A new species of the genus *Aleiodes* Wesmael from New Zealand (Hymenoptera: Braconidae: Rogadinae)

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Key words: Hymenoptera; Braconidae; Rogadinae; *Aleiodes*; New Zealand; Australasian; Oriental; East Palaearctic; new species; distribution; partial key; Geometridae; Ennominae; *Declana floccosa*; *Pseudocoremia suavis; Pseudocoremia fenerata*.
A new species of the genus *Aleiodes* Wesmael, 1838 (Braconidae: Rogadinae: Rogadini), *A. declanae* spec. nov. from New Zealand is described and illustrated. It has been reared from *Declana floccosa* Walker, *Cleora scriptaria* (Walker), *Pseudocoremia suavis* Butler and *P. fenerata* Felder & Rogenhofer (Geometridae: Ennominae).

Introduction

The second and third authors have been involved in compiling information on the parasitoids of an ennomine geometrid, *Pseudocoremia suavis* Butler, 1879, which had several large scale outbreaks in pine forests in New Zealand. One of the most common parasitoids proved to be an *Aleiodes* Wesmael, 1838 (Hymenoptera: Braconidae: Rogadinae: Rogadini), which turned out to be a new species according to research by the first and last authors. The only rogadine braconid previously recorded from the New Zealand biogeographic area is *Rogas gressitti*, described by Muesebeck (1964) from the subantarctic Campbell Island, and transferred to *Aleoides* by Marsh & Shaw (2003). There are for this species no reliable host records; Valentine (1967) lists a *Chloroclystis* spec. [= *Pasiphila*] from Campbell Is. as a host, based on information from Mr John S. Dugdale then with the Forest Research Institute in Rotorua.

Aleiodes species are koinobiont endoparasitoids of lepidopterous larvae, which mummify their hosts. Most species are solitary but a few gregarious species are known (Shaw & Huddleston, 1991; Fortier, 2000). The host range is centred on Lepidoptera with exposed larval feeding habits; most "Macrolepidoptera", especially Noctuidae and Geometridae (van Achterberg, 1985; Shaw, 2002).

For the recognition of the subfamily Rogadinae, see van Achterberg (1990, 1993, 1997), for the tribe Rogadini and the genus *Aleiodes* Wesmael, see van Achterberg (1991) and for the terminology used in this paper, see van Achterberg (1988). The abbreviation FRNZ stands for Forest Research Insect Collection, Rotorua; NMS for National Museum of Scotland, Edinburgh; NZAC for New Zealand Arthropod Collection, Landcare Research, Auckland and RMNH for the Nationaal Natuurhistorisch Museum, Leiden.

Description

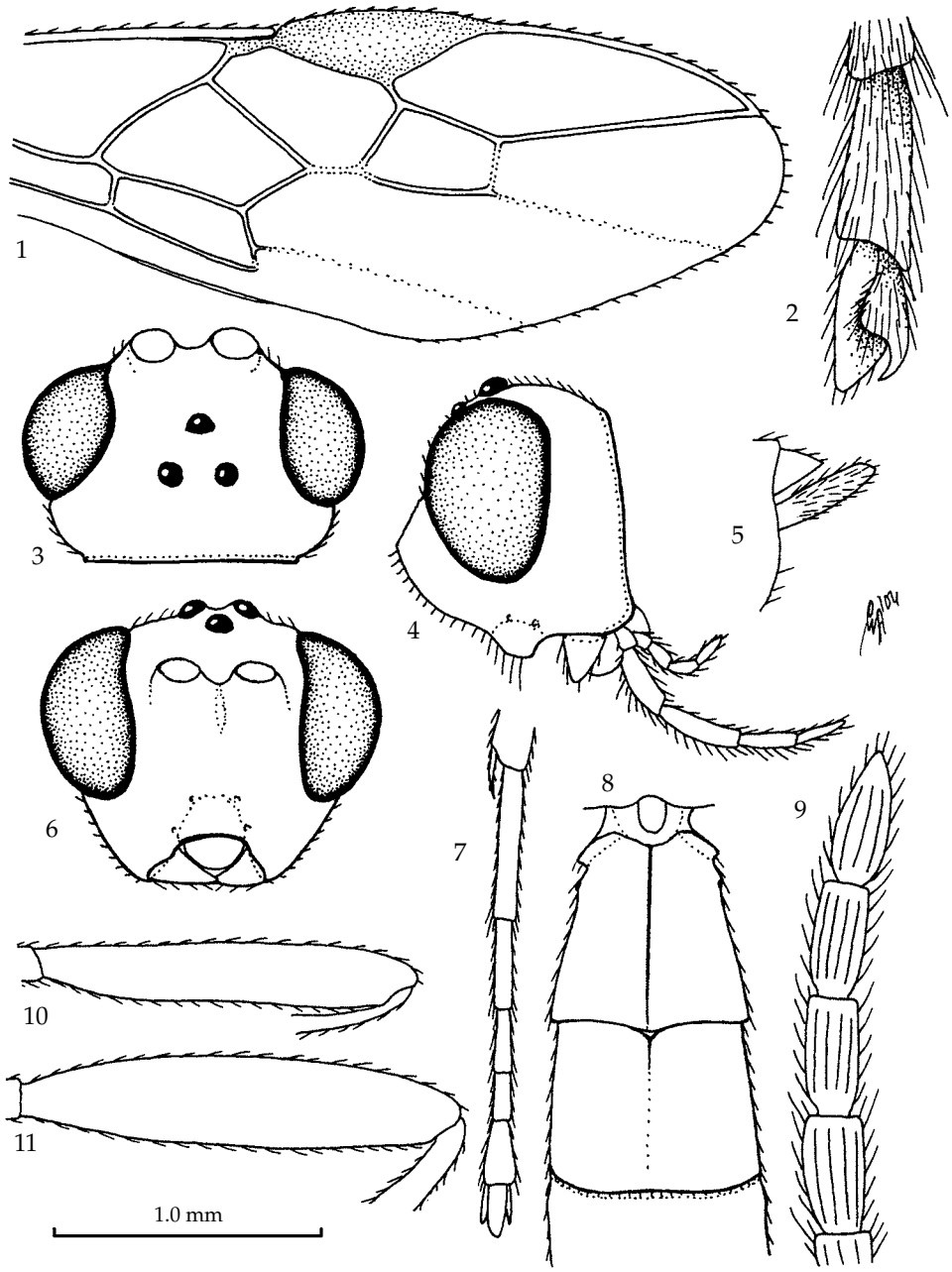
Aleiodes declanae van Achterberg, spec. nov.
(figs 1-11, 32-40)

