Taxonomic revision of the New Zealand endemic parasitoid genus *Rhyssaloides* Belokobylskij, 1999 (Hymenoptera: Braconidae)

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http://zoobank.org/urn:lsid:zoobank.org:pub:5A0B2188-6444-4ECB-A2AE-677F93BDA85C

Abstract

The New Zealand cyclostome braconid fauna is poorly studied but has a high diversity of Mesostoinae compared to other regions. We redescribe the endemic New Zealand genus *Rhyssaloides* Belokobylskij, 1999 and compare it to two morphologically similar New Zealand endemics, *Zealastoa* Quicke & Ward, 2020 and *Doryctomorpha* Ashmead, 1900. Two new species, *Rh. maculatus* sp. nov. and *Rh. noyesi* sp. nov., are described and illustrated. The species *Rhyssaloides antipoda* Belokobylskij, 1999, which is a parasitoid of the native cerambycid *Ambrodenius tristis* (Fabricius, 1775), is placed as a junior synonym of *Rhyssaloides ambeodonti* (Muesebeck, 1941), *syn. nov.* A key for determining the three known species is provided.

Key words: endemic, Ichneumonoidea, key, Mesostoinae, new species, new synonym, *Rhyssaloides*.

INTRODUCTION

The New Zealand cyclostome braconid fauna of the parasitoid family Braconidae is currently regarded as isolated and very peculiar, with many recent unexpected discoveries (Belokobylskij 2018; Quicke et al. 2019a, 2019b, 2020a), but is still insufficiently known.

A substantial part of the cyclostome diversity in New Zealand is in the subfamily Mesostoinae, which is a monophyletic group of Gondwanan origins (Quicke et al. 2020a). The following genera have been recorded in New Zealand: *Australohormius* Belokobylskij, 1989 (genus originally described from Australia), and the endemic taxa *Doryctomorpha* Ashmead, 1900, *Metaspathius* Brues, 1922, *Nepthiornius* van Achterberg & Berry 2004, *Rhyssaloides* Belokobylskij, 1999 and *Zealastoa* Quicke & Ward, 2020 (Ashmead 1900, Brues 1922, Belokobylskij 1989, 1999, Belokobylskij et al. 2004, van Achterberg & Berry, 2004, Yu et al. 2016, Quicke et al. 2019a, 2020a, 2020b). The genus *Zeachremylus* Belokobylskij, 2018, described as an endemic from New Zealand, is also very likely to belong this subfamily (Quicke et al. 2020a).

A recent molecular-based phylogenetic study of cyclostome taxa (including several genera of Mesostoinae) (Quicke et al. 2020b) showed *Rhyssaloides* is sister to *Doryctomorpha*, while the morphologically similar *Zealastoa* is sister to *Metaspathius*. All four genera formed a distinct New Zealand clade separate to other included mesostoine genera.

In this paper, we undertake a revision of the endemic New Zealand mesostoine genus *Rhyssaloides* Belokobylskij and, in so doing, redescribe the genus, treat the three included species, two of which are new, and provide a key to facilitate their identification.

MATERIAL AND METHODS

The terminology used for morphological features and measurements follows Belokobylskij and Maeto (2009). The wing venation nomenclature follows Belokobylskij and Maeto (2009), with van Achterberg (1993) terminology shown in parentheses. Specimens were examined using an Olympus SZS1 stereo microscope. Photographs were obtained using a Canon EOS 70D digital camera mounted on an Olympus SZX10 microscope (Zoological Institute RAS, St Petersburg). The images were enhanced, and the plates composed using Adobe Photoshop.

The holotype and most of paratypes of the new species are housed in the New Zealand Arthropod Collection (Auckland, New Zealand; NZAC), with a few paratypes in the Zoological Institute of the Russian Academy of Sciences (St Petersburg, Russia; ZISP).
Genus Rhyssaloides Belokobylskij, 1999

Type species: Rhyssaloides antipoda Belokobylskij, 1999 (= Doryctes ambeodonti Muesebeck, 1941), by original designation and monotypy.

Diagnosis

This genus is very similar to the recently described Zealastoa Quicke & Ward, 2020 (Quicke et al. 2020b), but differs from it in having fewer (18–28) antennal segments (33–35 segments in Rhyssaloides); mesoscutum smooth and shiny but with many deep setiferous punctures (densely and finely or very finely granulate to coriaceous with punctation in Rhyssaloides); second transverse anal vein (2a) in fore wing absent (present but usually colourless in Rhyssaloides); second radial absissa (3-SR) in fore wing less than 1.5 × length of the first radial absissa (r) (2.0–2.8 × in Rhyssaloides); median area of metanotum in posterior half with distinct median longitudinal carina transformed in dorsal obtuse lobe (without such carina and lobe in Rhyssaloides); and the ovipositor shorter than metasoma (much longer in Rhyssaloides).

Rhyssaloides Belokobylskij resembles the New Zealand genus Doryctomorpha Ashmead from which it distinctly differs in the high face (rather narrow in Doryctomorpha), short normal mandible (long and massive in Doryctomorpha), usually glabrous eyes (setose in Doryctomorpha), antennae longer than body (antennae distinctly shorter than body in Doryctomorpha), long tarsal segments of fore and middle legs (short segments in Doryctomorpha), antefurcal or interstitial position of recurrent vein (m-cu) (distinctly postfurcal in Doryctomorpha), second transverse anal vein (a) present (absent in Doryctomorpha), and distinctly sculptured first metasomal tergite (finely coriaceous in Doryctomorpha).

