

The New Zealand species of *Stethorus* Weise (Coleoptera: Coccinellidae)

KENNETH J. HOUSTON

Entomology Branch
Department of Primary Industries
McIers Road, Invercargilly Q, 4068,
Australia

Abstract Adults of the three New Zealand *Stethorus* species—*S. bifidus* Kapur, *S. griseus* Chazeau, and *S. hirtio* Chazeau—are redescribed and keyed. Short descriptions of the last instar larvae of *S. bifidus* and *S. griseus* are provided. Notes on nomenclature, affinities, distributions, and hosts are presented and a lectotype designated for *S. griseus*. *S. griseus* Whitehead and *S. incompletus* Whitehead are nomina nuda and *S. incompletus* Chazeau is treated as a synonym of *S. hirtio*. The record of the Australian species *S. nigripes* Kapur from New Zealand is incorrect.

Keywords Coleoptera; Coccinellidae; *Stethorus bifidus*; *S. griseus*; *S. hirtio*; taxonomy

INTRODUCTION

Kapur (1948) described *Stethorus bifidus* from New Zealand. In an unpublished thesis, Whitehead (1967a) described *S. griseus* and *S. incompletus*. Chazeau (1979) used both these unavailable names in a key to Oceanian *Stethorus* species, making them available from that date. However, *S. incompletus* is a synonym of *S. hirtio* Chazeau. This study was made to provide a full description for *S. griseus* and to clarify the nomenclature and species present in New Zealand. Some available larval material allowed short descriptions of the last instar larva of *S. griseus* and *S. bifidus*.

In specimen lists only examined localities are given, except for type material, those with associated adults and larvae, incorrect locality or identifiable prey, those whose larval or egg colour was noted, and specimens either from the T. Broan and A. E. Brookes Collections, or collected before 1940; data for such material is given in full. I accepted that the common name of CRM (citrus red mite) referred to *Panonychus citri* (McGregor), European red mite to *P. ulmi* (Koch), twospotted [mite] to *Tetranychus arcticus* Koch, and that *T. telarius* L. is a synonym of *T. arcticus*. The prey records of red mite, red spider, or spider eggs etc. could not be reliably attributed to a particular species. Area codes are those of Crosby et al. (1976). Some pinned material (including types) of E. Collyer from the Nelson area was incorrectly labelled by V. B. Whitehead as Wellington (J. C. Watt, pers. comm. 1984) and this is noted where appropriate. Information additional to that on labels is enclosed in square brackets. Any number(s) in parentheses after a range of numbers is that most commonly found. All specimens are in NZAC except where indicated. The following abbreviations are used for institutions: AMNZ, Auckland Institute and Museum, Auckland; BMNH, British Museum (Natural History), London; FRNZ, Forest Research Institute, Rotorua; LCNZ, Lincoln College, Canterbury; NZAC, New Zealand Arthropod Collection, DSIR, Auckland; QDPL, Queensland Department of Primary Industries, Brisbane.

**KEY TO THE NEW ZEALAND SPECIES
OF STETHORUS WEISE**

1. Elytra with long sparse semi-erect pubescence, punctures deeply impressed; metasternum distinctly convex posteromedially, with large deep punctures laterally but smaller and shallower posteromedially; femoral line complete and extending to three-quarters or more length of abdominal sternite 1, area within femoral line and lateral metasternum smooth or lightly reticulate *bifidus*

Elytra with short dense pubescence, punctures moderately to shallowly impressed; metasternum relatively flat posteromedially, with small or shallow punctures laterally; femoral line of abdominal sternite 1 complete or incomplete, area within femoral line and lateral metasternum densely reticulate 2

2. Elytral pubescence semi-erect in anterior half and decumbent posteriorly, punctures moderately impressed; metasternum with small deep punctures including posteromedially; femoral line usually complete, extending to about two-thirds length of abdominal sternite 1 *griseus*

Elytral pubescence decumbent, punctures shallowly impressed; metasternum with shallow punctures particularly posteromedially; femoral line incomplete, extending to three-quarters or more length of abdominal sternite 1 *Atrois*

Stethorus griseus Chazeau

(Fig. 1-7)

Stethorus griseus Whitehead, 1967a: 179, 1967b: 1565. Nomen nudum.