Material.— Holotype, ♀ (NZAC), "NZ [= New Zealand], [South Island], NC, Eyrewell forest, from *Declana floccosa* beaten off *Pinus radiata*, plot I, # 282, collected as 5th instar (19 mm long), 11.ii.2003, L. Berndt". Paratypes (17 ♀♀ + 16 ♂♂; FRNZ, NZAC, RMNH, NMS): 2 ♀♀, topotypic, but from *Pseudocoremia suavis* beaten off *Pinus radiata*, collected as 3rd instar, plot C. # 28, 28.xi.2002 or plot 19, # 290 and 13.ii.2003; 2 ♂♂, id., but plot A, # 7, 28.ix.2002 or plot G, # 97 and 15.i.2003; 1 ♂, as holotype but collected as 3rd instar, 13.ii.2003; 1 ♀, "New Zealand, NC, Eyrewell forest, plot II, # 27, 31.i.2003, L. Berndt", "reared ex *Pseudocoremia suavis* beaten from *Pinus radiata*"; 1 ♂, id., but plot 21, # 320, 13.ii.2003; 1 ♀, id., but plot C, # 20, 28.xii.2002, "reared ex *Declana floccosa*, coll. 4th instar on *P. radiata*"; 1 ♂, id. but plot A, # 6, 3rd instar; 1 ♀, "[New Zealand, North Island, NP], 56/9/01 [= *Pseudocoremia suavis*]", 2 para; 1 ♀, id., but 56/576/01, [= *Pseudocoremia suavis*] para 1; 1 ♀, id., but 57/3036/02; 1 ♀, but 57/3649/02 [= *Declana floccosa*]; 1 ♀, id., but 57/2461/03 [= *Pseudocoremia fenerata*]; 1 ♂, id. but para 2; 1 ♂, "[New Zealand, North Island, TO], Karioi, ex larva on manuku [= ?manuka], M.A. Stoodley"; 2 ♀♀, "[New Zealand, BP] Whaka[rewarewa SF] N. Is. [= North Island], host: larvae *Declana* & *Selodosema* [sic], G.B. Rawlings, No 9. Litt. 11 iii.[19]52"; 1 ♀, "[New Zealand, AK] Balmoral, 6.ii.1952, R. Zondag, ex *Selidosema suavis*"; 1 ♂, "New Zealand, WI, Bushy Park, Kai Iwi, 14 iii.1996, V. Munro, em. 15 iv.1996, ex geometrid larva on kawakawa [= *Macropiper excelsum*], 963 B10"; 1 ♂, "[New Zealand, North Island, TO], Taurewa, 60/134 of J.S.D., ex larva on *Coprosma* sp. [= Rubiaceae], em. 9.xii.[19]60, M.A. Stoodley"; 1 ♀, "New Zealand, Maupuia Park, coll. 19.iv.2003, em. 19.v.2003, ex *Cleora scriptaria* (Walker) (Ennominae) from *Macropiper excelsum* (Forst. f.) Miq. (Piperaceae), F.R. Schnitzler"; 1 ♂, id., but coll. 27.ii.2003, em. 31.iii.2003; 1 ♀, id., but Lower Hutt, Belmont Park, coll. 26.ii.2003, em. 17.iii.2003; 1 ♂, id., but coll. 20.iv.2003, em. 15.v.2003 1 ♀, id., but Karori Sanctuary, coll. 18.xii.2002, em. 24.i.2003; 1 ♀, id., but Otari/Wilton Bush, coll. 3.iv.2003, em. 2.v.2003; 1 ♀, id., but Huntleigh Park, coll. 12.xii.2002, em 9.i.2003; 1 ♂, id., but Lower Hutt, Speedy Reserve, coll. 16.xii.2002, em. 1.i.2003; 1 ♂, id., but Lower Hutt, Naenae, coll. 17.xii.2002, em. 4.i.2003; 1 ♂, id., but Upper Hutt, Bartons Bush, coll. 25.ii.2003, em. 31.iii.2003; 1 ♂, id., but Harbour View, coll. 4.iv.2003, em. 2.v.2003; 1 ♂, id., but Trelssick Park, coll. 23.iv.2003, em. 19.v.2003.

