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Descriptions of *Soronia* complex (Coleoptera: Nitidulidae: Nitidulinae) larvae of New Zealand with comments on life history and taxonomy

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Abstract

We provide the first descriptions of larvae of the nitidulid beetles *Soronia oculata* Reitter and *Hisparonia hystrix* (Sharp), compare them with similar larvae of other nitidulids, and comment on the utility of larval data in phylogenetic studies. *Soronia oculata* larvae are quite similar to many other larvae within the *Soronia* genus complex, but those of *H. hystrix* are distinctly different, namely by having an unfringed, spinose mandibular prostheca, striations of mola obscured by blunt teeth, and malar setae that are course and restricted to the distal half. This supports the recent transfer of the species to a monotypic genus. Larvae of *S. oculata* inhabit fermenting sap flows on woody plants and those of *H. hystrix* are found on sooty moulds. Both species are endemic to New Zealand, where they are widespread. A single unconfirmed record of *H. hystrix* from Fiji might represent an introduction. A species list of New Zealand nitidulid taxa is appended.

Keywords: *Soronia*, Coleoptera, Nitidulidae, New Zealand, Taxonomy

Introduction

The New Zealand nitidulid fauna consists of 28 species in 13 genera, of which 14 species are introduced (see Appendix 1). Although the fauna is less species rich than in neighboring Australia, it contains some ecologically and systematically important species. For example, in New Zealand, the endemic genus *Ceryllolodes* Kirejtshuk, 2006, is apparently endemic to the Nelson/Marlborough region and is the only wingless member of the nitiduline tribe Cyllodini. The monotypic genus *Hisparonia* Kirejtshuk, 2003, is common on sooty moulds throughout the country. The larvae of New Zealand are poorly known, and here we describe those of *Soronia oculata* Reitter, 1880 and *Hisparonia hystrix* (Sharp, 1876), both of which are placed in the *Soronia* genus complex, as recently studied by Kirejtshuk (2003). This study contributes to ongoing research on nitidulid beetle phylogenetics and related genetics work on *H. hystrix*.

Kirejtshuk (2003) recently changed the generic placement of the New Zealand species of the *Soronia* complex, an informal group presently containing eight genera worldwide (*Amphotis* Erichson, *Annachramus* Kirejtshuk, *Lobiopa* Erichson, *Soronia* Erichson, *Omosiphilia* Kirejtshuk, *Ornosia* Grouvelle, *Sebastianiella* Kirejtshuk, and *Temnoracta* Kirejtshuk). His description of the new genus *Hisparonia* to accommodate *Soronia hystrix* Sharp was based on a number of adult characters cited as justification for exclusion from *Soronia*. These included details of pubescence and surface ornamentation, medially excised pronotal margins, and dorsally dilated antennal insertions. His transfer of the genus *Platipidia* Broun 1893 (type species, *P. asperella* Broun) to *Soronia* Erichson was justified by the assertion that it "has no character allowing to distinguish it from the rest members of *Soronia* as a secluded taxon of generic or subgeneric rank" (Kirejtshuk, 2003, p. 240). Unfortunately his diagnosis of the *Soronia* complex and some of its genera, by his own admission, includes mostly plesiotypic characters that do little to adequately exclude members of other vaguely defined genera of the complex and other purportedly related Nitidulinae. Therefore, the *Soronia* complex, and its members, has not been shown to be monophyletic.

To provide additional data on which to base the generic limits of this troublesome but important complex of taxa, we provide comprehensive larval

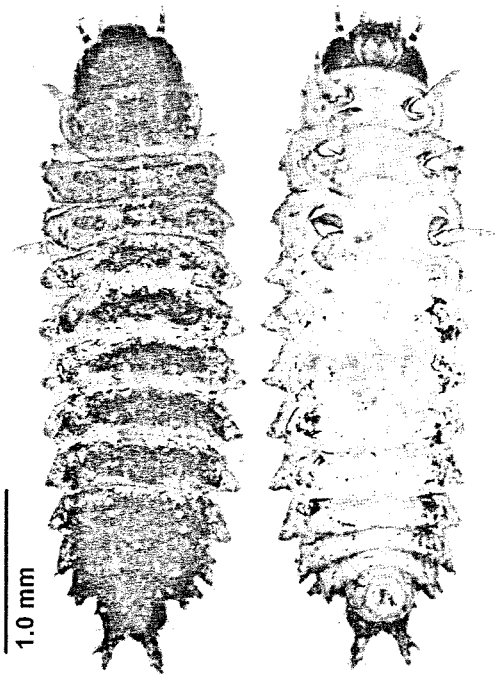


Figure 1. *Hisparonia hystrix*, mature larva, dorsal and ventral habitus.

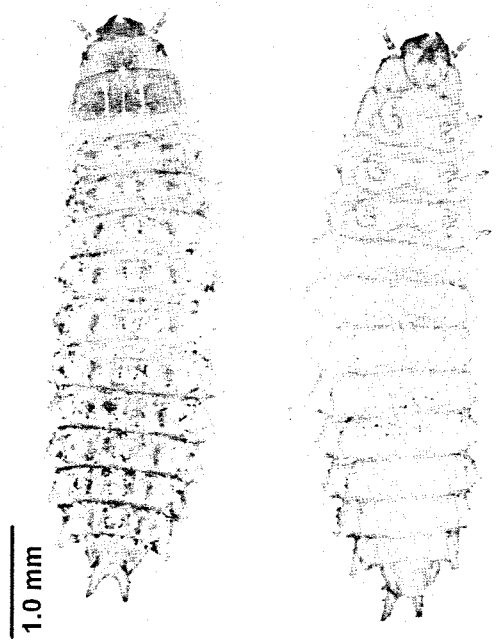


Figure 2. *Soronia oculata*, mature larva, dorsal and ventral habitus.

descriptions of these two species, both of which are characteristic members of the diverse New Zealand sooty mould fauna and/or those associated with sap flows. We compare these species with similar larvae described and illustrated in Hayashi's (1978) treatment of Japanese nitidulid larvae and provide comments about their life histories.