Redescription

Head. Subcuboid or weakly transverse. Ocelli in triangle with base 1.2–1.3 × its sides. Frons not or only weakly concave, without median keel. Eyes glabrous or with sparse short setae. Occipital carina present, fused with hypostomal carina at upper base of mandible. Malar suture absent or sometimes very fine and incomplete. Clypeal suture distinct. Clypeus with wide ventral flange. Hypoclypeal depression rather large and subcircular or weakly oval. Postgenal bridge present but narrow, sometimes very narrow. Palpi rather long and slender; maxillary palp six-segmented; labial palp three-segmented; second segment of labial palp shortened, 0.6–0.7 × as long as its third segment. Scape wide and rather short, without apical lobe and not angled apically. Pedicel subcuboid. First flagellar segment distinctly longer than second segment.

Mesosoma. Neck of prothorax elongated. Pronotal keel present, transverse in anterior third and semicircular in posterior third. Pleuropleural lobe distinct, short and wide. Mesonotum highly and almost perpendicularly elevated above prothorax, entirely densely setose. Median lobe of mesonotum without anterolateral corners, usually with complete or incomplete longitudinal furrow. Notauli deep and crenulate in anterior half or three-fifths, very shallow or absent in posterior half or two-fifths. Mesoscutum with distinct median longitudinal carina complete or in posterior half. Prescutellar depression relatively long, with high median carina. Scutellum convex, without lateral carinae at least in anterior half. Metanotum with short median carina not transformed in flange. Subalar depression rather shallow and wide. Precoxal sulcus (sternaulus) distinct, relatively wide, straight, oblique and crenulate. Prepectal carina distinct and complete. Metapleural flange short, wide and round apically. Propodeum with basal areas and usually areola distinctly delineated by carinae, lateral tubercles wide and short. Propodeal spiracles small and round.

Wings. Pterostigma of fore wing relatively narrow. Radial vein (r) arising behind middle of pterostigma. Radial (marginal) cell not shortened. Both radiomedial veins (2-SR and r-m) present. Recurrent (m-cu) vein antefurcal or almost interstitial to first radiomedial vein (2-SR). Nervulus (cu-a) distinctly postfurcal. Discoidal (discal) cell petiolate. Parallel (CU1a) vein arising from posterior fifth of apical side of brachial (subdiscal) cell. Brachial (subbscal) cell closed distally by tubular brachial vein (CU1b). Second transverse anal vein (a) present, but usually strongly unsclerotized. Hind wing with 3 hamuli. Submedial (subbasal) cell large. First absissa of mediocubital vein (M + CU) much longer than second absissa (1-M). Recurrent vein (m-cu) always absent. Medial (basal) cell wide, 0.4–0.5 × as long as hind wing. Radial vein (SR) arising from basal vein (1r-m) not far from costal vein (1-SC + R).

Legs. Fore tibia with rather dense slender spines arranged in narrow row. Hind coxa without basoventral tooth. Hind femur elongate-oval. Hind tibial spurs short, slender, weakly curved; inner spur 0.15–0.20 × as long as hind basitarsi. Basitarsus of hind tarsus 0.6–0.7 × as long as second to fifth segments combined.

Metasoma. First tergite wide and short. First tergite with distinct dorsosce and usually long dorsal carinae; spiracular tubercles weakly or almost indistinct, placed in basal third of tergite. Second suture absent or sometimes very fine. Second and following tergites without separate laterotergites; spiracles placed on sides of tergites; third and following tergites covered by rather dense irregular pale setae. Hypopygium rather large, pointed apically. Ovipositor longer than metasoma. Apical part of ovipositor with very wide and low dorsal node, serrate ventrally.

Distribution

New Zealand (endemic).

Key to species of the genus Rhyssaloides

1 Radial (marginal) and third radiomedial (submarginal) cells of fore wing with distinct and rather wide dark spots (Fig. 1a and 2a). First flagellar segment 3.8–4.3 × longer than its apical width (Fig. 1f). Head with very dense
Fig. 1. *Rhyssaloides maculatus* sp. nov., male, holotype. (a) Body, lateral view; (b) head, dorsal view; (c) head, front view; (d) head, lateral view; (e) antenna, apical segments; (f) antenna, basal segments; (g) mesosoma, dorsal view; (h) mesosoma, lateral view; (i) hind leg.
semi-erect and curved yellow setae (Fig. 1b). Body length 2.7–3.4 mm..................Rh. maculatus sp. nov.
- Radial (marginal) and third radiomedial (submarginal) cells of fore wing without dark spots (Figs 3a, 4g and 5a). First flagellar segment 5.5–6.3 × longer than its apical width (Figs 4d, 6a and 7f).................................................................2
2 Head with very dense semi-erect setae (Fig. 7b). Third radial abscissa (SR1) of fore wing rather strongly curved (Fig. 5a). Second radiomedial (submarginal) cell distinctly convex below (Fig. 5a). Length of long setae on dorsal side of hind tibia almost equal to maximum width of hind tibia (Fig. 7j). Body length 3.2–3.6 mm.................................Rh. noyesi sp. nov.
- Head with sparse semi-erect setae (Figs 4b and 6c). Third radial abscissa (SR1) of fore wing only weakly curved (Figs 3a and 4g). Second radiomedial (submarginal) cell weakly convex below (Figs 3a and 4g). Length of long setae on dorsal side of hind tibia distinctly shorter than maximum width of hind tibia (Figs 4e and 6a). Body length 3.3–4.3 mm...Rh. ambeodonti

**Fig. 2.** Rhyssaloides maculatus sp. nov., male, holotype. (a) Wings; (b) metasoma, dorsal view; (c) metasoma, lateral view.