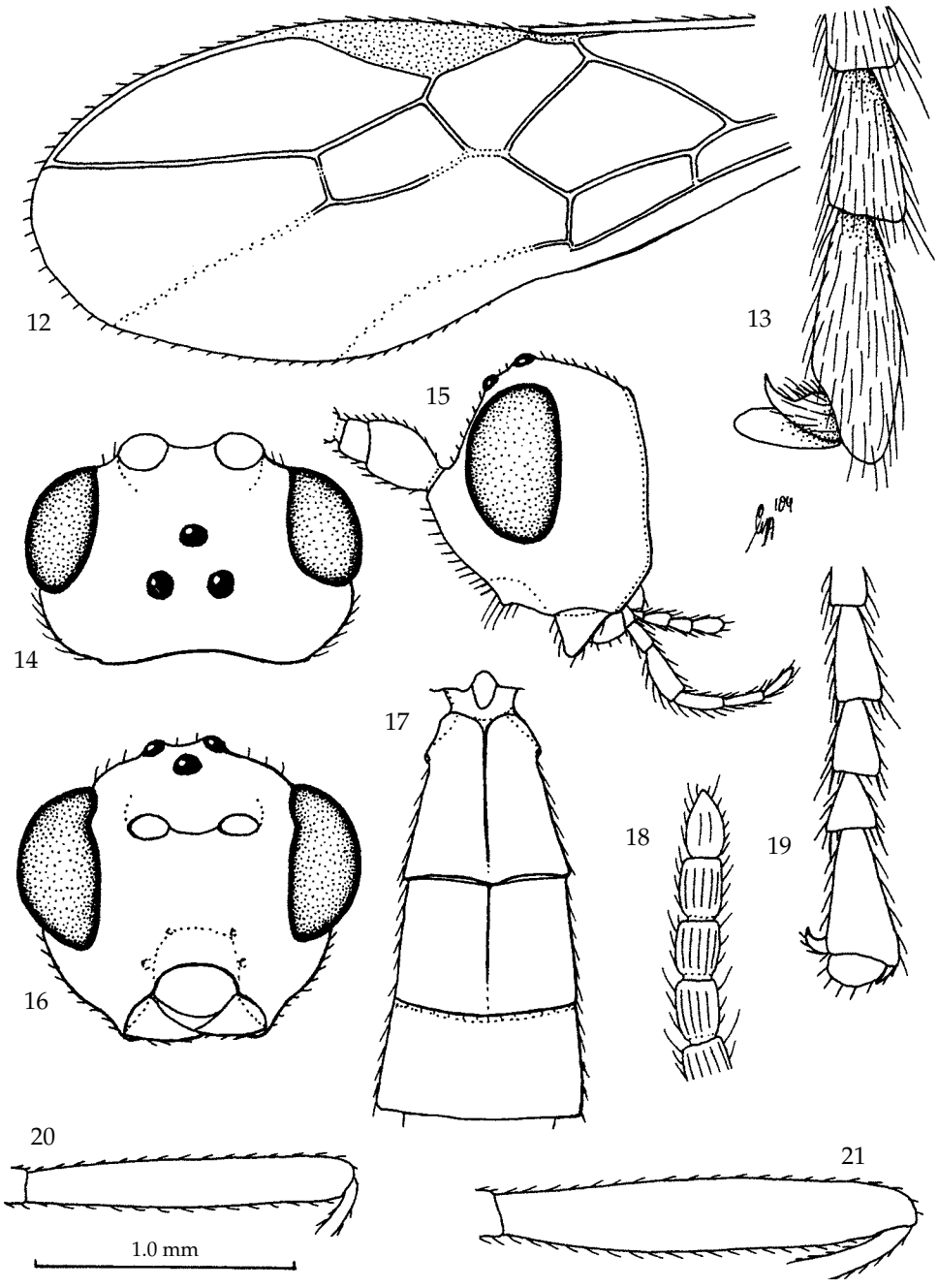
Holotype, ♀, length of fore wing 5.1 mm, of body 4.2 mm.

