovate, contacting antennal cavity, consisting of about 12 facets. Antennomere 2 globular, as long as wide, antennomere 3 subconical, longer and as wide as 2, widths of antennomeres 3–8 equal, antennomeres 4–8 similar, antennomere 4 shorter than 3, antennomere 9 scarcely wider than 8 and narrower than 10 and 11, antennomere 10 transverse and wider than 11, antennomere 11 about as long as 10, shorter than 9 and 10 combined. Pronotum transverse, pronotal length/width ratio ~0.72, widest in basal third; lateral edges parallel in basal half and convergent anteriorly; anterior angles weakly projecting anteriorly (not extending anterior to cervical foramen of prothorax); anterior part of the lateral furrow not pinched; pronotal disc impunctate, basally impressed with a row of foveolate punctures and a broad medial puncture; posterolateral angles narrowly rounded, acute, and projecting posteriorly; posterior margin strongly sinuate with weak scutellar lobe. Prothoracic hypomeron fused to prosternum, not separated by suture. Prosternal process with well-developed lateral marginal beads, with narrow longitudinal depression medially, process not expanded apically behind procoxae, apex narrowed and then truncate, width 0.63 longer than length of prosternum; procoxal cavity without anterolateral notch. Scutellar shield mostly hidden except for extreme apex. Elytra about 0.98 times as long as combined width, about 1.05 times width of pronotum at greatest width, about 1.37 times length of pronotum; surface impunctate; parasutural stria absent. Tarsi moderately slender, tarsomere 5 as wide as preceding tarsomeres in lateral view; mesotarsomeres 1–3 of subequal to equal lengths, with 1 slightly shorter than 2, 3 and 4 equal, 4 shorter than 3, mesotarsomere 5 equal to 1–4 combined. Abdominal ventrites free; first abdominal ventrite with intercoxal process that is weakly curved at the apex, narrower than mesoventrital process. Aedeagus with parameres fused to phallobase and broadest at their bases and separated at the apex, combined length of fused parameres about 1.2 times as wide as long; apices with 4 primary setae distinctly shorter than parameres, two at apex longer than two subapical setae; interparameral process absent; basipenis 6.0 times length of distipenis; distipenis rectangular, about 1.1 times longer than wide, lateral lobes widely separated and symmetrical; internal sac with a pair of thin endophallites that extend about 1/2 the length of the sac.

Distribution. North Island: WO, TO, GB, HB, RI, WI. WN, WA. **South Island:** NN, SD (Fig. 21).

Remarks. *Picrotus thoracicus* ranges from about the middle of North Island south to the north of the South Island. It may be abundant in leaf litter, dead wood, under bark, from fungus, wood and leaf mould and rarely from moss. All specimens we have examined that we consider as part of this species have the foveolate punctures at the base of the pronotal disc, though the strength and size of the punctures, including the median puncture, vary from moderately deeply impressed and circular to transverse and less impressed. Information on type material was given in Leschen & Gimmel (2012).

Picrotus wairarapa sp. nov.

(Figs 5, 19F)

Type material. Holotype: ♂ (NZAC), labelled: 'New Zealand WA Hikorangi 13 Sep 1982 J. C. Watt // Sifted woodmould 82/75 // Entomology Div. D.S.I.R. New Zealand / NZ Arthropod Collection Private Bag 92170 Auckland New Zealand NZAC04238506'. Paratypes (31; NZAC). **North Island: WA:** 2, Haurangi, Aorangi Mountains, 2 Sep 1965, moss in forest, J.I. Townsend, [41°21.978′S,175°23.713′E], NZAC04238599, NZAC04238610; 5, Hikorangi, 13 Sep 1982, sifted wood mould, J.C. Watt, [41°8.757′S,175°47.162′E], NZAC04114153, NZAC04234428, NZAC04234431, NZAC04234537, NZAC04234568; 5 (same as holotype), Hikorangi, 13 Sep 1982, litter, J.C. Watt, [41°8.801′S,175°47.114′E], NZAC04182063, NZAC04238388, NZAC04238556, NZAC04238598, NZAC04238605; 2, Ngaumu State Forest., 27 Jan 2008, under pine logs in pine plantation, K. Marske, R. Leschen, T. Buckley, 41°1.693′S,175°57.411′E, KM261, NZAC04137263, NZAC04138374; 3, Pongaroa, 31 Dec 1980, wood mould, J.C. Watt, [40°32.570′S,176°11.598′E], NZAC04136583, NZAC04138616, NZAC04139481; 1 Pongaroa, 31 Dec 1980, litter, J.C. Watt, [40°32.570′S,176°11.598′E], NZAC04135077; 9, Putangirua Pinnacles Scenic Reserve, Palliser Bay, 24 Jan 2008, dead wood, K. Marske, R. Leschen, T. Buckley, 41°27.011′S,175°14.435′E, KM250, NZAC03019073, NZAC04135546, NZAC04135944, NZAC04136715, NZAC04136806, NZAC04136811, NZAC04138859, NZAC04234039, NZAC04235138; 5, Sutherland Vehicle Track, Aorangi Range, 24 Jan 2008, sifted wood and leaf litter in secondary forest on former grazing land, K. Marske, R. Leschen, T. Buckley, 41°25.239′S,175°21.551′E, KM245, NZAC03018832, NZAC04272551, NZAC04272552, NZAC04272553, NZAC04272554; 2, West of Lake Wairarapa Reserve, 20 Apr 1997, in humus under bark of dead *Pseudopanax*, J. Nunn, [41°10.155′S,175°18.676′E], NZAC04235296, NZAC04272546.

Diagnosis. *Picrotus wairarapa* sp. nov. is easily distinguished from *P. thoracicus* by the lack of a basal row of foveolate punctures and broad medial puncture on the pronotum. The slightly longer prosternal process that is apically rounded or ligulate and the longer parameral setae will also distinguish this species from *P. thoracicus*.

Description. Length 1.10–1.75 mm. With characters of *P. thoracicus*, except as follows. Head with clypeal constriction slightly wider than length of antennomere 1. Pronotum with pronotal length/width ratio ~0.64; pronotal base weakly impressed, without a row of foveolate punctures and without a broad medial puncture. Prosternal process

with apex rounded or ligulate, width 1.16 times shorter than total length of prosternum. Elytra about as long as combined width, about 1.10 times width of pronotum at greatest width, about 1.70 times length of pronotum. First abdominal ventrite with intercoxal process subrounded at apex. Aedeagus with parameres fused to phallobase and broadest at their bases and not separated at the apex, combined length of fused parameres about 0.8 times as long as wide; apices with 3–4 primary setae distinctly as long as parameres, and of equal lengths; basipenis about 6.0 times length of distipenis; distipenis rectangular and elongate, about 1.5 times as long as wide; internal sac with a pair of thin endophallites that extend about 2/3 the length of the sac.

Etymology. The specific epithet is based on its distribution in the Wairarapa; noun in apposition.

Distribution. North Island: WA (Fig. 21).

Remarks. *Picrotus wairarapa* sp. nov. is restricted to the Wairarapa in the southeast of the North Island.

Thortus Broun, 1893

(Figs 6–19)

Type species. *Thortus ovalis* Broun, 1893, by monotypy.

Diagnosis. This genus is easily distinguished from most other New Zealand Picrotini by having glabrous to semi-glabrous body surfaces, the antenna inserted into a deep cavity, often accompanied by a constricted frons that is narrower than width of the antennal club, a reduced number of eye facets in many species, and the abdominal postcoxal lines usually present and the absence of hind wings. It can be distinguished from *Callichrotus* and *Picrotus* by having an elongate body, an antennal club of 3 antennomeres and a narrow lateral bead along the prothoracic carina. The genitalia also differ by having asetose or microsetose apices of the parameres.

Remarks. Based on the cladistic study below, *Thortus* is monophyletic, and we adhere to the definition of the genus as outlined in Gimmel & Leschen (2022).

Included species. *Thortus amoenus* (Broun, 1912); *T. bullerensis* sp. nov.; *T. crowsoni* sp. nov.; *T. helmorei* sp. nov.; *T. latus* sp. nov.; *T. lobatus* sp. nov.; *T. luscus* sp. nov.; *T. michauxi* sp. nov.; *T. ovalis* Sharp; *T. parallelus* sp. nov.; *T. simplex* sp. nov.; *T. sulcatus* sp. nov.; *T. tioripatea* sp. nov.

Thortus amoenus (Broun, 1912)

(Fig. 6)

Cryptophagus amoenus Broun, 1912: 423.
Thortus amoenus: Gimmel & Leschen (2022: 106).

Material examined (58; AMNZ, BMNH, FRNZ, NZAC). **North Island: TO:** 1 (FRNZ), Pukemako, 12 Feb - 19 Mar 2020, 37°51.648′S,175°32.027′E; 1 (FRNZ), Pukemako pitfall 2 14 Dec - 22 Feb 2023, C. Wardhaugh, 37°51.648′S,175°32.027′E; 1 (BMNH), Waimarino, Jan 1911, [39°26.368′S,175°7.732′E]. **GB:** 1 (FRNZ), Putere, Site 8495, 16 Jan 13 - 13 Feb 2013, E M. Scott, 38°56.39′S,176°55.004′E. **RI:** 1, Vinegar Hill Reserve, Nov 1999, tawa, titoki, mahoe forest remnant, G.M. Coombe, 39°56.220′S,175°38.35′E, AMNZ34211; 1, Wharite Summit, 23 Oct 1993, J. Nunn Collection, [40°15.274′S,175°51.454′E], NZAC04238460. **WI:** 1, Bruce Park, SH1, 3-6 Feb 2000, rimu/tawa forest, J.W. Early, 39°57.555′S,175°32.083′E, AMNZ27647; 1, Manawatu Gorge, near Woodville, Manawatu Dist., North Is, 12.12.1948, leaf mould, A. E. Brookes, 40°18.96′S,175°48.96′E, NZAC04069899. **WA:** 2, Puketoi Range, near Mount Butters, 28 Jan 2008, forest patch in gully below road, sifted leaf litter and rotten wood, K. Marske, R. Leschen, T. Buckley, 40°33.723′S,176°3.364′E, KM271, NZAC04234449, NZAC04234522; 2, Sutherland Vehicle Track, Aorangi Range, 24 Jan 2008, sifted wood and leaf litter in secondary forest on former grazing land, K. Marske, R. Leschen, T. Buckley, 41°25.239′S,175°21.551′E, KM245, NZAC03019393, NZAC03026611; 1, Waepae Forest, Puketoi Range, 28 Jan 2008, dead wood along disused forest track, K. Marske, R. Leschen, T. Buckley, 40°33.210′S,176°1.893′E, KM268, NZAC03019561. **WN:** 1, Balance Bridge Reserve, 3 Jan 1975, litter, J.C. Watt, [40°20.244′S,175°49.1′E], NZAC04234429; 1, Catchpool Loop Walk, Catchpool Stream, Rimutaka Forest Park, 22 Jan 2008, sifted wood and leaf litter, K. Marske, R. Leschen, T. Buckley, 41°21.067′S,174°55.964′E, KM233, NZAC03020596; 1, Kaitoke, Pakuratahi Forks, 18 Jul 1993, in *Cortaderia* litter, J. Nunn Collection, [41°3.374′S,175°11.698′E], NZAC04234613; 1, Kapiti Island, [40°51.617′S,174°54.317′E], NZAC03019658; 1, Karori Reservoir, 16 Oct 1994, forest leaf litter, J. Nunn Collection, [41°18.408′S,174°44.354′E], NZAC04234457; 1, Keith Gorge Reserve, Silverstream, 17 Apr 1995, leaf litter, J. Nunn, [41°8.254′S,174°58.561′E], NZAC04235060; 1, Khandallah Domain, 5 Apr 1994, decayed wood, J. Nunn [41°14.721′S,174°47.815′E], NZAC04234450; 2, Levin, Kimberley Reserve, 6 Nov 1980, litter, C.F. Butcher, [40°58.179′S,175°15.647′E], NZAC04234435, NZAC04234437; 1, Manawatu District Balance Bridge, 19 Dec 1948, leaf mould, A.E. Brookes Collection, [40°20.244′S,175°49.1′E], NZAC04234434; 1, Paraparaumu, Nikau Reserve, 3 Oct 1983, J. Nunn Collection, [40°54.581′S,175°2.563′E], NZAC04234432; 1, Ruahine Range, Wharite Peak, 19 Nov 2015, forest litter, J. Nunn, [40°15.274′S,175°51.454′E], NZAC04235090; 1, Tararua Forest Park 4 km along Waiotauru Road, 16 Nov 1991, J. Nunn Collection, [40°58.179′S,175°15.647′E], NZAC04234440; 1, Tararua Forest Park, Fields Hut, 8 Dec 1953, lichen sample, B.A. Holloway, [40°58.179′S,175°15.647′E], NZAC04234611; 1, Tararua Forest Park, Waiotauru Road, 25 Aug 1998, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234430; 1, Tararua Forest Park, Waiotauru Road, 4 May 1999, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04114146; 1, Tararua Forest Park, Waiotauru Road, 11 May 1999, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04114156; 2, WN, Tararua Forest Park, Waiotauru Road, 25 May 1999, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234442, NZAC04272533; 1, Tararua Forest Park, Waiotauru Road, 1 Jun 1999, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234615; 1, Tararua Forest Park, Waiotauru Road, 7 Jun 1999, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234438; 1, Tararua Forest Park, Waiotauru Road, 22 Jun 1999, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234527; 2, Tararua Forest Park, Waiotauru Road, 5 Jul 1999, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234451, NZAC04234542; 2, Tararua Forest Park, Waiotauru Road, 20 Jul 1999, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234475, NZAC04272534; 1, Tararua Forest Park, Waiotauru Road, 25 May 2000, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234577; 3, Tararua Forest Park, Waiotauru Road, 15 Jun 2000, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234553, NZAC04234556, NZAC04234632; 1, Tararua Forest Park, Waiotauru Road, 20 Jun 2000, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234483; 1, Tararua Forest Park, Waiotauru Road, 27 Jun 2000, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234609; 2, Tararua Forest Park, Waiotauru Road, 11 Jul 2000, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04114147, NZAC04234627; 1, Forest Park, Waiotauru Road, 18 Jul 2000, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234555; 2, Tararua Forest Park, Waiotauru Road, 15 Aug 2000, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04114154, NZAC04234528; 1, Tararua Forest Park, Waiotauru Road, 21 Aug 2000, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234541; 1, Tararua Forest Park, Waiotauru Road, 29 Aug 2000, E. Spurr, [40°58.179′S,175°15.647′E], NZAC04234642; 2, Tinokori Hill, 13 Jun 1991, decayed wood, J. Nunn Collection, [41°16.047′S,174°46.630′E], NZAC04234453, NZAC04234517; 1, Wiltons Bush, 4 Jul 1992, J. Nunn Collection, [41°15.991′S,174°45.164′E], NZAC04234456. **South Island: SD:** 1, Port Underwood Saddle, NE Picton, 10 Dec 2007, sifted leaf litter and woody debris, K. Marske, J. Allwood, [41°16.961′S,174°6.593′E], KM094, NZAC03018835. **MB:** 1 (FRNZ), Blenheim, Site BZ102 - East D. Henley 11 Jan - 7 Feb 2011, 41°22.204′S,173°58.687′E.

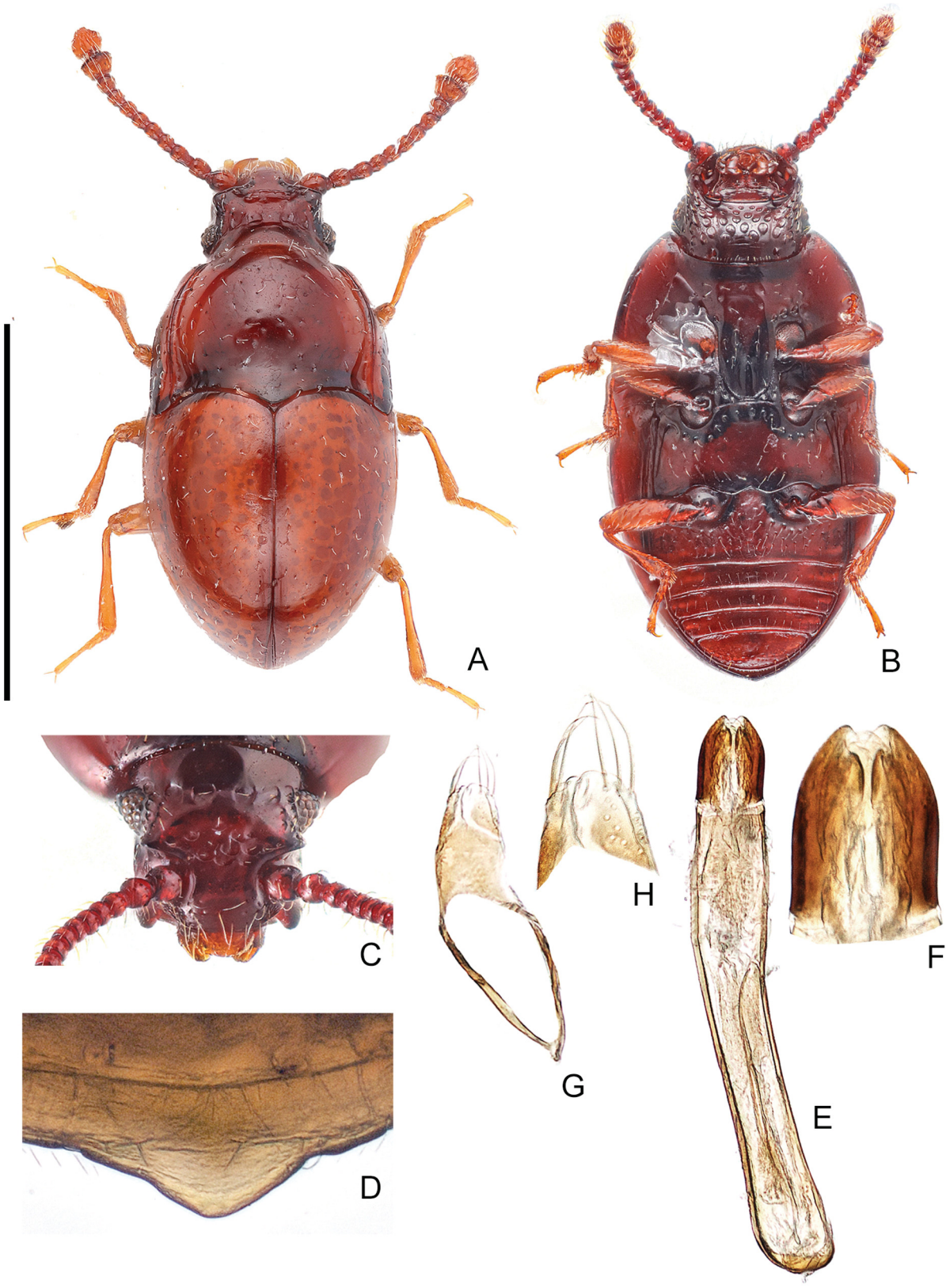

Fig. 5. *Picrotus wairarapa* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – prescutellar area of pronotum; E – aedeagus, dorsal view; F – distipenis, dorsal view; G – tegmen, dorsal view; H – parameres, dorsal view.

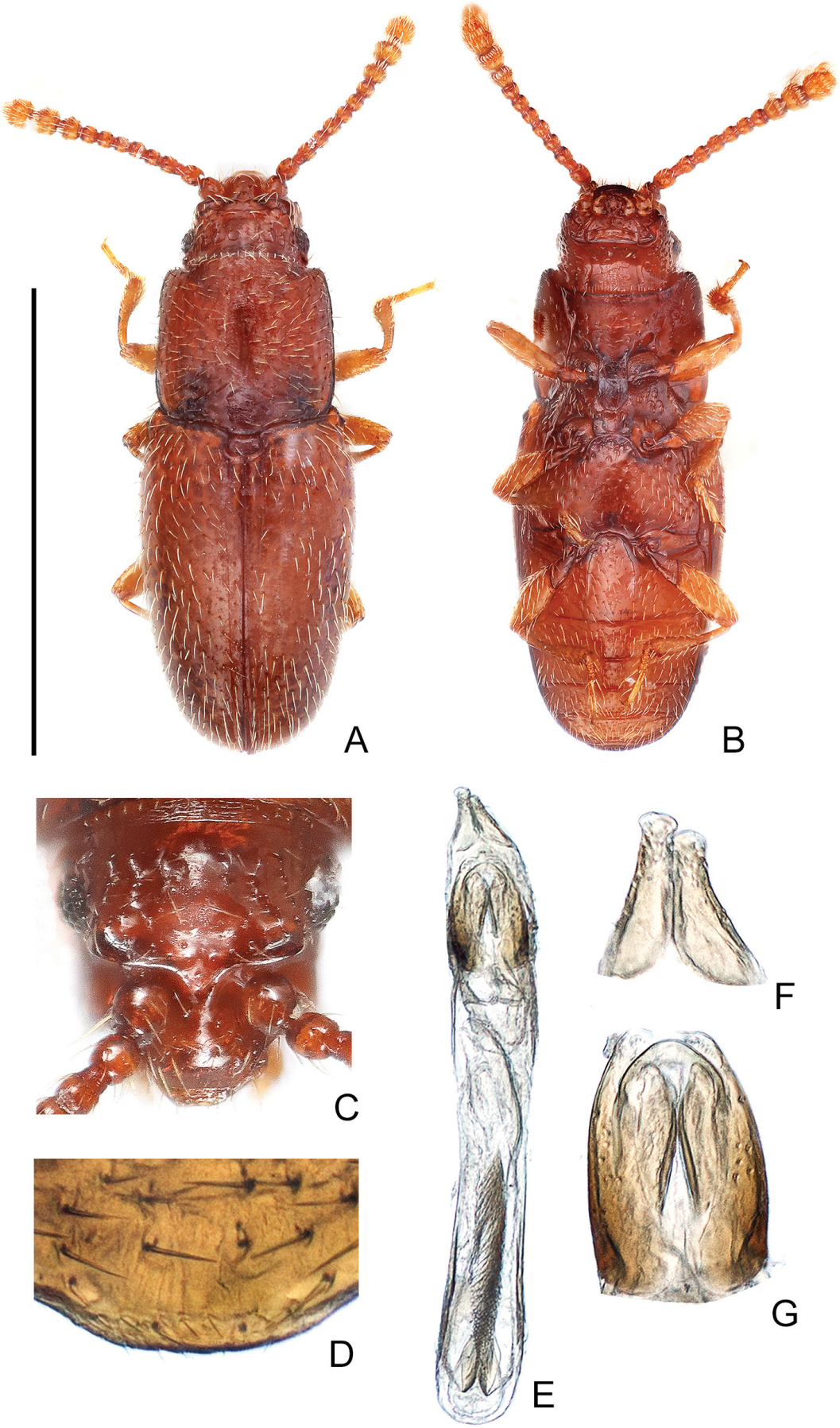

Fig. 6. *Thortus amoenus* (Broun, 1912). A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – prescutellar area on disc of pronotum; E – aedeagus, dorsal view; F – parameres, dorsal view; G – distipenis, dorsal view.

Diagnosis. *Thortus amoenus* is recognized by having the parasutural stria complete and the eye having 10–12 facets. It can be distinguished from *T. sulcatus* by the lack of a median pronotal impression and from *T. lobatus* by the wider clypeal constriction.

Redescription. Length 1.17–1.50 mm. Colour of body dark to light reddish-brown, mouthparts, legs, and antennal club lighter (sometimes entire antenna). Microsculpture absent, surfaces of body semiglabrous. Dorsal setae silvery-gold, sparse, dual, consisting of very long decumbent and scattered erect and suberect setae. Ventral surfaces with shorter, suberect setae; punctation ovate, mesoventrite foveolate, central disc of metaventrite with punctures larger and more impressed than those of prosternum, punctation of abdominal ventrites 1 to 4 smaller than those on metaventrite, punctation on ventrite 5 denser with a well-defined patch of posteriorly-directed setae. Head lengthened, with relatively long gena about 1.5 times length of antennomere 1; frons constricted, narrowed to a width about half the length of antennomere 1; supra-antennal ridge with well-developed rim, bead present; vertex delimited anteriorly by a transverse crenulate line, anterior surface nearly impunctate and glabrous, posterior surface with broad, shallow, foveolate punctures; gular punctation deep, ovate, diameters similar to those on side of head. Eye consisting of 10–12 facets. Antennomere 2 cylindrical, slightly wider than long, antennomere 3 subconical, longer and as wide as 2 and longer and slightly wider than 4, proportions of antennomeres 4–8 equal, antennomere 9 wider than 8 and narrower than 10 and 11, antennomere 10 transverse and as wide as 11, antennomere 11 longer than 10, shorter than 9 and 10 combined. Pronotum subquadrate, pronotal length/width ratio ~1.04, widest just behind middle; anterior margin straight; anterior angles right, not protruding or acute; lateral edges more or less parallel and not gradually converging anteriorly, curved posteriorly; pronotal disc with punctures regular, uniform, separated by a distance of up to 1 times their diameter, rarely with a median glabrous strip; median impression absent; not or weakly transversely depressed at base; basomedial macropuncture absent; posterolateral angles obtuse, rounded, not projecting posteriorly; posterior margin sinuate with a weak scutellar lobe. Prosternal process with well-developed lateral marginal beads, without longitudinal depression medially, process weakly widened posteriorly behind procoxae, apex rounded, width subequal to width of procoxa, 0.46 times shorter than length of prosternum; procoxal cavity without anterolateral notch. Scutellar shield rectangular, 3.3 times wider than long. Elytra about 1.85 times as long as combined width, about 1.24 times width of pronotum at greatest width, about 2.18 times length of pronotum; setation dual, consisting of very long, decumbent setae and fewer suberect setae; humeral plica present; parasutural stria present, complete, interspace setose; punctation similar to pronotum, but separated by a distance of up to 1–3 times their diameter. Metaventrital process with anterior margin rounded, marginal bead connected at middle. Tarsi moderately slender, 5-5-5 in female, 5-5-4 in male, male pro- and mesotarsomeres 1–3 lacking well-defined tenent setae; mesotarsomeres 1–3 of subequal lengths, mesotarsomere 5 equal to tarsomeres 1–4 combined. First abdominal ventrite with postcoxal lines acuminate and parallel, extending to mid-length of sclerite; intercoxal process rounded at apex. Aedeagus with relatively long parameres articulated to phallobase, paramere about 3 times as long as wide; apices asetose, with short, membranous extensions; basipenis about 4.73 times as long as distipenis; distipenis about 1.33 times as long as wide, lateral lobes not separated, basal plate absent; internal sac with a pair of short slender endophallites that are anteriorly widened and spatulate.