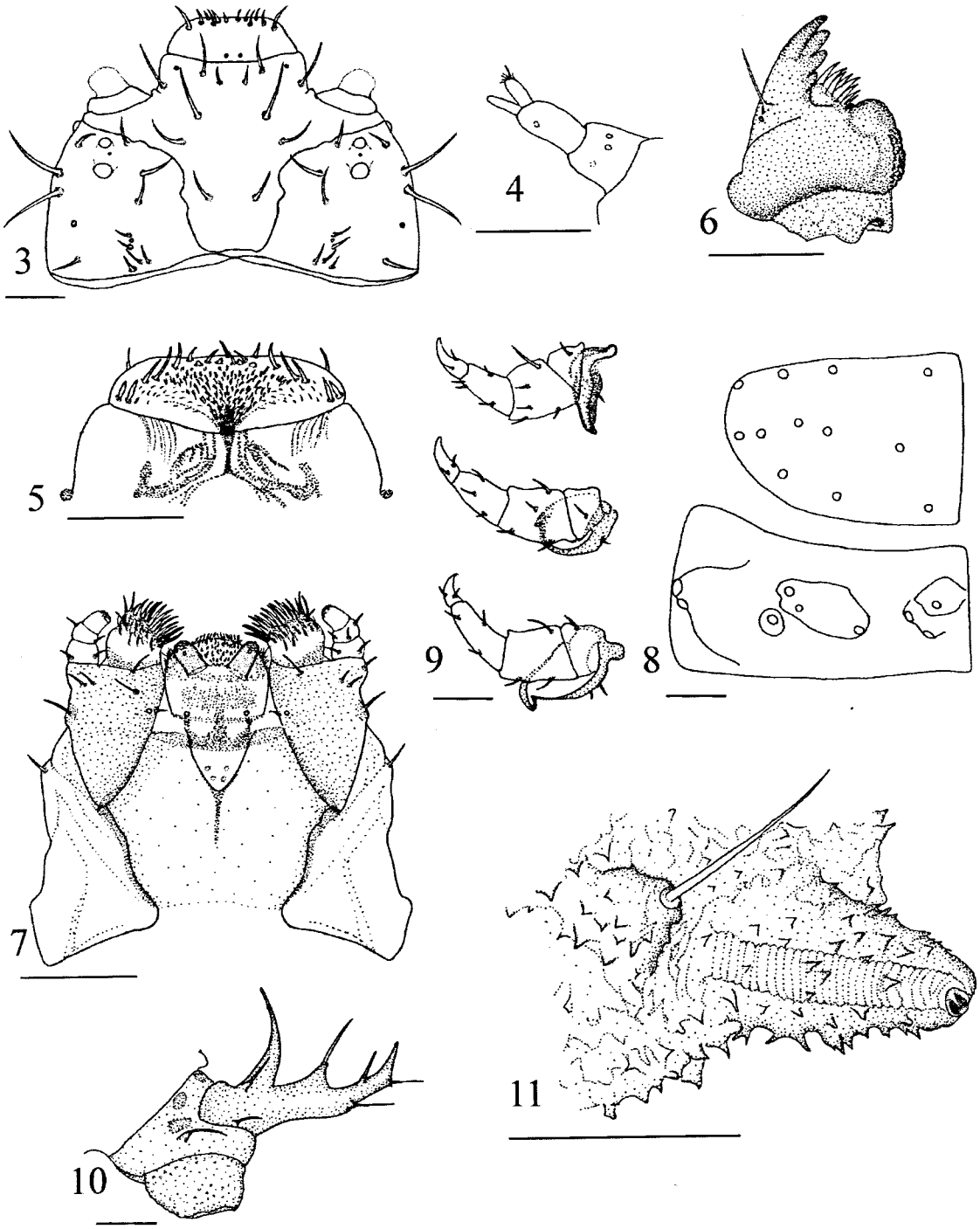
Mature larvae were dissected and examined with a compound microscope using the methods cited in Leschen and Carlton (1996). Localities are cited with their appropriate area acronyms (Crosby *et al*. 1998) for larval material we have examined. All material examined is placed into the New Zealand Arthropod Collection, Auckland (NZAC).

Hisparonia hystrix (Sharp, 1876)
(Figures 1, 3-11)

Diagnosis
Body pale gray with dark brown tergal plates, entire dorsal surface typically covered with crust of sooty mould that matches substrate. Dorsal setae of body stout and blunt, integument granulate. Three stemmata visible on either side of head. Mandibular prostheca spinose, not fringed. Malar setae coarse, limited to distal half.

Description
Mature larva (Fig. 1) 4.0 mm long, 1.3 mm wide across abdominal segment 3. Body subparallel, fusiform, gradually tapering posteriorly then abruptly constricted at A9, which bears recurved urogomphi and pregomphi. Colour of head, mouthparts, legs, and dorsal plates dark brown, remainder of integument pale gray with darker granulations, imparting a medium gray to gray-brown colour overall. Ventrally light gray. Dorsal setae of body stout, blunt, borne on tubercles or plates. Major ventral setae slender with elongate apical flagella. Dorsal surface usually covered with black crust of dried substrate material.