Head.— Antenna with 41 segments, length of third segment 1.1 times fourth segment, length of third, fourth and penultimate segments 3.0, 2.6 and 2.4 times their width, respectively, and apical segment without spine (fig. 9); OOL:diameter of posterior ocellus:POL = 7:4:5 (fig. 3); vertex behind stemmaticum rugulose; occipital carina complete; length of maxillary palp equal to height of head, with segments comparatively robust (fig. 4); face granulate, rather flat ventrally; clypeus granulate, convex and ventrally depressed, not protruding forwards (figs 4, 38, 39); width of hypoclypeal depression 0.3 times minimum width of face (figs 6, 39); length of eye 2.5 times temple in dorsal view (fig. 3); clypeus largely below lower level of eyes (figs 6, 38); length of malar space 0.4 times length of eye in lateral view and 1.8 times basal width of mandible (fig. 4); head in lateral view comparatively robust, width of temple near middle of eye 0.6 times width of eye (fig. 4).

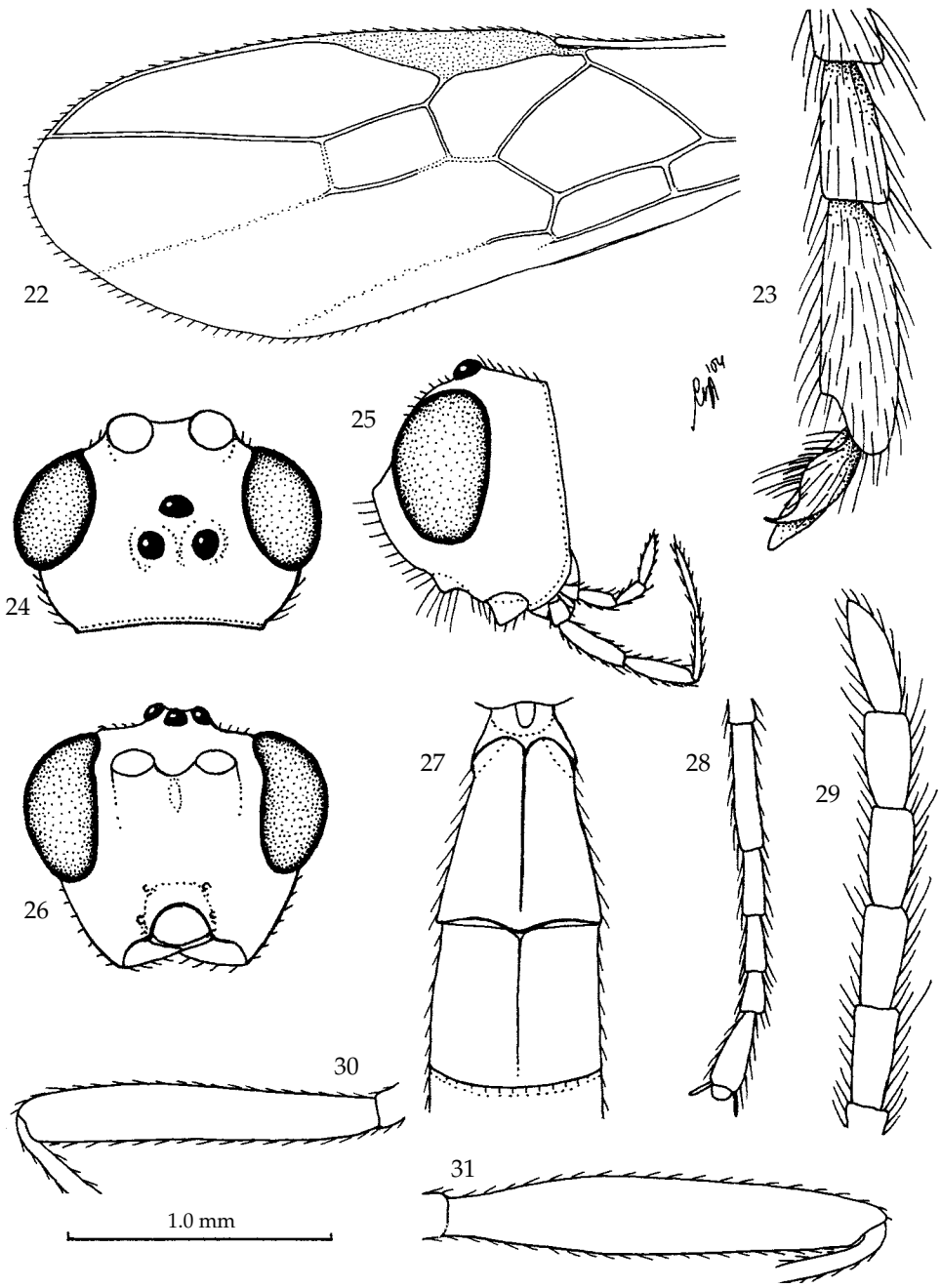
Mesosoma.— Length of mesosoma 1.7 times its height; mesoscutum low anteriorly; side of pronotum coarsely crenulate antero-dorsally, ventrally and dorsally granulate and remainder largely rugose; mesopleuron dorsally and precoxal sulcus medially rugose; remainder of mesopleuron distinctly granulate and rather matt, with speculum superficially granulate and shiny; metapleuron largely granulate; mesoscutum and