Stethorus griseus Chazeau, 1979: 300; Gordon & Chapin, 1983: 234.

Adult

Coloration. Body black to brown, often lighter on hypomera, epipleurae, and abdominal sternites 5, 6; antennae yellow; mouthparts brown, sometimes yellow; legs dark to light brown with tibiae and tarsi lighter and often yellow, trochanters and forelegs sometimes yellow.

Body. Length 1.09–1.29 mm, width 0.76–0.85 mm. Elytra with short dense pubescence, semi-erect in anterior half, decumbent posteriorly; punctures small, moderately shallow and close. Metasternum and abdominal sternite 1 with small, deep, and close punctures but shallower posteriorly on sternite 1,

reticulate laterally; metasternum flat to slightly convex medially. Femoral line complete, extending about two-thirds distance between hind coxa and posterior margin of abdominal sternite 1, rarely narrowly incomplete; area within femoral line mostly reticulate with small shallow punctures. Apex of abdominal sternite 6 rounded in both sexes.

Male genitalia. Sipro (Fig. 1) S-shaped with a notch beside small, often partly unpigmented capsule; distal quarter to fifth with many fine setae and dorsal side unpigmented; with apical and preapical pores. Trabes shallowly concave or straight proximally in dorsal view (Fig. 2). Basal piece wider than long and longer than deep, proximally bilobed with greatest depth. Median lobe extending to or slightly beyond apex of parameres; cone-shaped in dorsal view (Fig. 2), length about 2 times width; tongue-like in lateral view (Fig. 3) with apex downturned. Parameres with setae and pores ventrally and apically, (Fig. 4, 5)

Female genitalia. Genital plates (Fig. 6) with posterolateral margin partly to completely pigmented, with pores in apical half and 0–5 (1) setae at apex. Spermatheca (Fig. 7) annulate and C-shaped.

Last instar larva

Unpigmented. Mouthparts similar to those of *S. fenestratus* Houston (Houston 1980) except for slight differences in length of setae and palps. Maxillary and labial palps less than twice as long as wide; posterior setal pair on mentum-submentum usually not reaching base of median pair (as in fig. 14 for *S. fenestratus* in Houston 1980). Each tibiotarsus with about 16 clavate apical setae, including 1 pair of long thick dorsal setae with remaining setae distinctly shorter proximally but becoming progressively longer distally.

Type data. Lectotype (here designated), Dun Track, Nelson, 19 Feb 1966, E. Collyer; another white label "*Stethorus griseus* Whitehead 72", and a red label "*Stethorus griseus* TYPE V.B.W. 72". Paralectotypes: 4, same data as holotype; 13, Dun Track, [Nelson], Feb 1967, E. Collyer; 1 *S. griseus* and 1 *S. Aizois*, Stanton's citrus, [Nelson], Nov 1966, E. Collyer, *Panonychus citri*, dark eggs; 1, Nelson [incorrectly labelled as Wellington], 1963, E. Collyer, mites on apple; 5, Totaranui, Mar 1967, E. Collyer, *Tetranychus arizonicus*; all also with another white label "*Stethorus griseus* Whitehead 72", and an orange label "Paratype V.B.W. 72".

Adult material examined. New Zealand. 2 (paratypes of *S. bifidus*); T. Brown and A. E. Brookes

Collections, 2; 13 Jan 72, spider eggs on *Prunus domestica* L., 10.