Distribution. North Island: TO, GB, RI, WI, WA, WN. **South Island:** SD, MB (Fig. 21).

Remarks. *Thortus amoenus* is distributed in the southern portions of North Island. It is found in leaf litter, leaf mould, and decayed wood. Several specimens were collected in traps baited with 1080 (sodium fluoroacetate), a mammal-specific poison (e.g., Spurr & Berben 2004).

Some specimens have a medial glabrous strip on the pronotal disc, which is also a variation present in specimens of *T. lobatus*.

The holotype (BMNH), collected from Makatote (Tongariro), was confirmed in Leschen & Gimmel (2012). A second BMNH specimen labelled by Broun with his number (3229) also had attached to it handwritten labels with the combination '*Pithortus amoenus*' and collected from Waimarino which refers to place names in the central North Island ranging from Hawkes Bay westward to Tongariro.

Thortus bullerensis sp. nov.

(Fig. 7)

Type material. Holotype: ♂ (NZAC), labelled: 'Dublin Terrace Buller 25.11.61 leaf litter J. I. Townsend. [handwritten] // Thortus sp. nov. [handwritten] det. R. A. Crowson // Entomology Div. D.S.I.R. New Zealand / NZ Arthropod Collection Private Bag 92170 Auckland New Zealand NZAC04235080.' Paratype (NZAC). **South Island: BR:** Norris Creek, Buller Road, 14 Oct 1970, litter, J.I. Townsend, [42°6.245′S,172°12.171′E], NZAC04272538.

Diagnosis. *Thortus bullerensis* sp. nov. is a unicolourous species with a well-developed eye, a narrowed frons, the gena short, the pronotum widest in the anterior 1/3, and the parasutural stria incomplete. It is most similar to *T. parallelus*, which has the pronotum widest at the middle and the marginal bead of the metaventrital process present.

Description. Length 1.35 mm. Colour of body unicolourous red-brown, with lighter antennal club, mouthparts and legs. Body surface semiglabrous, microsculpture absent from most surfaces, very weak and present on ventral surfaces of the head, hypomeron and lateral portions of the abdominal ventrites. Dorsal setae silver, consisting of short scattered suberect and subdecumbent setae. Ventral surfaces with suberect setae; mesoventrite foveolate, not strongly impressed, disc of metaventrite with punctures variable, some more impressed than those on prosternum, punctation of abdominal ventrites 1 to 4 generally smaller or equal to those on metaventrite, setae longer at sides, punctation on ventrite 5 denser with a well-defined patch of posteriorly-directed setae. Head lengthened with short gena, subequal to length of antennomere 1; frons constricted, narrowed to width just less than half the length

of antennomere 1; supra-antennal ridge with well-developed rim, bead present; vertex delimited anteriorly by a weakly transverse crenulate line, anterior surface glabrous, posterior surface with broad foveolate punctures; gular punctation deep and ovate, diameters larger than those on sides of head. Eye consisting of approximately 13 facets. Antennomere 2 barrel-shaped, wider than long, antennomere 3 subconical, longer and narrower than 2 and longer and slightly wider than 4, proportions of antennomeres 4–8 equal, antennomere 9 wider than 8 and narrower than 10 and 11, antennomere 10 transverse same width as 11, antennomere 11 longer than 10, shorter than 9 and 10 combined. Pronotum transverse, pronotal length/width ratio ~0.81, widest at apical third; anterior margin convex; anterior angles obtuse, not projecting and rounded; lateral edges weakly convex, weakly curved anteriorly, gradually converging posteriorly; pronotal disc with punctation subuniform and foveolate, shallow, absent in central disc with a broad median glabrous area, separated by a distance of up to 1–2 times their diameter and larger at the base; median impression absent; transversely depressed at basal 1/5; basomedial macropuncture present, triangulate; posterolateral angles almost right, sharp, slightly projecting posteriorly; posterior margin sinuate with a weak scutellar lobe. Prosternal process with well-developed lateral marginal beads, without longitudinal depression medially, process subparallel-sided and slightly converging posteriorly, slightly expanded posteriorly behind procoxae, apex curved, width slightly narrower than procoxa and about half total prosternal length; procoxal cavity without anterolateral notch. Scutellary shield trapezoidal and transverse, 2.1 times wider than long. Elytra about 1.37 times as long as combined width, about 1.11 times width of pronotum at greatest width, about 1.90 times length of pronotum; setation dual consisting of relatively short suberect and shorter subdecumbent setae; humeral plica present; parasutural stria present and incomplete, present to about basal 1/3; punctation less dense than pronotum, except at base where it is more impressed. Metaventrital process with anterior margin straight, marginal bead present at sides, absent at middle. Tarsi moderately slender, 5-5-5 in female, 5-5-4 in male, tenent setae not observed; mesotarsomeres 1–3 of subequal lengths, mesotarsomere 5 subequal to tarsomeres 1–4 combined. First abdominal ventrite with broad rounded intercoxal process, postcoxal lines long, divergent, extending middle of sclerite. Aedeagus with relatively short parameres that are fused at their bases and fixed to phallobase, paramere about as wide as long; apices asetose (?), without membranous extensions; basipenis about 2.5 times length of distipenis; distipenis about 1.60 times longer than width, lateral lobes separated, basal plate absent; internal sac with a pair of short slender endophallites.

Etymology. The specific epithet is taken from the Buller region; adjective.

Distribution. South Island: BR (Fig. 21).

Remarks. *Thortus bullerensis* sp. nov. is endemic to the Buller region of the South Island. It was collected from leaf litter. The two specimens were completely disarticulated.

Thortus crowsoni sp. nov.

(Fig. 8)

Type material. Holotype: ♀ (NZAC, card-mounted after dissection), labelled: 'NZ: S. Canterbury, Geraldine, Peel For. Nat. Res. under bark of Kanikoreas matais, 27. xii. 1956, SC2 R. Crowson // Entomology Div. D.S.I.R. New Zealand // NZ Arthropod Collection Private Bag 92170 Auckland New Zealand NZAC04235098.'

Diagnosis. *Thortus crowsoni* sp. nov. is a bicolourous species with a unifacetted eye and a broad body. It is most similar to *T. ovalis* but has well-developed punctures on the pronotum and the head and has a broader clypeal constriction, and lack of a fine, transverse line on the vertex.

Description. Length 1.70 mm. Colour of body dark reddish-brown, with lighter elytra, antennal club, mouthparts and legs. Body surfaces semiglabrous, microsculpture absent. Dorsal setae silver, consisting of short scattered recurved setae. Ventral surfaces with suberect setae; punctation ovate on head and prosternum, mesoventrite foveolate, not strongly impressed, disc of metaventrite with ovate punctures that are slightly less impressed than those on prosternum, punctation of abdominal ventrites 1 to 4 generally smaller or equal to those on metaventrite, weak, setae not longer at sides, punctation on ventrite 5 denser with a well-defined patch of posteriorly-directed setae. Head not lengthened with relatively short gena, with length narrowed subequal to length of antennomere 1; frons wide and not constricted, narrowed to width to about equal in length to antennomere 1; supra-antennal ridge with well-developed rim, bead absent; vertex not delimited anteriorly by a weak transverse crenulate line, surface rugulose with deep punctures of mixed sizes, two rows of weak transverse rows, the largest fused with their anterior rims connected and forming a crenulate line; gular punctation deep and ovate, diameters less than those on sides of head. Eye unifacetted. Antennomere 2 barrel-shaped, slightly wider than long, antennomere 3 subconical, longer and narrower than 2 and longer and slightly wider than 4, proportions of antennomeres 4–8 nearly the same, antennomere 9 slightly wider than 8 and narrower than 10 and 11, antennomere 10 not transverse and about the same width as 11, antennomere 11 longer than 10, shorter than 9 and 10 combined. Pronotum transverse, pronotal length/width ratio ~0.86, widest near middle; anterior margin weakly convex; anterior angles obtuse, not projecting and rounded; lateral edges weakly convex, curved anteriorly at anterior 1/3, gradually converging posteriorly; pronotal disc with punctation not uniform and foveolate, enlarged towards base, shallow, present in central disc (without a median glabrous strip), separated by a distance of up to 1 times their diameter; median impression absent; transversely depressed at basal 1/5; basomedial macropuncture absent; posterolateral angles almost right, sharp, slightly projecting posteriorly; posterior margin sinuate with a scutellar lobe. Prosternal process with well-developed lateral marginal beads, with longitudinal depression medially, process subparallel-sided, slightly expanded posteriorly behind procoxae, apex curved, width slightly narrower than procoxa and 0.5 times length of prosternum; procoxal cavity without

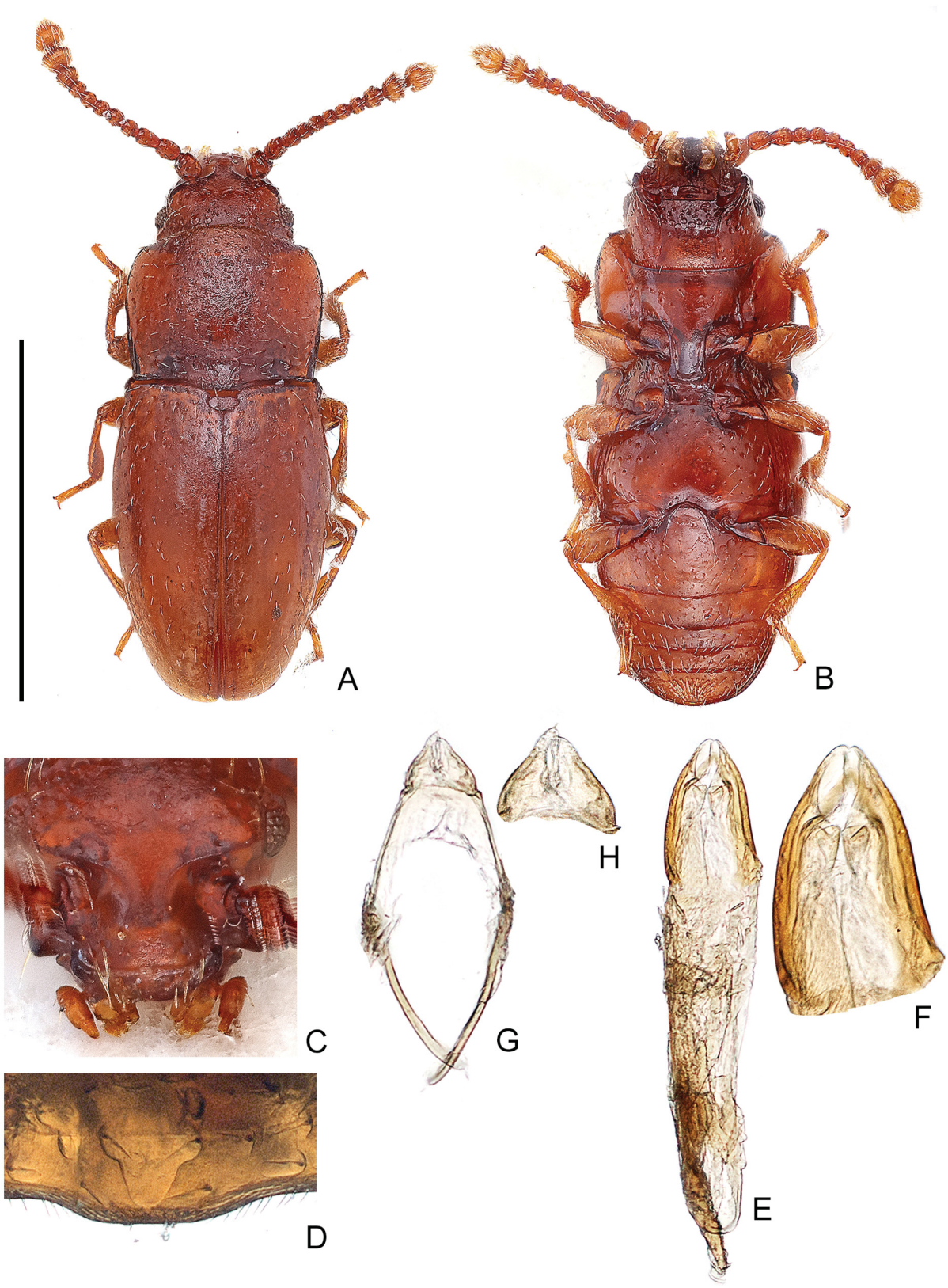

Fig. 7. *Thortus bullerensis* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – prescutellar area of pronotum; E – aedeagus, dorsal view; F – distipenis, dorsal view; G – tegmen, dorsal view; H – parameres, dorsal view.

anterolateral notch. Scutellary shield subtrapezoidal and transverse, 1.7 times as wide as long. Elytra about 1.20 times as long as combined width, about 1.14 times greatest width of pronotum, about 1.58 times length of pronotum; setation uniform consisting of relatively short, curved setae; humeral plica absent; parasutural stria absent; punctation present, sparse and not as impressed as that on pronotum. Metaventrital process with anterior

Fig. 8. *Thortus crowsoni* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view.

margin straight, marginal bead present at sides, absent at middle. Tarsi moderately slender, 5-5-5 in female, male unknown; mesotarsomeres 1–3 of subequal lengths, mesotarsomere 5 slightly longer than tarsomeres 1–4 combined. First abdominal ventrite with broad rounded intercoxal process, postcoxal lines long, weakly convex, extending middle of sclerite.

Etymology. The specific epithet is a patronym for Roy Crowson, collector of the holotype, and modernist reviser of Coleoptera classification. The specimen, along with others in yellow-aged spirits, was gifted to the RABL during his first visit to Glasgow in 1992.

Distribution. South Island: SC (Fig. 21).

Remarks. *Thortus crowsoni* sp. nov. is known from a single specimen collected with specimens of *Thortus ovalis*. The misspelling on the label may refer either to kahikatea (*Dacrycarpus dacrydioides* (A.Rich.) de Laub.) or matai (*Prumnopitys taxifolia* (Banks & Sol. ex D. Don) de Laub.).

Thortus helmorei sp. nov.

(Figs 9, 19D)

Type material. Holotype: ♂ (AMNZ), labelled: 'NEW ZEALAND, ND Waipoua Forest, 10.i.1967, R. Rowe. By giant kauri. Litter. L5787 // AMNZ36232'. Paratypes (4; AMNZ, ANIC, NZAC). **North Island: ND:** 1 (ANIC), Waipoua SF, Yakas Tree Tk., 350 m, 11-14.iv.1980, broadlf.-podocarp, A. Newton, M. Thayer [35°36.99′S 173°31.91′E], litter at bases of *Metrosideros robusta* trunks; 1, Waipoua Forest, 10 Jan 1967, litter by giant kauri, R.J. Rowe, 35°37′S,173°33.067′E, AMNZ36233; 2, Waipoua State Forest, SH12, 20 Sep 1977, rotten stumps trees, D.W. Helmore, [35°38.772′S,173°33.321′E], NZAC04235069, NZAC04272548.

Diagnosis. *Thortus helmorei* sp. nov. is a unicolourous species with the eye composed of a single facet. The only known Northland species of the genus, it can be distinguished from other unifacetted species by the absence of abdominal postcoxal lines.

Description. Length 1.70–1.75 mm. Colour of body unicolourous red-brown, with lighter antennal club, mouthparts and legs. Body surface glabrous, microsculpture absent from most surfaces, very weak and present on ventral surfaces of the head, hypomeron and lateral portions of the abdominal ventrites. Dorsal setae golden, consisting of short slightly curved and suberect setae. Ventral surfaces with short and suberect setae; punctation ovate on head (more impressed than on frons) and prosternum, mesoventrite foveolate, strongly impressed, disc of metaventrite with punctures variable, more closely spaced than those on the central disc of the prosternum, punctation of abdominal ventrites 1 to 4 generally smaller or equal to those on metaventrite, setae longer at sides, punctation on ventrite 5 denser with a well-defined patch of posteriorly-directed setae. Head not lengthened with a relatively short gena that is subequal in length to antennomere 1; frons not greatly constricted, narrowed to a width equal to length of antennomere 1; supra-antennal ridge with well-developed rim, bead absent; vertex delimited anteriorly by a transverse crenulate line, anterior surface punctured, posterior surface glabrous with small punctures posteriorly; gular punctation deep and ovate, diameters about equal to those on sides of head. Eye consisting of a single facet. Antennomere 2 barrel-shaped, wider than long, antennomere 3 subconical, equal in length and narrower than 2 and longer and as wide than 4, proportions of antennomeres 4–8 about the same, antennomere 9 wider than 8 and narrower than 10 and 11, antennomere 10 transverse and about the same width as 11, antennomere 11 longer than 10, subequal to 9 and 10 combined. Pronotum transverse, pronotal length/width ratio ~0.92, widest at apical third; anterior margin convex; anterior angles obtuse, not projecting and rounded; lateral edges weakly convex, weakly curved anteriorly in anterior 1/4, gradually and weakly converging posteriorly; pronotal disc with punctation more or less uniform and more larger and foveolate towards base, shallow to sparse to weak in central disc (without a median glabrous strip), separated by a distance of up to 3 times their diameter at anterolateral areas and larger and closer at base; median impression absent; transversely depressed at basal 1/5; basomedial macropuncture vaguely indicated; posterolateral angles obtuse and rounded, not projecting posteriorly; posterior margin sinuate with scutellar lobe. Prosternal process with weak lateral marginal beads, without strong longitudinal depression medially, process subparallel-sided and slightly expanded posteriorly behind procoxae, apex rounded, width slightly narrower than procoxa, 0.5 times as wide as prosternum; procoxal cavity with weak anterolateral notch. Scutellary shield suboval and transverse, 1.9 times as wide as long. Elytra about 1.27 times as long as combined widths, about 1.11 times as greatest width of pronotum, about 1.54 times longer than length of pronotum; setation uniform consisting of relatively short slightly curved setae; humeral plica absent; parasutural stria absent; punctation less dense than pronotum, impressed near base. Metaventrital process with anterior margin curved, marginal bead weakly indicated at middle. Tarsi moderately slender, 5-5-5 in female, 5-5-4 in male, male protarsomeres 1–3 and mesotarsomere 1 with tenent setae; mesotarsomeres 1–3 of subequal lengths, mesotarsomere 5 subequal to tarsomeres 1–4 combined. First abdominal ventrite with broad rounded intercoxal process, postcoxal lines absent. Aedeagus with relatively moderately long parameres weakly articulated to phallobase, paramere about 2 times as long as wide; apices more or less acute with two microsetae, membranous extensions absent; basipenis about 2.29 times as long as distipenis; distipenis about 1.90 times as long as wide, lateral lobes not well separated, basal plate absent; internal sac (?) with a single endophallite.

Etymology. Rarely into the field but quietly working at his bench, Des Helmore, artist, former illustrator at the NZAC and friend of the first author, is honored with the specific epithet.

Distribution. South Island: ND (Fig. 21).

Remarks. *Thortus helmorei* sp. nov. is known from five specimens, two collected from a rotten tree stump and litter at the base of a *Metrosideros robusta* A.Cunn. trunk.

Thortus latus sp. nov.

(Fig. 10)

Type material. Holotype: ♀ (NZAC), labelled: 'NEW ZEALAND, NN, Mount Arthur, 13 Jan 2020, sifted dead wood, Y. Chen, R. Leschen, H. Lindsay, 41°11.448′S,172°44.252′E, RL2270 // NZ Arthropod Collection Private Bag 92170 Auckland New Zealand NZAC04272556.' Paratype (NZAC). **South Island: NN:** 1, Kaituna, Aorere, 6 May 1965, litter, G. Kuschel, [40°42.900′S,172°35.457′E], NZAC04235091.

Diagnosis. *Thortus latus* sp. nov. is a unicolourous species with a short gena, a weakly indicated or absent parasutural stria and a notch at the lateral edges of the supra-antennal ridge. It can be recognized from similar-looking species by its broad body and eye composed of 6 or 7 facets.

Description. Length 1.25 mm. Colour of body unicolourous red-brown, with lighter antennal club, mouthparts and legs. Body surface glabrous, microsculpture absent. Dorsal setae silver, consisting of sparse, short suberect curved setae. Ventral surfaces with sparse suberect curved setae; punctation ovate on prosternum, mesoventrite weakly foveolate, not strongly impressed, disc of metaventrite with punctures variable, about as impressed as those on prosternum, punctation of abdominal ventrites 1 to 4 generally weaker than on metaventrite, setae slightly longer at sides, punctation on ventrite 5 denser with a patch of posteriorly-

-directed setae. Head not lengthened with a relatively short gena that is subequal to the length of antennomere 1; frons moderately constricted, narrowed to a width equal in length to antennomere 1; supra-antennal ridge with well-developed rim, terminating at a notch laterad, bead absent; vertex delimited anteriorly by a transverse crenulate line, anterior surface punctured, posterior surface glabrous virtually impunctate; gular punctation irregular and ovate, diameters larger than those on sides of head. Eye consisting of 6 or 7 facets. Antennomere 2 barrel-shaped, wider than long, antennomere 3 subconical, as long as and slightly narrower than 2 and longer and slightly wider than 4, proportions of antennomeres 4–8 same, antennomere 9 wider than 8 and narrower than 10 and 11, antennomere 10 transverse and about the same width as 11, antennomere 11 longer than 10, slightly shorter than 9 and 10 combined. Pronotum transverse, pronotal length/width ratio ~0.84, widest at middle; anterior margin convex; anterior angles obtuse, not projecting and rounded; lateral edges weakly convex, weakly curved anteriorly from middle, parallel-sided at basal half; pronotal disc with punctation subuniform and foveolate, shallow, sparse (without a median glabrous strip), separated by a distance of up to 1–2 times their diameter and larger at the base; median impression absent; transversely depressed at basal 1/5; basomedial macropuncture weakly indicated; posterolateral angles almost right, sharp, slightly projecting posteriorly; posterior margin sinuate with scutellar lobe. Prosternal process with well-developed lateral marginal beads, without longitudinal depression medially, process subparallel-sided and slightly converging posteriorly, not expanded posteriorly behind procoxae, apex curved, width wider than procoxa and 1.75 times longer than length of prosternum; procoxal cavity without anterolateral notch. Scutellary shield trapezoidal and transverse, 1.8 times as wide as long. Elytra about 1.28 times as long as combined widths, about 1.11 times as wide as width of pronotum, about 1.09 times longer than length of pronotum; setation uniform consisting of relatively short suberect and curved setae; humeral plica present; parasutural stria incomplete, barely visible, punctation less dense than pronotum, but at base slightly more impressed. Metaventrital process with anterior margin straight. Tarsi moderately slender, female 5-5-5, 5-5-4 in male, tenent setae not present, but long curled setae present on pro- and mesotarsomeres 1–4 of both sexes; mesotarsomeres 1–3 of subequal lengths, mesotarsomere 5 subequal to combined lengths of tarsomeres 1–4. First abdominal ventrite with broad rounded intercoxal process, postcoxal lines long, weakly convergent, extending middle of sclerite. Aedeagus with relatively long parameres articulated to phallobase, paramere about 3 times longer than wide; apices not expanded and subacute; basipenis about 2.87 times as long as distipenis; distipenis about 1.33 times as long as wide, lateral lobes not separated, basal plate absent; internal sac (?) with a single, elongate endophallite.

Etymology. The specific epithet is the Latin adjective '*latus*', meaning 'broad', in reference to the distinctive body form.

Remarks. *Thortus latus* sp. nov. is known from a single specimen collected from forest litter. The aedeagus was damaged during dissection.

Distribution. South Island: NN (Fig. 21).

Thortus lobatus sp. nov.

(Fig. 11)

Type material. Holotype: ♂ (NZAC), labelled: 'NEW ZEALAND, WD Ship Cr 6 Nov 2007 R. Leschen C. Carlton RL1299 (RL007) // leaf litter and rotten log berlesate 43 45.556S 169 8.986E // NZ Arthropod Collection Private Bag 92170 Auckland New Zealand NZAC04235171'. Paratypes (21; NZAC): **North Island: TK:** 1, Egmont National Park, Waiwhakaiho Track, 16 Jan 2008, sifted leaf litter, K. Marske, R. Leschen, T. Buckley, 39°13.371′S,174°7.444′E, KM180, NZAC04272537; 1, Pouakai Range, 9-13 Jan 1978, J.C. Watt, [39°14.451′S,174°1.232′E], NZAC04235150. **South Island: NN:** 1, Collingwood, Kaituna, Aorere Valley, 3 Apr 1964, litter, J.I. Townsend, [40°43.442′S,172°35.915′E], NZAC04235034; 1, Karamea Saddle, 13 Oct 1970, litter, J.I. Townsend, [41°30.981′S,172°1.229′E], NZAC04235301. **BR:** 1, Punakaiki, Pahautane Bay, 9 June 1983, H.P. McColl, [42°6.317′S 171°20.183′E], NZAC04272536; 1, Punakaiki, Pororari River Walk, 27 Aug 2010, washed soil sample supplejack/nikau forest, J. Nunn Collection, [42°6.431′S,171°20.413′E], NZAC04235172. **WD:** 2, Open Bay Islands, Taumaka Island, 30 Apr 1976, litter mainly *Schefflera digitalis*, *Melicytus ramiflorus*, R.H. Matlin, [43°51.644′S,168°52.95′E], NZAC04235169, NZAC04272547. **OL:** 1, Haast Pass, Found Creek Culvert, 6 Mar 2003, sifted leaf litter and rotting logs, R. Leschen, C. McGuiness, 44°3.539′S,169°22.778′E, RL785, NZAC04235300. **FD:** 1, Bauza Island, 3 March 2010, sifted litter/rotten logs, S.A. Forgie, 45°17.768′S,166°55.82′E, SAF030, NZAC03027041; 1, Dusky Sound, Gilbert Islands, 25 Jan 2011, sifted litter/bark/lichen/moss/log scrapings, S.A. Forgie, 45°36.047′S,166°39.595′E, SAF042, NZAC03027121; 1, Eglington Valley, Cascade Creek, 21 Jan 1962, litter, J.I. Townsend, [44°53.694′S,168°4.938′E], NZAC04235081; 1, Routeburn Track, 11 May 200, ex Calostoma, R. Leschen, 44°49′S,168°7′E, RL574, NZAC04235142; 3, Secretary Island, Grono Bay, 24 Mar 1984, sifted litter, C.F. Butcher, [45°17.044′S,166°56.321′E], NZAC04235073, NZAC04235078, NZAC04235135; 2, Secretary Island, ridge towards Mount Grono, 30 Nov 1981, mats and mosses, C.F. Butcher, [45°16.553′S,166°56.488′E], NZAC04235111, NZAC04235141; 2, Secretary Island, ridge towards Mount Grono, 30 Nov 1981, alpine mats, moss and tussock, C.F. Butcher, [45°16.553′S,166°56.488′E], NZAC04235059, NZAC04235137; 1, Wilmot Pass, Jan 1970, mats, J.S. Dugdale, [45°30.482′S,167°11.553′E], NZAC04235082.