Figs 1-11, *Aleiodes declanae* spec. nov., ♀, holotype. 1, fore wing (except its base); 2, outer hind claw; 3, head, dorsal aspect; 4, head, lateral aspect; 5, ovipositor sheath, lateral aspect; 6, head, anterior aspect; 7, fore tarsus, dorsal aspect; 8, first and second metasomal tergites, dorsal aspect; 9, apex of antenna; 10, fore femur, lateral aspect; 11, hind femur, lateral aspect. 1, 8: 1.0 × scale-line; 2, 9: 2.5 ×; 3-7, 10, 11: 1.5 ×.



Figs 12-21, *Aleiodes gressitti* (Muesebeck), ♀, holotype. 12, fore wing (except its base); 13, outer hind claw; 14, head, dorsal aspect; 15, head, lateral aspect; 16, head, anterior aspect; 17, first-third metasomal tergites, dorsal aspect; 18, apex of antenna; 19, fore tarsus, dorsal aspect; 20, fore femur, lateral aspect; 21, hind femur, lateral aspect. 12, 17: 1.0 × scale-line; 13, 18, 19: 2.5 ×; 14-16, 20, 21: 1.5 ×.



Figs 22-31, *Aleiodes mythimnae* He & Chen, ♀, paratype. 22, fore wing (except its base); 23, outer hind claw; 24, head, dorsal aspect; 25, head, lateral aspect; 26, head, anterior aspect; 27, first and second metasomal tergites, dorsal aspect; 28, fore tarsus, dorsal aspect; 29, apex of antenna; 30, fore femur, lateral aspect; 31, hind femur, lateral aspect. 22, 27:1.0 × scale-line; 23, 29: 2.5 ×; 24-26, 28, 30, 31: 1.5 ×.

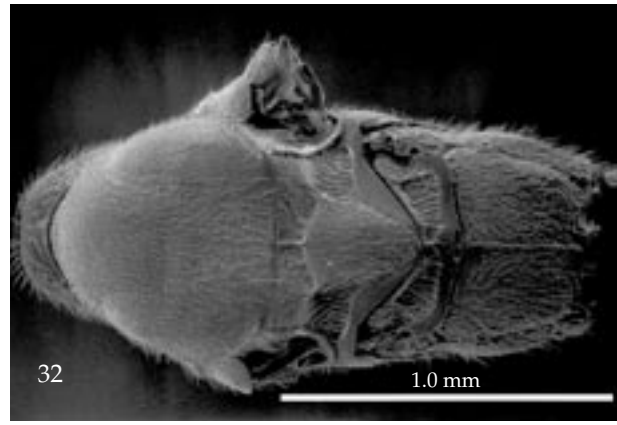


Fig. 32, *Aleiodes declanae* spec. nov., ♀, paratype. SEM photograph of mesosoma, dorsal aspect.

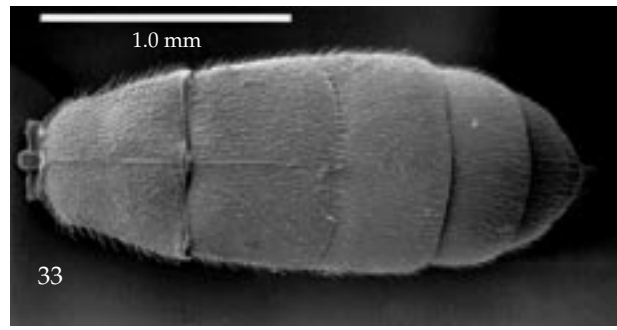


Fig. 33, *Aleiodes declanae* spec. nov., ♀, paratype. SEM photograph of metasoma, dorsal aspect.