Head (Fig. 3). Prognathous, 0.4 mm long, 0.7 mm wide. Surface weakly wrinkled, shining. Clypeus bearing one pair of paramedian short setae, two pairs of lateral long setae; clypeofrontal



Figures 3-11. *Hisparonia hystrix*, mature larva. **Fig. 3**, head capsule, dorsal view; **Fig. 4**, antenna; **Fig. 5**, epipharynx, ventral view; **Fig. 6**, mandible, dorsal view; **Fig. 7**, maxillary-labial complex, ventral view; **Fig. 8**, diagrammatic outline of pro-mesothoracic terga showing setal bases and outlines of tergal plates; **Fig. 9**, legs, ventral views; **Fig. 10**, urogomphus, lateral view; **Fig. 11**, spiracular tubercle and surface texture of A8.

protuberances absent. Frontoclypeal suture absent. Setae and campaniform sensillae of head capsule as illustrated (Fig. 3). Epicranial stem absent, frontal arms weakly lyriform, distantly separated at occiput, sinuate, weakly divergent basally then more abruptly divergent at middle of cranium to genae. Three stemmata on each side, anterodorsal, anteroventral and posterodorsal. Antennae (Fig. 4) 3-segmented with relative antennomere lengths from base to apex 1.0, 1.2, 0.6. Antennal base broad, membranous. Segment 1 simple, asetate, bearing two dorsal and one ventral circular sensoria. Segment 2 with one dorsal circular sensorium and a sensory appendix subequal to the length of segment 3 and arising ventral to base of 3. Segment 3 bearing one long seta and a cluster of approximately six shorter setae. Labrum free, transverse with straight anterior margin. Ventral surface of labrum with a marginal row of stout recurved setae and small sensory pegs and two pairs of large pegs laterally. Epipharynx (Fig. 5) bearing a mass of fine asperities between diagonal ridges, ridges convergent to a central ridge to form an inverted Y, oblique strips posterior to ridge arms faint, somewhat irregular, approximately six on either side. Mandibles weakly asymmetrical, the left (Fig. 6) with four teeth, the largest terminal, the remainder decreasing in size towards base; the right with three teeth and few prosthecal processes; prostheca comprising approximately 10 spiny processes, not fringed with setae; mola with poorly defined rows of stubby teeth largely obscuring rows of minute asperites. Ventral mouthparts (Fig. 7) retracted with elongate cardines as typical for family. Maxilla with rounded mala bearing dense brush of coarse marginal setae that is limited to distal half; uncus spiniform, deeply bifid. Stipes weakly sclerotized, elongate, somewhat triangular with rounded palpiger and a pair of lateral setae. Maxillary palpi 3-segmented, 1 and 2 subequal, 3 slightly longer and narrower, apex with a cluster of small sensillae. Mentum/submentum triangular. Prementum rounded, palpifer poorly developed. Labial palpi simple, arising at middle of prementum, 1-segmented with terminal cluster of sensillae. Hypopharynx with a complex of dense brushes; a broad apical U-shaped band. Hypopharygeal sclerome/anterior arms broadly U-shaped.

Cervical region posterior to occiput bearing transverse row of approximately six small sclerites on each side of midline, some narrowly to broadly confluent.

Prothorax slightly narrower and longer than meso- metathorax (Fig. 8). Prothoracic shield occupying most of dorsum, dark brown except for lighter median narrow line and two wider paramedian irregular lines. Intersegmental and lateral areas evenly granulate. Macrosetae elongate, thick and blunt, all borne on shields.

Meso- and metathorax similar in length and width, fleshy and evenly granulate except for small paramedian and lateral plates in anterior third. A pair of low, rounded paramedian mound-like tubercles present, each bearing three macrosetae. A pair of large, fleshy lateral tubercles present, bearing one and three macrosetae, respectively. The dorsal setae of the meso-metathoracic lateral tubercles, thick and blunt as for other dorsal setae, apical and ventral lateral setae are fine and aciculate, as for the ventral setae. Mesothorax setal arrangements as shown (Fig. 8); metathorax similar.

Legs (Fig. 9) well-developed, five segmented, widely separated, two tarsungular setae.

Abdominal segments A1-A8 similar to meso- and metathorax except paramedian plates fused at midline to single transverse oval plates on A2-A8 and tubercles progressively larger posteriorly. A9 about half width of A8. A1-A8 laterally bearing large, fleshy, conical tubercles with apical and subapical ventral aciculate macrosetae, but lacking the anteapical dorsal macrosetae present on the thoracic tubercles.

Pregomphi and urogomphi (Fig. 10) borne on sclerotized terminal plate. Pregomphus strongly, evenly curved dorsally and anteriorly, bearing a single basolateral macroseta borne on a stout tubercle and a terminal seta. Urogomphus weakly curved dorsally, bearing four macrosetae, decreasing in size apically, most basal seta borne on a stout elongate tubercle.

Spiracles of mesothorax and A1-A8 biforous, borne on rounded papillae that increase in size from A6 to A8, forming tubercles on posterior segments (Fig. 11).

Sternal areas soft, non sclerotized. Thoracic and A1 sterna bearing a few fine microsetae (not obvious under incident light). A2-A7 sterna with one pair of sublateral slender, elongate macrosetae. Macrosetae absent on sternite A8.