Additional material. South Island: SD: 1, Port Liger, Marlborough, 26 Oct 1969, litter, F. Alack, 40°54.586′S,173°58.688′E, NZAC04235115.

Diagnosis. *Thortus lobatus* sp. nov. can be distinguished from most species by having complete parasutural striae and a relatively long gena. It is most similar to *T. amoenus* and *T. sulcatus* sp. nov.; it can be distinguished from *T. amoenus* by the narrow clypeus and from *T. sulcatus* sp. nov. by lacking a median pronotal impression.

Description. Length 1.20–1.55 mm. Colour of body dark reddish-brown, mouthparts, legs, and antennal club lighter. Body surface semiglabrous, microsculpture absent, apart from posterior portion of gula. Dorsal setae silvery-gold, consisting of very long decumbent and scattered suberect to erect and subdecumbent curved and straight setae. Ventral surfaces with shorter subdecumbent straight and slightly curved setae; punctation ovate, well-impressed, and not uniform in size, mesoventrite foveolate, central disc of metaventrite with punctures of different sizes, with larger ovate punctures present anteriorly and those on central disc smaller than those on prosternum, punctation of abdominal ventrites 1 to 4 about as large as those on the central disc of metaventrite, with those on ventrites

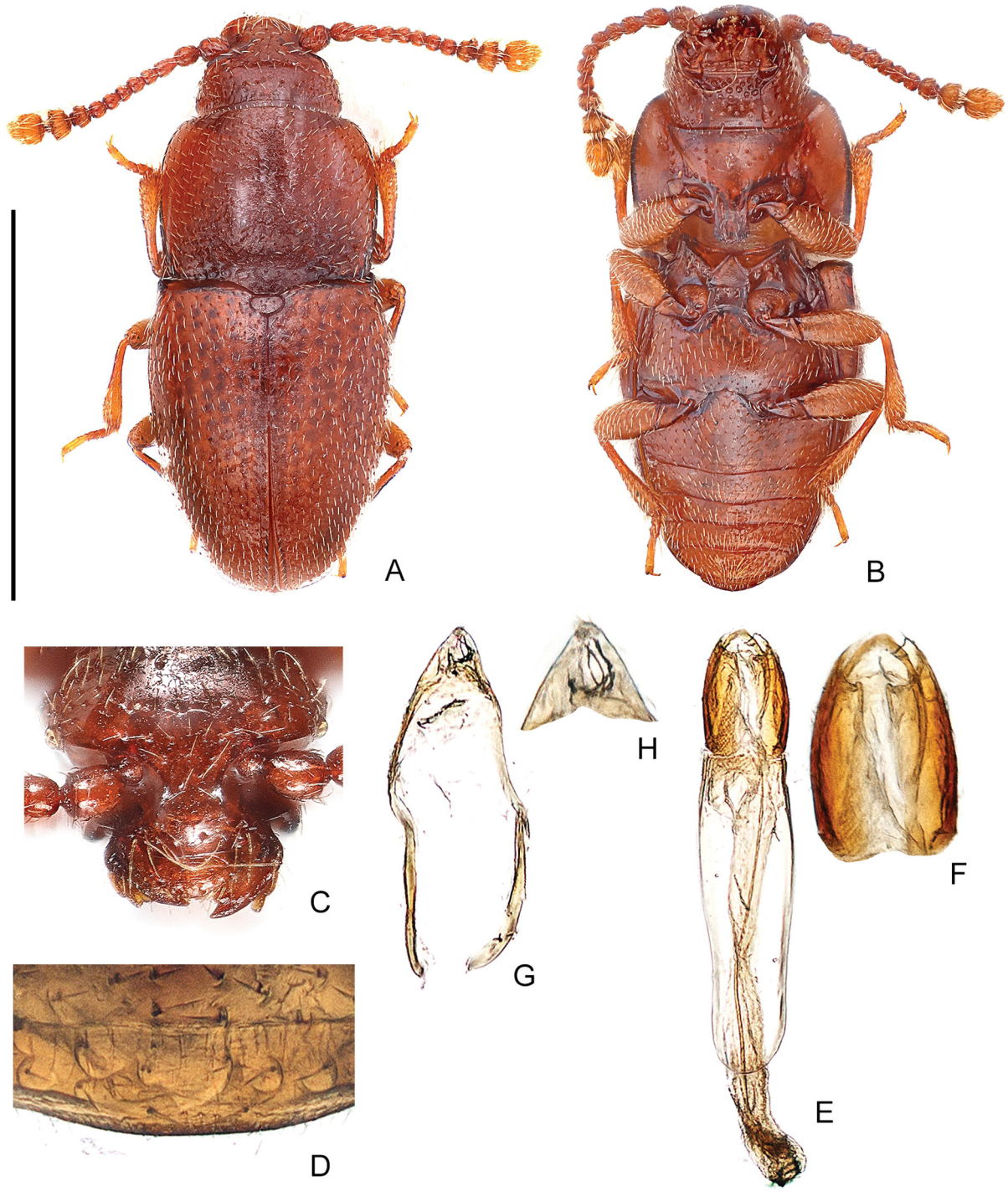

Fig. 9. *Thortus helmorei* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – prescutellar area of pronotum; E – aedeagus, dorsal view; F – distipenis, dorsal view; G – tegmen, dorsal view; H – parameres, dorsal view.

1–5 generally more closely packed and more shallower on ventrites 4 and 5, punctation on ventrite 5 denser with a well-defined patch of posteriorly-directed setae. Head lengthened with relatively long gena, about 1.5 times as long as length of antennomere 1; frons constricted, narrowed to a width about 2/3 the length of antennomere 1; supra-antennal ridge with well-developed rim, bead present, well developed and relatively broad; vertex not delimited anteriorly by a transverse crenulate line, surfaces punctate to foveolate (punctures larger in a specimen from Taranaki); gular punctation irregular, deep and ovate, diameters similar to those on side of head. Eye consisting of about 11–18 facets. Antennomere 2 cylindrical, slightly longer than wide, antennomere 3 subconical, longer and about as wide as 2 and longer and about as wide as 4, proportions of antennomeres 4–8 same, antennomere 9 wider than 8 and slightly narrower than 10 and 11, antennomere 10 transverse and slightly wider than 11, antennomere 11 longer than 10, shorter than 9 and 10 combined. Pronotum subquadrate, pronotal length/width ratio ~1.03, widest at

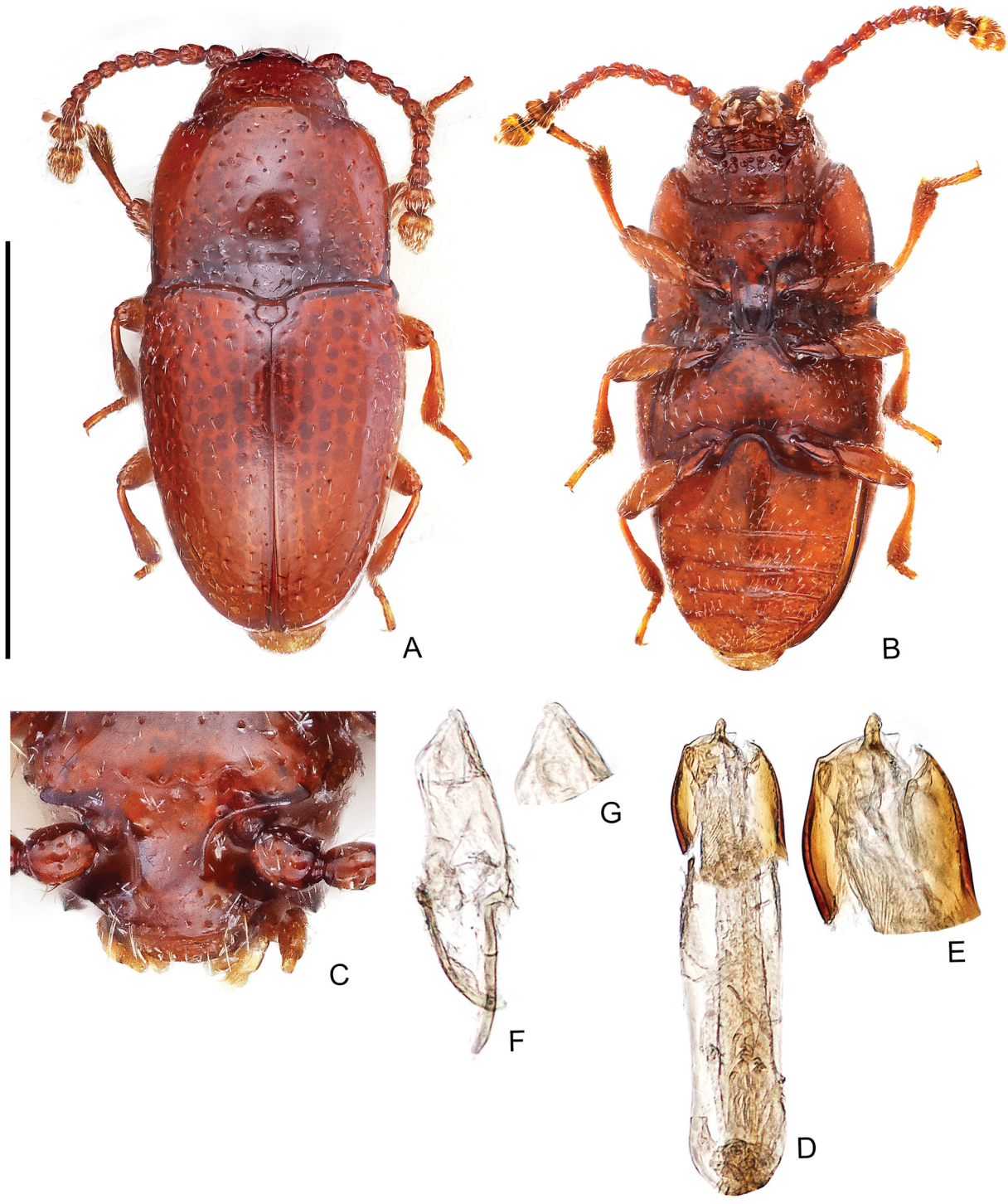

Fig. 10. *Thortus latus* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – aedeagus, dorsal view; E – distipenis, dorsal view; F – tegmen, dorsal view; G – parameres, dorsal view.

middle; anterior margin slightly curved; anterior angles obtuse and rounded; lateral edges somewhat evenly rounded and gradually converging anteriorly and posteriorly; pronotal disc with punctures more or less regular and uniform and at base weaker or absent at middle and more strongly impressed along posterior margin, separated by a distance of 0.5–1.0 times their diameter; median impression absent; not or weakly transversely depressed at base; basomedial macropuncture absent; posterolateral angles obtuse and rounded, not projecting posteriorly; posterior margin sinuate with weak scutellar lobe. Prosternal process with well-developed lateral marginal beads, without longitudinal depression medially, process weakly widened posteriorly behind procoxae, apex subacute, width 0.48 times shorter than length of prosternum; procoxal cavity without anterolateral notch. Scutellary shield ovoid, 1.77 times as wide as long. Elytra about 1.50 times as long as combined widths, about 1.17 times wider than width of pronotum, about 1.70 times longer than length of pronotum; setation dual, consisting of very long straight and curved

setae; humeral plica present; parasutural stria present and complete, interspace setose; punctation dissimilar to pronotum, more impressed, larger and dense at base, separated by a distance of up to 1–4 times their diameter. Metaventrital process with anterior margin straight, marginal bead absent. Tarsi moderately slender, 5-5-5 in female, 5-5-4 in male, male pro- and mesotarsomeres 1 and 2 with tenent setae; mesotarsomeres 1–3 of subequal lengths, mesotarsomere 4 slightly longer than tarsomeres 1–3 combined. First abdominal ventrite with postcoxal lines weakly convex, extending slightly beyond mid-length of sclerite; intercoxal process somewhat narrowed, rounded at apex. Aedeagus with long and slender parameres articulated to phallobase; paramere about 3 times as long as wide, apices asetose with long membranous extensions; basipenis about 3.92 times as long as distipenis; distipenis about 1.61 times as long as wide, lateral lobes not separated, basal plate absent; internal sac (?) with at least one slender endophallite.

Etymology. The specific epithet is the Latin adjective '*lobatus*', meaning 'lobate', in reference to the modified apex of the parameres.

Distribution. North Island: TK. **South Island:** NN, ?SD, WD, FD (Fig. 21).

Remarks. *Thortus lobatus* sp. nov. is known from several specimens, including one from the North Island, Taranaki, with the rest from the western South Island. A single damaged specimen excluded from the type series with missing elytra from Port Ligar (Fig. 22C) may also be attributed *T. lobatus* sp. nov. based on the form of the frons and the shape of the pronotum. This specimen locality is shown in Fig. 24 as '*Thortus* nr. *lobatus*'. Specimens have been taken mainly by sifting moss, leaf litter and rotten wood.

Thortus luscus sp. nov.

(Fig. 12)

Type material. Holotype: ♂ (LUNZ), labelled: 'NZ:38°S 175.58°E MauRes, F:-; P:- (3363ha) #W651-013, 33cm diam litter: 72hr Berlese, Edge dist 34.7m (9.2m offset), RK Didham 19-Feb-08.' Paratypes (8; AMNZ, FRNZ, LUNZ, NZAC). **North Island: WO:** 1 (LUNZ), Mangatautari, 20 Nov - 17 Dec 2008, south cell outside cell, C.H. Watts, [38°2.679′S,175°33.832′E]; 1, Mangatautari, 21 Jan - 24 Feb 2008, south cell outside cell, C.H. Watts, [38°2.679′S,175°33.832′E], NZAC04272535; 1, Maungatautari, 18 Dec 2010 - 20 Jan 2011, C.H. Watts, 37°58.133′,175°33.683′E, AMNZ86330; 1 (LUNZ), Maungatautari Mountain, 18 Dec 2010 - 20 Jan 2011, C.H. Watts, 38°0′S,175°34.8′E; 1 (LUNZ, same as holotype), Mau Reserve Forest Park (Mangatautari), 19 Feb 2008, litter, R.K. Didham, 38°0′S,175°34.8′E; 1, Sanctuary Mountain, Maungatautari, southern enclosure, 20 Nov 2020, litter, R. Leschen, Y. Chen, 38°2.679′S,175°33.832′E, RL2265, NZAC03038714. **BP:** 1 (FRNZ), Dansey [Road Scenic] Reserve, pitfall trap OP5, C. Wardhaugh, 9 Jan - 3 Feb 2023, 38°5.417′S, 176°7.45′E; 1 (FRNZ), Endean′s Bush native forest pitfall 1, C. Wardhaugh, 13 Dec 2022 - 9 Feb 2023, 38°9.871′S,176°1.622′E.

Diagnosis. *Thortus luscus* sp. nov. is unicolourous and has a unifacetted eye. The abdominal postcoxal lines are divergent, but do not reach the middle of the disc of abdominal ventrite 1. It most closely resembles *T. simplex*, differing from it by having the pronotum widest at the middle and by having parasutural striae.

Description. Length 1.30–1.40 mm. Colour of body unicolourous red-brown, with lighter antennal club, mouthparts and legs. Body surface glabrous, microsculpture present on ventral surfaces and distinct on the abdominal ventrites, absent or very weak and present on lateral surfaces of the head and at the sides of the pronotum. Dorsal setae silver, consisting of short scattered decumbent setae. Ventral surfaces with suberect setae; punctation ovate on prosternum, mesoventrite foveolate and strongly impressed, disc of metaventrite with punctures variable and as impressed as those on prosternum, but generally smaller, punctation of abdominal ventrites 1 to 4 smaller or equal to those on metaventrite and lass impressed, setae not longer at sides, punctation on ventrite 5 denser with a well-defined patch of posteriorly-directed setae. Head not lengthened with relatively short gena that is subequal to the length of antennomere 1; frons constricted, narrowed to a width subequal in length to antennomere 1; supra-antennal ridge with well-developed rim, bead absent; vertex delimited anteriorly by a transverse crenulate line, anterior surface punctured, posterior surface subglabrous and irregularly foveolate; gular punctation semi-regular and ovate, diameters more or less equal to those on sides of head. Eye consisting of a single facet. Antennomere 2 barrel-shaped, slighter longer than wide, antennomere 3 subconical, about as long as slightly narrower than 2 and longer and wider than 4, proportions of antennomeres 4–8 nearly the same, antennomere 9 wider than 8 and narrower than 10 and 11, antennomere 10 transverse and about the same width as 11, antennomere 11 longer than 10, shorter than 9 and 10 combined. Pronotum transverse, pronotal length/width ratio ~1.16, widest at middle; anterior margin convex; anterior angles obtuse, rounded and not projecting; lateral edges weakly convex, converging anteriorly, gradually converging posteriorly; pronotal disc with punctation coarse and subuniform and foveolate, shallow, sparse to absent in central disc, separated by a distance of up to 1 times their diameter and larger at the base; median impression absent; transversely depressed at basal 1/5; basomedial macropuncture present but weakly indicated and elongate and may be weakly triangulate; posterolateral angles right, sharp, not or slightly projecting posteriorly; posterior margin sinuate with a weak scutellar lobe. Prosternal process with well-developed lateral marginal beads, without longitudinal depression medially, process more or less subparallel-sided, slightly expanded posteriorly behind procoxae, apex subacute, width slightly narrower than procoxa 0.5 times as long as length of prosternum; procoxal cavity without anterolateral notch. Scutellary shield subtrapezoidal and transverse, 2.3 times as wide as long. Elytra about 1.31 times as long as combined widths, about 1.11 times wider than width of pronotum, about 1.70 times longer than length of pronotum; setation uniform consisting of relatively short decumbent setae; humeral plica present; parasutural stria present, incomplete and extending to about basal 1/3; punctation less dense than pronotum, but at base more impressed. Metaventrital process with anterior margin weakly curved, marginal bead weakly indicated at middle. Tarsi moderately slender, 5-5-5 in female, 5-5-4 in male, male pro- and mesotarsomeres 1–3 with tenent setae; mesotarsomeres 1–3 of subequal lengths, mesotarsomere

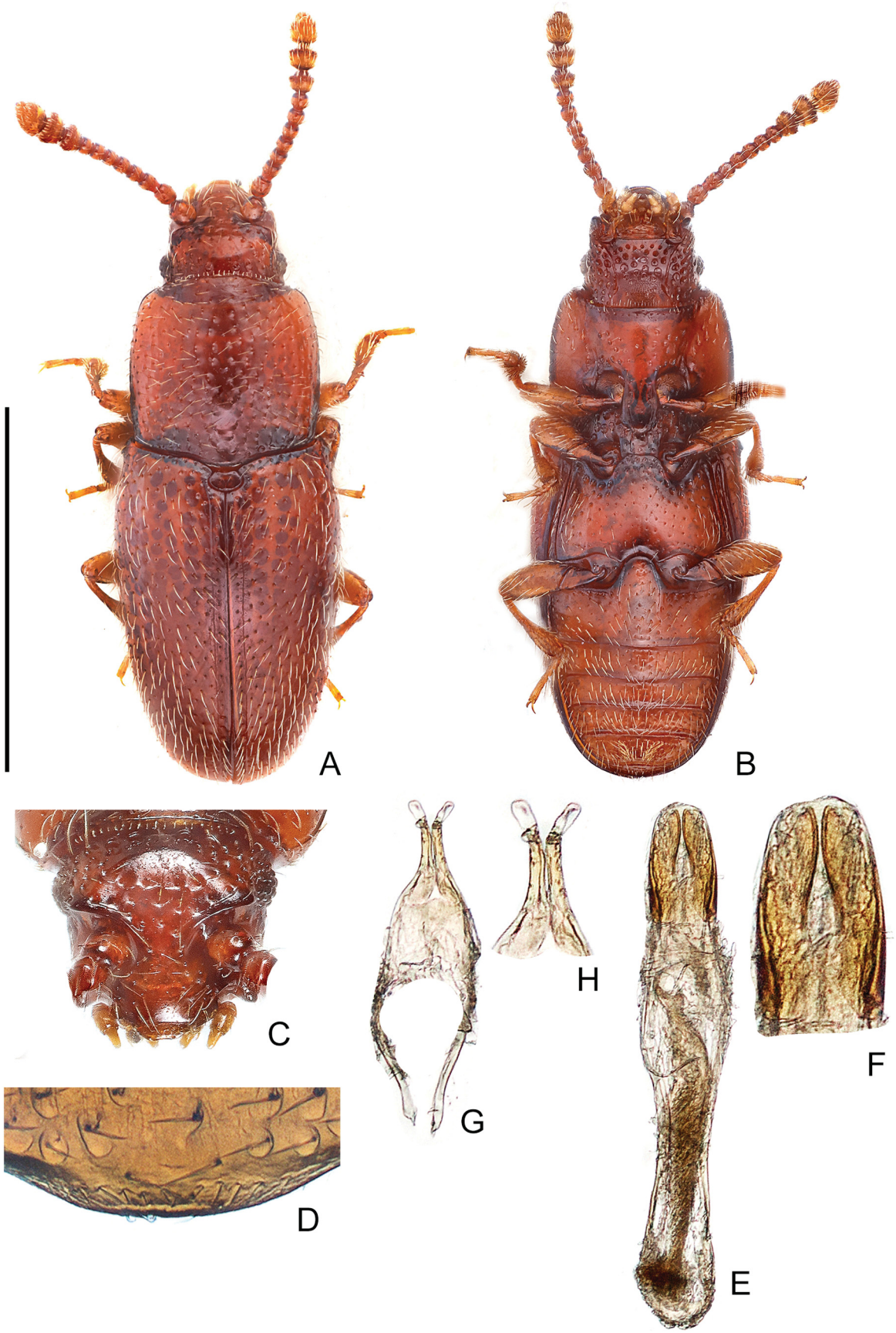

Fig. 11. *Thortus lobatus* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – prescutellar area of pronotum; E – aedeagus, dorsal view; F – distipenis, dorsal view; G – tegmen, dorsal view; H – parameres, dorsal view.

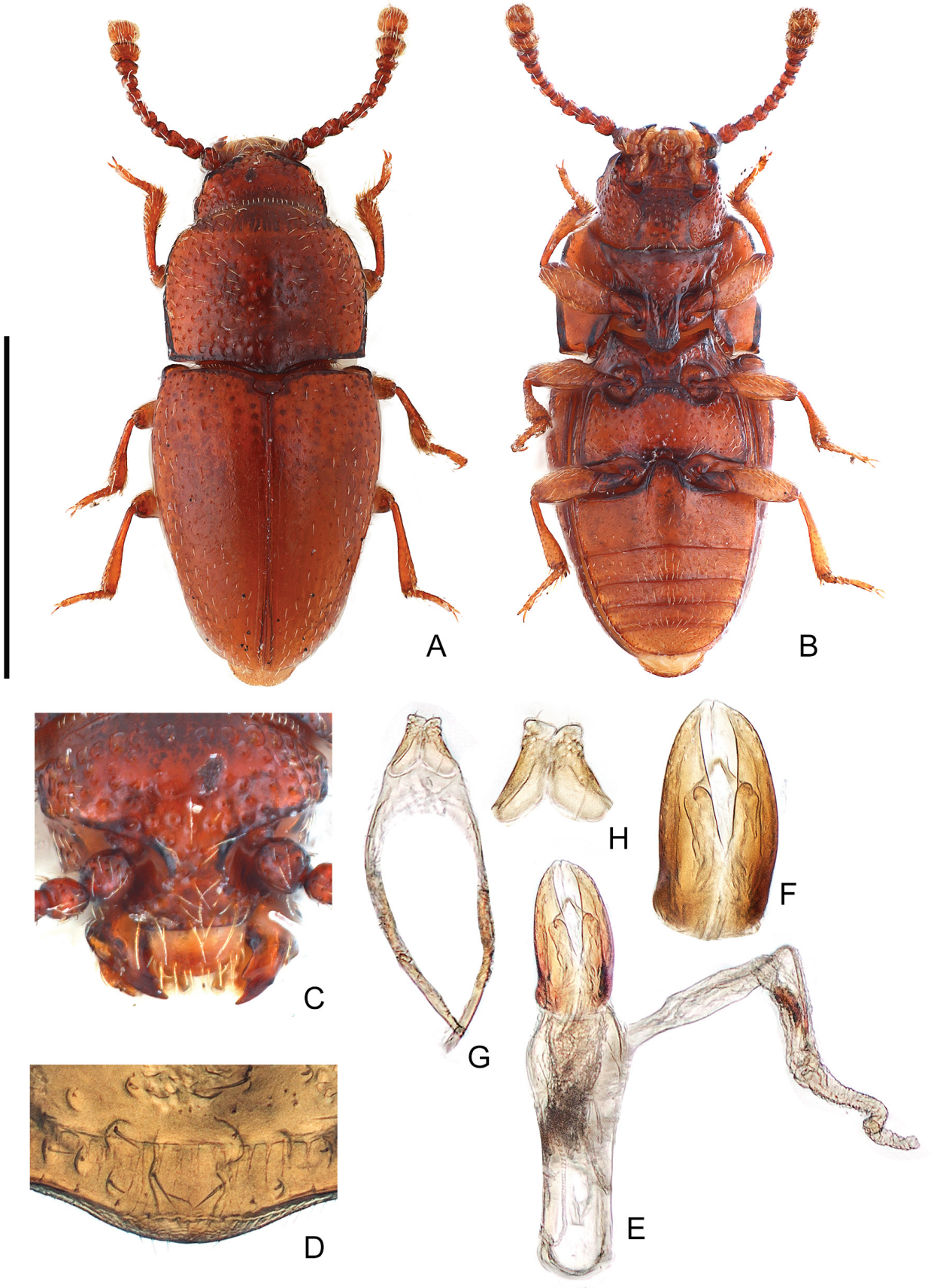

Fig. 12. *Thortus luscus* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – prescutellar area of pronotum; E – aedeagus, dorsal view; F – distipenis, dorsal view; G – tegmen, dorsal view; H – parameres, dorsal view.

5 subequal to tarsomeres 1–4 combined. First abdominal ventrite with intercoxal process relatively narrowed and subacute, postcoxal lines relatively short, divergent, extending to basal 1/3rd of sclerite. Aedeagus with relatively long parameres articulated to phallobase, paramere about 2 times as long as wide; apices somewhat truncate or subrounded, without membranous projections, unisetose; basipenis about 3.43 times as long as distipenis; distipenis about 1.76 times as long as wide, lateral lobes separated, basal plate absent; internal sac with a pair of long slender endophallites, one, at least is expanded apically.