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Of *Doryctes ambeodonti* Muesebeck, 1941 (all in NZAC): 4 ♀, ‘Sap of Rimu – Papakura. Parasitising *Ambeodontus tristis*. July 1940. K. Harrow’, ‘Paratype’, ‘*Doryctes ambeodonti* Muesebeck, 1941’ (NZAC04195396, NZAC04194768, NZAC04194321 and NZAC04191214); 3 ♀, 1 ♂, ‘Parasites of *Ambeodontus tristis*, 1st Nov.1940’, ‘Paratype’, ‘*Doryctes ambeodonti* Muesebeck, 1941’, (assumed location of Papakura as per other specimens (July 1940) but not on label) (NZAC04191548, NZAC04191223, NZAC04190779 and NZAC04191826).

**Other material**

New Zealand: 1 ♀, Nelson, 24.III.1926, W. Heighway coll. (NZAC04087447); 1 ♀, Nelson, on window pane, I.1948, A. W. Parrott coll. (NZAC04087208); 5 ♀, Auckland, Owairaka, ex insectary, 11.III.1949, K. Harrow leg. (NZAC04086627, NZAC04086769, NZAC04087270, NZAC04087376, NZAC04087651); 1 ♀, Auckland, Western Springs, 25.I.1950, K. Wise coll. (NZAC04087211); 1 ♀, Marlborough, Kenepuru Sound, foot Mt Stokes, from dead branches of *Coprosma*...
Fig. 4. *Rhyssaloides ambeodonti* (Muesebeck, 1941), female, paratype of *Rh. antipoda*. (a) Body, lateral view; (b) head, dorsal view; (c) mesosoma and first metasomal tergite, dorsal view; (d) head and mesosoma, lateral view; (e) propodeum and metasoma, lateral view; (f) metasoma, dorsal view; (g) wings.

*australis*, W67/89, 13.X.1967, J. McBurney coll. NZAC04086691, NZAC04086731, NZAC04086793, (NZAC04214412); 19 ♀, Auckland, North Shore, ex infested stump, I.1944, D. Spiller coll. (NZAC04086538, NZAC04086796, NZAC04087110, NZAC04087245, NZAC04087280, NZAC04087511, NZAC04087513, NZAC04086621, NZAC04086623, NZAC04086639, NZAC04087572, NZAC04087583 and NZAC04087707); 6 ♀, ‘Parasites of *Ambeodontus tristis*, 1st Nov. 1940’
Fig. 5. Rhyssaloides noyesi sp. nov., female, holotype. (a) Wings; (b) metasoma, dorsal view; (c) metasoma, lateral view.

Description

Female

Size. Body length 3.3–4.7 mm; fore wing length 3.3–4.3 mm.

Head. Head width 1.3–1.5 × median length, 1.1–1.2 × width of mesoscutum at level of tegulae. Temple behind eyes parallel in anterior half, roundly narrowed in posterior half; transverse diameter of eye 0.8–0.9 × length of temple (dorsal view). POL 1.3–1.6 × Od, 0.40–0.45 × OOL; Od 0.3 × OOL. Eye 1.4–1.5 × higher than broad. Malar space 0.4–0.5 × height of eye, 0.8–1.0 × basal width of mandible. Face width 1.1–1.2 × eye height and 1.1–1.2 × height of face and clypeus.
combined. Width of hypoclypeal depression subequal to distance from depression to eye, 0.4–0.5 × as wide as face. Head strongly and roundly narrowed below eyes.

Antennae rather slender, almost filiform, 28–33-segmented, 1.1–1.2 × longer than body. Scape short and wide, 1.5–1.7 × longer than maximum width. First flagellar segment 5.7–7.0 × longer than its apical width, 1.2–1.3 × length of second segment. Penultimate segment 2.0–2.2 × longer than wide, 0.3 × as long as first flagellar segment, 0.8–0.9 × as long as apical segment; the latter weakly distinctly acuminate apically.

Mesosoma. 1.8–2.0 × longer than its height. Mesoscutum 0.9–1.0 × as long as maximum width (near tegulae). Median lobe of mesoscutum usually with complete, narrow and shallow median longitudinal furrow, which is deep and wide in posterior half, but sometimes almost indistinct in anterior half. Notauli deep and coarsely crenulate in anterior half, almost absent or absent in posterior half. Prescutellar depression rather deep, with distinct median carina, mainly weakly rugulose, 0.35–0.40 × as long as scutellum. Scutellum with fine and complete lateral carinae. Subalar depression shallow, entirely coarsely rugulose- reticulate, without striation. Sternalus weakly curved, coarsely crenulate with rugosity, running along anterior 0.6 of lower part of mesopleuron. Propodeum weakly and almost evenly curved posterior, but abrupt in posterior fifth.