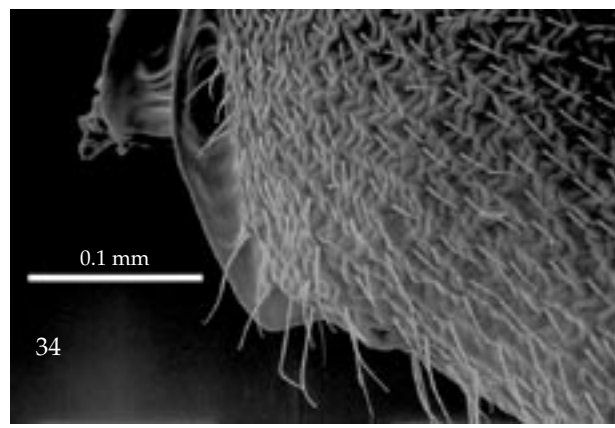


Fig. 34, *Aleiodes declanae* spec. nov., ♀, paratype. SEM photograph of detail of baso-lateral flange of first metasomal tergite.

scutellum finely granulate but mesoscutum medio-posteriorly distinctly rugose; notauli narrow, posterior half obsolescent and anteriorly only granulate (fig. 32); lateral carina of scutellum largely absent; propodeum evenly convex and largely rugose, its median carina weakly developed, without tubercles (fig. 35).

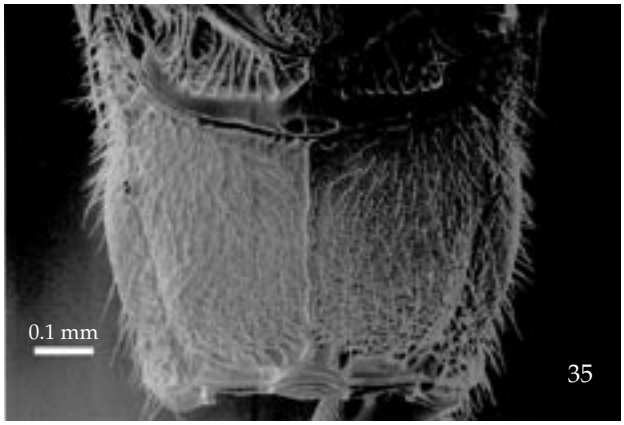


Fig. 35, *Aleiodes declanae* spec. nov., ♀, paratype. SEM photograph of propodeum, dorsal aspect.

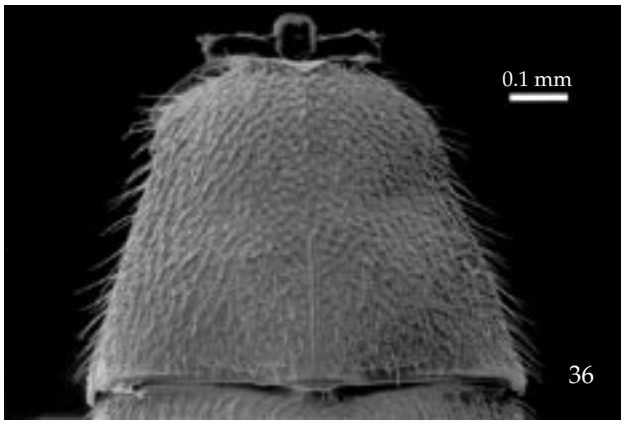


Fig. 36, *Aleiodes declanae* spec. nov., ♀, paratype. SEM photograph of first metasomal tergite, dorsal aspect.

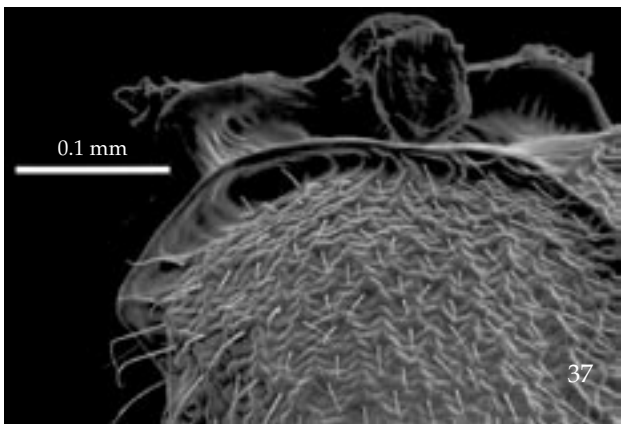


Fig. 37, *Aleiodes declanae* spec. nov., ♀, paratype. SEM photograph of detail of baso-lateral flange of first metasomal tergite.