Etymology. The specific epithet is the Latin adjective '*luscus*', meaning 'one-eyed'.

Distribution. North Island: WO, BP (Fig. 21).

Remarks. *Thortus luscus* sp. nov. is known from nine specimens, collected at Maungatautari, Endean's Bush, and Dansey Road Scenic Reserve. It has been taken in pitfall traps and sifting litter and dead wood.

Thortus michauxi sp. nov.

(Figs 13, 19B)

Type material. Holotype: ♂ (NZAC), labelled: 'Ewing I. Auckland Is. 9 Feb 73 D. S. Horning // ex mat of thick moss on prostrate trunk of Olearia lyalli // NZ Arthropod Collection Private Bag 92170 Auckland New Zealand NZAC04235028.' Paratypes (80; AMNZ, BPMN, NZAC, OMNZ). **Auckland Islands (AU):** 2, Adams Island, 20 Jan - 4 Feb 2011, tussock and megaherbs, in flat albatross nestling area, G. Elliott, K.J. Walker, 50°54.158′S,166°0.262′E, AMNZ85286, AMNZ85287; 1, Adams Island, 19 Jan - 3 Feb 2011, southern rata forest coastal, sooty shearwater colony, G. Elliott, K.J. Walker, 50°51.905′S,166°22.117′, AMNZ85292; 1 (OMNZ), Adams Island, 2-7 Dec 1996, G.H. Sherley, B. Patrick, [50°50.248′S,165°55.342′E]; 1, Adams Island, Fairchilds Garden, 20 Jan 1966, litter, G. Kuschel, 50°50.248′S,165°55.342′E, NZAC04235277; 2, Adams Island, Fairchilds Garden, 22 Mar 2006, megaherb leaf litter, R. Leschen, E. Edwards, 50°50.248′S,165°55.342′E, NZAC03019027, NZAC03021584; 1, Adams Island, Magnetic Point, 28 Nov - 14 Dec 1996, herbfield, G.H. Sherley, [50°50.248′S,165°55.342′E], NZAC04235197; 21, Adams Island, Magnetic Cove Station, 28 Jan 1966, litter, G. Kuschel, [50°51.645′S,166°5.302′E], NZAC04231310, NZAC04235064, NZAC04235068, NZAC04235112, NZAC04235158, NZAC04235160, NZAC04235161, NZAC04235163, NZAC04235210, NZAC04235238, NZAC04235239, NZAC04235245, NZAC04235265, NZAC04235299, NZAC04235305, NZAC04235313, NZAC04235314, NZAC04272528, NZAC04272540, NZAC04272541, NZAC04272542; 1, Carnley Harbour, E Tagua Bay, 4 Feb 1973, litter, J.S. Dugdale, [50°48.633′S,166°3.933′E], NZAC04235268; 7, Auckland Islands, Disappointment Island, 15 Feb 1975, plants, D.S. Horning, [50°36.45′S,165°58.283′E], NZAC04235186, NZAC04235212, NZAC04235221 NZAC04235224, NZAC04235228, NZAC04235310, NZAC04235318; 18, Ewing Island, 9 Feb 1973, in bark of live *Olearia lyalli*, D.S. Horning, [50°31.711′S,166°18.215′E], NZAC04235032, NZAC04235039, NZAC04235040, NZAC04235055, NZAC04235061, NZAC04235067, NZAC04235070, NZAC04235071, NZAC04235149, NZAC04235162, NZAC04235164, NZAC04235167, NZAC04235170, NZAC04235247, NZAC04235289, NZAC04235290, NZAC04235295, NZAC04235319; 13 (same as holotype), Ewing Island, 9 Feb 1973, ex mat of thick moss on prostrate trunk of *Olearia layallii*, D.S. Horning, [50°31.713′S,166°18.229′E], NZAC04235028, NZAC04235031, NZAC04235083, NZAC04235084, NZAC04235101, NZAC04235162, NZAC04235180, NZAC04235183, NZAC04235195, NZAC04235200, NZAC04235219, NZAC04235256, NZAC04235272, NZAC04235275; 4, Ewing Island, 7 Feb 1973, in rotting bark of live *Olearia lyallii*, D.S. Horning, [50°31.713′S,166°18.229′E], NZAC04235037, NZAC04235077, NZAC04235298, NZAC04235317; 3, Ewing Island, 9 Feb 1973, leaf litter in *Olearia layallii* forest in drainage, D.S. Horning, [50°31.713′S,166°18.229′E], NZAC04235065, NZAC04235132, NZAC04235276; 1, Ewing Island, 9 Feb 1973, *Stillbocarpus polaris*, *Olearia layalli* litter, D.S. Horning, [50°31.713′S,166°18.229′E], NZAC04235114; 1 (BPMN), Ewing Island, Port Ross, 1 Jan 1963, moss on tree trunk, K.A.J. Wise, [50°31.733′S,166°18.033′E]; 1, Fleming Plateau, 9 Feb 1973, swards, J.S. Dugdale, [50°47.383′S,165°56.833′E], NZAC04235230; 1, Mount D′urville, 4 Jan 1973, mats, J. Farrell, [50°49.9′S,166°10.333′E], NZAC04235216; 1, Waterfall Inlet, 26 Mar 2006, litter along stream margins, R. Leschen, E. Edwards, 50°48.977′S,166°12.042′E, NZAC04235209.

Diagnosis. The Auckland Islands endemic *Thortus michauxi* sp. nov. is distinguished from all other *Thortus* species by having a large body with a weak supra-antennal ridge which lacks a rim and abdominal ventrite 1 lacking postcoxal lines. It is also the only species of the genus with males that have a dense brush of tenent setae on tarsomeres 1–3 on the pro- and mesolegs and the aedeagus with a well-formed basal plate in the distipenis.

Description. Length 2.10–2.50 mm. Colour of body dark to light reddish-brown, mouthparts, legs, and distal parts of the antennae often lighter. Body surface semiglabrous, microsculpture strigulate over all surfaces, but weaker or absent from elytra. Dorsal setae golden, sparse, dual, consisting of very short decumbent and erect setae, and longer suberect to erect setae. Ventral surfaces with more dense and shorter erect setae of variable lengths; finely to shallowly punctate, central disc of metaventrite with punctures larger and more impressed than those of prosternum, punctation of abdominal ventrites 1 to 4 less impressed than metaventrite, and on ventrite 5 denser, and with a well-defined patch of posteriorly-directed setae. Head lengthened with relatively long gena, about 2 times as long as antennomere 1; frons relatively wide and parallel-sided between antenna, width about equal to length of antennomere 1; supra-antennal ridges without a well-developed rim and bead; vertex with regular punctation and not delimited anteriorly by a transverse crenulate line or distinctly glabrous areas; punctation of gula and sides of the head similar, distinct and ovate. Eye consisting of 12–16 facets. Antennomere 2 cylindrical, wider than long, antennomere 3 subconical, longer and as wide as 2 and longer and slightly wider than 4, proportions of antennomeres 4–8 same, antennomere 4 shorter than 3, antennomere 9 wider than 8 and narrower than 10 and 11, antennomere 10 transverse and scarcely wider than 11, antennomere 11 longer than 10, shorter than 9 and 10 combined. Pronotum quadrate, pronotal length/width ratio ~1.00, shape widest at middle; anterior margin weakly sinuate; anterior angles obtuse lateral edges subparallel in basal half and gradually converging anteriorly; pronotal disc with punctures regular and uniform, widely separated by a distance between punctures up to 3–6 times their diameter; median impression absent; transversely depressed at basal 1/5; basomedial macropuncture present, ovoid and well-delineated by extensions of the posterior bead; posterolateral angles subacute and not projecting posteriorly; posterior margin evenly and weakly convex, scutellar lobe absent. Prosternal process with well-developed lateral marginal beads, without longitudinal depression medially, process not expanded apically behind procoxae, apex rounded, width subequal that of procoxa and 0.49 times as long as prosternum; procoxal cavity with weak anterolateral notch.

Scutellary shield ovoid, 1.4 times as wide as long. Elytra about 1.68 times as long as combined widths, about 1.25 times as wide as width of pronotum, about 2.08 times as long as length of pronotum; setation dual, consisting of very short decumbent or erect setae, and longer suberect to erect setae; humeral plica absent; parasutural stria present in apical 1/3, with interspace asetose; punctation similar to pronotum, but less uniform, and separated by a distance of 1–4 times their diameter. Metaventrital process with anterior margin weakly curved, marginal bead connected at middle. Tarsi moderately slender, 5-5-5 in female, 5-5-4 in male, male pro- and mesotarsomeres 1–3 with dense tenent setae; mesotarsomeres 1–3 of subequal lengths with 1 slightly shorter than 2, 3 and 4 which are equal, mesotarsomere 5 equal to tarsomeres 1–4 combined. First abdominal ventrite without postcoxal lines; intercoxal process subacute. Aedeagus with very short parameres broadly fused to phallobase at their bases, separated at the apex, length about 2.25 times as long as wide; apices asetose, lacking membranous extensions; basipenis about 5.17 times as long as distipenis; distipenis about 1.38 times as long as wide, lateral lobes moderately separated, basal plate present; internal sac with a pair of short slender endophallites.

Etymology. A high school teacher dedicated to understanding Earth history and conservation of birds, Bernard Michaux, friend and colleague of the first author, is honoured with the specific epithet.

Distribution. Offshore Island: Auckland I. (AU) (Fig. 21).

Remarks. Like many species of edaphic subantarctic beetles, *T. michauxi* sp. nov. does not appear to be a microhabitat specialist (Carlton & Leschen 2001). It has been collected in leaf litter, under bark, and in moss.

Thortus ovalis Broun, 1893

(Figs 14, 15, 19E)

Thortus ovalis Broun 1893: 1345.

Material examined (303; AMNZ, LUNZ, NZAC). **South Island: NN:** 1, 6km up Little Wanganui River, 24 Jun 1967, litter, F. Alack, [41°22.661′S,172°5.392′E], NZAC04234647; 1, Karamea Area, 20 Jun 1967, litter, F. Alack, [41°14.611′S,172°8.515′E], NZAC04234604; 1, Karamea Bluff, 26 Jan 2005, litter, R. Leschen, T. Buckley, R. Hoare, 41°31′S,172°1′E, RL958, NZAC04234640; 1, Karamea Bluff, 29 Sep 1966, CLW-RRF, [41°30.926′S,172°1.286′E], NZAC04234582; 6 Karamea Bluff, 9 Feb 1999, litter, R. Leschen, R. Hoare, 41°31′S,172°1′E, RL275, NZAC04234547, NZAC04234560, NZAC04234636, NZAC04234658, NZAC04234672, NZAC04234719; 1, Karamea Bluff, 20 Feb 1999, ex *Ramaria* sp, R. Leschen, R. Hoare, 41°31′S,172°1′E, RL346, NZAC04235174; 14, NN, Karamea Bluff, View Hill Saddle, 2 Mar 2007, sifted wood and leaf litter, K. Marske, 41°30.981′S,172°1.229′E, KM040, NZAC03018796, NZAC04234476, NZAC04234480, NZAC04234486, NZAC04234531, NZAC04234544, NZAC04234598, NZAC04234599, NZAC04234614, NZAC04234624, NZAC04234625, NZAC04234630, NZAC04234655, NZAC04234656; 19, Karamea Gorge Route, along Virgin Creek, 28 Feb 2007, sifted wood and leaf litter, K. Marske, 41°14.793′S,172°12.826′E, KM034, NZAC03019647, NZAC04234466, NZAC04234496, NZAC04234503, NZAC04234535, NZAC04234536, NZAC04234548, NZAC04234549, NZAC04234550, NZAC04234565, NZAC04234567, NZAC04234571, NZAC04234588, NZAC04234602, NZAC04234605, NZAC04234606, NZAC04234607, NZAC04234616, NZAC04234648; 1, Karamea Saddle, 13 Oct 1970, J.I. Townsend, [41°30.981′S,172°1.229′E], NZAC04234622; 1, Mt Owen, 13 Mar 1938, C.E. Clarke, 41°33.183′S,172°32.483′E, AMNZ34193; 1, Mt Owen at river, 12 Mar 1938, C.E. Clarke, 41°35.4′S,172°32.467′E, AMNZ34194; 7, Oparara Basin, Box Canyon/Crazy Paving Caves track and carpark, 27 Feb 2007, mixed *Nothofagus* and podocarp forest, sifted wood and leaf litter, K. Marske, 41°8.076′S,172°11.525′E, KM028, NZAC03018653, NZAC04234443, NZAC04234461, NZAC04234481, NZAC04234540, NZAC04234595, NZAC04234597; 6, Oparara Basin, Moria Gate Track, 1 Mar 2007, sifted wood and leaf litter, K. Marske, 41°9.084′S,172°11.862′E, KM039, NZAC04234521, NZAC04234526, NZAC04234570, NZAC04234600, NZAC04234703, NZAC04234704; 1, Oparara Gorge, 9 Feb 1999, litter, R. Leschen, R. Hoare, 41°13′S, 172°09′E, RL281, NZAC04234715; 2, Oparara River, 27 Apr 1963, litter, J.I. Townsend, [41°11.711′S,172°11.476′E], NZAC04234641, NZAC04234700; 2, NN, Oparara River mouth, 1 Jan 2011, under driftwood after flood, J. Nunn, [41°12.746′S,172°6.750′E], NZAC04234620, NZAC04235155; 1, Oparara Road, 27 Apr 1963, forest litter, J.I. Townsend, [41°11.711′S,172°11.476′E], NZAC04234618. **BR:** 1, 1.6km NW Capleston, Italians Creek, 21 April 1972, litter, J.S. Dugdale, [42°3.984′S,171°55.345′E], NZAC04234575; 5, BR, 12km NE Ikamatua, 9 Feb 1965, litter, N.A. Walker, [42°11.245′S,171°43.397′E], NZAC04234579, NZAC04234591, NZAC04234608, NZAC04234667, NZAC04234673; 1, 3.5km N Rapahoe, 12 Jan 1998, *Nothofagus truncata* leaf litter, R. Leschen, C. Carlton, 42°42′S,171°15′E, RL051, NZAC04234463; 1, Bell Hill Scientific Reserve, 14 Jul 1996, K.W. Drew, E.B. Spurr, [42°33.694′S,171°34.641′E], NZAC04234460; 1, Blackball Road, 20 Jan 2005, R. Leschen, T. Buckley, P. Lambert, 42°20.851′S,171°23.552′E, RL926, NZAC04234680; 3, Boatmans Creek, 4 Oct 1972, litter, G. Kuschel, [42°3.994′S,171°55.244′E], NZAC04134954, NZAC04136280, NZAC04139061; 3, Capleston, 6 Apr 1973, litter, J.C. Watt, [42°4.021′S,171°55.243′E], NZAC04234511, NZAC04234516, NZAC04234580; 1, Capleston, 4.5km SE of Cronadun, Redmans Creek, 8 Nov 1972, litter, J.C. Watt, [42°3.317′S,171°54.217′E], NZAC04272531; 25, Capleston, Flowers Creek, 12 Nov 1971, fungus, J.C. Watt, [42°3.209′S,171°53.444′E], NZAC04134341, NZAC04234530, NZAC04234543, NZAC04234551, NZAC04234552, NZAC04234557, NZAC04234559, NZAC04234561, NZAC04234562, NZAC04234566, NZAC04234572, NZAC04234573, NZAC04234574, NZAC04234583, NZAC04234585, NZAC04234587, NZAC04234589, NZAC04234592, NZAC04234593, NZAC04234594, NZAC04234596, NZAC04234626, NZAC04234631, NZAC04234690; 1, Charleston, 8.5km S, 5 Nov 1965, J.I. Townsend, 41°54.346′S,171°26.207′E, NZAC04234663; 2, Denniston, 1 Nov 1965, forest litter, J.I. Townsend, A.C. Eyles, [41°44.167′S,171°47.676′E], NZAC04234472, NZAC04234638; 6, Fletchers Creek, 7 Mar 1972, litter, J. McBurney, [41°59.113′S,171°53.454′E], NZAC04134966, NZAC04135413, NZAC04135699, NZAC04136190, NZAC04139339, NZAC04139623; 1, Fletchers Creek, 26 Jan 1972, litter, J.S. Dugdale, [41°59.113′S,171°53.454′E], NZAC04136771; 1, Fletchers Creek, 1.5km W Coll Creek, 26 Jan 1972, litter, J.S. Dugdale, [41°59.113′S,171°53.454′E], NZAC04134523; 1, Fletchers Creek, SW Rotokohu, Nov 1971, J. McBurney, [41°59.113′S,171°53.454′E], NZAC04234698; 3, Fletchers Creek, 6km SW Rotokohu, 25 Jan 1972, litter, J. McBurney, [41°59.113′S,171°53.454′E], NZAC04134391, NZAC04139128, NZAC04139560; 2, Fletchers Creek, 6km SW Rotokohu, 26 Jan 1972, litter, J.C. Watt, [41°59.113′S,171°53.454′E], NZAC04134807, NZAC04135497; 2, Grey Valley, Waipuna, 21 Apr 1971, litter, J.S. Dugdale, 42°2′S,171°43′E, NZAC04234578, NZAC04234612; 2, Greymouth, Grandjeans Track, 10 Nov 2005, R. Leschen, S. Nomura, 42°28′S,171°12′E, RL1019, NZAC04234644, NZAC04234722; 1, Greymouth, Rapahoe, 29 May 1963, litter, G. Kuschel, [42°42′S,171°15′E], NZAC04234661; 1, Hochstetter State Forest, 9 Nov 1972, litter, J.S. Dugdale, [42°22.387′S,171°32.674′E], NZAC04234677; 7, Hochstetter State Forest, 6km S of Ahaura, 11 Nov 1971, litter, J.C. Watt, [42°22.387′S,171°32.674′E], NZAC04234629, NZAC04234633, NZAC04234637, NZAC04234651, NZAC04234652, NZAC04234657, NZAC04234659; 3, Inangahua, 23 Jan 1957, E.S. Gourlay, [41°51.508′S,171°57.269′E], NZAC04234479, NZAC04234619, NZAC04234639; 3, Inland Pack Track, 1km N Punakaiki River, 29 Dec 2010, sifted ground litter, J. Nunn, [42°7.521′S,171°21.423′E], NZAC04234458, NZAC04234617, NZAC04234660; 1, Inland Pack Track, 1km N Punakaiki River, 29 Dec 2010, in flood debris, J. Nunn, [42°7.521′S,171°21.423′E], NZAC04234474; 1, Kopara Forest, 17 Jul

1996, K.W. Drew, E.B. Spurr, [42°34.042′S,171°44.034′E], NZAC04234459; 1, Kopara Forest, 18 Jul 1996, K.W. Drew, E.B. Spurr, [42°34.042′S,171°44.034′E], NZAC04234513; 1, Kopara Forest, 19 Jul 1996, K.W. Drew, E.B. Spurr, [42°34.042′S,171°44.034′E], NZAC04234670; 1, Lake Rotoroa, 7 Feb 1974, litter, S.B. Peck, J. Peck, [41°47.724′S,172°35.569′E], NZAC04234653; 2 (ANIC), Lake Rotoroa, Braeburn Track, 25-27 Mar 1980, *Nothofagus* podocarp, litter, A. Newton, M. Thayer, [41°47.724′S,172°35.569′E], NZAC04234649, NZAC04234701; 1, Lake Rotoroa, near road end, 5 Nov 2014, deep damp *Nothofagus* litter, J. Nunn, [41°47.724′S,172°35.569′E], NZAC04234467; 1, Lewis Pass, 10 Feb 1965, litter, N.A. Walker, [42°22.712′S,172°23.967′E], NZAC04234650; 3 (ANIC), Mount Robert, N slope, 21-26 Mar 1980, *Nothofagus* spp., litter, A. Newton, M. Thayer, [41°49.330′S,172°48.614′E], NZAC04234499, NZAC04234590, NZAC04234717; 1, Norris Creek, Buller Road, 14 Oct 1970, litter, J.I. Townsend, [42°6.245′S,172°12.171′E], NZAC04234468; 2, Paparoa National Park, 2km NE Punakaiki, Bullock Creek Road, 12 Jan 1998, *Metrosideros robusta* leaf litter, R. Leschen, C. Carlton, 42°06′S,171°22′E, RL048, NZAC04234507, NZAC04234512; 1 (LUNZ), Punakaiki, 13 Jan 1983, coastal podocarp-broadleaf, litter, J.W. Early, [42°6.431′S,171°20.413′E]; 1 (LUNZ), Punakaiki S Road, Porari Road, 6 Jun 1985, litter and moss, J.W. Early, [42°6.431′S,171°20.413′E]; 5 (ANIC), Punakaiki, 0.8km N Bullock Creek, 23 Mar 1980, broadleaf nikau palm podocarp, litter, A. Newton, M. Thayer, [42°6.053′S,171°21.141′E], NZAC04234477, NZAC04234506, NZAC04234510, NZAC04234705, NZAC04234710; 1, Punakaiki, Bullock Creek, 12 Oct 1970, litter, J.I. Townsend, [42°6.053′S,171°21.141′E], NZAC04234711; 3 (LUNZ), Punakaiki, Bullock Creek, 1 Apr 2002, rimu, ground litter, K. Affeld, [42°6.053′S,171°21.141′E]; 1, Punakaiki, Bullock Creek Road (within 1st km), 4 Mar 2007, dead wood with fungi, K. Marske, 42°6.026′S,171°20.621′E, KM047, NZAC04234708; 3, Punakaiki, Bullock Creek Road (within 1st km), 4 Mar 2007, sifted leaf litter, K. Marske, 42°6.026′S,171°20.621′E, KM049, NZAC04234500, NZAC04234726, NZAC04234727; 2, Punakaiki, Pororari River Track, near intersect with Inland Pack Track., 3 Mar 2007, sifted wood and leaf litter, K. Marske, 42°7.169′S,171°22.156′E, KM044, NZAC04234694, NZAC04234706; 1, Punakaiki, Truman Track, 4 Mar 2007, dead wood with fungi, K. Marske, 42°5.629′S,171°20.442′E, KM050, NZAC04234720; 3, Rahu Scenic Reserve, 23 Feb 2007, beech forest, dead wood with fungi, K. Marske, 42°15.111′S,171°57.888′E, KM004, NZAC04234433, NZAC04234508, NZAC04234724; 7, Rahu Scenic Reserve, 25 Feb 2007, beech forest, sifted wood and leaf litter, K. Marske, 42°15.111′S,171°57.888′E, KM023, NZAC03018756, NZAC04234462, NZAC04234501, NZAC04234514, NZAC04234674, NZAC04234713, NZAC04234723; 1, Rahu Scenic Reserve, Klondyke Spur Track, 23 Feb 2007, beech forest, dead wood with fungi, K. Marske, 42°18.833′S,172°7.061′E, KM007, NZAC04234699; 3, Reefton, 12 Apr 1977, pine forest, J.A. Wightman, [42°6.656′S,171°52.201′E], NZAC04234484, NZAC04234487, NZAC04234664; 10, Reefton, 12 Apr 1977, cutover pine, J.A. Wightman, [42°6.656′S,171°52.201′E], NZAC04234495, NZAC04234628, NZAC04234643, NZAC04234668, NZAC04234669, NZAC04234671, NZAC04234675, NZAC04234678, NZAC04234682, NZAC04234684; 2, Reefton, 12 Apr 1977, burnt pine, J.A. Wightman, [42°6.656′S,171°52.201′E], NZAC04234646, NZAC04234693; 16, Reefton, 12 Apr 1977, beech forest, J.A. Wightman, [42°6.656′S,171°52.201′E], NZAC04234478, NZAC04234485, NZAC04234488, NZAC04234489, NZAC04234490, NZAC04234491, NZAC04234493, NZAC04234494, NZAC04234504, NZAC04234505, NZAC04234676, NZAC04234707, NZAC04234714, NZAC04234716, NZAC04234721, NZAC04234725; 1, Reefton, 5 Nov 1958, J.M. Hoy Collection, [42°6.656′S,171°52.201′E], NZAC04234692; 4, Reefton, 3.5km up Rahu Road, 25 Nov 1961, litter, J.I. Townsend, [42°6.656′S,171°52.201′E], NZAC04234464, NZAC04234558, NZAC04234569, NZAC04234635; 1, Reefton, Dublin Terrace, 25 Nov 1961, leaf litter, J.I. Townsend, [42°6.656′S,171°52.201′E], NZAC04234563; 1, Rotoiti, 3 Jun 1916, T. Broun Collection, [41°48.360′S,172°50.375′E], NZAC04234482; 1 (LUNZ), Shenandoah Saddle, 12 Nov 1981, litter, J.W. Early, [42°1.598′S,172°14.61′E]; 1 (LUNZ), Shenandoah Saddle, 12 Nov 1981, moss, J.W. Early, [42°1.598′S,172°14.61′E]; 1 (LUNZ), Shenandoah Saddle, 10 Jan 1982, on *Nothofagus fusca*, moss, R.M. Emberson, [42°1.598′S,172°14.61′E]; 6, St Arnaud, Lake Rotoiti, 19 Feb - 15 Mar 2004, beech forest, M. Sim, 41°49.817′S,172°51.217′E, AMNZ67820, AMNZ67821, AMNZ67822, AMNZ67823, AMNZ67824, AMNZ67825; 7, Tawhai State Forest, 3km S Reefton, 9 Nov 1971, litter, J.S. Dugdale, [42°9.448′S,171°48.324′E], NZAC04234564, NZAC04234654, NZAC04234683, NZAC04234686, NZAC04234688, NZAC04234689, NZAC04234691; 1, Victoria State Forest Park, Shenandoah Saddle, 22 Feb 2007, beech forest, sifted wood and leaf litter, K. Marske, 42°1.117′S,172°14.413′E, KM002, NZAC03019164; 26, West Inangahua State Forest, Stoney Creek, 25 Jan 1972, litter, J.S. Dugdale, [41°59.865′S,171°52.945′E], NZAC04233862, NZAC04233965, NZAC04234051, NZAC04224179, NZAC04224210, NZAC04224211, NZAC04234546, NZAC04134725, NZAC04134832, NZAC04134924, NZAC04135096, NZAC04135102, NZAC04135117, NZAC04135581, NZAC04136335, NZAC04136803, NZAC04136807, NZAC04136859, NZAC04136868, NZAC04137378, NZAC04137712, NZAC04137734, NZAC04137809, NZAC04138330, NZAC04138684, NZAC04139536; 19, Woods Creek Track, 24 Feb 2007, regenerating *Wienmannia racemosa* and rahu forest, sifted leaf litter, K. Marske, 42°33.194′S,171°20.926′E, KM013, NZAC03019555, NZAC04234470, NZAC04234471, NZAC04234497, NZAC04234502, NZAC04234515, NZAC04234532, NZAC04234538, NZAC04234603, NZAC04234621, NZAC04234634, NZAC04234645, NZAC04234665, NZAC04234687, NZAC04234695, NZAC04234696, NZAC04234697, NZAC04234702, NZAC04234709. **SC:** 4, Geraldine, Peel Forest Scientific Reserve, 27 Dec 1956, under bark of *Kanikoreas matais*, R. Crowson, [43°53.338′S,171°14.96′E], NZAC04234662, NZAC04234712, NZAC04272543, NZAC04272544**. WD:** 2, Okuku Scenic Reserve, 46.7km W Otira, 12 Jan 1998, *Laurelia novae-zelandiae* leaf litter, R. Leschen, C. Carlton, 42°43′S,171°14′E, RL050, NZAC04234469, NZAC04234492; 1, Open Bay Islands, Taumaka Island, 30 Apr 1976, litter mainly *Schefflera digitalis*, *Melicytus ramiflorus*, R.H. Matlin, [43°51.644′S,168°52.95′E], NZAC04234518; 1, Ross, Mikonui Track, 9 Nov 2005, ants in wood, R. Leschen, S. Nomura, 43°0′S,170°1′E, RL1015, NZAC04234685. **FD:** 1, Bauza Island, 18 Mar 1984, penguin moulting, C.F. Butcher, [45°17.129′S,166°54.326′E], NZAC04235072; 2, Bauza Island, 27 Nov 1981, litter and moss, C.F. Butcher, [45°17.129′S,166°54.326′E], NZAC04234554, NZAC04234586; 2, Bauza Island, Mar 1984, C.F. Butcher, [45°17.129′S,166°54.326′E], NZAC04234509, NZAC04272545; 1, Secretary Island, Grono Bay, 28 Nov 1981, sifted litter, C.F. Butcher, [45°17.044′S,166°56.321′E], NZAC04234666; 3, Wilmot Pass, Jan 1970, litter, I. Townsend, [45°30.482′S,167°11.553′E], NZAC04234529, NZAC04234584, NZAC04234718; 1, Wilmot Pass, Deep Cove, Jan 1970, litter, A.C. Eyles, [45°27.887′S,167°9.709′E], NZAC04234681.