Pygopod circular and blunt.

Comments

Adults of *H. hystrix* are distinctive relative to other members of the *Soronia* complex and so too is its larva, based on the reduced number of stemmata and mouthpart features, supporting the generic classification of Kirejtshuk (2003) that places it in its own monotypic genus.

Distribution

The species is commonly found throughout New Zealand, from Northland to Stewart Island, but not recorded from major offshore islands (Chatham Islands, Poor Knights, and Three Kings Islands). Kirejtshuk (2003) reported a single specimen from Fiji that may have been an introduction. A request for additional material from the Bishop Museum, Honolulu and checks in the NZAC, where a large portion of Fijian material is maintained, did not produce material of *H. hystrix*, so this country record needs to be confirmed.

Biology

Kuschel (1990) reported this species from sooty mould on *Leptospermum scoparium* in the Auckland region, and we have seen many adult specimens from this host throughout New Zealand. The NZAC contains specimens from the following plant hosts: *Aristotelia, Coprosma, Cyathodes, Dracophyllum, Ghania, Hebe, Muehlenbeckia, Neopanax, Nothofagus, Pittosporum, Pseudowintera, Pseudopanax*, and dead flowers of *Cordyline australis*. NZAC records of this species on smuts of *Ixerba* and *Myrsine* also exist, but these may be misidentified sooty moulds.

Material examined

North Island: AK, Whangaparaoa, 2002, S. Moore (1 third instar larva). *South Island:* FD, Routeburn Tk, Key Summit, 11 May 2000, R. Leschen RL567, 44.49'S, 168.08'E (3 third instar larvae, 3 adults); BR, Runanga, Coal Ck Walk, 19 Jan 2005, R. Leschen, T. Buckley, beating, at large, night, RL923, 42.24'S, 171.15'E (1 third instar larva); BR, Lake Rotoiti, 13 Nov. 1999, R. Leschen, R. Hoare, beating, RL 458, 41° 32' S, 172° 51 E (2 adults, 9 fourth instar larvae); NC, Arthur's Pass, Taipo Valley Tk, 2 km RT73, 8 Nov 2005, R. Leschen, S. Nomura, beating, RL1008, 42.45'S, 171.25'E (8 adults, 4 third instar larvae); MK, Lake Ohau, 10 Jan 2006, R. Leschen, T. Buckley, R. Hoare, sooty mould RL1039, 44° 28'S,169° 86'E (+20 adults, 4 third instar larvae); OL, Mt Iron, 11 Jan 2006, R. Leschen, T. Buckley, R. Hoare, sooty mould RL1048, 44° 69'S, 169° 16'E (6 adults, 2 third instar larvae); OL, Mt Aspiring NP, Diamond Lake, 12 Jan 2006, R. Leschen, T. Buckley, R. Hoare, sooty mould, *Fuchsia* forest, RL1055, 44° 64'S, 169° 96'E (15 adults, 3 third instar larvae); FD, Kepler Tk, nr Rainbow Reach, 10 May 2000, R. Leschen ex sooty mould on *Leptospermum*, RL 563, 564, 45° 29'S, 167° 40'E (4 adults, 16 second instar, 12 third instar larvae); FD, Kepler Tk, Golf Course Loop Rd., 10 May 2000, R. Leschen ex sooty mould on *Leptospermum*, RL 562, 564, 45° 28'S, 167° 42'E (4 adults, 3 second instar, 3 third instar larvae).

Soronia oculata Reitter, 1880

(Figures 2, 12-20)

Diagnosis

Body light brown to tan with darker brown tergal plates. Dorsal setae of body stout and blunt, integument granulate. Three stemmata visible on either side of head. Mandibular prostheca with hyaline lobe bearing 12-13 plumose processes. Malar setae fine, extending around mesal margin to near base.

Description

Mature larva (Fig. 2) 5.2 mm long, 1.9 mm wide across abdominal segment 3. Body subparallel, fusiform, gradually tapering posteriorly then abruptly constricted at A9, which bears recurved urogomphi and pregomphi. Colour of head, mouthparts, legs, and dorsal plates medium brown, remainder of integument tan with darker lateral patches on T2-A8, paramedian and lateral setae-bearing plates not darker than surrounding integument. Ventrally light yellowish-tan. Dorsal setae of body stout, blunt; borne on small, blunt tubercles. Major ventral setae slender with elongate apical flagella.

Head (Fig. 12). Prognathous, 0.5 mm long, 0.9 mm wide. Surface smooth, shining. Clypeus bearing one pair of paramedian short setae, two pairs of lateral long setae and low rounded protuberances at anterolateral corners. Frontoclypeal suture absent. Setae and campaniform sensillae of head capsule as illustrated (Fig. 12). Epicranial stem