Wings.— Fore wing: 1-M posteriorly and M+CU1 apically weakly curved (fig. 1); 2-SR+M comparatively long (fig. 1); r:3-SR:SR1 = 8:29:79; 2-SR:3-SR:r-m = 25:29:16; 1-CU1 subhorizontal, 0.16 times 2-CU1; cu-a postfurcal by about its own length and vertical; first subdiscal cell somewhat widened apcially (fig. 1); second submarginal cell rather

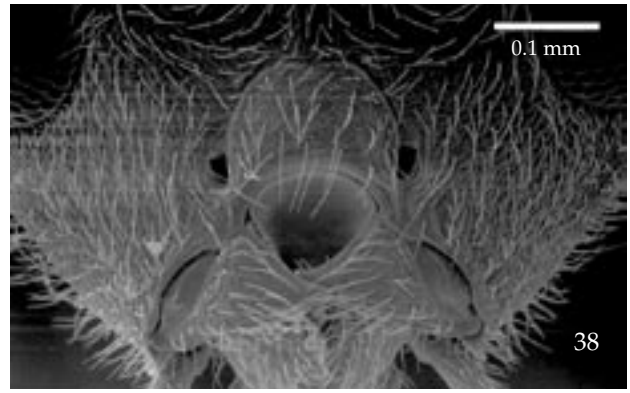


Fig. 38, *Aleiodes declanae* spec. nov., ♀, paratype. SEM photograph of clypeus and hypoclypeal depression, anterior aspect.

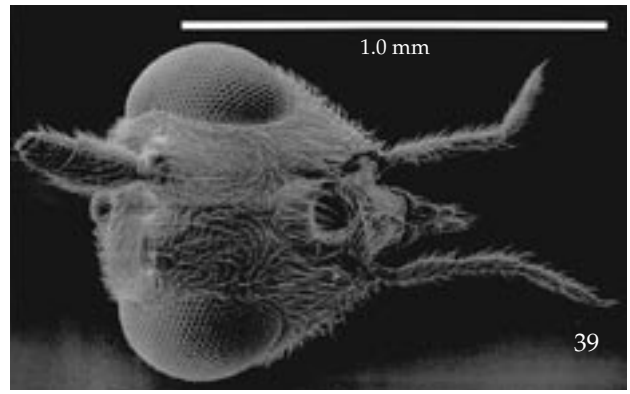


Fig. 39, *Aleiodes declanae* spec. nov., ♀, paratype. SEM photograph of head, anterior aspect.

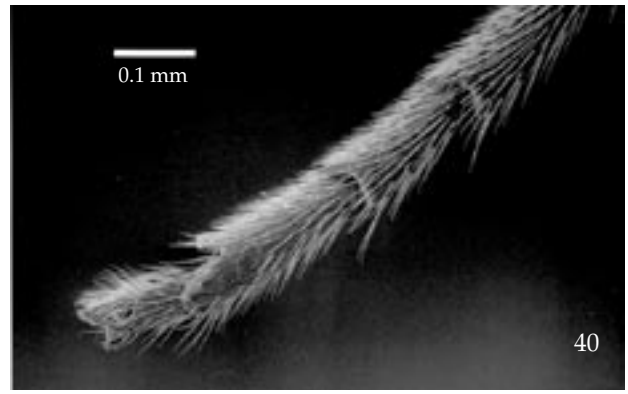


Fig. 40, *Aleiodes declanae* spec. nov., ♀, paratype. SEM photograph of hind tarsus, lateral aspect.

robust (fig. 1). Hind wing: apical half of marginal cell subparallel-sided, slightly widened apically; M+CU:1-M = 10:7.

Legs.— Hind coxa granulate; length of femur, tibia and basitarsus of hind leg 4.9, 13.1 and 7.8 times their width, respectively (fig. 11); length of fore femur 6.1 times its width (fig. 10); tarsal claws robust and mainly setose (figs 2, 40); length of hind trochantellus 2.1 times its width and 1.3 times ventral length of hind trochanter; apex of hind

tibia without comb at inner side; length of hind tibial spurs 0.30 and 0.25 times hind basitarsus.

Metasoma.— Slender, with seven segments visible; first tergite robust, distinctly convex and as long as wide apically (fig. 36), apically wider than base of second tergite and baso-lateral flange angularly protruding posteriorly (figs 8, 34, 37); first, second and basal half of third tergites finely longitudinally rugose (fig. 33), remainder of metasoma superficially granulate; second suture distinctly crenulate; second tergite with a weakly developed median carina and without a distinct triangular medio-basal area basally; second suture deep medially and shallow laterally; basal half of third tergite finely rugose, remainder of metasoma largely smooth,
punctulate; second and basal half of third tergite with lateral a crease; ovipositor sheath rather wide and setose (fig. 5), 0.07 times as long as fore wing.