Diagnosis. *Thortus ovalis* is recognized by its multicoloured body, a narrow clypeal constriction, short gena, and an absent or weakly indicated, incomplete parasutural stria. It has a well-developed eye and can be distinguished from *T. parallelus* sp. nov. and *T. bullerensis* sp. nov. by the larger and more impressed median basal puncture on the pronotum and the shorter subcoxal lines on the first abdominal ventrite.

Redescription. Length 1.31–1.60 mm. Colour of body variable, dark to light reddish or dark brown, sometimes the pronotum is light with darker edges, elytra usually pale to light at the base and humeral area, sometimes tricoloured, mouthparts, legs, antennal club lighter, and central parts of the ventral sclerites lighter. Body surfaces glabrous, microsculpture absent from most surfaces, very weak and present on ventral surfaces of the head, hypomeron and lateral portions of the abdominal ventrite, glabrous in southern populations (Fiordland). Dorsal setae silver, variable, sparse, usually dual, consisting of long scattered suberect and subdecumbent setae, with those at the base of the elytra longer and often more erect, some specimens with shorter setae. Ventral surfaces typically with

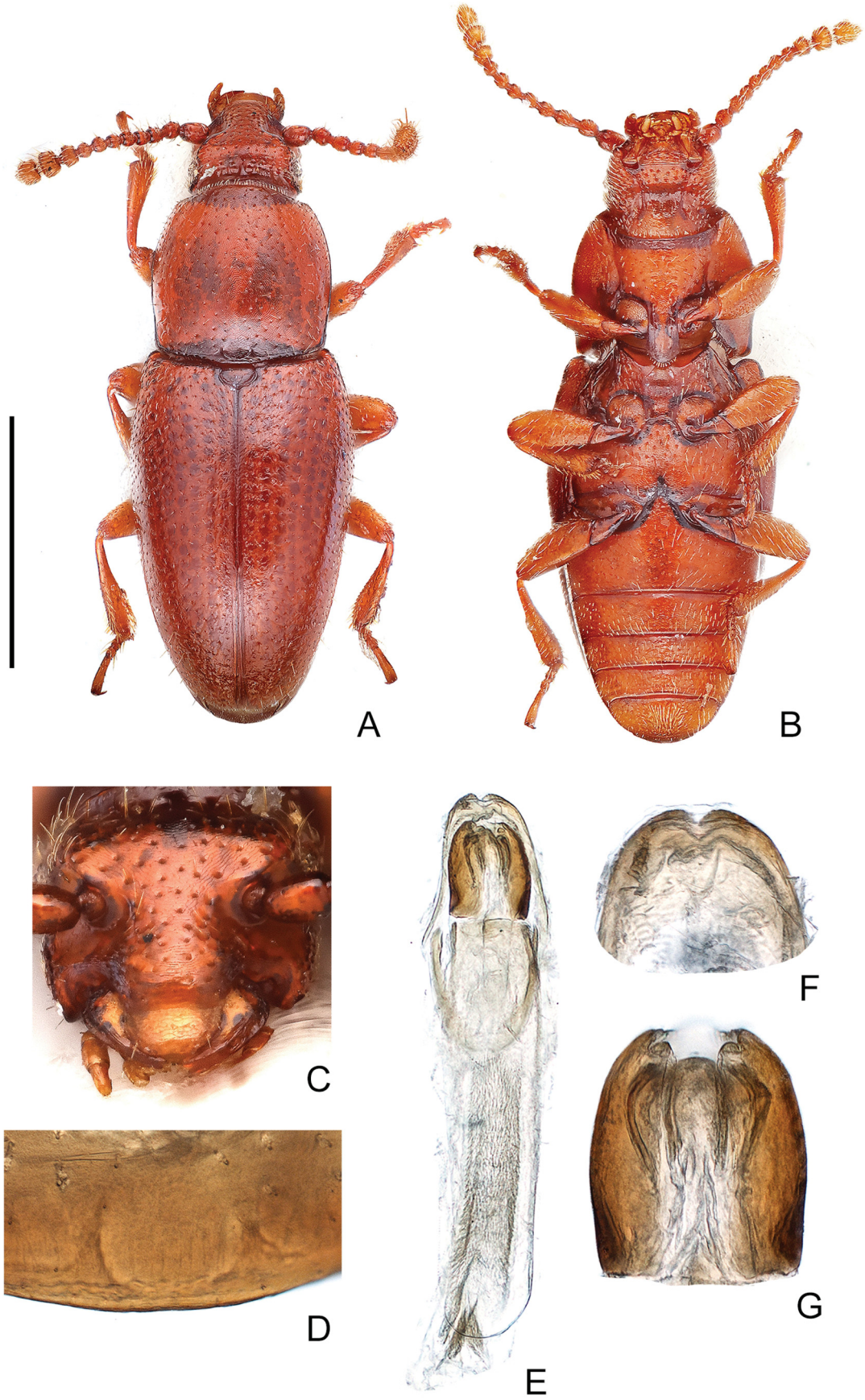

Fig. 13. *Thortus michauxi* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – prescutellar area of pronotum; E – aedeagus, dorsal view; F – parameres, dorsal view; G – distipenis, dorsal view.

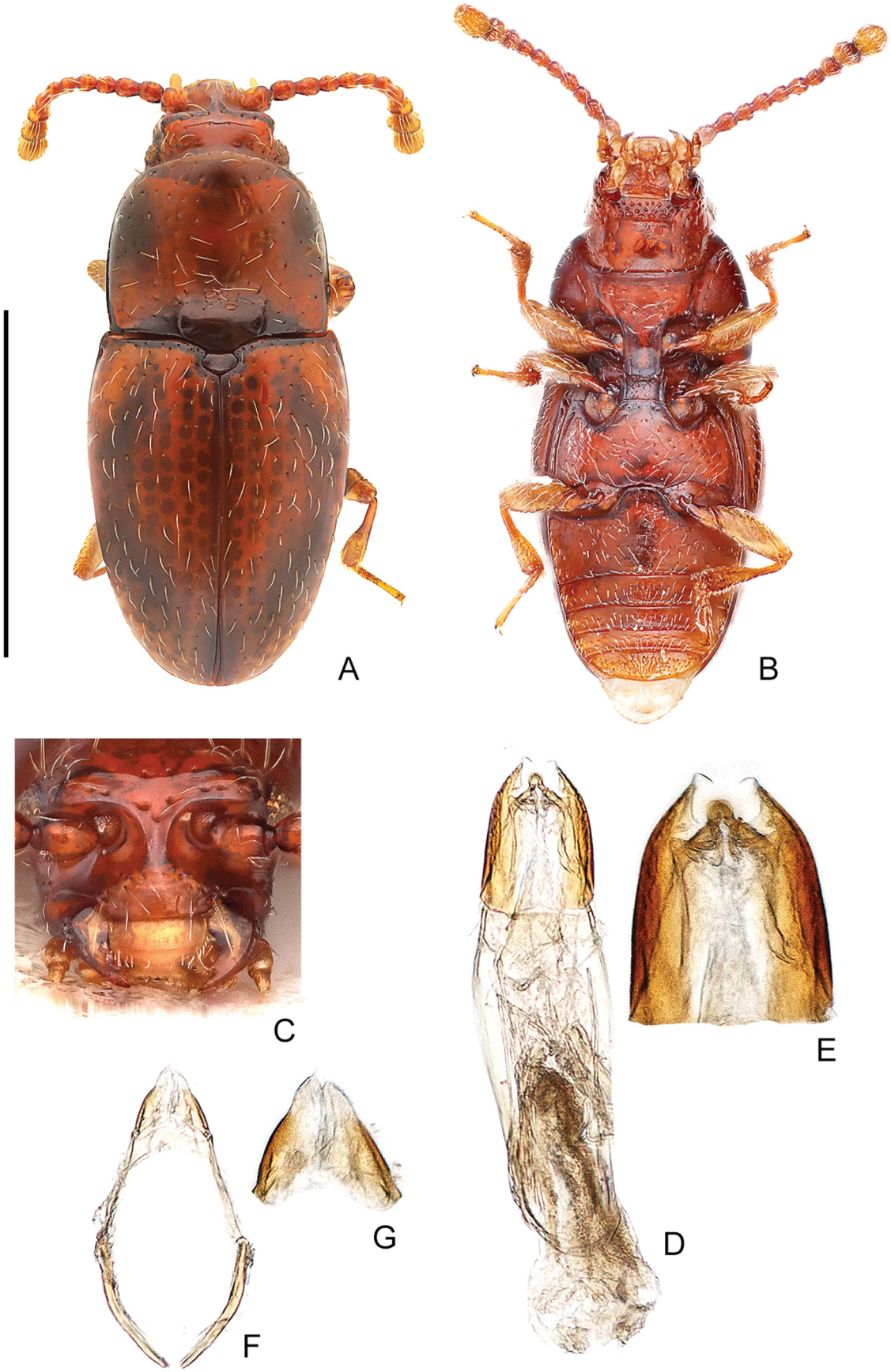

Fig. 14. *Thortus ovalis* Broun, 1893. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – aedeagus, dorsal view; E – distipenis, dorsal view; F – tegmen, dorsal view; G – parameres, dorsal view.

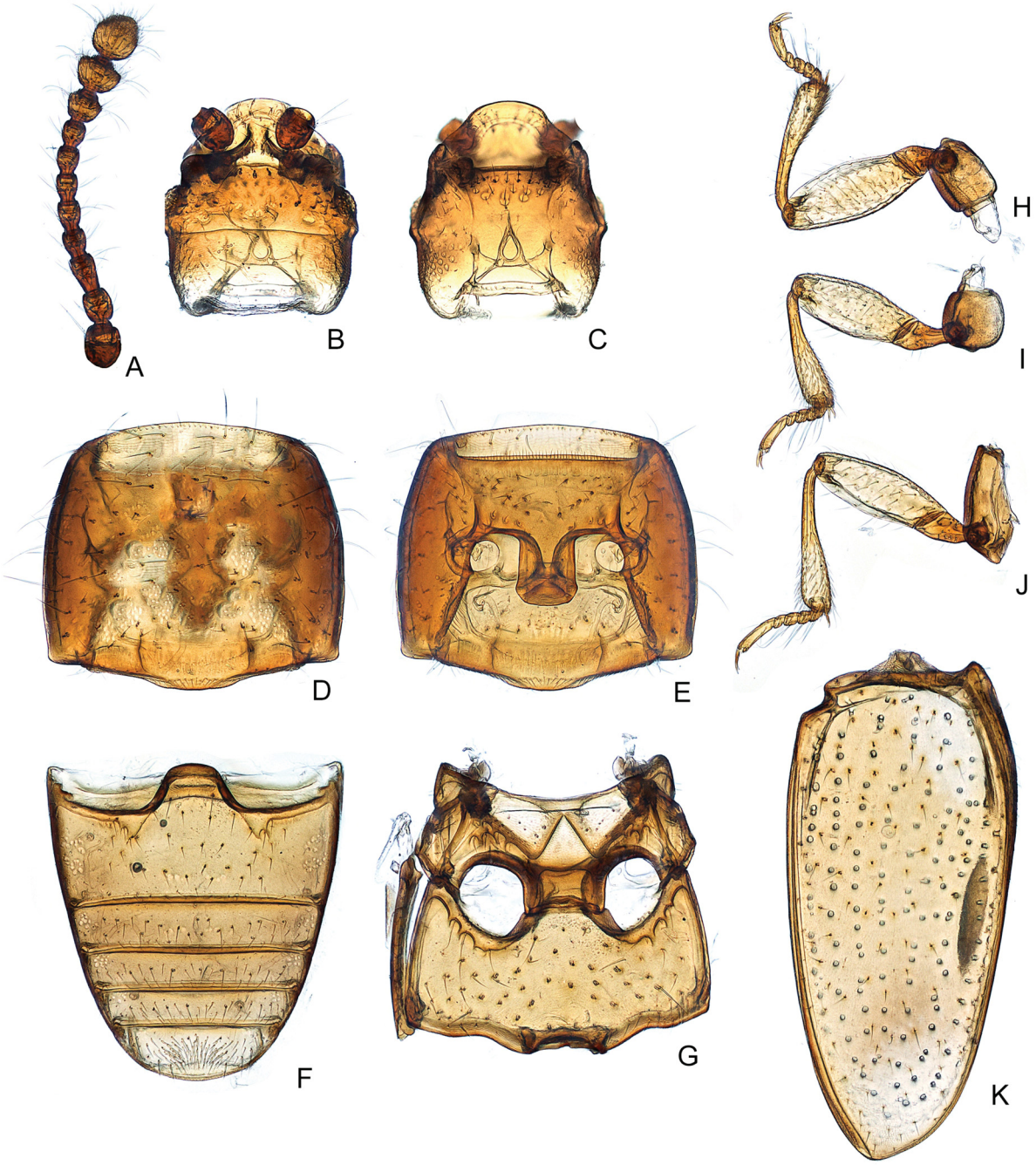

Fig. 15. *Thortus ovalis* Broun, 1893; parts cleared in KOH. A – antenna; B – head, dorsal view; C – head, ventral view; D – prothorax, dorsal view; E – prothorax, ventral view; F – abdomen, ventral view; G – meso- and metaventrites, ventral view; H – front leg; I – middle leg; J – hind leg; K – left elytron, ventral view.

shorter suberect setae; punctation ovate on prosternum, mesoventrite foveolate, not strongly impressed, disc of metaventrite with punctures smaller than those of prosternum, punctation of abdominal ventrites 1 to 4 smaller or equal to those on metaventrite, setae longer at sides, punctation on ventrite 5 denser with a well-defined patch of posteriorly-directed setae. Head not lengthened with relatively short gena subequal to length of antennomere 1; frons constricted, narrowed to a width that is about 1/3 less than half the length of antennomere 1; supra-antennal ridge with well-developed rim, bead absent; vertex delimited anteriorly by a transverse line that may be weakly crenulate line, surfaces punctured and glabrous; gular punctation regular and ovate, diameters larger than those on sides of head. Eye consisting of approximately 15 facets. Antennomere 2 cylindrical, slightly wider than long, antennomere 3 subconical, longer and narrower than 2 and longer and slightly wider than 4, proportions of antennomeres 4–8 same, antennomere 9 wider than 8 and narrower than 10 and 11, antennomere 10 transverse and slightly narrower than 11, antennomere 11 longer than 10, shorter than 9 and 10 combined. Pronotum trans-

verse, pronotal length/width ratio ~1.13, widest at basal third or at middle and parallel-sided (mostly southern populations); anterior margin weakly convex; anterior angles obtuse, not projecting; lateral edges weakly convex and gradually converging anteriorly, weakly curved posteriorly; pronotal disc with punctation variable from shallow to well-impressed, irregular, sparse to absent in central disc (without a median glabrous strip), separated by a distance of up to 2–4 times their diameter; median impression absent; transversely, and abruptly depressed at basal 1/5; basomedial macropuncture present, forming a broad groove and well-delineated by a polished surface and lateral ridges; posterolateral angles almost right, rounded, not projecting posteriorly; posterior margin sinuate with a weak scutellar lobe. Prosternal process with weak lateral marginal beads, without longitudinal depression medially, process parallel-sided and not expanded posteriorly behind procoxae, apex weakly curved, width subequal to width of procoxa and 0.5 times as long as length of prosternum; procoxal cavity without anterolateral notch. Scutellary shield ovoid and transverse, 2.8 times as wide as long. Elytra about 1.47 times as long as combined widths, about 1.13 times as wide as pronotum, about 1.67 times as long as length of pronotum; setation variable, consisting of very long and short subdecumbent setae; humeral plica reduced; parasutural stria absent or weakly indicated in some specimens with interspaces setose; punctation similar to pronotum, may be weakly impressed in some specimens and in central surfaces. Metaventrital process with anterior margin straight or weakly curved, marginal bead weakly indicated at middle. Tarsi moderately slender, 5-5-5 in female, 5-5-4 in male, male pro- and mesotarsomeres 1–3 with tenent setae; mesotarsomeres 1–3 of subequal lengths, mesotarsomere 5 subequal to tarsomeres 1–4 combined. First abdominal ventrite with broad and truncate intercoxal process, postcoxal lines short, divergent, extending at most to basal one-fourth of sclerite. Aedeagus with relatively short parameres articulated to phallobase, paramere wider than long; apices subacute, unisetose, without membranous projections; basipenis about 3.33 times as long as distipenis; distipenis about 1.13 times as long as wide, lateral lobes separated, basal plate absent; internal sac with a pair of short slender sclerites apical endophallites.

Distribution. South Island: NN, BR, WD, SC, FD (Fig. 21).

Remarks. *Thortus ovalis* is found in the South Island. The variable colour, punctation and subtle differences in setation among the specimens does not appear to be geographically related; though specimens from southern populations have the prothorax parallel-sided and the microsculpture on the venter is reduced or absent. The single record from South Canterbury based on a collection made by Roy Crowson contained 2 specimens of *T. ovalis* (one was teneral) which must have been a mislabelling of the locality. Information on the holotype of *T. ovalis* was given by Leschen & Gimmel (2012).

Most specimens have been collected by sifting litter and dead wood, and rarely from fungi. They may also be collected from pitfall traps, under bark and rarely from moss.

Thortus parallelus sp. nov.

(Fig. 16)

Type material. Holotype: ♂ (NZAC), labelled: 'New Zealand. NN. Oparara Basin, Oparara Arches Tk. 27 Feb 2007. K. Marske. KM026 Sifting. mixed Nothofagus/podocarp fores. Sifted wood and leaf litter. 41.09S 172. 11E // NZ Arthropod Collection Private Bag 92170 Auckland New Zealand NZAC03019630'. Paratype (1; NZAC). **South Island: NN:** 1, Oparara Basin, Box Canyon/Crazy Paving Caves track and carpark, 27 Feb 2007, mixed *Nothofagus* and podocarp forest, sifted wood and leaf litter, K. Marske, 41°8.076′S,172°11.525′E, KM028, NZAC04235139.

Diagnosis. *Thortus parallelus* sp. nov. is a unicolourous species with a well-developed eye, a narrowed clypeus and parallel abdominal postcoxal lines. It is most similar to *T. bullerensis* sp. nov. but the pronotal sides are subparallel and the abdominal postcoxal lines are parallel.

Description. Length 1.35 mm. Colour of body unicolourous red-brown, with lighter antennal club, mouthparts and legs. Body surfaces glabrous, microsculpture absent, apart from the gular region. Dorsal setae golden, consisting of short scattered suberect straight and subdecumbent curved setae. Ventral surfaces with suberect straight and subdecumbent curved setae; punctation ovate on prosternum, mesoventrite foveolate and moderately impressed, disc of metaventrite with punctures variable, larger on lateral portions, and about as impressed as those on prosternum, punctation of abdominal ventrites 1 to 4 smaller or equal to those on metaventrite, setae not longer at sides, punctation on ventrite 5 denser with a well-defined patch of posteriorly-directed setae. Head not lengthened with a relatively short gena with length subequal to length of antennomere 1; frons constricted, narrowed to a width that is less than about half the length of antennomere 1; supra-antennal ridge with well-developed rim, bead absent; vertex delimited anteriorly by a transverse crenulate line, anterior surface distinctly punctured, posterior surface virtually glabrous and lacking punctures; gular punctation irregular and ovate, diameters larger and more dense than those on sides of head. Eye consisting of approximately 17 facets. Antennomere 2 barrel-shaped, wider than long, antennomere 3 subconical, longer and narrower than 2 and longer and slightly wider than 4, proportions of antennomeres 4–8 same, antennomere 9 wider than 8 and narrower than 10 and 11, antennomere 10 transverse and about the same width as 11, antennomere 11 longer than 10, slightly shorter than 9 and 10 combined. Pronotum transverse, pronotal length/width ratio ~0.91, widest at middle; anterior margin convex; anterior angles obtuse, not projecting and rounded; lateral edges weakly convex, slightly converging anteriorly, gradually converging posteriorly; pronotal disc with punctation subuniform and foveolate, shallow, sparse in central disc (without a distinct median glabrous strip), separated by a distance of up to 1–1.5 times their diameter; median impression absent; transversely depressed at basal 1/5; basomedial macropuncture present, triangulate; posterolateral angles almost right, sharp, not projecting posteriorly; posterior margin sinuate with weak scutellar lobe. Prosternal process with well-developed lateral marginal beads, without longitudinal depression medially, process subparallel-sided and converging posteriorly, slightly

expanded posteriorly behind procoxae, apex rounded, width subequal to width of procoxa and 0.5 times as long as prosternum; procoxal cavity with anterolateral notch. Scutellary shield trapezoidal and transverse, 1.9 times as wide as long. Elytra about 1.31 times as long as combined widths, about 1.12 times as wide as width of pronotum, about 1.87 times as long as length of pronotum; setation dual consisting of relatively short suberect and subdecumbent setae; humeral plica weak; parasutural stria present, incomplete, present to middle of elytra; punctation less dense and smaller than pronotum, more impressed at base. Metaventrital process with anterior margin straight, marginal bead weakly indicated at middle. Tarsi moderately slender, 5-5-5 in female, male unknown; mesotarsomeres 1–3 of subequal lengths, mesotarsomere 5 shorter than tarsomeres 1–4 combined. First abdominal ventrite with broad rounded intercoxal process, postcoxal lines long, parallel, extending to middle of sclerite.

Etymology. The specific epithet is the Latin adjective '*parallelus*', referring to both the shape of the abdominal postcoxal lines and the subparallel sides of the pronotum.

Distribution. South Island: NN (Fig. 21).

Remarks. *Thortus parallelus* sp. nov. is known from two female specimens collected at Oparara Arches.

Thortus simplex sp. nov.

(Fig. 17)

Type material. HOLOTYPE: ♂ (NZAC; card-mounted after dissection), labelled: 'Fell Pk. Richmond Ra. 4250′ 13.iii.69 J.C. Watt // Litter // NZ Arthropod Collection Private Bag 92170 Auckland New Zealand NZAC04235076'.

Diagnosis. *Thortus simplex* sp. nov. is a unicolourous species with a unifacetted eye. It also lacks well-developed abdominal postcoxal lines which, instead, has a broad bead that extends a short distance onto the disc. It most closely resembles *T. luscus* sp. nov. but differs from it by having the pronotum widest in the anterior third and the elytra lacking parasutural striae.

Description. Length 1.37 mm. Colour of body unicolourous red-brown, with lighter antennal club, mouthparts and legs. Body surfaces glabrous, microsculpture absent. Dorsal setae silver, consisting of short scattered suberect, curved setae. Ventral surfaces with suberect slight curved setae; punctation ovate, prosternum mainly glabrous, mesoventrite foveolate, strongly impressed, disc of metaventrite with shallowly impressed punctures, punctation of abdominal ventrite 1 similar to metaventrite, punctation on ventrites 2 to 4 more denser, setae not longer at sides, but more erect than those on disc, punctation on ventrite 5 denser with a well-defined patch of posteriorly-directed setae. Head not lengthened with a relatively short gena with length subequal to length of antennomere 1; frons moderately constricted, narrowed to a width that is longer than half of the length of antennomere 1; supra-antennal ridge with well-developed rim, bead present; vertex delimited anteriorly by a transverse crenulate line, anterior surface distinctly punctured, posterior surface glabrous, small punctures present along the base; gular punctation irregular and ovate, diameters larger than those on sides of head. Eye consisting of a single facet. Antennomere 2 barrel-shaped, wider than long, antennomere 3 subconical, subequal and narrower than 2 and longer and nearly the same width as 4, proportions of antennomeres 4–8 same, antennomere 9 wider than 8 and narrower than 10 and 11, antennomere 10 transverse and about the same width as 11, antennomere 11 longer than 10, nearly as long as 9 and 10 combined. Pronotum transverse, pronotal length/width ratio ~0.88, widest at apical third; anterior margin convex; anterior angles obtuse, slightly projecting and acute; lateral edges weakly curved and convergent anteriorly, gradually converging posteriorly; pronotal disc with punctation somewhat uniform and foveolate, shallow, absent in central disc with a poorly defined median glabrous strip, separated by a distance of up to 1/2 to 1 times their diameter, though fused and larger in basal half; median impression absent; transversely depressed at basal 1/5; basomedial macropuncture present, triangulate; posterolateral angles obtuse, sharp, not slightly projecting posteriorly; posterior margin sinuate with a scutellar lobe. Prosternal process with well-developed lateral marginal beads, without longitudinal depression medially, process subparallel-sided and slightly converging posteriorly, not expanded posteriorly behind procoxae, apex curved, width subequal to width of procoxa and 0.5 times as long as length of prosternum; procoxal cavity without anterolateral notch. Scutellary shield heart-shaped and weakly transverse, 1.2 times as wide as long. Elytra about 1.44 times as long as combined widths, about 1.08 times as wide as width of pronotum, about 1.77 times as long as length of pronotum; setation uniform consisting of moderately long suberect, curved setae; humeral plica present; parasutural stria absent; punctation at base similar to that on pronotum, then smaller and sparser elsewhere on disc. Metaventrital process with anterior margin straight, marginal bead present at middle. Tarsi moderately slender, female unknown, 5-5-4 in male, male with pro- and mesotarsomeres 1 and 2 with tenent setae; mesotarsomeres 1–3 of subequal lengths, mesotarsomere 5 subequal to tarsomeres 1–4 combined. First abdominal ventrite with broad rounded intercoxal process, postcoxal lines absent, but subcoxal bead broad. Aedeagus with relatively long parameres articulated to phallobase, paramere about 2.37 times as long as wide; apices subacute bearing single microsetae, without membranous projections; basipenis about 3.12 times as long as distipenis; distipenis about 1.75 as long as wide, lateral lobes not separated, basal plate absent (?); internal sac with a pair of slender sclerites.