Fig. 6. Rhyssaloides ambeodonti (Muesebeck, 1941), female, paratype. (a) Body, lateral view; (b) head, front view; (c) head, dorsal view; (d) head and mesosoma, lateral view.
Wings. Length of fore wing 3.2–3.5 × its maximum width. Pterostigma 4.0–5.0 × as long as wide, 0.70–0.85 × as long as metacarp (1-R1). Second radial abscissa (3-SR) 2.0–2.6 × longer than first abscissa (r), 0.4–0.5 × as long as the slightly curved third abscissa (SR1), 0.7–0.9 × as long as first radiomedial vein (2-SR). Second radiomedial (submarginal) cell rather long, weakly convex below, its length 2.6–2.8 × its width, 1.7–2.0 × length of brachial (subdiscal) cell. Recurrent vein (m-cu) weakly antefurcal to first radiomedial vein (2-SR) or very rarely almost interstitial, 0.40–0.55 × its length, subparallel to
basal vein (1-M). Nervulus (cu-a) distinctly oblique, distance between nervulus (cu-a) and basal vein (1-M) almost equal to nervulus (cu-a) length. Second transverse anal vein (a) strongly discoloured. Hind wing 4.3–4.5 × longer than wide. Second medial abscissa (1-M) 0.25–0.30 × as long as first abscissa (M + CU), 0.8–1.0 × as long as nervulus (cu-a), 0.6–0.7 × as long as basal vein (1r-m). Radial vein (SR) tubular only in basal fifth but discoloured, practically absent in remaining part.

**Legs.** Hind coxa 1.4–1.5 × as long as maximum width, 0.8–0.9 × as long as propodeum. Hind femur 3.9–4.2 × longer than wide, 0.7 × as long as hind tibia. Hind tarsus 0.8 × as long as hind tibia. Second tarsal segment 0.4–0.5 × as long as first segment, 1.3–1.4 × as long as fifth segment (without pretarsus). Hind basitarsus without lower keel.

**Metasoma.** 0.8–1.0 × as long as head and mesosoma combined. First tergite distinctly and almost linearly widened towards apex, with convex and wide suboval medial area, length of tergite almost equal to its apical width; apical width 1.8–2.0 × its basal width. Length of second and third tergites combined 0.7–1.0 × basal width of second tergite, 0.6–0.7 × their maximum width. Ovipositor sheath 1.6–2.2 × longer than metasoma, 0.8–1.1 × as long as body, 0.7–1.2 × as long as fore wing.

**Sculpture and pubescence.** Vertex densely and finely to very finely coriaceous; frons distinctly densely granulate and sometimes with additional rugulosity; face finely reticulate coriaceous with punctuation, sculpture finer below; temple very finely coriaceous to almost smooth. Mesonotum densely and distinctly punctate and additionally coriaceous or finely granulate in interspaces. Mesopleura very finely reticulate coriaceous, partly almost smooth. Propodeum finely or sometimes distinctly rugulose-reticulate, with coarse cariniae delineated areas; areola short and rather wide, pentagonal, but sometimes its anterior cariniae (furca) fine and areola almost open anteriorly, 1.1–1.6 × longer than maximum width; petiolate cell rather long and trapezoid; median carina present in basal third of propodeum, but sometimes rather fine, 0.8–1.5 × longer than furca of areola. Hind coxa finely coriaceous to smooth; hind femur densely reticulate-punctate. First metasomal tergite distinctly curvedly striate, with fine reticulation between striae. Remaining tergites completely smooth. Head covered by relatively sparse, short and semi-erect pale setae. Mesoscutum entirely with very densely and shortly yellow setae. Hind tibia with short, semi-erect and dense yellow setae; length of setae on dorsal side about 0.5 × maximum width of hind tibia.

**Colour.** Body mainly light reddish brown to yellowish brown, rarely mesosoma and metasoma mainly dark reddish brown and partly with almost black spots; mesosoma laterally, first tergite and distal third of metasoma or rarely metasoma entirely reddish brown to dark reddish brown. Palpi pale yellow. Antennae light brown, faintly darkened towards apex. Legs light brown or yellow, basally pale yellow; middle femur in apical third, hind femur in apical third or half and hind tibia basally and in distal third infuscate to reddish brown. Wings faintly infuscate, more distinctly darkened along veins. Pterostigma brown medially, pale marginally. Ovipositor sheath light reddish brown or yellow, dark brown apically.

**Male**

**Size.** Body length 2.5–3.7 mm; fore wing length 2.4–3.1 mm.

**Head.** Width 1.4–1.5 × median length, often vertex widely smooth or very finely coriaceous. Temple behind eyes evenly roundly narrowed; transverse diameter of eye 1.0–1.2 × length of temple (dorsal view). Malar space 0.25–0.30 × height of eye, 0.5–0.6 × basal width of mandible. Face width 0.9 × eye height. Width of hypoclypeal depression 1.2–1.4 × distance from depression to eye. Antennae 26–32-segmented. First flagellar segment 4.5–5.0 × longer than its apical width. Penultimate segment 2.3–2.5 × longer than wide, 0.4–0.5 × as long as first flagellar segment, 0.9–1.0 × as long as apical segment.

**Metasoma.** 0.7–1.0 × as long as head and mesosoma combined. Length of first tergite 1.2–1.4 × its apical width; apical width 1.5–1.8 × its basal width. Length of second and third tergites combined 1.3–1.4 × basal width of second tergite, almost equal their maximum width. Suture between second and third tergites present laterally.