Colour.— Yellowish-brown; malar space, clypeus, palpi, fore and middle coxae, trochanters and trochantelli and tegulae pale yellowish; antenna (except scapus and pedicellus) and prothorax largely, mesopleuron dorsally, lateral lobes of mesoscutum, veins largely, parastigma and ovipositor sheath dark brown or blackish; pterostigma infuscate laterally and remainder of pterostigma brown; wing membrane slightly infuscate.

Distribution.— Australasian: New Zealand (North and South Island).

Biology.— Parasitoid of Geometridae-Ennominae: *Declana floccosa* Walker, 1858, *Cleora scriptaria* (Walker, 1860), *Pseudocoremia suavis* Butler, 1879, and *P. fenerata* Felder & Rogenhofer, 1875. The parasitoid probably attacks the host larva in the first or second instar, and mummifies the host in the fourth or fifth instar. The slender mummy is attached to the substrate by the anterior end of the body. According to Zondag (1956) the mature parasitoid larva breaks the host skin ventrally and pushes out the unconsumed contents. This substance coagulates quickly in the air and fastens the anterior part of the body on to the [pine] needle. The parasitoid makes a circular emergence hole near its dorsal apex. Only one species of hyperparasitoid has been reared from *A. declanae* mummies: an unidentified *Mesochorus* species (Ichneumonidae: Mesochorinae).

Variation.— Length of fore wing 3.2-4.2 mm, and of body 3.6-5.1 mm; antenna of ♀ with 35(1), 36(2), 38(2), 39(2), 40(2) or 41(1) segments, of ♂ 37(2), 38(1), 39(2) or 40(3) segments; stemmaticum, middle lobe of mesoscutum partly, scutellum laterally, scapus and pedicellus, tarsi, metapleuron and complete pterostigma may be dark brown; mesoscutum sometimes completely yellowish; vein 1-SR of fore wing medium-sized to comparatively long (fig. 1); males may have the propodeum and the first tergite entirely brown, the mesoscutum dark brown with the notaulic area yellow, the vertex and the temple brown and the mesopleuron entirely yellowish-brown.

Notes.— *Aleiodes declanae* spec. nov. is similar to the East Palaearctic and Oriental *A. mythimnae* He & Chen, 1988, and may be compared with this and the only other known species of *Aleiodes* from New Zealand (*A. gressitti* (Muesebeck, 1964)) as follows:

1. Apical segments of antenna of ♀ robust (fig. 18); fore telotarsus enlarged (fig. 19); hypoclypeal depression about 0.5 times as wide as face (fig.16); malar space in anterior view wider (fig. 16); vein cu-a of fore wing far postfurcal (fig. 22); Campbell Island (New Zealand) ..... ***A. gressitti*** (Muesebeck, 1964)
- Apical segments of antenna of ♀ slender (figs 9, 29); fore telotarsus normal; hypoclypeal depression about 0.3 times as wide as face (figs 6, 26); malar space in anterior view narrower (figs 6, 26); vein cu-a of fore wing variable (figs 1, 22) 2

2. Baso-lateral flange of first metasomal tergite angularly protruding posteriorly (figs 8, 37); vein cu-a of fore wing less postfurcal (fig. 1); vein 1-M of fore wing posteriorly and vein M+CU1 of fore wing apically more or less curved (fig. 1); antenna with 35-41 segments; maxillary palp about as long as height of head and apical and subapical segments comparatively robust (figs 4, 39); fore wing membrane slightly infuscate; first and second metasomal tergites comparatively robust (figs 8, 33, 36); parasitoid of Geometridae; Australasian (New Zealand) ..... ***A. declanae*** spec. nov.
- Baso-lateral flange of first metasomal tergite roundly protruding posteriorly (fig. 27); vein cu-a of fore wing comparatively far postfurcal (fig. 22); vein 1-M of fore wing posteriorly and vein M+CU1 of fore wing apically straight (fig. 22); antenna with 39-44 segments; maxillary palp 1.2-1.4 times as long as height of head and apical and subapical segments usually comparatively more slender (fig. 25); fore wing membrane subhyaline; first and second metasomal tergites less robust (fig. 27); parasitoid of Noctuidae; Palaearctic and Oriental ..... ***A. mythimnae*** He & Chen, 1988

We have seen some specimens (FRNZ) of another new species very similar to *A. declanae* spec. nov. reared from *Pasiphila sandycias* (Meyrick, 1905) (Geometridae-Larentiinae); we refrain from describing till more specimens become available. It differs by having a larger hypoclypeal depression (as has *A. gressitti*, but *A. gressitti* has aberrant telotarsi: fig. 19), baso-lateral flange not angularly protruding posteriorly, pterostigma basally pale and remainder dark brown (♂) or yellow (♀), vein cu-a of fore wing more postfurcal, mesoscutum without lateral infuscation and antenna with 33-34 segments.

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