absent, frontal arms weakly lyriform, distantly separated at occiput, sinuate, weakly divergent basally then more abruptly divergent at middle of cranium to genae. Three stemmata on each side, anterodorsal, anteroventral and posterodorsal. Antennae (Fig. 13) 3-segmented with relative antennomere lengths from base to apex 1.0, 1.5, 0.6. Antennal base broad, membranous. Segment 1 simple, asetate, bearing two dorsal and one ventral circular sensoria. Segment 2 with a sensory appendix half the length of segment 3 and arising ventral to base of 3. Segment 3 bearing a pair of short subapical setae. Labrum free, transverse. Semicircular, weakly emarginated medially with arcuate anterior margin. Ventral surface of labrum with a marginal row of approximately 20 sensory pegs that are progressively longer and more seta-like laterally. Epipharynx (Fig. 14) bearing a mass of stout, recurved asperities between diagonal ridges, ridges convergent to a central ridge to form an inverted Y. Oblique strips posterior to ridge arms prominent and regular, approximately ten on each side. Mandibles asymmetrical, the left (Fig. 15) with four teeth, the largest distal, the remainder decreasing in size towards base; the right with three teeth, the basal tooth minute and scarcely visible; prostheca with hyaline lobe bearing 12-13 plumose processes and two basal spines; mola with ~15 rows of fine asperities. Ventral mouthparts (Fig. 16) retracted with elongate cardines as typical for family. Maxilla with rounded mala bearing dense brush of fine marginal setae extending to near base of mesal margin; uncus spiniform, deeply bifid, with ventral row of fine denticles. Stipes weakly sclerotized, elongate, somewhat triangular with rounded palpiger and a pair of lateral setae. Maxillary palpi 3-segmented, 1 and 2 subequal, 3 slightly longer and narrower, with a subterminal constriction and single stout seta. Mentum/submentum triangular. Prementum rounded, palpifer poorly developed. Anterior lobe of prementum covered with regular patches of fine, velvety sensillae. Labial palpi simple, arising at middle of prementum, 1-segmented with terminal cluster of sensillae. Hypopharynx with a relatively homogeneous mat of fine trichoid sensillae that is finer and more dense near anterior margin. Hypopharygeal sclerome/anterior arms broadly U-shaped; bracon divergent to posterolateral angle.

Cervical region posterior to occiput bearing transverse row of approximately six small scleriteson each side of midline, well separated from each other.

Prothorax slightly narrower and longer than meso- metathorax (Fig. 17). Prothoracic shield occupying most of dorsum, dark brown except for lighter median narrow line and two wider paramedian irregular lines. Intersegmental and lateral areas evenly granulate. Macrosetae short and stiff, all borne on shields.

Meso- and metathorax similar in length and width, fleshy and evenly granulate except for small, partially fused paramedian and lateral plates. Low, rounded paramedian mound-like tubercles present, each bearing three macrosetae. Large, fleshy lateral tubercles present, bearing one and three macrosetae, respectively. Dorsal setae of meso-metathoracic lateral tubercles thick and blunt as for other dorsal setae, apical and ventral lateral setae fine and aciculate, as for the ventral setae. Mesothoracic setal arrangement as shown (Fig. 17); metathorax similar. A1-A8 laterally bearing large, fleshy, conical tubercles with apical and subapical ventral aciculate macrosetae, but lacking the anteapical dorsal macrosetae present on the thoracic tubercles.

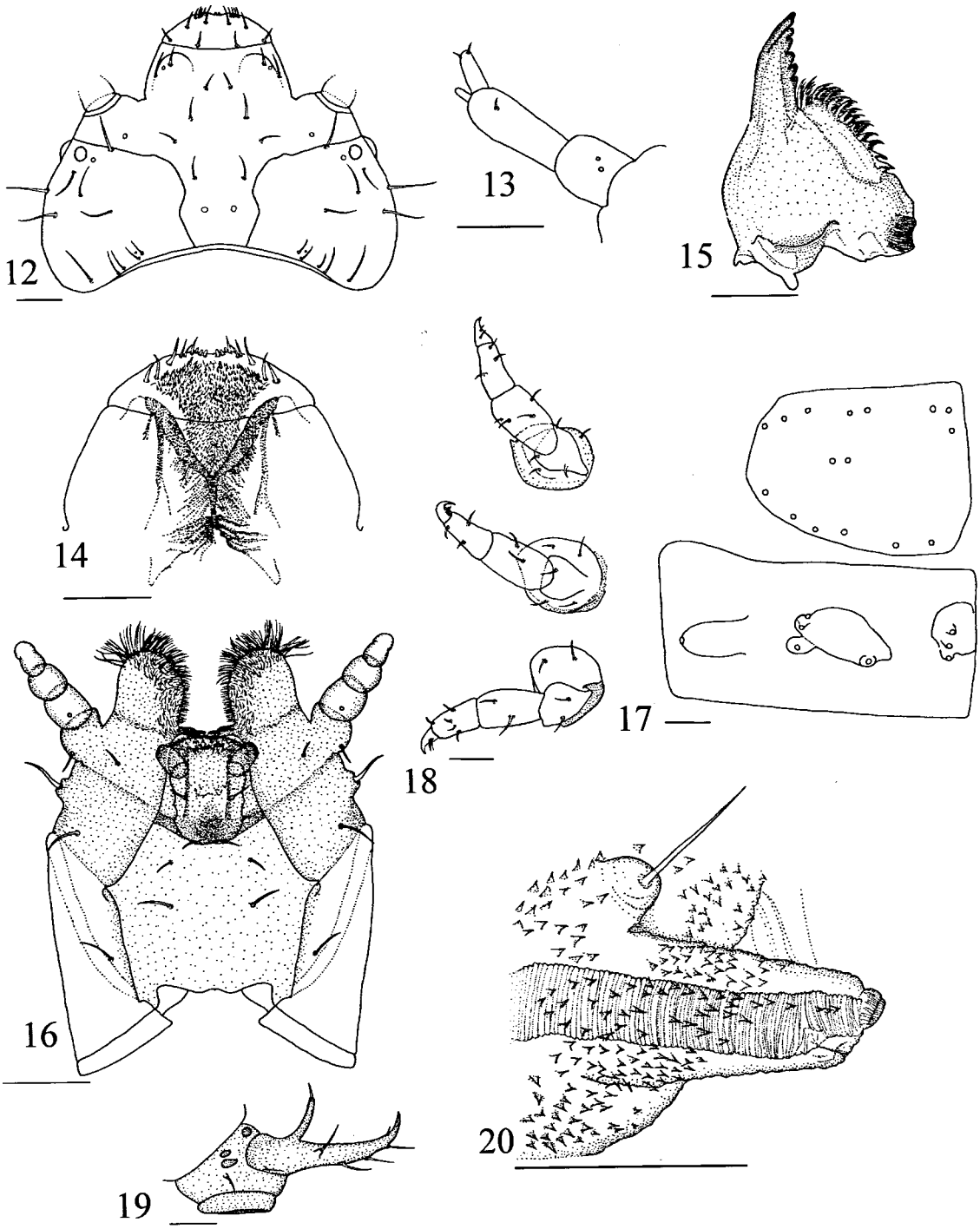
Legs (Fig. 18) well-developed, five segmented, widely separated, bearing two tarsungular setae.