Etymology. The specific epithet is the Latin adjective '*simplex*', meaning 'simple', referring to its simple, single eye facet.

Distribution. South Island: MB (Fig. 21).

Remarks. *Thortus simplex* sp. nov. is known by one specimen collected from litter in the Richmond Range. It was completely disarticulated and remounted on a card. The tegmen was lost after imaging. The genitalia were damaged during articulation and the apex of the internal sac was broken off.

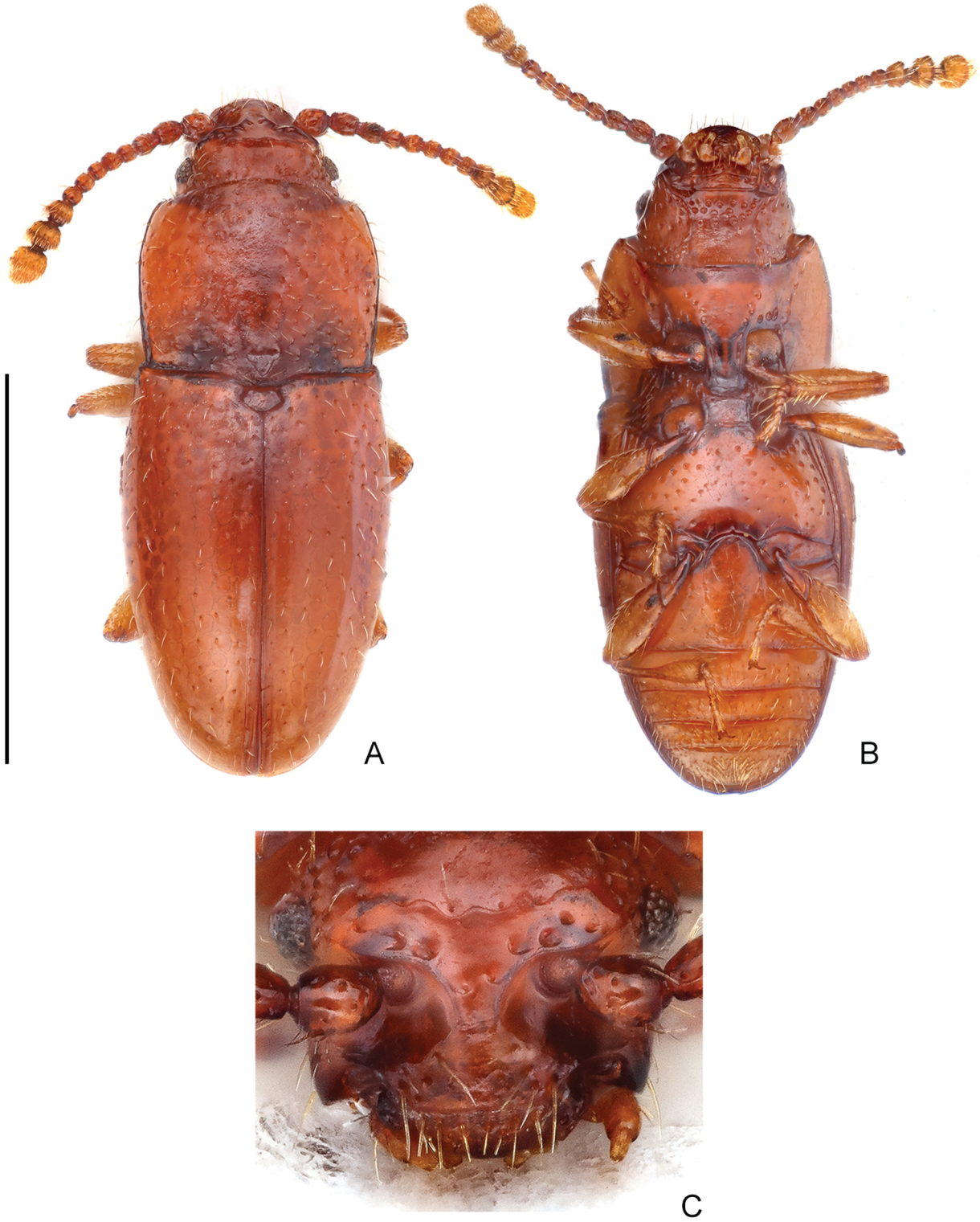

Fig. 16. *Thortus parallelus* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view.

Thortus sulcatus sp. nov.

(Fig. 18)

Type material. Holotype: ♂ (NZAC), labelled: 'New Zealand SL Slopedown Ra, N of Slopedown Hill 28/1 – 5/2/08 // Pit trap c580m Steve Rate // Manuka/inaka shrubland E2208228 N5423327 // NZ Arthropod Collection Private Bag 92170 Auckland New Zealand NZAC04235121.' Paratypes (5; NZAC). **South Island: MC:** 1, Port Hills, Ahuriri Scientific Reserve, 7 Apr 2007, washed soil sample broadleaf forest, J. Nunn, [43°39.933′S,172°36.643′E], NZAC04235236. **SL:** 1, Owaka, Tautuku Reserve, 19 Jan 1978, S.B. Peck, J. Peck, [46°35.1′S 169°25.133′E], S. & J. Peck Collection, NZAC04272532; 1, Purakaunui, near Owaka, 31 Dec 1995, J. Nunn Collection, 46°31.181′S,169°31.667′E, NZAC04235103; 2, Waionepu Creek, near Tokanui, 13 Feb 1968, litter, J.I. Townsend, 46°36.376′S,168°58.66′E, NZAC04235127, NZAC04235134.

Diagnosis. *Thortus sulcatus* sp. nov. is most similar to *T. amoenus* and *T. occidens* sp. nov., which have complete

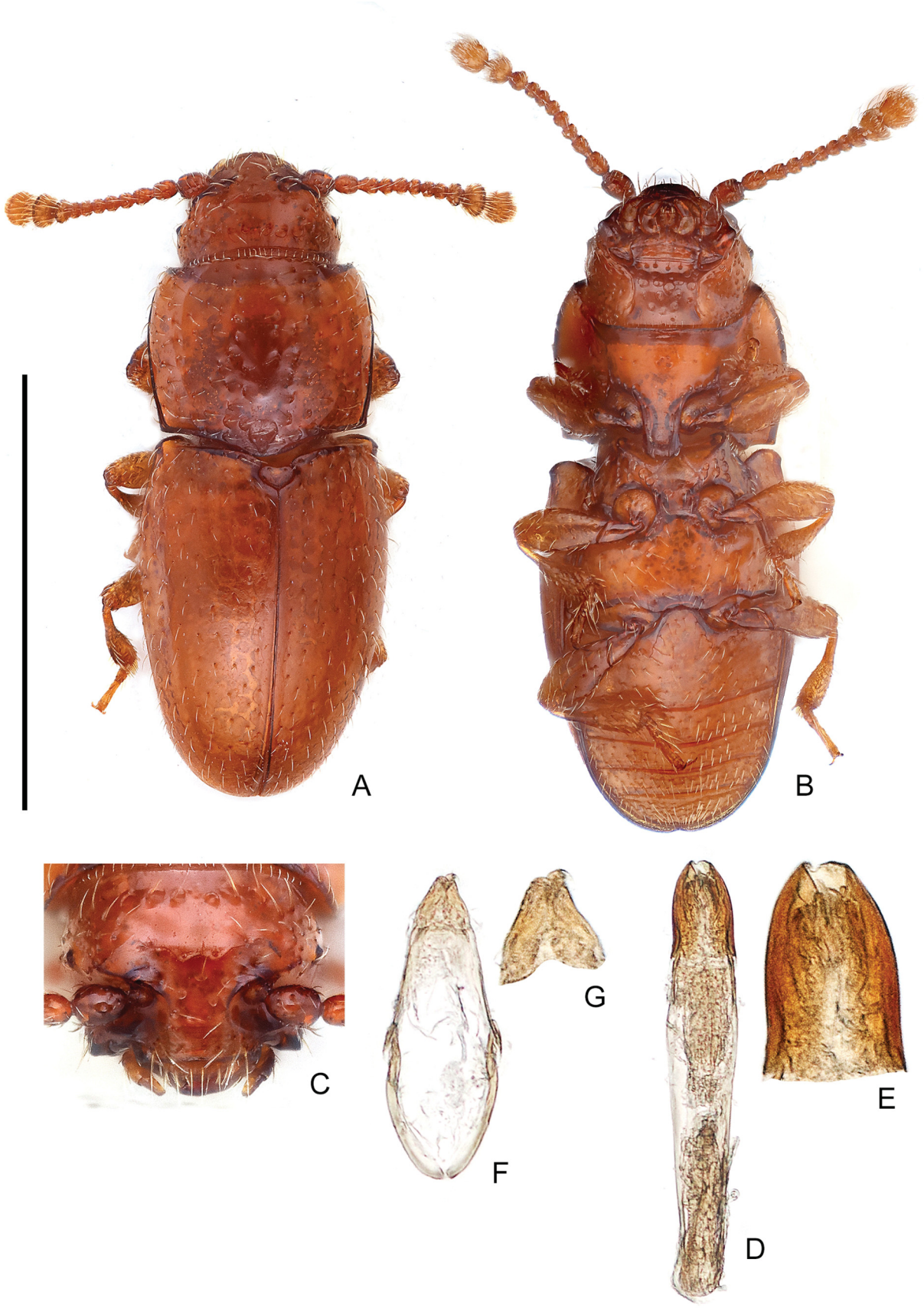

Fig. 17. *Thortus simplex* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – aedeagus, dorsal view; E – distipenis, dorsal view; F – tegmen, dorsal view; G – parameres, dorsal view.

parasutural striae and long genae, but is easily recognized from these and all other species by having a median pronotal impression.

Description. Length 1.60–1.70 mm. Colour of body dark reddish-brown, mouthparts, legs, and antennal club lighter. Body surfaces semiglabrous, microsculpture absent. Dorsal setae silvery-gold, sparse, dual, consisting of very long decumbent and scattered suberect curved and straight setae. Ventral surfaces with shorter decumbent mostly straight setae; punctation ovate, well-impressed, and uniform, mesoventrite foveolate, central disc of metaventrite with punctures of different sizes, mostly about the same or a little larger than those of prosternum, punctation of abdominal ventrites 1 to 4 generally smaller than those on metaventrite, with those on ventrite 1 generally larger than those on ventrites 2–5, punctation on ventrite 5 denser with a well-defined patch of posteriorly-directed setae. Head lengthened with relatively long gena, about 1.5 times as long as length of antennomere 1; frons constricted, narrowed to width to about half the length of 2/3rd the length of antennomere 1; supra-antennal ridge with well-developed rim, relatively broad bead present; vertex not delimited anteriorly by a weak transverse crenulate line, surface rugulose with deep irregular punctures (one specimen weakly punctate in the middle); gular punctation deep and ovate, diameters about equal to those on sides of head. Eye consisting of about 20 facets. Antennomere 2 cylindrical, about as wide as long, antennomere 3 subconical, longer and as wide as 2 and longer and slightly wider than 4, proportions of antennomeres 4–8 same, antennomere 9 wider than 8 and narrower than 10 and 11, antennomere 10 transverse and narrower than 11, antennomere 11 longer than 10, shorter than 9 and 10 combined. Pronotum subquadrate, pronotal length/width ratio ~0.96, widest at middle; anterior margin slightly curved; anterior angles obtuse; lateral edges somewhat evenly rounded and gradually converging anteriorly and posteriorly; pronotal disc with punctures regular and uniform, separated by a distance of 0.5–1.0 times their diameter; median impression present, glabrous within; not or weakly transversely depressed at base; basomedial macropuncture absent; posterolateral angles obtuse and rounded, not projecting posteriorly; posterior margin sinuate without scutellar lobe. Prosternal process with well-developed lateral marginal beads, with longitudinal depression medially, process weakly widened posteriorly behind procoxae, apex subacute, width subequal to width of procoxa and 0.47 times narrower than length of prosternum; procoxal cavity with anterolateral notch. Scutellary shield ovoid, 1.45 times wider than long. Elytra about 1.20 times as long as combined widths, about 1.17 times as wide as pronotum at greatest width, about 1.46 times as long as length of pronotum; setation singular, consisting of very long decumbent setae; humeral plica present; parasutural stria present and complete, interspace setose; punctation similar to pronotum near base, but separated by a distance of up to 1–3 times their diameter and less impressed towards apex. Metaventrital process with anterior margin straight, marginal bead completely absent. Tarsi moderately slender, 5-5-5 in female, 5-5-4 in male, male protarsomeres 1–2 with tenent setae; mesotarsomeres 1–3 of subequal lengths, mesotarsomere 5 slightly longer than tarsomeres 1–4 combined. First abdominal ventrite with postcoxal lines convex, extending to mid-length of sclerite; intercoxal process rounded at apex. Aedeagus with relatively long parameres articulated to phallobase, paramere about 3 times as long as wide; apices subacute, asetose (?), and lacking membranous extensions; basipenis about 4.04 times as long as distipenis; distipenis about 1.67 times as long as wide, lateral lobes not separated, basal plate absent; internal sac with a pair of short slender endophallites that are anteriorly widened and spatulate.

Etymology. The specific epithet is the Latin adjective '*sulcatus*', meaning 'furrowed', in reference to the impression on the pronotum.

Distribution. South Island: MC, SL (Fig. 21).

Remarks. *Thortus sulcatus* sp. nov. is known from six specimens collected by leaf litter sifting. It is known by only four specimens from Southland, with one specimen collected from the Port Hills. Crowson labelled specimens of this species as '*Pithortus*' n. sp.

Thortus tioripatea sp. nov.

(Figs 19A, C)

Type material. Holotype: ♂ (NZAC), labelled: 'NEW ZEALAND, WD, Mt Aspiring NP, Haast Hwy, Cameron Ck Tk K. Marske 15 Jan 2019 nr lookout // Mixed beech, broadleaf forest Sifted leaf and woody litter. 44.15698, 169.30682. 390mm KM359 // Entomology Div. D.S.I.R. New Zealand // NZ Arthropod Collection Private Bag 92170 Auckland New Zealand NZAC04254613.'

Diagnosis. *Thortus tioripatea* sp. nov. is recognized by having an incomplete parasutural stria and the eye composed of about 30 facets. It can be distinguished from *T. sulcatus* sp. nov. by the lack of a median pronotal impression, from *T. lobatus* sp. nov. by its narrower clypeal constriction, and from *T. amoenus* by having more eye facets and acute posterior pronotal angles.

Description. Length 1.60 mm. Colour of body light reddish-brown, mouthparts, legs, and antennal club lighter, prothorax lighter, the central disc of pronotum darker. Body surface glabrous, microsculpture absent. Dorsal setae silvery-gold, sparse, dual, consisting of short decumbent and scattered suberect setae of about equal lengths. Ventral surfaces with suberect setae of equal lengths to dorsal setae; mesoventrite foveolate, central disc of metaventrite with punctures larger and more impressed than those of prosternum, punctation of abdominal ventrites 1 to 4 weak and indistinct, punctation on ventrite 5 denser with a well-defined patch of posteriorly-directed setae. Head not lengthened with relatively short gena that is equal in length to antennomere 1; frons narrowed between antennae, width narrowed about half the length of antennomere 1; supra-antennal ridge with well-developed rim, bead absent; vertex delimited anteriorly by a transverse crenulate line, anterior and posterior surfaces glabrous; gular punctation deep and ovate, diameters equal to those on sides of head. Eye consisting of about 32 facets. Antennomere 2 cylindrical, slightly wider than long, antennomere 3 subconical, longer and as wide as 2 and longer

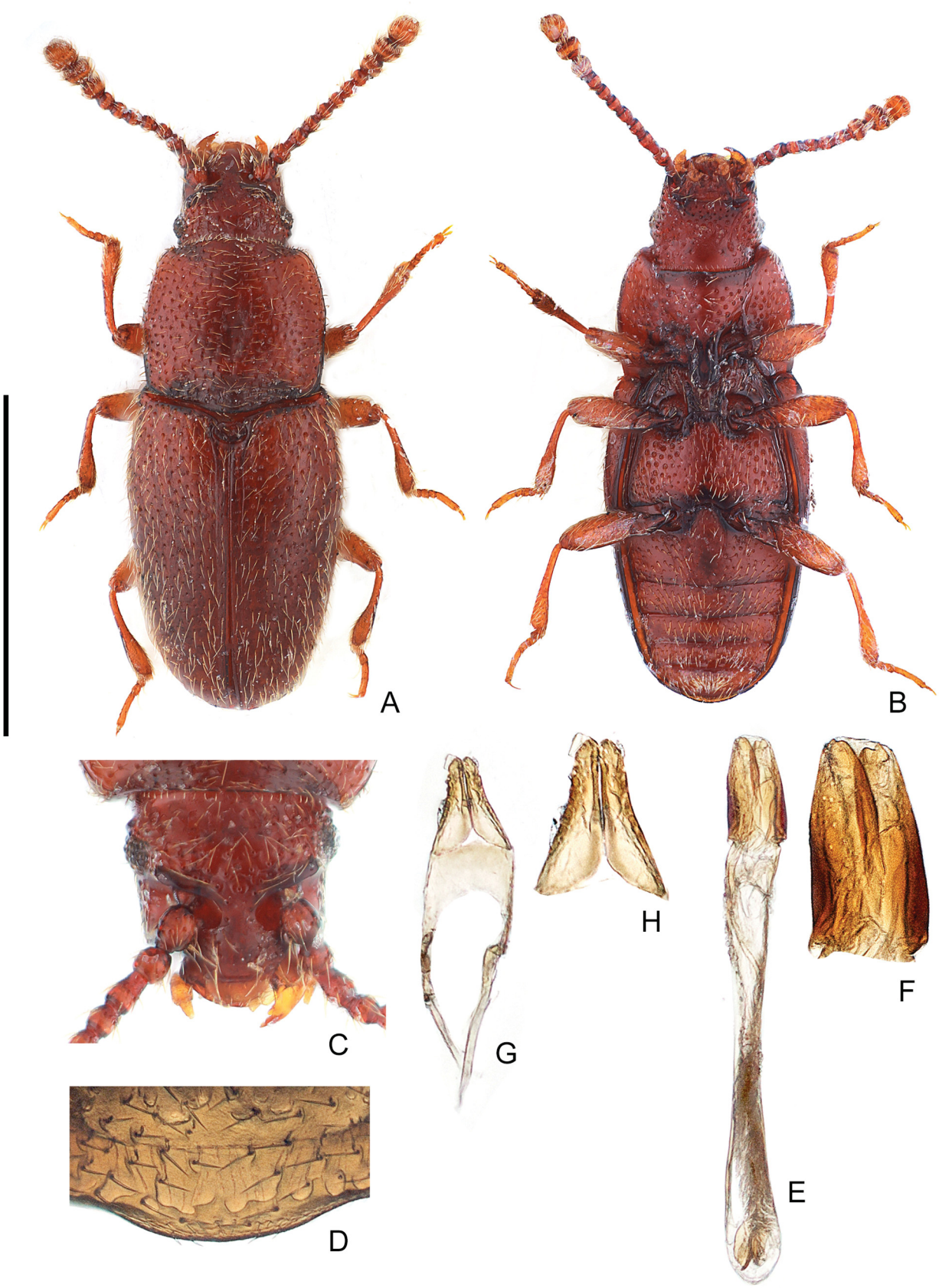

Fig. 18. *Thortus sulcatus* sp. nov. A – dorsal habitus (scale bar = 1 mm); B – ventral habitus; C – head, dorsal view; D – prescutellar area of pronotum; E – aedeagus, dorsal view; F – distipenis, dorsal view; G – tegmen, dorsal view; H – parameres, dorsal view.

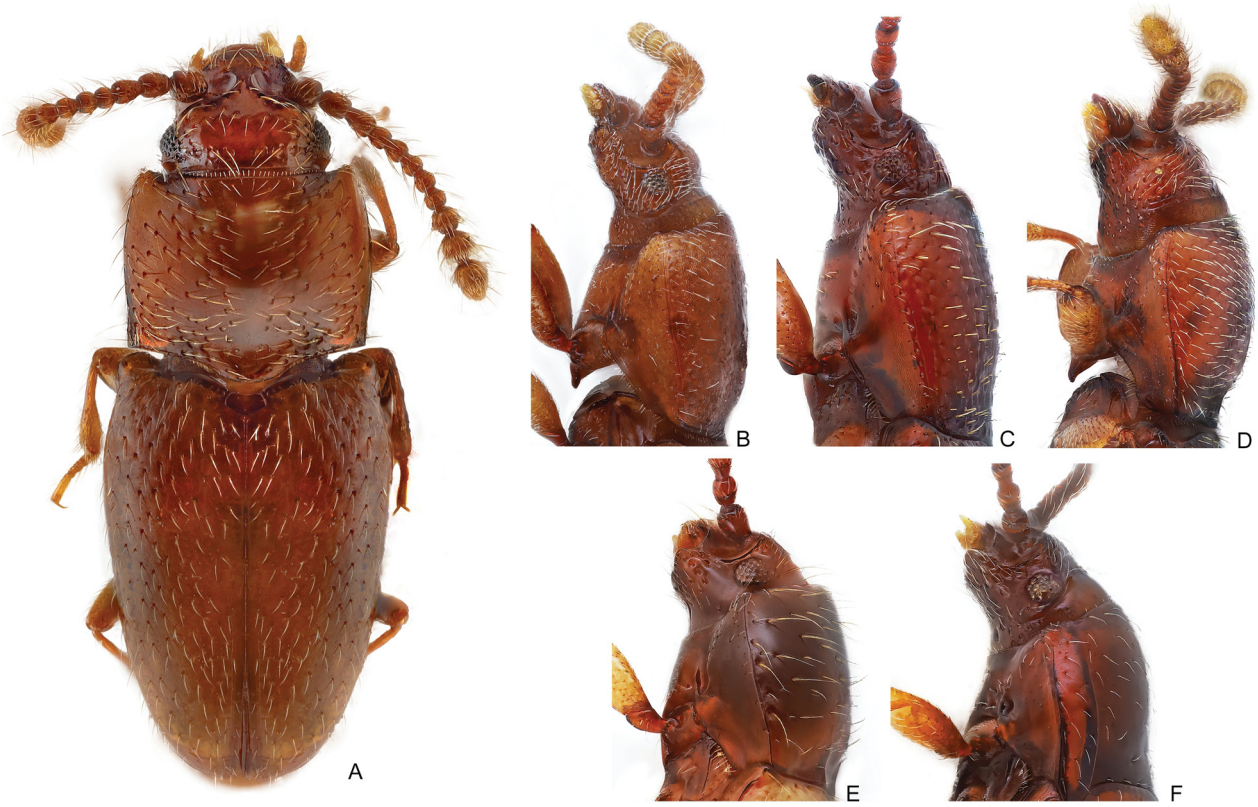

Fig. 19. *Thortus* and *Picrotus* species. A – *Thortus tioripatea* sp. nov., dorsal habitus (length = 1.60 mm); B – *T. michauxi* sp. nov., lateral view of head and prothorax; C – *T. tioripatea* sp. nov., same; D – *T. helmorei* sp. nov., same; E – *T. ovalis* Broun, 1893, same; F – *P. wairarapa* sp. nov., same.

and wider than 4, proportions of antennomeres 4–8 more or less similar, antennomere 9 wider than 8 and narrower than 10 and 11, antennomere 10 transverse and as wide as 11, antennomere 11 longer than 10, shorter than 9 and 10 combined. Pronotum subquadrate, pronotal length/width ratio ~0.82, widest at middle; anterior margin straight; anterior angles right and not protruding; lateral edges more or less parallel and not gradually converging anteriorly, very weakly curved posteriorly; pronotal disc with punctures subregular and not uniform, separated by a distance of up to 1–5 times their diameter, median glabrous strip present; median impression absent; transversely depressed at base; basomedial macropuncture absent; posterolateral angles obtuse and acute, not projecting posteriorly; posterior margin sinuate with a well-developed scutellar lobe. Prosternal process with well-developed lateral marginal beads, without deep longitudinal depression medially, process nearly parallel-sided not widened posteriorly behind procoxae, apex nearly straight, width less than width of procoxa and 0.36 times shorter than length of prosternum; procoxal cavity without anterolateral notch. Scutellary shield trapezoidal, 1.68 times as wide as long. Elytra about 1.48 times as long as combined widths, about 1.15 times greatest width of pronotum, about 2.06 times length of pronotum; setation dual of equal sizes, consisting of moderately short decumbent setae and very few scattered suberect setae; humeral plica present but reduced; parasutural stria present and short, present at apical 1/3, interspace with few setae; punctation similar to pronotum only at base, otherwise smaller and less dense, separated by a distance of up to 1–7 times their diameter. Metaventrital process with anterior margin straight, marginal bead present at sides, absent at middle. Tarsi moderately slender, female unknown, 5-5-4 in male, male protarsomeres 1–3 with tenent setae; mesotarsomeres 1–3 of subequal lengths, mesotarsomere 5 equal to combined lengths of tarsomeres 1–4. First abdominal ventrite with postcoxal lines divergent extending just beyond mid-length of sclerite; intercoxal process rounded at apex.

Etymology. The specific epithet is derived from *tiori-patea*, meaning in te reo Māori ‘the way ahead is clear’, for Haast Pass which was used as a traditional trade route through the Southern Alps.

Distribution. South Island: WD (Fig. 21).

Remarks. *Thortus tioripatea* sp. nov. is known by a single male from Haast Pass. It was not dissected.

Key to species of flightless New Zealand Picrotini

Remarks. All species covered in this treatment are included below. *Callichrotus* gen. nov. runs to couplet 2 with *Picrotus* in the key in Gimmel & Leschen (2022).