**Colour.** Body mainly dark reddish brown, often head and mesoscutum reddish brown or light reddish brown; sometimes body light reddish brown or yellowish brown with dark metasoma behind first tergite. Antennae brown to dark brown, pale to yellow basally. Legs yellow basally, but mainly brownish yellow, sometimes not distinctly infuscated. Wings infuscate, without more intensive darkening along of veins. Pterostigma mainly brown or light brown, pale basally.

**Remarks**

The holotype of *Doryctes ambeodonti* Muesebeck should be in the Smithsonian Institute (Washington) according to the information from the original description of the species (Muesebeck, 1941). However, the information about this species is absent in the Internet catalogues of the types preserved in the Institute ([https://collections.si.edu/](https://collections.si.edu/)), and additional searching could not locate it. Fortunately, some of the paratypes of this species (7 females and 1 male from the original description of 23 females and 2 males) (Muesebeck, 1941) were found in the New Zealand Arthropod Collection, and the images of the best-preserved specimen were produced for this paper.

The comparison of the description and this illustration of *Doryctes ambeodonti* with the description and paratypes preserved in the ZISP collection allow us to synonymise these species names: *Doryctes ambeodonti* Muesebeck, 1941 = *Rhyssaloides antipoda* Belokobylskij, 1999, syn. nov.
Biology

The species was reared from Ambeodontus tristis, a New Zealand endemic Cerambycid beetle which can be a minor forestry pest on native and introduced softwoods (Clark 1934). The most commonly infested tree species are Dacrydium cupressinum (Rimu), Dacrycarpus dacrydioides (Kahikatea) and the exotic Cupressus macrocarpa (Macrocarpa). The larvae of this longhorn bore in dead softwoods in logs, branches and dead trees; however, infestation also occurs in living trees.

Rhyssaloides maculatus sp. nov
(Figs 1, 2)
http://zoobank.org/urn:lsid:zoobank.org:pub:5A0B2188-6444-4ECD-A2AE-677F93BDA85C

Material examined

Holotype
♂ ‘New Zealand AK, Waitakere Ra, Nov. 1980, J. Noyes’, ‘N. Z. Arthropod Collection, NZAC, Private Bag 92170, AUCKLAND, New Zealand’ (NZAC04191388).

Paratypes
1 ♂, ‘New Zealand AK, Waitakere Ra, 20–21 Sep. 1980, J.S. Noyes’, ‘N.Z. Arthropod Collection, NZAC, Private Bag 92170, AUCKLAND, New Zealand’ (ZISP); 1 ♂, ‘New Zealand OL, Makarora, 18 Jan. 1981, J.S. Noyes and E.W. Valentine’, ‘Sweeping, Nothofagus’, ‘N.Z. Arthropod Collection, NZAC, Private Bag 92170, AUCKLAND, New Zealand’ (NZAC); 1 ♂, ‘New Zealand OL, L. Wakatipu, Bobs Cove, 23 Jan 1981, J.S. Noyes’, and ‘E.W. Valentine, Sweeping, Nothofagus’ (NZAC).

Diagnosis

This new species is very similar to Rh. noyesi sp. nov.; the differences between these species are shown below and in the key.

Description

Male

Size. Body length 2.7–3.4 mm; fore wing length 2.9–3.4 mm.

Head. Head width 1.5–1.6 × median length, 1.2–1.3 × width of mesoscutum at level of tegulae. Temple behind eyes weakly convex in anterior half and weakly rounded narrowed in posterior half; transverse diameter of eye 0.8–1.0 × length of temple (dorsal view). POL 1.3–1.6 × Od, 0.5–0.6 × OOL; Od about 0.3 × OOL. Eye 1.3–1.4 × as high as broad. Malar space 0.3–0.4 × height of eye, 0.6–0.8 × basal width of mandible. Face width almost equal to eye height and 1.1–1.2 × height of face and clypeus combined. Width of hypoclypeal depression 1.2–1.5 × distance from depression to eye, 0.45–0.50 × width of face. Head distinctly and almost linearly narrowed below eyes (front view).

Antennae slender, weakly setiform, 29–30-segmented, 1.2 × longer than body. Scape short and rather wide, 1.3–1.4 × longer than maximum width. First flagellar segment 3.8–4.3 × longer than its apical width, 1.2–1.3 × longer than second segment. Penultimate segment 2.5–2.8 × longer than wide, about 0.5 × as long as first segment, 0.8–0.9 × as long as apical segment; the latter weakly acuminate apically.

Mesosoma. 1.9–2.1 × longer than its height. Mesoscutum 0.8–0.9 × as long as maximum width (near tegulae). Median lobe of mesoscutum with rather deep median longitudinal furrow in posterior two–thirds, absent anteriorly. Notauli deep and coarsely crenulate in anterior half, completely absent in posterior half. Prescutellar depression distinct, with high median carina, mainly finely rugulose or almost smooth, 0.3 × as long as scutellum. Scutellum with distinct lateral carinae, convex. Subalar depression rather shallow, almost entirely weakly reticulate-rugulose, without striae. Sternaulus weakly oblique, coarsely crenulate, running along anterior 0.6 of lower part of mesopleuron. Propodeum (lateral view) weakly and almost evenly curved in anterior two–thirds, strongly abrupt in posterior third.