Abdominal segments A1-A8 similar to meso-metathorax except paramedian plates fused at midline, forming single quadrate median plates on A2-A8 that become more transverse quadrate posteriorly. Lateral tubercles absent on A9. A9 about half width of A8. Pregomphi and urogomphi (Fig. 19) borne on sclerotized terminal plate. Pregomphus strongly, evenly curved dorsally, bearing a single basolateral macroseta borne on a stout tubercle and a terminal seta. Urogomphus weakly curved dorsally, bearing four macrosetae, decreasing in size apically, most basal borne on a stout tubercle.

Spiracles of mesothorax and A1-A8 biforous, borne on prominent papillae that increase in size to form tubercles on A7 and A8 (Fig. 20).

Sternal areas soft, not sclerotized. Thoracic and A1 sterna bearing a few fine microsetae (not obvious under incident light). A2-A7 sterna with one pair of sublateral slender, elongate macrosetae. Macrosetae absent on sternite A8.

Pygopod circular and blunt.



Figures 12-20. *Soronia oculata*, mature larva. **Fig. 12**, head capsule, dorsal view; **Fig. 13**, antenna; **Fig. 14**, epipharynx, ventral view; **Fig. 15**, mandible, dorsal view; **Fig. 16**, maxillary-labial complex, ventral view; **Fig. 17**, diagrammatic outline of pro-mesothoracic terga showing setal bases and outlines of tergal plates; **Fig. 18**, legs, ventrolateral views; **Fig. 19**, urogomphus, lateral view; **Fig. 20**, spiracular tubercle and surface texture of A8.

Comments

Kirejtshuk (2003) did not comment on the validity of the names of the five nominal species of *Soronia* in New Zealand (Appendix), and a revision is needed to fix the species names and determine which ones are valid. Five species are named, and two new species have been seen among NZAC material. Two species may be strictly associated with sooty moulds, as opposed to sap flows, in the northern portion of the South Island. We chose to use the name *S. oculata* Reitter 1880 for the specimens we treat in this paper because this name has priority over *S. asperella* (Broun, 1893), though formal synonymy is pending further study of type material. The latter was included as a member of *Platipidia* Broun, 1893, but that genus was synonymised with *Soronia* by Kirejtshuk (2003). *Soronia asperella* was described from the Auckland area, and specimens with the same morphology are widespread from the North Island to the South Island and Stewart Island. The type locality for *S. oculata* is Greymouth, based on comments made by Reitter (1880) at the heading of his paper that precedes the description, and NZAC material from Buller are conspecific with these.

Distribution

Widespread throughout New Zealand.

Biology

Kuschel (1990) reported this species from trunks and thicker branches of trees in association with sap in the Auckland region. This association with sap flows is consistent with data from adult and larval specimens contained in the NZAC from the North and South Islands. Numerous adult specimens have been collected in association with sooty moulds in beech forests, indicating that adults may be using both sooty moulds and sap for sustenance.

Material examined

North Island: AK, Destruction Gully, 21 July 2002, R. Hoare, E. Edwards, in sappy exudation in trunk of Vitex lucens with old Aentus virescens (Lepidoptera) tunnels, 37.02S, 174.32E (5 adults, 2 third instars, 4 early second instars); AK, Auckland Domain, 06 Nov 2006, from bark of *Callistemon* sp., M. Bullians and C. Inglis (2 adults, 2 first instars, 4 second instars, 4 third instar larvae). *South Island*: DN, Mt Finnie, 15 Edith St., Fairfield, C. M. Fox MAF, Dunedin, in bark of tree (1 third instar larva); OL, 10.5km N.W. Glenorchy, Rees Valley Rd, 19 Jan 1998, R. Leschen, C. Carlton sap flow, RL088, 089, 44°47'S, 168°27'E (14 adults,4 second instar, 4 third instar larvae); MC, Craigieburn SF, Dracophyllum Flat Tk, 800-850m, 10 Jan 1998, R. Leschen, C. Carlton leaf/log berlesate RL035, 43°10'S, 171°42'E (1 second instar larva).