1. Body elongate (Fig. 13A), pronotum with narrow lateral bead, antennal club of 3 antennomeres. .... 2 (***Thortus*** Broun, 1893)
– Body ovate (Fig. 1B), pronotum with wide lateral bead and a deep sublateral groove, antennal club of 2 antennomeres. 14
2. Abdominal postcoxal lines absent (Fig. 13B), at most a wide bead may be present. 3
– Abdominal postcoxal lines present (Fig. 7B). 4
3. Eye well developed and multifacetted; body length over 2.0 mm (Fig. 13A); Auckland Islands. .... ***T. michauxi* sp. nov.**
– Eye unifacetted (Fig. 19D); body length less than 2.0 mm; Northland. ..... ***T. helmorei* sp. nov.**
4. Eye poorly developed, consisting of 6 or 7 facets or less (Fig. 19D). 5
– Eye well developed, consisting of 10 or more facets (Fig. 19E). 8
5. Body bicoloured, pronotum darker than elytron (Fig. 8A). ..... ***T. crowsoni* sp. nov.**
– Body unicoloured. 6
6. Head and pronotum coarsely punctured (Fig. 12A). .. .. ***T. luscus* sp. nov.**
– Head and pronotum weakly punctured (Fig. 17A). … 7
7. Eye unifacetted (Fig. 19D); sides of pronotum weakly convex, widest at apical 1/3 (Fig. 17A). .... ***T. simplex* sp. nov.**
– Eye consisting of 7 facets; sides of pronotum converging anteriorly, widest at basal 1/3 (Fig. 10A). .... ***T. latus* sp. nov.**
8. Pronotum with distinct impression at middle (Fig.18A); Southland. ..... ***T. sulcatus* sp. nov.**
– Pronotum lacking impression at middle (Fig. 19A). 9
9. Sides of pronotum distinctly parallel-sided throughout its length (Fig. 19A); elytron with parasutural stria always present, complete or incomplete. 10
– Sides of pronotum weakly convex (Fig. 6A) or parallel-sided only at base (Fig. 16A); elytron with parasutural stria incomplete or absent. 12
10. Elytron with parasutural stria incomplete (Fig. 19A); posterior pronotal angles acute. ..... ***T. tioripatea* sp. nov.**
– Elytron with parasutural stria complete (Fig. 6A); posterior pronotal angles rounded. 11
11. Width of frons narrower than width of antennomere 1 (Fig. 6C); metaventrite coarsely punctate; tarsomeres 5-5-4 in male and 5-5-5 in female. .... ***T. amoenus*** (Broun, 1912)
– Width of frons about as wide as width of antennomere 1 (Fig. 11C); metaventrite moderately punctate; tarsomeres 4-4-4 in both sexes. ..... ***T. lobatus* sp. nov.**
12. Pronotum widest at middle or at anterior 1/3 (Fig. 7A), anterolateral edge of lateral carina visible in dorsal view; body unicoloured. 13
– Pronotum widest in posterior 1/3 (Fig. 14A), anterolateral edge of lateral carina hidden in dorsal view; body typically bicoloured. ..... ***T. ovalis*** Broun, 1893
13. Pronotum weakly convergent towards base (Fig. 7A), widest at anterior 1/3; scutellar shield strongly transverse, about 2.5 times wider than long; abdominal postcoxal lines weakly divergent. .... ***T. bullerensis* sp. nov.**
– Pronotum subparallel-sided at base (Fig. 16A), widest at middle; scutellar shield about 2.0 times wider than long; abdominal postcoxal lines parallel. .... ***T. parallelus* sp. nov.**
14. Clypeus constricted between antennal insertions (Fig. 3C), eye distant from antennal fossa (Fig. 3C), antennomere 10 transverse, abdominal ventrites free. ... 15
– Clypeus not constricted between antennal insertions (Fig. 1C), eye contacting antennal fossa (Fig. 1C), abdominal ventrites 1 and 2 connate, antennomere 10 not transverse. ..... ***Callichrotus gimmeli* gen. & sp. nov.**
15. Pronotal disc with basomedial puncture (Fig. 3A), prosternal process with apex truncate, widely distributed in North and South Island. .... ***Picrotus thoracicus*** Sharp, 1886
– Pronotal disc without basomedial puncture (Fig. 5A), prosternal process with apex rounded; restricted to the Wairarapa. ..... ***P. wairarapa* sp. nov.**

Discussion

Composition of New Zealand Picrotini. Prior to this work, the New Zealand Picrotini fauna consisted of nine genera and 15 described species, and several undescribed species (Gimmel & Leschen 2022). This tally includes an undescribed species of *Odontosomatula* Gimmel & Leschen, 2022, containing one described species from Ecuador. Here we add one new genus and 13 new species, for a total of ten genera and 28 species. *Ostreacryptus* Leschen, 2001 is shared with Australia and Chile. In New Zealand there are three described (*O. clarkae* Leschen, 2001; *O. helmsi* (Reitter, 1880); *O. insignis* (Reitter, 1880)) and one undescribed species. *Antarcticotectus* Brookes, 1951 and *Notocryptus* Gimmel & Leschen, 2022 are shared with Australia and in New Zealand contain three described species each, plus two and six undescribed species, respectively. Among the six endemic New Zealand genera, three are monotypic (*Callichrotus* gen. nov., *Connatocryptus* Gimmel & Leschen, 2022, and *Foveocryptus* Gimmel & Leschen, 2022). Two genera are bitypic, *Humerocryptus* Gimmel & Leschen, 2022, containing *Humerocryptus tumidus* (Broun, 1893) and an undescribed species, and *Picrotus*. The endemic genus *Thortus* is the most diverse genus in New Zealand with 13 species. The species *T. michauxi* sp. nov. and *T. amoenus* considered by Crowson and Broun under the manuscript name '*Pithortus*' are placed within *Thortus*. As an aside, the recognition of *Callichrotus* gen. nov. as separate from *Picrotus* is supported, even though it shares the thickened pronotal lateral carina, a unique feature in cryptophagids, with *Picrotus*. A phylogenetic study that includes a broader sample of picrotines will determine if there may be additional New Zealand genera to describe.

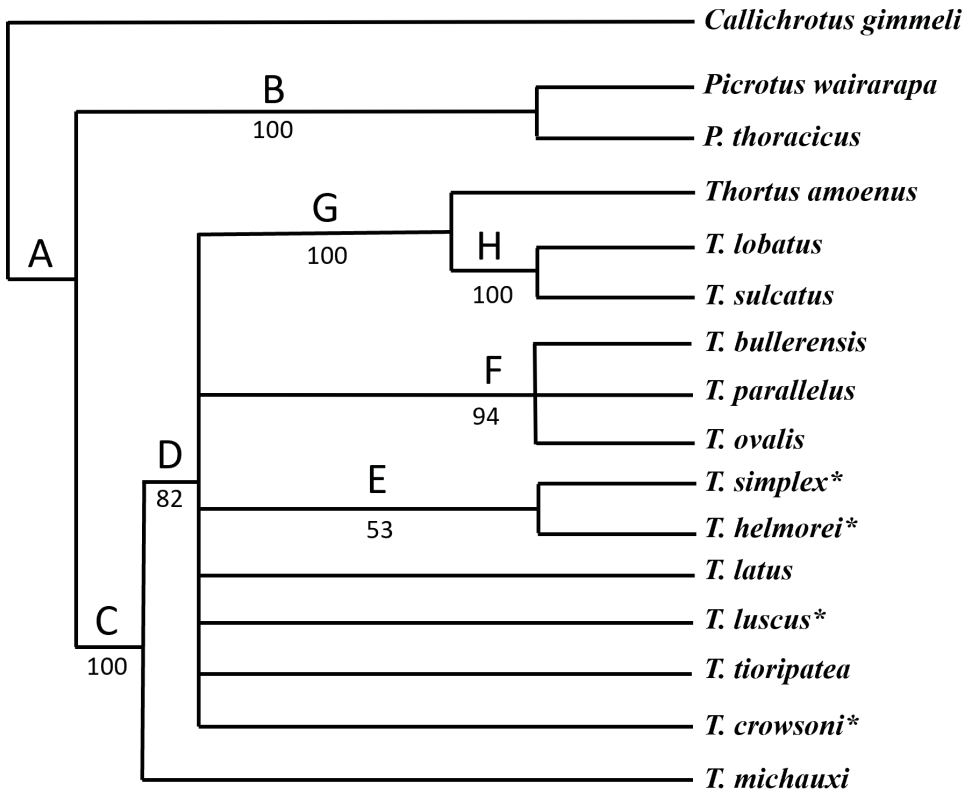

Fig. 20. Phylogeny of the flightless New Zealand Picrotini represented as a 50% majority rule consensus tree with percentages indicated below branches. Labelled nodes are referred to in the text. An asterisk indicates species with unifaceted eyes.

Biogeography. New Zealand members of the genera covered here occur across the mainland but are absent from most offshore islands. They exhibit distributional gaps from Northland, north of Waipoua, eastern North Island, drier areas of the southern South Island and Stewart Island (Figs 21–25). Species are regionally or locally endemic. There is generally little overlap among species.

The northwestern South Island has the highest diversity of *Thortus* species. *Thortus ovalis* is sympatric with three range-restricted species (Figs 23, 24) and the more widespread *T. lobatus*. Flightless picrotines are missing from the centre of Westland, consistent with a biotic gap of plants and animals (e.g., Wallis & Trewick 2009) that may have resulted from recent glaciation (Leschen et al. 2008). A break in distribution of the eastern species *T. sulcatus* (Fig. 22D), with one record from the Port Hills, may also relate to glaciation (Trewick & Wallis 2001), but is more likely the result of widespread extermination of forests (McGlone 1989).

Thortus michauxi is endemic to the subantarctic Auckland Islands, the largest of five archipelagos that constitute those aerial portions of the Campbell Plateau, which contain a high diversity of endemic beetles (Michaux & Leschen 2005). While some of these are paleo-endemics, i.e., basal members of their monophyletic groups (Ahn et al. 2010, Liebherr et al. 2011, Yamamoto & Maruyama 2018, Orlov et al. 2019; see also Owens et al. 2019 and Leschen et al. 2020), many species are neo-endemics with affinities elsewhere in New Zealand (Kuschel 1971, Leschen & Michaux 2005, Leschen et al. 2011). If we accept that *T. michauxi* diverged early in the evolution of the genus *Thortus* (Fig. 20), the geographic pattern is consistent with that found for New Zealand Priasilphidae (Leschen & Michaux 2005), which also has a paleoendemic species present on the Auckland Islands. At present, no paleoendemic terrestrial insect from the Campbell Plateau has been included in a broader molecular phylogenetic study that would test the ancient patterns of propinquity as outlined in Leschen & Michaux (2005) and Michaux & Leschen (2005).

The biogeographic history of the *T. lobatus* group could be explained by tectonic and phylogeographic processes (Fleming 1979, Heads 1998, Bunce et al. 2006, Wallis & Trewick 2009, Marske & Boyer 2024). The ancestor of this group may have spanned both southern North and South Islands which had remained together as terra firma at least until the late Miocene and early Pliocene (Fleming 1979, Bunce et al. 2006, Strogen et al. 2023) with the split between *T. amoenus* and the sister pair *T. lobatus* + *T. sulcatus* attributed to vicariance, resulting in the distribution of *T. amoenus* seated in the north (Fig. 22A) and the distribution of the sister species *T. lobatus* + *T. sulcatus* seated in the south (Fig. 22D). Evidence for this early split is supported by the present-day distribution of *T. amoenus* with a population in Marlborough that may have dispersed at the time of a land bridge in that area (Lewis

et al. 1994, Trewick & Bland 2012). The presence of *T. lobatus* in Taranaki is consistent with a later divergence and a dispersal northward during the Pleistocene where there was significant interchange among biotic communities in a western region as shown by fossil and extant communities (Wardle 1988, Marra et al. 2009, Trewick & Bland 2012). The split between *T. lobatus* and *T. sulcatus* could be attributed to the lateral displacement of the Alpine Fault (Heads 1998).

In the southern North Island, *P. thoracicus* and *P. wairarapa* are parapatric (Fig. 21B), with the latter present in the Wairarapa, an area with relatively few endemic invertebrates (Taylor-Smith et al. 2020). This distribution is indicative of having an ancestor that may have been split into eastern and western portions during Pleistocene mountain-building of the axial ranges (see Ellis et al. 2015). Consistent with this hypothesis is the presence of *P. thoracicus* in Marlborough and eastern Nelson that resulted from an interchange in the older eastern land connection. A molecular study of *Picrotus* would verify this hypothesis.

Flightlessness and Eye Reduction. Flightlessness has multiple origins in Cryptophagidae (Leschen 1996). *Callichrotus*, *Picrotus*, and *Thortus* are not the only picrotines that are apterous (Gimmel & Leschen 2022). Members of *Neopicrotus* Leschen, 1996 (4 spp.; Australia, Chile) and *Paragnetaria* Gimmel & Leschen, 2022 (2 spp.; Australia) are apterous, while all members of *Cryptothelypterus* Leschen & Lawrence, 1991 (Juan Fernandez Islands) and one species of New Zealand *Ostreacryptus* are brachypterous (Leschen & Lawrence 1991, Leschen 2001, Gimmel & Leschen 2022). Many apterous groups also have the antenna inserted into a relatively deep fossa surrounded by a ridge, antennomere 9 is reduced, and the metaventrite is shortened, the latter character of which typifies many beetles lacking flight musculature (e.g., Thayer 1992). Eye loss (anophthalmy) or reduction in the number of ommatidia (microphthalmy) may also be part of the flight loss syndrome (Thayer 1992, Wagner & Liebherr 1992), often occurring in species with smaller body size (Taylor 1991, Makarova et al. 2019) or having a certain lifestyle, such as inquilinism (e.g., Leschen 1999, Silva et al. 2023), living in caves or deep soils (Barr et al. 2015), or in deserts (Wagner & Liebherr 1992). Eye reduction occurs in several groups of New Zealand beetles present among different habitats and vegetation types, though all species could be classified as edaphic (soil-dwelling, endogean or subsurface; see Trajano & de Carvalho 2017 and Escalona & Oberprieler 2021).

Picrotines generally have well-developed eyes (see Figs 81–89 in Gimmel & Leschen 2022), as do most *Thortus* with eyes consisting of over 10 eye facets (Figs 19B–E). A lesser number of facets occurs in the eye of *T. latus* (6 or 7), while single-facetted eyes occur in *T. crowsoni*, *T. helmorei*, *T. luscus*, and *T. simplex* (Fig. 19D). Among other mycophagous/saprophagous New Zealand beetles, anophthalmy occurs in the endemic leiodid genus *Zelode*s Leschen, 2000 (see Leschen 2000a) and in the tenebrionid genus *Menimus* Sharp, 1876 (Watt 1992), which also has micropthalmic species.

Anophthalmy in New Zealand occurs in several Adephaga: cave Trechinae (Townsend 2010), edaphic Bembidiini (Moore 1980, Sokolov 2023), and deep-aquifer Dytiscidae (Ordish 1976), all of which may have nearest relatives occurring elsewhere (e.g., Leijs et al. 2003, Andújar et al. 2017). An- and microphthalmy also occurs in staphylinids, including Pselaphinae (e.g., Théry & Leschen 2013) and undescribed Leptotyphlinae and Aleocharinae (Homalotini) represented in the FMNH and the NZAC. The preceding groups are predatory, whereas microphthalmy in phytophagous chrysomelids is exclusive to the endemic chrysomeline genus *Nanomela* Leschen, Reid & Nadein, 2020, which may have single-facetted eyes (Leschen et al. 2020). Several weevils, including the eyeless *Myrtonymus zelandicus* Kuschel, 1990 (questionably placed in Erirhininae) and *Reyesiella* Alonso-Zarazaga & Lyal, 1999 (Cyclominae), belong to groups that are present elsewhere in the Australopacific (Kuschel 2014, Grebennikov 2010, Escalona & Oberprieler 2021). Phylogenies for these groups would determine whether eye reduction has evolved in the New Zealand context or whether the features were inherited more deeply within their evolutionary history.

Loss or reduction in the number of ommatidia is inversely associated with light intensity of the habitat (Freelance et al. 2021). It is reasonable to deduce that retention of a single ommatidium in *Thortus* and other edaphic species allows for optic sensitivity in dim light to locate food sources, mates, oviposition sites or resting places (Jongh 2021), or possibly serve as a *Zeitgeber* in diel activity as suggested by studies of dorsal ocelli (Baird & Yilmaz 2023). In such cases comparative genomics examining visual opsin and other genes may provide clues to the functioning between ano- and microphthalmic species (e.g., Guinard et al. 2022) and how these lineages evolved (Langille et al. 2022). Finally, it is quite possible that coupled occurrence of eye and hind wing reduction, especially in endogean beetles (Andújar & Grebennikov 2021), may have genomic underpinnings associated with the non-specificity of transcription factor functions operating on both traits (Percival-Smith 2017).

Rarity and Conservation. Over 950 specimen and 250 collecting events were examined for 16 species including one an extralimital specimen assigned as *Thortus* nr. *lobatus*. These were collected mostly by sifting leaf litter and coarse woody debris, though a few were collected in pitfall and bait traps and by other means. Half (six of 12) of the new species are known from single locations; three of these are known by singletons. Three species comprised over half of all specimens (*T. ovalis* (303), *P. thoracicus* (127), and *T. amoenus* (58)). The number of specimens collected per collecting event are plotted in Fig. 22. The values on the bars are the number of collection events by date for each species. Given the highly skewed data, the horizontal line is the median (1.25) across species. Nine species and *Thortus* nr. *lobatus* were placed below the median and judged rare. Six species placed well above the median were regarded as not rare, while three near to the median were ambiguous.

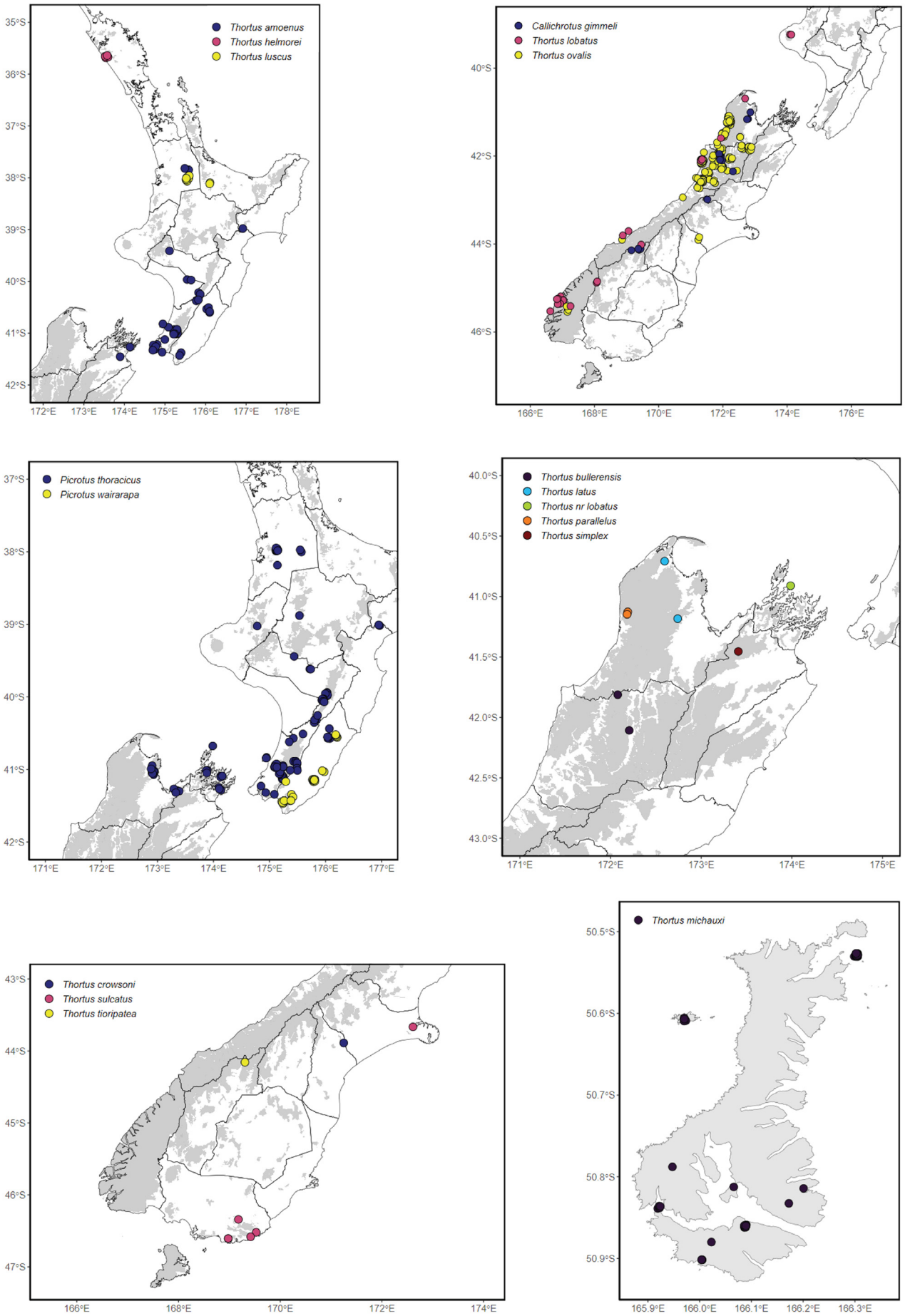

Fig. 21. Distribution maps of flightless New Zealand Picrotini.

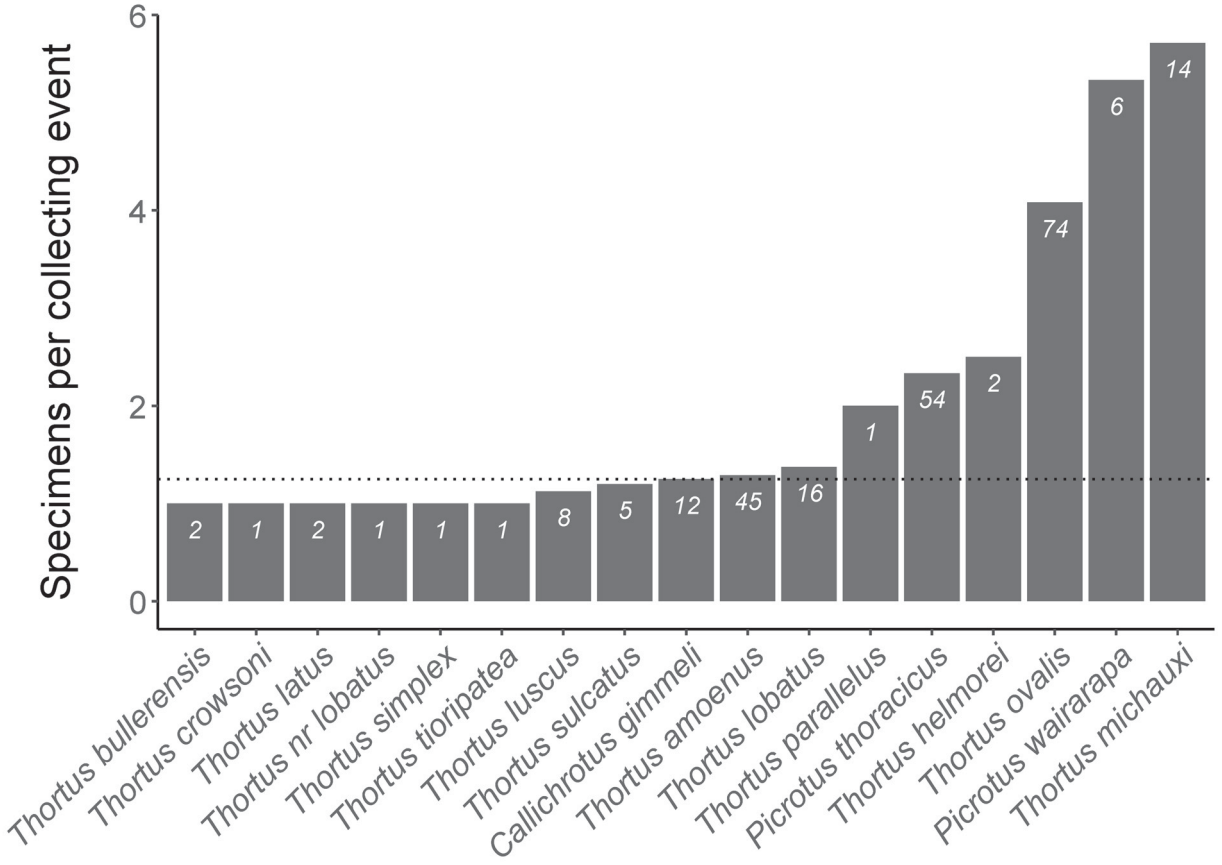

Fig. 22. Plot of mean number of specimens per collection event by species. The horizontal line is the median (1.25) across species, below of which is considered as rare. The values on the bars are the number of collection events for each species.

On one hand, the data match what could be an intuitive interpretation of rarity, that is, the fewer the specimens per collection event, the rarer the species. On the other hand, it is counter-intuitive that *T. parallelus*, which is known by two specimens, is not rare, while *T. amoenus*, with 58 specimens, is marginal. However, this impression may be largely due to the non-systematic sampling of species. Collecting events were not conducted in an empirical design to sample all sites with equal effort, and so sampling effort is not accounted for in these data. If we were able to factor in effort, e.g., all collecting trips where a species was not collected, there would be hundreds of zero-counts per species known from a single collection and/or a single specimen. While ideally future research would include empirical studies that account for collecting effort with rigorous sampling, we recognise the impracticalities of this approach in many circumstances.

There was a much greater sampling effort in some regions for our species that generally have low overlap, with *P. thoracicus* and *T. ovalis* the most widespread species and having a higher likelihood of capture. Rarity, therefore, is more than just the number of collection events of a particular species. Collecting biases associated with location, seasonality, repeat visits, and unknown life histories affect the identification of a rare species (Ward 2012, Seidel et al. 2020), as does collector bias (Hughes et al. 2021). Below we highlight three cases of serendipitous collecting and repeated attempts to collect rare species by the first author and his colleagues.

Roy A. Crowson, the modernizer of Coleoptera classification, made an infamous visit to New Zealand during the 1950s (Leschen 2000b) at which time he collected a single specimen of *T. crowsoni* from Peel Forest in South Canterbury. Five subsequent visits to the site by three collectors, four of which included sift samples, did not produce additional specimens. Katie Marske, a community ecologist, collected a single specimen of *T. tioripatea* by sifting at Haast Pass where there have been over 30 collection events, seven of which were sift samples (she had also collected the two only known specimens of *T. parallelus* and many other species in other beetle families that other coleopterists had failed to collect). *Thortus helmorei* is known from five specimens and four collections. Des Helmore, former illustrator at the NZAC, who had only conducted field work three times during his entire career at Landcare Research, collected the longest series of two specimens! There were 22 sifting events of litter/coarse woody debris and 22 fungal collections at Waipoua Forest, Northland where no additional specimens were collected.