NORTH ISLAND, ND. Kauri Sanctuary, Oruhua State Forest, 1; Coppermine I, Chickens Is, 2. **AK.** Motuhoropapa I, Noises Is, 1; Otara I, Noises Is, 2; Auckland, 4; Howick, T. Brown and A. E. Brookes Collections, 2. **CL.** Stanley I, Mercury Is, 1; Tapu Rd - summit, 1; Tapu Saddle, Commandol, 1. **BP.** Fitzgerald Glade, [near Tapapa], 1. **GB.** Gisborne, 3. **TK.** Palaka, 12. **RI.** Mangaweka Hills, 1. (AMNZ); Totara Reserve, Pohangina Valley, 1. **WI.** Palmerston North, 26 Nov 1936, W. Cottier, predacious on *Tetranychus arizone* on *Phormium tenax*, 18; Foxton, 5. **SOUTH ISLAND, SD.** Te Mahia, 27 Mar 1967, *Lycosteria*, dark larvae, 14; Te Mahia, 27 Apr 1967, *Lycosteria*, pale larvae, 1; Te Mahia, 27 Apr 1967, E. Collyer, pale larvae, 1. **NN.** Totoranui, Mar 1967, *Lycosteria*, dark larvae, 6; Totoranui, Mar 1967, *Tetranychus arizone* on *Lycosteria*, 16; Astrolabe, Ngaiu, 15 Jan 1966, 2; Nelson, 19; Dun Track, Nelson, 19 Feb 1966, *Tetranychus arizone* on *Lycosteria*, 29; Dun Track, Nelson, 10 Feb 1967, E. Collyer, 1 (paratype of *S. incognitus*); Dun Track, Nelson, 10 Feb 1967, feeding on *Tetranychus arizone*, pale larvae, 2; Perry's orchard, [Nelson], Jan 1967, dark larvae, 4; Mill. Hammer, 1. **KA.** Wairiri, Kikoura, T. Brown and A. E. Brookes Collections, 1. **BR.** Granville Forest Camp 19 [near Totara Flat], 1. (FRNZ). **NC.** Omihia State Forest, 8. (FRNZ); Lees Valley near Oxford, Canterbury, 1. (FRNZ); Alford State Forest, 1. (FRNZ). **MC.** Christchurch, 2. (LCNZ); Riccarton Bush, Christchurch, 15 Sep 1936, E. S. Gouley, 1; Lincoln College [Christchurch], 25 Oct 1961, R. A. Harrison, ex *Tetranychus arizone* colony, 1. (LCNZ); Ardagh [=Methven], 14 Feb 1912, T. Brown and A. E. Brookes Collections, 1; Methven, 1 Aug 1912, T. Brown and A. E. Brookes Collections, 1. **OL.** Makarora, 3. **CO.** Alexandra, 1. **Larval material examined.** New Zealand, 13 Jan? 2, spider eggs on *Prunus domestica* L. **NN.** Astrolabe, Ngaiu, 15 Jan 1966, 1 on slide; Dun Track, Nelson, 19 Feb 1966, *Tetranychus arizone* on *Lycosteria*, (also with *S. bifidus* larvae).

Remarks. The male and female genitalia of *S. griseus* are very similar to those of the Australian *S. nigripes* Kapur, except that the siph is S-shaped with hairs distally. This is the only *Serphos* species with a row of setae on the siph.

Serphos bifidus Kapur

(Fig. 8–11)

Serphos sp. Cottier, 1934: 68 (larva).

Serphos bifidus Kapur, 1948: 317; Whitehead, 1967a: 180; Chazeau, 1979: 296; Gordon & Chapin, 1983: 234.

Serphos bifidus: Bielawski, 1976: 393 [misident. for *S. vagans* (Blackburn)].

Adult

Coloration. Body black to brown; hypomera, epipleurae, and abdominal sternites lighter; antennae yellow; mouthparts light to dark brown; legs dark to light brown, femora darkest, but tarsal segments 1 and 2 yellow.

Body. Length 1.02–1.27 mm, width 0.73–0.87 mm. Elytra with long, sparse, semi-erect pubescence; punctures large, deeply impressed, and close. Metasternum convex medially with large deep close punctures laterally, smaller elsewhere on metasternum and abdominal segment 1 and shallower and sparser midposteriorly, smooth to lightly reticulate laterally. Femoral line complete, extending to three-quarters or more distance between hind coxa and posterior margin of abdominal sternite 1; area within femoral line smooth or lightly reticulate with shallow punctures. Apex of abdominal sternite 6 with deep triangular emargination in male, area around emargination concave but often with small convex bridge at apex of triangle dividing concavity in half.