Wings. Length of fore wing 2.8–3.0 × its maximum width. Pterostigma 4.5–5.1 × longer than wide, 0.9–1.0 × as long as metacarp (1-R1). Second radial abscissa (3-SR) 2.0–2.3 × longer than first abscissa (r), 0.40–0.45 × as long as almost straight third abscissa (SR1), 0.8–0.9 × as long as first radiomedial vein (2-SR). First radiomedial vein (2-SR) weakly sinuate and sometimes with short additional sclerotised abscissa into discoidal (discal) cell. Second radiomedial (submarginal) cell rather long, weakly convex below, its length 2.3–2.5 × maximum width, 1.7–2.0 × length of relatively wide brachial (subdiscal) cell. Recurrent vein (m-cu) distinctly antefurcal to first radiomedial vein (2-SR), and 0.6–0.7 × its length, subparallel to basal vein (1-M). Nervulus (cu-a) weakly oblique, distance between nervulus (cu-a) and basal vein (1-M) 1.0–2.0 × nervulus (cu-a) length. Second transverse anal vein (a) strongly discoloured. Hind wing 4.3–4.8 × longer than wide. Second medial abscissa (1-M) 0.2–0.3 × as long as first abscissa (M + CU), 0.8–1.2 × as long as nervulus (cu-a), 0.8–1.2 × as long as basal vein (1r-M). Radial vein (SR) more or less tubular only in basal 0.3–0.5, fine and discoloured in remaining part.

Legs. Hind coxa about 1.5 × as long as maximum width, 0.9–1.0 × as long as propodeum. Hind femur elongate-oval, 3.9–4.1 × longer than wide, 0.6–0.7 × as long as hind tibia Hind tarsus 0.9 × as long as hind tibia. Second tarsal segment 0.40–0.45 × as long as first segment, 0.9 × as long as fifth segment (without pretarsus). Hind basitarsus without lower keel.

Metasoma. 0.7–0.8 × as long as head and mesosoma combined. First tergite weakly and almost linearly widened towards apex, with distinctly spiracular tubercles in basal third and convex wide suboval medial area, length of tergite 1.2–1.3 × its apical width; apical width about 1.8 × its subbasal width. Length of
second and third tergites combined 1.3–1.4 × basal width of second tergite, almost equal to their maximum width.

**Sculpture and pubescence.** Vertex very densely and finely punctate and weakly coriaceous; frons finely coriaceous to almost smooth; face finely coriaceous-punctate, smooth laterally; temple upper very finely punctate and smooth in lower half or mostly. Mesonotum distinctly and densely punctate and finely coriaceous in interspaces. Mesopleuron very finely reticulate-coriaceous, below or medially partly almost smooth. Propodeum rugulose-reticulate in posterior half and laterally; basolateral areas relatively long, mainly densely granulate or coriaceous with short additional rugae along carinae; areola short and very narrow, pentagonal; petiolate areal small and trapezoid; median carina present in basal half of propodeum, 3.5–4.0 × longer than anterior furca of areola. Hind femur almost entirely densely rugulose-punctate. First metasomal tergite with few sparse carinae, almost entirely densely and finely reticulate-granulate. Remaining tergites smooth. Head almost entirely in very dense, relatively long and curved semi-erect yellow setae. Mesoscutum almost entirely in densely and relatively long semi-erect white setae. Hind tibia dorsally with short and long, dense, semi-erect, pale setae; length of long setae on dorsal side about equal to maximum width of hind tibia.

**Colour.** Body mainly or entirely dark reddish brown, sometimes head mostly, mesosoma dorso-anteriorly and metasoma medially reddish brown. Palpi yellow. Antennae mainly dark brown to black, reddish brown basally. Fore and middle legs yellow, but tibiae at least partly and tarsi almost entirely brownish; hind leg partly yellow, distal two–thirds of hind femur, base and apical third of hind tibia dark reddish brown, hind tarsus reddish brown; all fifth tarsal segments dark brown; sometimes hind coxa brownish yellow. Wings faintly infuscate, apices of radial (marginal) and third radiomedial (submarginal) cells with rather wide and subround dark spots, without or finely infuscate along veins. Pterostigma light brown, darkened apically.

**Female**

Unknown.

**Etymology**

Named after maculate of the distal part of fore wing.

**Rhysaloides noyesi** sp. nov

(Figs 5, 7)

http://zoobank.org/urn:lsid:zoobank.org:pub:5A0B2188-6444-4ECB-A2AE-677F93BDA85C

**Type material**

**Holotype**

♀, ‘New Zealand: OL, Lake Hawea, Kirks Bush, 16 Jan 1981, J. S. Noyes and E.W. Valentine, Sweeping, Nothofagus’ (NZAC04196598).

**Paratypes**

1 ♂, 1 ♀ (both without heads), ‘New Zealand OL, L. Wakatipu, Bobs Cove, 23 Jan 1981, J.S. Noyes and E.W. Valentine, Sweeping, Nothofagus’ (NZAC, ZISP); 1 ♀ with the labels as in holotype (ZISP); 1 ♂, ‘New Zealand OL, Glenorchy SF Dart River, 21 Jan 1981, J.S. Noyes and E.W. Valentine, Sweeping’ (NZAC); 1 ♂, ‘New Zealand OL, Mt Aspiring NP, Makarora, 25 Jan 1981, J.S. Noyes and E.W. Valentine, Sweeping Nothofagus, Podacarpus’ (NZAC).