In each case, the collectors' habits differed from the routine of RABL, his of which multiple habitats are generally sampled for each collecting event. Crowson wielded an axe to sample deeply into rotten wood. Marske sampled 1-metre plots and removed all coarse woody debris to the

humous layer, and Helmore sifted a rotten stump. It is possible that the rarer species, especially microphthalmic species, may inhabit environments that are below the loose litter level and present in the humous layer or in deeper confines of rotten logs and stumps, which RABL seldom sampled. Another possibility: RABL is a poor collector.

Rarity, therefore, as measured by collection and museum data is messy. How to account for hits and misses of target species is a challenge and the identity of a rare species could potentially be addressed by minimising biases through modelling (Daru et al. 2018).

With respect to insect conservation and species protection, a species' rarity refers to the potential risk of extinction (Mace et al. 2008), i.e., the fewer the individuals within a population, the more likely that species will vanish (Collen et al. 2011). Therefore, if there were a remarkable shift towards including tiny edaphic insects in the schemes of New Zealand conservation management, our taxonomic work on flightless picrotines and similar work could underpin objectives for monitoring biodiversity (McGlone et al. 2020).

Numbers of specimen records and observations, natural history, and morphology are criteria for rating New Zealand beetles as threatened species (Townsend et al. 2008, Leschen et al. 2012). While a large-bodied insect in New Zealand is particularly vulnerable due to introduced mammalian predators (McGuinness 2001), limited flight ability may also classify a species as threatened (Hagge et al. 2021). Based on the rarity metric above, *Picrotus* spp., *T. amoenus*, *T. lobatus*, *T. michauxi*, and *T. ovalis* with a relatively high number of specimens would be regarded as Not Threatened while the remaining species would be rostered as Data Deficient following the threat classification of Townsend et al. (2008). Yet data deficiency may be a red herring. Picrotines lacking hind wings with reduced vision and having been collected only once (e.g., *T. parallelus*) or known from a single locality (e.g., *T. helmorei*) could be considered as 'at risk', either as 'naturally uncommon' or 'relict' and even 'nationally critical' (Townsend et al. 2008). Further research and assessment may be needed for ranking.

Chowdhury et al. (2023) estimated that 76% of the world's insects are poorly represented in protected areas, though geographic regions and types of insects may vary. For example, an area that is legally protected may serve as an umbrella for the conservation of all species present, but this objective may not work well for certain taxa, like aquatic species living outside protected areas (e.g., Abellán 2013). Connolly & Ward (2020) showed that there was significantly less coverage for New Zealand insects classified as Threatened or At Risk (Townsend et al. 2008) compared to those ranked as Not Threatened with respect to their occurrence in the Protected Area Network (Anonymous 2007).

Our flightless picrotines were collected in areas that are currently managed to varying degrees by the Department of Conservation (see grey areas in Figs 21, 22). Therefore, we could assume that even the rare species are thriving in these areas and may be safe from extinction following the guidelines of McGlone et al. (2020). If, however, governments change laws to prioritize economic development over conservation and forests are destroyed in the process, populations of species like *T. luscus* may be vulnerable to extinction. This species is known from a native patch within timberlands (Endean's Bush) and a scenic reserve (Dansey Road Scenic Reserve), both of which may be subject to edge effects (Watt 1977). However, *T. luscus* could survive long-term in Maungatautari Sanctuary, Waikato, one of 84 ecosanctuaries (Innes et al. 2019). Meanwhile, *P. wairarapa* and populations of *T. amoenus* in Wairarapa may be a concern as the forests these species inhabit are contained within a mosaic of acutely threatened and critically under-protected habitat (Walker et al. 2008). We would recommend that forests containing these species should be protected long term.

The status of *T. crowsoni* remains unknown. The single specimen was collected in 1956 from Peel Forest, South Canterbury, in an area now considered as acutely threatened (Walker et al. 2008). As stated above, subsequent sampling yielded no further specimens, including *T. ovalis*, which were collected at the same time. There is a chance that the specimens were mislabelled, as there are no other records from Canterbury for *T. ovalis*.

Finally, we are not advocating that picrotines, especially those that are rare, be indicator species. Their presence alongside other species in a patch of forest, however, would provide added value to conserving ecosystems.

Acknowledgements

Specimens were collected under Landcare Research Permit CA-31615-OTH issued by the Department of Conservation. We would like to thank Grace Hall for initial data entry and Bernard Michaux for discussions on biogeography. Many have assisted in fieldwork, including Thomas Buckley, Grace Hall, Robert Hoare, Katie Marske, and Dave Seldon. We also appreciate curators listed in the methods for loan of material. Matt Gimmel and Takahiro Yoshida reviewed the manuscript and provided valuable comments for revision. This work was funded by Strategic Science Investment Funding for Crown Research Institutes from the Ministry of Business, Innovation and Employment's Science and Innovation Group and partially by the Marsden Fund Te Pūtea Rangahau (Contract LCR1902).

References

AHN K. J., JEON M. J. & BRANHAM M. A. 2010: Phylogeny, biogeography and the stepwise evolutionary colonization of intertidal habitat in the Liparocephalini based on morphological and molecular characters (Coleoptera: Staphylinidae: Aleocharinae). *Cladistics* **26**: 344–358.

ANDÚJAR C. & GREBENNIKOV V. V. 2021: Endogean beetles (Coleoptera) of Madagascar: deep soil sampling and illustrated overview. *Zootaxa* **4963**: 317–334.

ANDÚJAR C., PÉREZ-GONZÁLEZ S., ARRIBAS P., ZABALLOS J. P., VOGLER A. P. & RIBERA I. 2017: Speciation below ground: Tempo and mode of diversification in a radiation of endogean ground beetles. *Molecular Ecology* **26**: 6053–6070.

ANONYMOUS 2007: *Protected Areas Network.* https://oldwww.landcareresearch.co.nz/resources/maps-satellites/pannz. (accessed 10 February 2024).

BAIRD E. & YILMAZ A. 2023: Insect dorsal ocelli: a brief overview. Pp. 205–221. In: BUSCHBECK E. & BOK M. (eds): *Distributed Vision: From Simple Sensors to Sophisticated Combination Eyes*. Springer Nature Switzerland AG, Cham, vii + 320 pp.

BARR C. B., GIBSON J. R. & DIAZ P. H. 2015: *Typhloelmis* Barr (Coleoptera: Elmidae: Elminae), a new stygobiontic riffle beetle genus with three new species from Texas, USA. *Coleopterists Bulletin* **69**: 531–558.

BROUN T. 1893: *Manual of the New Zealand Coleoptera. Part VI*. Samuel Costall, Wellington, pp. 1321–1394.

BROUN T. 1912: Descriptions of new genera and species of Coleoptera [Part 1]. *Transactions and Proceedings of the New Zealand Institute* **44** [1911]: 379–440.

BUNCE M., WORTHY T. H., PHILLIPS M. J., HOLDAWAY R. N., WILLERSLEV E., HAILE J., SHAPIRO B., SCOFIELD R. P., DRUMMOND A., KAMP P. J. J. & COOPER A. 2009: The evolutionary history of the extinct rarite moa and New Zealand Neogene paleogeography. *Proceedings of the National Academy of Sciences* **106**: 20646–20651.

CARLTON C. E. & LESCHEN R. A. B. 2001: Species in sympatry: *Pselaphotheseus* of Campbell Island (Coleoptera: Staphylinidae: Pselaphinae). *New Zealand Journal of Zoology* **28**: 387–393.

CHICHORRO F., JUSLÉN A. & CARDOSO P. 2019: A review of the relation between species traits and extinction risk. *Biological Conservation* **237**: 220–229.

CHOWDHURY S., ZALUCKI M. P., HANSON J. O., TIATRAGUL S., GREEN D., WATSON J. E. & FULLER R. A. 2023: Three-quarters of insect species are insufficiently represented by protected areas. *One Earth* **6**: 139–146.

COLLEN B., McRAE L., DEINET S., De PALMA A., CARRANZA T., COOPER N., LOH J. & BAILLIE J. E. 2011: Predicting how populations decline to extinction. *Philosophical Transactions of the Royal Society B: Biological Sciences* **366**: 2577–2586.

CONNOLLY S. & WARD D. 2020: Utilising museum data for comparative analysis of threatened insect species. *Journal of Insect Conservation* **24**: 793–804.

CROSBY T. K., DUGDALE J. S. & WATT J. C. 1998: Area codes for recording specimen localities in the New Zealand subregion. *New Zealand Journal of Zoology* **25**: 175–183.

DARU B. H., PARK D. S., PRIMACK R. B., WILLIS C. G., BARRINGTON D. S., WHITFELD T. J., SEIDLER T. G., SWEENEY P. W., FOSTER D. R., ELLISON A. M. & DAVIS C. C. 2018: Widespread sampling biases in herbaria revealed from large-scale digitization. *New Phytologist* **217**: 939–955.

EGLI L., LEVAN K. E. & WORK T. T. 2020: Taxonomic error rates affect interpretations of a national-scale ground beetle monitoring program at National Ecological Observatory Network. *Ecosphere* **11(4) (e03035)**: 1–12.

ELLIS E. A., MARSHALL D. C., HILL K. B., OWEN C. L., KAMP P. J. & SIMON C. 2015: Phylogeography of six codistributed New Zealand cicadas and their relationship to multiple biogeographical boundaries suggest a re-evaluation of the Taupo Line. *Journal of Biogeography* **42**: 1761–1775.

ESCALONA H. E. & OBERPRIELER R. G. 2021: *Undarobius*, a new genus of cavernicolous weevils (Curculionidae: Entiminae: Leptopiini) from the Undara Lava Caves in north-eastern Australia, with an overview of anophthalmic and microphthalmic Australian Curculionidae. *Zootaxa* **5023**: 207–222.

FLEMING C. A. 1979: *The geological history of New Zealand and its life*. Auckland University Press, Auckland, 141 pp.

FREELANCE C. B., TIERNEY S. M., RODRIGUEZ J., STUART-FOX D. M., WONG B. B. & ELGAR M. A. 2021: The eyes have it: dim-light activity is associated with the morphology of eyes but not antennae across insect orders. *Biological Journal of the Linnean Society* **134**: 303–315.

GILPIN M. E. & SOULÉ M. E. 1986: Minimum viable populations: processes of species extinction. Pp. 19–34. In: SOULÉ M. E. (ed.): *Conservation biology: the science of scarcity and diversity*. Sinauer Associates, Sunderland, 585 pp.

GIMMEL M. L. & LESCHEN R. A. B. 2022: Revision of the genera of Picrotini (Coleoptera: Cryptophagidae: Cryptophaginae). *Acta Entomologica Musei Nationalis Pragae* **62**: 61–109.

GREBENNIKOV V. V. 2010: First *Alaocybites* weevil (Insecta: Coleoptera: Curculionoidea) from the Eastern Palaearctic: a new microphthalmic species and generic relationships. *Arthropod Systematics & Phylogeny* **68**: 331–365.

GUIGNARD Q., ALLISON J. D. & SLIPPERS B. 2022: The evolution of insect visual opsin genes with specific consideration of the influence of ocelli and life history traits. *BMC Ecology and Evolution* **22**: 1–9.

HAGGE J., MÜLLER J., BIRKEMOE T., BUSE J., GOSSNER M. M., GRUPPE A., HEIBL C., JARZABEK-MÜLLER A., SEIBOLD S., SIITONEN J. & SOUTINHO J. G. 2021: What does a threatened saproxylic beetle look like? Modelling extinction risk using a new morphological trait database. *Journal of Animal Ecology* **90**: 1934–1947.

HARRIS R. A. 1979: A glossary of surface sculpturing. *California Department of Food and Agriculture, Bureau of Entomology* **28**: 1–31.

HEADS M. 1998: Biogeographic disjunction along the Alpine fault, New Zealand. *Biological Journal of the Linnean Society* **63**: 161–176.

HUGHES A. C., ORR M. C., MA K., COSTELLO M. J., WALLER J., PROVOOST P., YANG Q., ZHU C. & QIAO H. 2021: Sampling biases shape our view of the natural world. *Ecography* **44**: 1259–1269.

INNES J., FITZGERALD N., BINNY R., BYROM A., PECH R., WATTS C., GILLIES C., MAITLAND M., CAMPBELL-HUNT C. & BURNS B. 2019: New Zealand ecosanctuaries: types, attributes and outcomes. *Journal of the Royal Society of New Zealand* **49**: 370–393.

JONGH E. de 2021: Navigation and orientation in Coleoptera: a review of strategies and mechanisms. *Animal Cognition* **24**: 1153–1164.

KUSCHEL G. 1971: Entomology of the Aucklands and other islands south of New Zealand: Coleoptera: Curculionidae. *Pacific Insects Monograph* **27**: 225–259.

KUSCHEL G. 2014: The blind weevils of Myrtonymina in New Caledonia and Australia (Curculionidae: Curculioninae: Erirhinini: Myrtonymina). *Zoologia Neocaledonica* **8**: 165–180.

LANGILLE B. L., TIERNEY S. M., BERTOZZI T., BEASLEY-HALL P. G., BRADFORD T. M., FAGAN-JEFFRIES E. P., HYDE J., LEIJS R., RICHARDSON M., SAINT K. M. & STRINGER D. N. 2022: Parallel decay of vision genes in subterranean water beetles. *Molecular Phylogenetics and Evolution* **173**: 1–9.

LAWRENCE J. F., BEUTEL R. G., LESCHEN R. A. B. & ŚLIPIŃSKI A. 2010: Glossary of morphological terms. Pp. 9–20. In: LESCHEN R. A. B., BEUTEL R. G. & LAWRENCE J. F. (eds): *Handbook of zoology. Coleoptera, volume 2: morphology and systematics (Elateroidea, Bostrichiformia, Cucujiformia partim)*. Walter de Gruyter, Berlin, 786 pp.

LEIJS R., WATTS C. H., COOPER S. J. & HUMPHREYS W. F. 2003: Evolution of subterranean diving beetles (Coleoptera: Dytiscidae Hydroporini, Bidessini) in the arid zone of Australia. *Evolution* **57**: 2819–2834.

LESCHEN R. A. B. 1996a: Phylogeny and revision of the genera of Cryptophagidae (Coleoptera: Cucujoidea). *University of Kansas Science Bulletin* **55**: 549–634.

LESCHEN R. A. B. 1999: Origins of symbiosis: phylogenetic pattens of social insect inquilinism in Cryptophagidae (Coleoptera: Cucujoidea). *University of Kansas Natural History Museum Special Publication* **24***:* 85–101.

LESCHEN R. A. B. 2000a: Pseudoliodini (Coleoptera: Leiodidae: Leiodinae) of New Zealand. *New Zealand Entomologist* **22** [1999]: 33–44.

LESCHEN R. A. B. 2000b: Roy A. Crowson 1915–1999. *New Zealand Entomologist* **22**: 102–104.

LESCHEN R. A. B. 2001: A new genus of Cryptosomatulini (Coleoptera: Cryptophagidae: Cryptophaginae) from New Zealand. *New Zealand Entomologist* **24**: 7–9.

LESCHEN R. A. B. 2010: Cryptophagidae Kirby, 1837. Pp. 327–334. In: LESCHEN R. A. B., BEUTEL R. G. & LAWRENCE J. F. (eds): *Handbook of zoology. Coleoptera, volume 2: morphology and systematics (Elateroidea, Bostrichiformia, Cucujiformia partim)*. Walter de Gruyter, Berlin, 786 pp.

LESCHEN R. A. B., BUTLER E., BUCKLEY T. R. & RITCHIE P. 2011: Biogeography of the New Zealand subantarctic islands: phylogenetics of *Pseudhelops* (Coleoptera: Tenebrionidae). *New Zealand Entomologist* **34**: 12–26.

LESCHEN R. A. B. & GIMMEL M. L. 2012: Catalogue of the tribe Picrotini (Coleoptera: Cryptophagidae: Cryptophaginae). *New Zealand Entomologist* **35**: 14–28.

LESCHEN R. A. B. & LAWRENCE J. F. 1991: Fern sporophagy in Coleoptera from the Juan Fernandez Islands, Chile, with descriptions of two new genera in Cryptophagidae and Mycetophagidae. *Systematic Entomology* **16**: 329–352.

LESCHEN R. A. B., MARRIS J. W. M., EMBERSON R. M., NUNN J., HITCHMOUGH R. A. & STRINGER I. 2012: The conservation status of New Zealand Coleoptera. *New Zealand Entomologist* **35**: 91–98.

LESCHEN R. A. B. & MICHAUX B. 2005: Biogeography and evolution of New Zealand Priasilphidae (Coleoptera: Cucujoidea). *New Zealand Entomologist* **28**: 55–64.

LESCHEN R. A. B., REID C. A. M. & NADEIN K. S. 2020: Generic review of New Zealand Chrysomelinae (Coleoptera: Chrysomelidae). *Zootaxa* **4740**: 1–66.

LEWIS K. B., CARTER L. & DAVEY F. J. 1994: The opening of Cook Strait: Interglacial tidal scour and aligning basins at a subduction to transform plate edge. *Marine Geology* **116**: 293–312.

LIEBHERR J. K., MARRIS J. W., EMBERSON R. M., SYRETT P. & ROIG-JUÑENT S. 2011: *Orthoglymma wangapeka* gen. n., sp. n. (Coleoptera: Carabidae: Broscini): a newly discovered relict from the Buller Terrane, north-western South Island, New Zealand, corroborates a general pattern of Gondwanan endemism. *Systematic Entomology* **36**: 395–414.

MADDISON W. P. & MADDISON D. R. 2021: *Mesquite: a modular system for evolutionary analysis. Version 3.70.* http://www.mesquiteproject.org

MACE G. M., COLLAR N. J., GASTON K. J., HILTON-TAYLOR C., AKÇAKAYA R., LEADER-WILLIAMS N., MILNER-GULLAND E. J. & STUART S. N. 2008: Quantification of extinction risk: IUCN's System for Classifying Threatened Species. *Conservation Biology* **22**: 1424–1442.

MAKAROVA A. A., MEYER-ROCHOW V. B. & POLILOV A. A. 2019: Morphology and scaling of compound eyes in the smallest beetles (Coleoptera: Ptiliidae). *Arthropod Structure & Development* **48**: 83–97.

MARRA M. J., CROZIER M. & GOFF J. 2009: Palaeoenvironment and biogeography of a late MIS 3 fossil beetle fauna from South Taranaki, New Zealand. *Journal of Quaternary Science* **24**: 97–107.

MARSKE K. A. & BOYER S. L. 2024: Phylogeography reveals the complex impact of the Last Glacial Maximum on New Zealand's terrestrial biota. *Journal of the Royal Society of New Zealand* **54**: 8–29.

McGLONE M. S. 1989: The Polynesian settlement of New Zealand in relation to environmental and biotic changes. *New Zealand Journal of Ecology* **12**: 115–130.

McGLONE M. S., McNUTT K., RICHARDSON S. J., BELLINGHAM P. J. & WRIGHT E. F. 2020: Biodiversity monitoring, ecological integrity, and the design of the New Zealand Biodiversity Assessment Framework. *New Zealand Journal of Ecology* **44**: 1–12.

McGUINNESS C. A. 2001: *The Conservation Requirements of New Zealand's Nationally Threatened Invertebrates. Threatened Species Occasional Publication 20*. Department of Conservation, Wellington. 657 pp.

MOORE B. P. 1980: A synopsis of the New Zealand Anillini (Coleoptera: Carabidae: Bembidiinae), with descriptions of new genera and species. *New Zealand Journal of Zoology* **7**: 399–406.

ORDISH R. G. 1976: Two new genera and species of subterranean water beetle from New Zealand (Coleoptera: Dytiscidae). *New Zealand Journal of Zoology* **3**: 1–10.

ORLOV I., SOLODOVNIKOV A. & LESCHEN R. A. B. 2019: Systematics and biogeography of the subantarctic *Leptusa* (Coleoptera: Staphylinidae: Aleocharinae: Homalotini). *Systematics and Biodiversity* **17**: 60–79.

OWENS B. E., LESCHEN R. A. B. & CARLTON C. 2019: The Pselaphini (Coleoptera: Staphylinidae: Pselaphinae) of the Subantarctic and Chatham Islands of New Zealand; description of five species and one genus. *Insect Systematics and Diversity* **3**: 1–14.

PAGE R. D. 2016: DNA barcoding and taxonomy: dark taxa and dark texts. *Philosophical Transactions of the Royal Society B: Biological Sciences* **371**: 1–7.

PEBESMA E. 2018: Simple features for R: Standardized support for spatial vector data. *The R Journal* **10**: 439–446.

PERCIVAL-SMITH A. 2017: Non-specificity of transcription factor function in *Drosophila melanogaster*. *Development Genes and Evolution* **227**: 25–39.

PRENDERGAST J. R., QUINN R. M., LAWTON J. H., EVERSHAM B. C. & GIBBONS D. W. 1993: Rare species, the coincidence of diversity hotspots and conservation strategies. *Nature* **365**: 335–337.

R CORE TEAM 2024: *R: A Language and Environment for Statistical Computing.* R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/.

SEIDEL M., MINOSHIMA Y. N., LESCHEN R. A. B. & FIKÁČEK M. 2020: Phylogeny, systematics and rarity assessment of New Zealand endemic *Saphydrus* beetles and related enigmatic larvae (Coleoptera: Hydrophilidae: Cyclominae). *Invertebrate Systematics* **34**: 260–292.

SILVA L. E. B., LIMA M. A. P., CAMPOS L. A. O., BERNARDES R. C. & LOPES-ANDRADE C. 2023: Scotocryptini beetles (Leiodidae) in nests of stingless bees. *Apidologie* **54**: 1–12.

SHARP D. 1886: On New Zealand Coleoptera, with descriptions of new genera and species. *Scientific Transactions of the Royal Dublin Society, Series 2* **3**: 351–456.

SOKOLOV I. M. 2023: Eight new species of the genus *Nesamblyops* Jeannel (Anillini: Carabidae: Coleoptera) from New Zealand with notes about dispersal of the genus to the North Island. *Zootaxa* **5230**: 179–201.

SPURR E. B. & BERBEN P. H. 2004: Assessment of non-target impact of 1080-poisoning for vertebrate pest control on weta (Orthoptera: Anostostomatidae and Rhaphidophoridae) and other invertebrates in artificial refuges. *New Zealand Journal of Ecology* **28**: 63–72.

STROGEN D. P., SEEBECK H., HINES B. R., BLAND K. J. & CRAMPTON J. S. 2023: Palaeogeographic evolution of Zealandia: mid-Cretaceous to present. *New Zealand Journal of Geology and Geophysics* **66**: 528–557.

SWOFFORD D. L. 2002: *PAUP*: Phylogenetic analysis using parsimony (* and other methods). Version 4.* Sinauer Associates, Sunderland, MA.

TAYLOR V. A. 1981: The adaptive and evolutionary significance of wing polymorphism and parthenogenesis in *Ptinella* Motschulsky (Coleoptera: Ptiliidae). *Ecological Entomology* **6**: 89–98.

TAYLOR-SMITH B., MORGAN-RICHARDS M. & TREWICK S. A. 2020: Patterns of regional endemism among New Zealand invertebrates. *New Zealand Journal of Zoology* **47**: 1–19.

THAYER M. K. 1992: Discovery of sexual wing dimorphism in Staphylinidae (Coleoptera): "*Omalium*" *flavidum*, and a discussion of wing dimorphism in insects. *Journal of the New York Entomological Society* **100**: 540–573.

THÉRY T. & LESCHEN R. A. B. 2013: Pselaphinae (Coleoptera: Staphylinidae) of the Three Kings Islands. *New Zealand Entomologist* **36**: 37–64.

TOWNSEND J. I. 2010: Trechini (Insecta: Coleoptera: Carabidae: Trechinae). *Fauna of New Zealand* **62**: 1–101.

TOWNSEND A. J., De LANGE P. J., DUFFY C. A., MISKELLY C. M., MOLLOY J. & NORTON D. A. 2008: *New Zealand Threat Classification System Manual.* Science & Technical Publishing, Department of Conservation, Wellington, 36 pp.

TRAJANO E. & De CARVALHO M. R. 2017: Towards a biologically meaningful classification of subterranean organisms: a critical analysis of the Schiner-Racovitza system from a historical perspective, difficulties of its application and implications for conservation. *Subterranean Biology* **22**: 1–26.

TREWICK S. A. & BLAND K. J. 2012: Fire and slice: palaeography for biogeography at New Zealands North Island / South Island juncture. *Journal of the Royal Society of New Zealand* **42**: 153–183.

TREWICK S. A. & WALLIS G. P. 2001: Bridging the "beech-gap": New Zealand invertebrate phylogeography implicates Pleistocene glaciation and Pliocene isolation. *Evolution* **55**: 2170–2180.

WAGNER D. L. & LIEBHERR J. K. 1992: Flightlessness in insects. *Trends in Ecology & Evolution* **7**: 216–220.

WALKER S., PRICE R. & RUTLEDGE D. T. 2008: *New Zealand's remaining indigenous cover: recent changes and biodiversity protection needs. Science for Conservation 284.* Science & Technical Publishing, Department of Conservation, Wellington, 32 pp.

WALLIS G. P. & TREWICK S. A. 2009: New Zealand phylogeography: evolution on a small continent. *Molecular Ecology* **18**: 3548–3580.

WARD D. F. 2012: More than just records: analysing natural history collections for biodiversity planning. *PLoS One* **7(11) (e50346)**: 1–8.

WARDLE P. 1988: Effects of glacial climates on floristic distribution in New Zealand 1. A. review of the evidence. *New Zealand Journal of Botany* **26**: 541–555.

WATT J. C. 1977: Conservation and type localities of New Zealand Coleoptera, and notes on collectors 1770–1920. *Journal of the Royal Society of New Zealand* **7**: 79–91.

WATT J. C. 1992: Tenebrionidae (Insecta: Coleoptera): catalogue of types and keys to taxa. *Fauna of New Zealand* **26**: 1–70.

WICKHAM H. 2016: *ggplot2: Elegant graphics for data analysis. Second Edition.* Springer International Publishing AG Switzerland, Cham, XVI + 260 pp.

YAMAMOTO S. & MARUYAMA M. 2018: Phylogeny of the rove beetle tribe Gymnusini sensu n. (Coleoptera: Staphylinidae: Aleocharinae): implications for the early branching events of the subfamily. *Systematic Entomology* **43**: 183–199.