Male genitalia. Siphonal capsule large knob-shaped with inner side slightly longer than outer in lateral view and divided in ventral view; siph apex (Fig. 8) hammer shaped with outer ventral corner and inner dorsal part unpigmented, outer dorsal edge crenulate, inner ventral edge with row of teeth including 2 larger teeth at inner and outer ventral corner and often 1 large tooth near stem; apex flattened and thinner than stem of siph in ventral view. Trabes slightly longer than tegmen, expanded distally, with proximoventral side unpigmented. Median lobe in lateral view with dorsal edge convexly curved and length more than 3 times depth; in dorsal view (Fig. 9) median lobe cleft apically with length about 2 times width. Parameres narrow and elongate, three-fifths to three-quarters length of median lobe, with ventral pores on proximal half and 0–2 pores in apical half, with 2–5 (2 long, 1 short) apical setae (in Kapur 1948, fig. 65 most apical setae should be drawn to reach or extend just beyond apex of median lobe).

Female genitalia. Most of genital plates (Fig. 10) pigmented with pores in apical half and 3–6 (5–6)

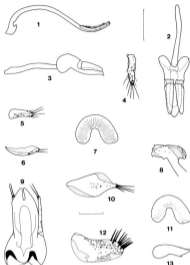


Fig. 1-13. *Stethocac*: 1-7.5. *griseus*: 1, siphon, lateral view; 2, tegmen and trabes, dorsal view; 3, tegmen and trabes, lateral view; 4, parameres, dorsal view; 5, parameres, lateral view; 6, genital plate; 7, spermatheca; 8-11 *S. bifidax*: 8, siphonal apex, lateral view; 9, tegmen, ventral view; 10, genital plate; 11, spermatheca; 12-13.5. *Aedei*: 12, genital plate; 13, spermatheca (scale lines = 0.1 mm for 1-5, = 0.05 mm for 6-13). [Stippling indicates membranous areas.]

apical setae. Spermatheca (Fig. 11) annulate and C-shaped.

Last instar larva

Specimens from Nelson unpigmented; those from Waitara with antero-ventral corner of head capsule below ocelli brown and dorsally with pigmentation

on many setal bases with some fusion of pigment particularly on lateral half to five-eighths of meso- and metanotal plates and dorsolateral abdominal tubercles, lateral five-eighths of metanotal plate often almost completely pigmented (see Cottier 1934, fig. 1A).

Masillary and labial palps more than twice as long as wide; long posterior setal pair on mentum-

submentum extending to base of anterior pair. Each subcapitulum with 10–12 long clavate apical setae, thick dorsal pair about same length as others.

Type data. Holotype: New Zealand, Riwaka, 18 Jan 1922, D. Miller, predacious on eggs of *Bryobia* on apple. Paratypes: 3 ♂♂, same data as holotype; 3 ♂♂ and 2 ♀♀, *Aizovia*, New Zealand, Jan 1932, J. Muggidge, predacious on red spider mite; 2 ♂♂, *griseus*, New Zealand. All in BMNH.

Adult material examined. New Zealand, W. Cottier, predacious on *Panonychus affinis*, 7; Jan 1932, predacious on red mite, 3.

NORTH ISLAND. Palmerston North (WI) and Makaraka (GB), 6 Dec 1931, W. Cottier, 2. ND, Pukemai, Hohonu Hbr, 1, (AMNZ); Mokohinau I., T. Brown and A. E. Brookes Collection, 1. AK, Maria I, Noises Is, 3; Whatipu, 4; Auckland, 35; Huapai, Auckland, 2 Dec 1958, R. Viney, feeding on *Panonychus affinis* on *Prunus persica* (L.) Batsch, 5; Corban's vineyard, Henderson (NN), [Auckland], 30 Mar 1967, *Eotetranychus semicalanus* (Riley) on *Vitis vinifera* L., 2; New Lynn, [Auckland], 26 Jan 1953, K.P. Lamb, predator of *Tetranychus arctus* on *Physalis peruviana* L., 3. CL, Little Barrier I, 1, (AMNZ); Ohena I, Ohena Is, 10; Ruamahutu I, Alderman Is, 1. WD, Hamilton, 1. BP, Manakau Plateau, 27 km W Rotorua, 1. GB, Gisborne, 1. TK, Waitara, 21 Feb 1979, N. A. Martin, predator of *Tetranychus arctus* on *Solanum aviculare*, 19. HB, Hawkes Bay, 20 Nov 1932, Adamson, red mites on *Salix officinalis* L., 8; Hawkes Bay Forests Ltd, 4, (FRNZ); Bluff Hill, Napier, 1; Hastings, 21 Aug 1957, N. B. Corydon, *Tetranychus arctus* on *Mahoe sylvestris*, 1; Hastings, 14; "Belmarven", Hawke's Bay North, 1. WN, Sakes V, Wellington, 1.