Notes on Soronia *complex larvae*

Soronia oculata and *H. hystrix* run to *Soronia* in the key to Japanese nitidulid larvae provided by Hayashi (1978) and the more limited key of Böving and Rozen (1962). *Hisparonia hystrix* bears a superficial resemblance to *Soronia lewisi* Reitter in gross body outline and surface features (i.e., arrangement of tergal plates, shape of the urogomphi, and length of the spiracular tubercles). That species has four stemmata on each side of the head while *H. hystrix* has three, but this may be polymorphic within genera and probably represents extreme reduction of the fourth stemma. Fresh material should be examined more carefully in this regard. The mandible of *H. hystrix* is quite different from that of *S. lewisi* or members of other presumed closely related genera, basically in the reduced prostheca. The prosthecal processes are coarse and spinose and not fringed or plumose as they are in most nitiduline genera, and the striations of the mola are poorly defined and obscured by low, blunt irregular rows of teeth. The mandible of *Omosita colon* (L.) is similar. The marginal setae of the maxillary mala are coarser and less dense than those of most nitidulines illustrated, and again, there is some similarity to those structures in *Omosita colon*.

In Hayashi's (1978) key, *S. oculata* would run to *Phenolia picta* (Macleay) (=*Lasiodactylus pictus* in Hayashi's nomenclature), the preceding couplet, instead of *S. lewisi* were it not for the more approximately set paramedian tergal plates. The incisor teeth, prostheca, and mola of the mandible of *S. oculata* are similar to those of *P. picta*, but larvae of many species of nitidulids across at least four subfamilies (Nitidulinae, Carpophilinae, Amphicrossinae, and Cryptarchinae) share these similarities, with subtle variations. Because of the incomplete state of nitidulid larval taxonomy, no larval characters can be identified from the literature

and specimens we have examined that set *S. oculata* apart from the larvae of any one of a number of widely distributed genera of nitidulines (e.g., *Lobiopa*, *Physoronia* Reitter, *Phenolia* Erichson). This larval body plan appears to represent a highly conserved and adaptable combination of features that predates the adaptive radiation of a large and taxonomically confusing assemblage of nitiduline sap beetles. Assembling a comprehensive dataset and phylogenetic analysis of larval characters will allow identification of phylogenetic trends that have emerged from this conservative ground-plan, but this will only be possible with much greater taxon sampling and integration of larval characters to facilitate more informed decisions about genus-group nomenclature.

Comments on life history

Hisparonia hystrix adults and larvae are found mainly on aerial growths of sooty moulds, which are a significant and unusual component of New Zealand forests (Hughes 1976). Sooty moulds can grow to fantastic proportions on honeydew secretions produced by margarodid Hemiptera (see Morales 1991). Common tree hosts of sooty moulds and their honeydew producers are *Nothofagus* (southern beech trees) and *Leptospermum* (tea tree), but sooty mould growth and associated *H. hystrix* may be found on several other trees and on various shrubs, even in open country, wherever sooty moulds are well established (see above). No one knows how long the sooty mould habitat has been present in New Zealand, but many taxa are restricted to it (e.g., Morales 1988), including all members of the New Zealand endemic beetle families Metaxinidae (Kolibáč 2004), Agapythidae (Leschen *et al.* 2005), and Cyclaxyridae (Klimaszewski & Watt 1997).

Soronia oculata can be collected as adults in sooty moulds, but the larvae appear to be exclusive to sap flows in beech and in mixed broadleaf/podocarp forests. The larvae and adults of both species may be coated with debris, but not to the extent of *H. hystrix* adults and larvae. *Hisparonia hystrix* specimens are coated with spores and hyphae of sooty moulds (see larva in Fig. 1). The mandibular cavities in adults cited by Kirejtshuk (2003) do not seem to be mycangia, but additional specimens need to be examined for presence of fungal spores.

The mouthparts of *S. oculata* larvae are similar to many other nitidulid larvae in the form of the mandible (with complex prostheca and serrate incisor lobe), setose mala, and complex epipharynx, which may be associated with sap or fungal feeding. These characters differ in the sooty-mould feeding *H. hystrix*. The mandible with reduced prostheca, strongly toothed apex, and mola with indistinct blunt teeth and indistinct rows of asperites, in addition to the strongly developed setae on the mala and epipharynx, are characters that reflect a completely different feeding mechanism. Unlike *S. oculata* larvae, that appear to feed on viscous fluids that need to be pressed and filtered, *H. hystrix* larvae feed on hardened spores and hyphae of sooty moulds that must be scraped or pulled from the context of the hyphae/spore mass, compacted (not strained) and then moved into the foregut.

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Appendix:

Checklist of New Zealand Nitidulidae Species

The following checklist is based on literature and specimens contained in the NZAC. An asterisk (*) indicates an introduced species (see Kuschel 1990) and some important taxonomic citations are listed after each entry. We do not list species that have been intercepted at the border or on produce.

Aethina Erichson, 1843: * *A.* (*Ideathina*) *concolour* (Macleay) [see Kirejtshuk and Lawrence (1999)]

Brachypeplus Erichson, 1842: *B. brevicornis* Sharp, 1878

Brounthina Kirejtshuk, 1997; *B. aequalis* Kirejtshuk, 1997

Carpophilus Stephens, 1830: **C. davidsoni* Dobson, 1952; **C. dimidiatus* (Fabricius 1792), **C. gaveni* Dobson, 1964, **C. hemipterus* (Linnaeus, 1758), **C. ligneus* Murray, 1864, **C. marginellus* Motschulsky, 1858, *C. oculatus* Murray, 1864 [see Kuschel 1990 and Leschen and Marris 2005]

Cerylollodes Kirejtshuk, 2006: **C. dacnoides* Kirejtshuk, 2006

Epuraea Erichson, 1843: *E. antarctica* White, 1846, **E. imperialis* Reitter, 1877, **E. scutellaris* (Broun, 1880), *E. signata*