**Diagnosis**

This new species is similar to *Rhysaloides ambeodonti* (Muesebeck) but differs from it by the dense and long setae on the head (setae sparse and short in *Rh. ambeodonti*), third radial abscissa (SR1) strongly curved (only weakly curved in *Rh. ambeodonti*), second radiomedial (submarginal) cell distinctly convex below (weakly convex in *Rh. ambeodonti*), and long setae on dorsal side of hind tibia almost equal to maximum width of hind tibia (only about half in *Rh. ambeodonti*).

Also, this new species is very similar to *Rh. maculatus* sp. nov. but differs in having the radial (marginal) and third radiomedial (submarginal) cells of fore wing without dark spots (with rather wide dark spots in *Rh. maculatus*), first radiomedial vein (2-SR) weakly curved and without additional abscissa (sinuate and sometimes with short additional abscissa in *Rh. maculatus*), third radial abscissa (SR1) weakly curved (strongly curved in *Rh. maculatus*), and recurrent vein (cu-a) weakly antefurcal to first radiomedial vein 2-SR (distinctly antefurcal in *Rh. maculatus*).

**Description**

**Female**

**Size.** Body length 3.2–3.6 mm; fore wing length 3.1–3.4 mm.

**Head.** Head width 1.3–1.4 × median length, 1.1 × width of mesoscutum at level of tegulae. Temple behind eyes weakly convex in anterior half and weakly rounded in posterior half; transverse diameter of eye about 0.8 × length of temple (dorsal view). POL 1.2–1.3 × Od, 0.3 × OOL; Od 0.3 × OOL. Eye 1.3–1.4 × as high as broad. Malar space 0.50–0.55 × height of eye, almost equal to basal width of mandible. Face width 1.2 × eye height and 1.2–1.3 × height of face and clypeus combined. Width of hypoclypeal depression almost equal to distance from depression to eye, 0.4–0.5 × as wide as face. Head distinctly and roundly narrowed below eyes (front view).

Antennae relatively slender, filiform, 27-segmented, weakly longer than body. Scape short and wide, 1.5–1.6 × longer than maximum width. First flagellar segment 5.5–5.8 × longer than its apical width, 1.2–1.3 × longer than second segment. Penultimate segment 2.0 × longer than wide, 0.3 × as long as first segment, 0.9 × as long as apical segment; the latter weakly distinctly acuminate apically.
Mesosoma. 1.8–2.0 × longer than its height. Mesoscutum 0.8–0.9 × as long as maximum width (near tegulae). Median lobe of mesoscutum with complete and shallow median longitudinal furrow, but sometimes with furrow very shallow anteriorly. Notauli deep and coarsely crenulate in anterior half, shallow and reticulate in posterior half. Prescutellar depression deep, with distinct median carina, mainly rugulose-striate or weakly rugulose, 0.3–0.4 × as long as scutellum. Scutellum with weak lateral carinae. Subalar depression shallow, almost entirely rugulose-punctate, without striation. Sternaulus straight, coarsely crenulate, running along anterior 0.6 of lower part of mesopleuron. Propodeum weakly and almost evenly curved posterior, but more abrupt in posterior fifth.

Wings. Length of fore wing 3.3–3.5 × its maximum width. Pterostigma 4.2–4.7 × longer than wide, 0.7–0.8 × as long as metacarp (1-R1). Second radial abscissa (3-SR) 2.0–2.8 × longer than first abscissa (r), 0.5–0.6 × as long as strongly curved third abscissa (SR1), 0.8–1.0 × as long as first radiomedial vein (2-SR). Second radiomedial (submarginal) cell rather long, distinctly convex below, its length 2.6–3.0 × maximum width, 2.0–2.2 × length of relatively wide brachial (subdiscal) cell. Recurrent vein (m-cu) weakly antefurcal to first radiomedial vein (2-SR), and 0.5–0.6 × its length, subparallel to basal vein (1-M). Nervulus (cu-a) distinctly oblique, distance between nervulus (cu-a) and basal vein (1-M) 1.1–1.5 × nervulus (cu-a) length. Second transverse anal vein (a) strongly discoloured. Hind wing 4.2–4.6 × longer than wide. Second medial abscissa (1-M) 0.2–0.3 × as long as first abscissa (M + CU), 0.7–1.0 × as long as nervellus (cu-a), 0.5–0.6 × as long as basal vein (1r-m). Radial vein (SR) tubular only in basal third but discoloured, practically absent in remaining part.

Legs. Hind coxa 1.5–1.6 × as long as maximum width, 0.8–1.0 × as long as propodeum. Hind femur elongate-oval, subclavate, 4.0–4.4 × longer than wide, 0.7 × as long as hind tibia. Hind tarsus 0.8 × as long as hind tibia. Second tarsal segment 0.4–0.5 × as long as first segment, 1.1–1.2 × longer than fifth segment (without pretarsus). Hind basitarsi without lower keel.

Metasoma. Almost as long as head and mesosoma combined. First tergite weakly and curvily widened towards apex, with distinctly convex and wide suboval medial area, length of tergite 0.9 × its apical width; apical width almost twice its subbasal width. Length of second and third tergites combined 0.8–0.9 × basal width of second tergite, 0.5–0.6 × their maximum width. Ovipositor sheath 1.4–1.7 × longer than metasoma, 0.7–0.8 × as long as body, 0.7–0.8 × as long as fore wing.