SOUTH ISLAND. SD, Stephens I, 5; Te Māhia, 27 Apr 1967, E. Collyer, pale larvae, 13; Te Māhia, 27 Apr 1967, on *Lycopersia*, pale larvae, 21, dark larvae, 3. NN, Totaranui Saddle, 2; Riwaka Hort. Res. Stn, 29; Nelson, 21 Mar 1921, on *Mahoe sylvestris*, 9; Nelson, 4 Feb 1925, E. S. Gourlay, A. E. Brookes Collection, 5; Nelson, 39; Nelson [incorrectly labelled as Wellington], 1965, E. Collyer, mites on *Mahoe sylvestris*, 1; DSIR Halifax St, [Nelson], Dec 1966, E. Collyer, on *Tetranychus arctus*, 1; DSIR Halifax St, [Nelson], Dec 1966, *Tetranychus arctus* on rose and melon, pale eggs and larvae, 11; Stannons citrus, [Nelson], Nov 1966, E. Collyer, on *Panonychus citri*, dark eggs, 1; Dun Track, Nelson, 19 Feb 1966, *Tetranychus arctus* on *Lycopersia*, 65; Dun Track, Nelson, 10 Feb 1967, E. Collyer, pale larvae, 6; Dun Track, Nelson, 10 Feb

1967, *Tetranychus arctus* on *Lycopersia*, pale larvae, 38; Mopua [W of Nelson], 1; Richmond, 18; Appleby, 28 Feb 1966, on *Tetranychus arctus* on clover delto., 11; Appleby, 1. MB, Blenheim, 7. BR, Lake Rotoua, 1; Capleton, T. Brown and A. E. Brookes Collections, 1. MC, Ashgah [= Methven], 14 Feb 1912, T. Brown and A. E. Brookes Collections, 1. CO, Clyde R., Central Otago, 1; Alexandra, 7; Watai Rock, Carrick Ra, 2; Earnsclough, 5.

Larval material examined. TK, Waitara, 21 Feb 1979, N. A. Martin, *Tetranychus arctus* on *Solanum aviculare*, NN, Dun Track, Nelson, 19 Feb 1966, *Tetranychus arctus* on *Lycopersia*, [also with *S. griseus* larvae].

Remarks. The male and female genitalia of *S. bifidus* are similar to those of the Australian *S. vagans* (Blackburn), except for the large teeth on the inner ventral edge of the siphonal apex and the longer and narrower median lobe and parameres in the male.

Sesthorus hirtus Chazeau

(Fig. 12, 13)

Sesthorus incompletus Whitehead, 1967a: 182, 1967b: 1565. Normen nudum.

Sesthorus nigripes Kapur sensu Britton & Lee, 1972: 59 (misident.).

Sesthorus hirtus Chazeau, 1974: 269; Gordon & Anderson, 1979: 62; Houston, 1980: 89; Gordon & Chapin, 1983: 272.

Sesthorus incompletus Chazeau, 1979: 300. New synonymy.

Adult

As described by Houston (1980) and Gordon & Chapin (1983) except: anterior third of genital plate (Fig. 12) twisted more than 90° to posterior part; spermatheca (Fig. 13) unpigmented and lightly annulate with thick corns, long narrow nodulus, and short pointed ramus.

Last instar larva

As described by Britton & Lee (1979), Houston (1980), and Gordon & Anderson (1979).

Type data. Holotype, Stannons citrus, [Nelson], Nov 1966, E. Collyer, *Panonychus citri*, dark eggs; another white label "*Sesthorus incompletus* Whitehead 72", and a red label "*Sesthorus incompletus* TYPE V.B.W. 72". Paratypes: 1, same

data as holotype; 5, Nelson (incorrectly labelled as Wellington), 1965, E. Collyer, mites on apple; 1 *S. griseus*, Dun Track, Nelson, 10 Feb 1967, E. Collyer; all also with another white label "*Stethorus incompletus* Whitehead 72", and an orange label "Paratype V.B.W. 72".