Broun, 1880, *E. zelandica* Sharp, 1878

Hisparonia Kirejtshuk, 2003: *H. hystrix* (Sharp, 1876)

Homepuraea Broun, 1893: *H. amoena* (Broun, 1893), *H. halli* (Broun, 1921) [see Jelínek 1982]

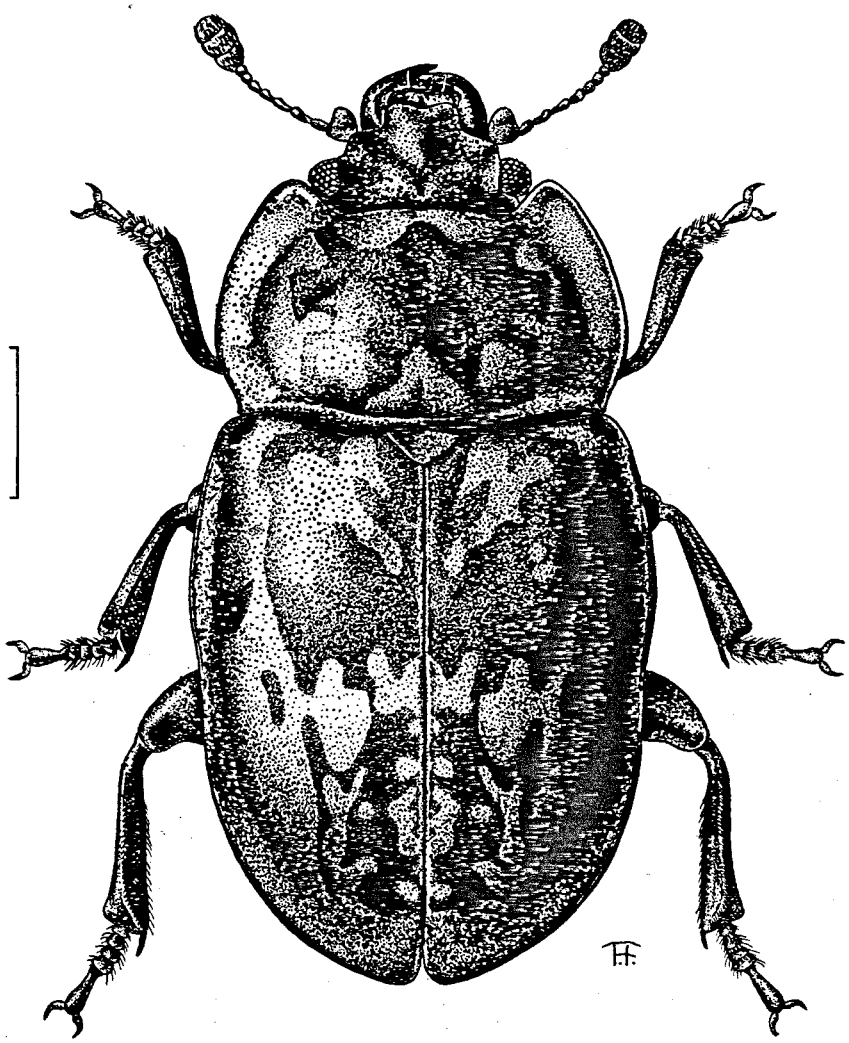
Nitidula Fabricius, 1775: **N. carnaria* (Schaller, 1783) [see Kuschel 1990]

Omosita Erichson, 1843: **O. colon* (Linnaeus, 1758), **O. discoidea* (Fabricius, 1775) [see Kuschel 1990]

Praitelus Broun, 1882: *P. optandus* (Broun, 1881)

Soronia Erichson, 1843: *S. asperella* (Broun, 1893), *S. micans* Broun, 1893, *S. morosa* Broun, 1893, *S. oculata* Reitter, 1880, *S. optata* Sharp, 1878 [see Kirejtshuk 2003]

Thalycrodes Blackburn, 1891: **T. australis* Blackburn, 1891 [see Kuschel 1990]



Soronia asperella (Broun) is one of five species of described *Soronia* from New Zealand (Illustration by Tony Harris; reproduced by permission from Landcare Research; scale bar = 1 mm).

The New Zealand Entomologist

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The New Zealand Entomologist is a refereed journal that publishes articles by New Zealand entomologists and papers that are of significance to New Zealand entomology in all its aspects, including arachnids and other terrestrial arthropods. It is the official publication of the Entomological Society of New Zealand (Inc.). Most published articles are the results of original research but review articles, short communications and book reviews are welcome. Papers published or submitted elsewhere for publication will not be considered, but publication of an abstract or summary elsewhere (e.g., conference proceedings) does not preclude publication of the full text in the New Zealand Entomologist. Accepted papers become copyright of the Entomological Society of New Zealand. Authors are encouraged to be members of the Society.

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Feature Photograph: *Holacanthella spinosa* (Lubbock, 1899) (Top, 10mm), and *Holacanthella paucispinosa* (Salmon, 1941) (Bottom, 13mm) (Collembola: Neanuridae). Species of 'giant' springtails are up to 17mm long. These specimens were collected by R. Morris in Beech Forest at Rahu Saddle, Lewis Pass, South Island. (See: Mark I. Stevens *et al.* 2007. New Zealand's forgotten biodiversity: different techniques reveal new records for 'giant' springtails. *New Zealand Entomologist* 30: 79-84). Photos by Rod Morris, Rod Morris Productions, Dunedin, NZ (www.rodmorris.co.nz).