Sculpture and pubescence. Head almost entirely rather densely and finely reticulate-coriaceous and with fine and sparse additional punctuation; temple mostly almost smooth. Mesonotum distinctly and densely coriaceous-punctate. Mesopleuron finely reticulate-coriaceous or punctulate, partly almost smooth. Propodeum mainly densely and finely or very finely rugulose-reticulate; basolateral areas medium-sized and mainly densely and finely granulate or reticulate and usually with short rugae along carinae; areola short and rather narrow, pentagonal; petiolar areal small and trapezoid; median carina present in basal 0.3–0.4, and 1.5–2.0 × longer than anterior furca of areola. Hind coxa almost widely finely reticulate-coriaceous but almost smooth posteriorly; hind femur densely rugulose-granulate. First metasomal tergite entirely rugose-striate, with fine granulation or rugulosity between striae, basomedially reticulate-coriaceous, sometimes weakly. Remaining tergites smooth. Head almost entirely in very dense, relatively long and almost erect white setae. Mesoscutum entirely in very densely and relatively long semi-erect white setae. Hind tibia dorsally mainly with long, but in distal half with additionally short, semi-erect, rather dense pale setae; length of long setae on dorsal side almost equal to maximum width of hind tibia.

Colour. Body entirely light reddish brown. Palpi yellow. Antennae mainly light brown, darkened (sometimes faintly) towards apex. Fore and middle legs yellow; hind leg partly yellow, distal two-thirds of hind femur and apical third of hind tibia reddish brown or light reddish brown. Wings mainly hyaline, with distinct and relatively wide infuscation along veins. Pterostigma pale yellow, sometimes weakly darkened marginally. Ovipositor sheath mainly yellow or pale brown, faintly infuscate basally and dark brown to black apically.

Male

Size. Body length 3.0–3.4 mm; fore wing length 3.1–3.3 mm.

Head. Width 1.4–1.6 × median length. Vertex entirely densely and very finely rather punctate, without or sometimes with coriaceous sculpture. Temple behind eyes evenly roundly narrowed; transverse diameter of eye almost equal to length of temple (dorsal view). Malar space 0.4 × height of eye. Antennae weakly setiform, 27–29-segmented. First flagellar segment 4.0–4.5 × longer than its apical width. Penultimate segment 2.3–2.5 × longer than wide.

Mesosoma. Median lobe of mesoscutum with median longitudinal furrow complete, but sometimes very shallow anteriorly. Sternaulus rather shallow, entirely rugulose or finely crenulate. Scutellum sometimes only densely punctate; mesopleuron smooth on rather wide areas or finely coriaceous. In for wing third radial abscissa (SR1) less distinctly curved.

Metasoma. Weakly shorter than head and mesosoma combined. First tergite length 1.2–1.4 × its apical width, almost entirely finely reticulate-coriaceous, laterally with additional and rather fine or distinct curved or oblique striation. Length of second and third tergites combined 1.4–1.5 × basal width of second tergite, 0.9–1.1 × their maximum width.

Colour. Body entirely dark reddish brown, partly (especially dorsally) with reddish brown spots or widely reddish brown. Antennae light brown or light reddish brown in basal quarter, then towards apex dark brown to black. Wings faintly infuscate; pterostigma light brown. Otherwise similar to female.
Etymology
Named in honour of the collector of this species, Dr John S. Noyes.

DISCUSSION
The genus *Rhyssaloides* occurs across much of New Zealand (regions: Auckland, Bay of Plenty, Taupo, Nelson, Marlborough, Mid Canterbury, and Otago) but has mostly been collected from well sampled locations, suggesting it is more widespread than current records indicate. Only *R. noyesi* is ‘restricted’ (to the Otago region) but this is likely due to limited sampling and/or the lack of subsequent identification from existing samples.

The biology of the Mesostoinae may help provide significant clues about the ancestral biology of the whole of the cyclostome braconid lineage (Quicke et al. 2019c). Information about the biology of the Mesostoinae (to which *Rhyssaloides* belongs) is not abundant but shows they utilize a wide spectrum of hosts. Several mesostoine genera are associated with galls: *Mesostoa* van Achterberg, 1975 induces galls (directly by cecidogenesis) (Austin & Dangerfield, 1998), but the Neotropical genera *Aspilodemon* Fischer, 1966 and *Hydrangeocola* Brèthes, 1927 are parasitoids of gall forming Cecidomyiidae (Oda et al. 2001; Quicke et al. 2019a, 2019b, 2019c). Very likely belonging to this subfamily the New Zealand *Zeachremylus* Belokobylskij, 2018 is suspected as a parasitoid of either Diptera or Coleoptera developing in the guano of bats *Mystacina* spp. (Mystacinidae) (Belokobylskij, 2018). *Andestpolis* Whitfield & Choi, 2004 is associated with the larvae of semi-concealed, leaf-mining and leaf-rolling moths (Lepidoptera) (Townsend & Shaw 2009) and species of *Nepithormius* van van Achterberg & Berry, 2004 are known parasitoids of Coleoptera, Lepidoptera and Diptera (van Achterberg & Berry, 2004; Quicke et al. 2019c). Finally, the genera *Rhyssaloides* and *Metaspathius* Brues, 1922 are known as parasitoids of beetle larvae from the families Cerambycidae and Curculionidae (Muesebeck 1941; Quicke et al. 2019a).

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