Adult material examined. New Zealand, Jan 1932, predaceous on red mite, 1; Jan 1932, J. Muggoridge, predaceous on red spider mite, 2 (paratypes of *S. bifidus*).

NORTH ISLAND. ND, Kerikeri, 20 Oct 1982, U. Gerson, feeding on *Panonychus citri* on Citrus, 15; Kerikeri, 4; AK, Auckland, 10; WO, Hamilton, 2. BP, Kaikati, 4, (FRNZ).

SOUTH ISLAND. NN, Nelson (incorrectly labelled as Wellington), 1965, E. Collyer, mites on *Mohr sylvestris*, 1; Stanton's citrus, [Nelson], Nov 1966, E. Collyer, *Panonychus citri*, dark eggs, 1 (paratype of *S. griseus*); Nelson, 2; Whangaroa Solle, 1.

Larval material examined. ND, Kerikeri, 20 Oct 1982, U. Gerson, feeding on *Panonychus citri* on citrus.

Remarks. The presence of a spermatheca was overlooked by previous authors except Whitehead (1967a). It is membranous and easily lost during dissection and only visible on a slide under a compound microscope. Australian specimens I examined also have a spermatheca.

DISCUSSION

Nomenclature

Whitehead (1967a) described both *S. griseus* and *S. incompletus* in his thesis, available only as microfilm or xerox copies. However, this does not constitute publication within the meaning of the International Code of Zoological Nomenclature (3rd ed., 1985) as it contravenes both articles 8 and 9. The two species are noted in Whitehead (1967b) without a description but with a reference to his unpublished thesis. Since

all information that affects nomenclature must be published within the meaning of the Code (article 7), *griseus* and *incompletus* are nomina nuda in Whitehead (1967a, b). Chazeau (1979) erroneously believed that the names were available and used them in a key. Since this action satisfies Article 13 of the Code, both names became available with Chazeau as their authority. Gordon & Chapin (1983) supported this interpretation.

Chazeau (1979) specifically noted that the type and paratypes of *S. incompletus* were deposited in NZAC, so that Whitehead's type series can apply directly Chazeau's *S. incompletus*. Although Chazeau did not mention the types of *S. griseus*, this species is also based on the description and therefore specimens of Whitehead (1967a); so I have here designated as lectotype the specimen labelled as type by Whitehead.

Affinities and distribution

S. griseus and *S. bifidus* are endemic to New Zealand (both with an earliest dated record of Feb 1912) and their closest relatives are in Australia. *S. nigripes* and *S. vagans*, respectively. *S. griseus* and *S. nigripes* are related to species in south-east Asia particularly *S. pasperculatus* Weise and *S. parasperculatus* Pang, whereas the genitalic characters of *S. bifidus* and *S. vagans*, show closest resemblance to those of *S. vietnamicus* Hoang from Vietnam.

S. citrici has an unusual distribution, being found on the Reunion Islands in the Indian Ocean, Australia, New Caledonia, New Zealand, Chile, and Mexico. It has been present in New Zealand since at least 1932, while the earliest Australian record is 1892 (Houston 1980). It is related to species in south-east Asia and the Pacific, particularly *S. yunnanensis* Pang & Mao, *S. guangxiensis* Pang & Mao and *S. guierrensi* Chazeau. The Australian species *S. nigripes*, as *S. lintoni* Britton & Lee a junior synonym, was recorded from Wellington, New Zealand [NZAC] by Chazeau (1983). He borrowed specimens from Whitehead's (1967a) type series of *S. griseus* and *S. incompletus* (R. Crow, pers. comm. 1988), but did not label any

Table 1. Tetranychid prey of *Stethorus* recorded from specimens examined.

<i>Stethorus</i>	Tetranychidae				
	<i>Bryobia</i> eggs	<i>Eotetranychus acromaculatus</i>	<i>Panonychus citri</i>	<i>Panonychus ulmi</i>	<i>Tetranychus urticae</i>
<i>griseus</i>			X		X
<i>bifidus</i>	X	X	X	X	X
<i>citrici</i>			X		

as *S. lozoni*. Whitehead gave the "type locality" of both species as Wellington, but in fact all types were collected from the Nelson district (see material examined). Of the 26 types of *S. griseus* examined there were 25 *S. griseus* (1 incorrectly labelled Wellington) and 1 *S. aisorio*, whereas the 8 types of *S. inaequalis* included 7 *S. aisorio* (5 incorrectly labelled Wellington) and 1 *S. griseus*. The only other specimens from Wellington were 2 *S. bifidus*, one of which was incorrectly labelled. There were no *S. nigripes* amongst all the material examined. Thus Chazeau's record of *S. nigripes* from New Zealand is a misidentification which cannot be attributed to a particular species.

Prey

Table 1 shows the acaronyctid prey of the three *Sethorus* species noted from the specimens examined. Gordon & Chapin (1983) listed other prey records for *S. aisorio*. The prey records and biological work of Contier (1934) on "*Scyenus* sp." and Collyer (1964) on "*S. bifidus*" cannot be reliably attributed to particular species. The descriptions of the life history stages and biology of Contier (1934) are applicable to many *Sethorus* species, except that the larva can be recognised as that of *S. bifidus*.

Identification and colour patterns of last instar larvae

S. aisorio is easily recognised by its characteristic pigmentation (Brimon & Lee 1972, fig. 3 as *S. nigripes* and Gordon & Anderson 1979, fig. 6), as can pigmented last instar larva of *S. bifidus* (Contier 1934, fig. 1A as *Scyenus* sp.). Although all specimens of *S. griseus* examined were unpigmented, fresh material may show they are also characteristically pigmented. Unpigmented larvae of *S. bifidus* and *S. griseus* can be recognised by the more elongate narrower maxillary and labial palps and longer posterior setae on the mentum-submentum of *S. bifidus*, as well as differences in the number and arrangement of apical hairs on the tibia-tarsi.

Collyer (1964) noted both light and dark coloured eggs and larvae of "*S. bifidus*". However, later material from 1966 and 1967 placed by her in these categories were not conspecific. I identified the following species from it: dark eggs: *S. griseus* 1, *S. bifidus* 1, *S. aisorio* 3; pale eggs: *S. bifidus* 11; dark larvae: *S. griseus* 24, *S. bifidus* 3; pale larvae: *S. griseus* 4, *S. bifidus* 89. Thus these colours are not taxonomic characters and probably depend on the

internal body pigments in the prey of adults or larvae.

ACKNOWLEDGMENTS

I thank the curators of the institutions cited above for the loan of specimens in their care. In particular, I am grateful to Dr J. C. Watt, DSIR, Auckland, for the loan of many specimens of *Sethorus* and taxonomic advice; Dr B. A. Holloway for information on collection data; and Dr B. K. Carroll for many helpful comments on the manuscript.

REFERENCES

- Bielawski, R. 1976: *Rhynobirni, Sethorini, Scymnini et Pharini (Coleoptera, Coccinellidae) de Nouvelle Calédonie*. *Annales zoologiques* 30 (14): 387-409.
- Beitán, E. B.; Lee, B. 1972: *Sethorus lozoni* sp. n. (Coleoptera: Coccinellidae), a newly discovered predator of the two-spotted mite. *Journal of the Australian Entomological Society* 11(1): 55-60.
- Chazeau, J. 1979: *Mise au point sur le genre Sethorus en Océanie et description de deux espèces nouvelles de Melanesie (Col., Coccinellidae)*. *Entomophaga* 24 (7): 299-303.
- : 1983: *Deux prédateurs de Tetranychidae en Nouvelle-Guinée: Sethorus expectatus* n. sp. et *Sethorus crassibialis* n. sp. (Col., Coccinellidae). *Entomophaga* 28(4): 373-378.
- Chazeau, J.; Biéme, J.; Fursch, H. 1974: *Les Coccinellidae de l'Ile de la Réunion (Insecta: Coleoptera)*. *Bulletin du Muséum National D'Histoire Naturelle 3e série, no. 219, Zoologie* 140: 285-297.
- Collyer, E. 1964: *Phytophagous mites and their predators in New Zealand orchards*. *New Zealand journal of agricultural research* 7 (4): 551-568.
- Contier, W. 1934: *The natural enemies of the European red-mite in New Zealand*. *The New Zealand journal of science and technology* 16 (2): 68-80.
- Crosby, T. K.; Daggdale, J. S.; Watt, J. C. 1976: *Recording specimen localities in New Zealand: an arbitrary system of areas and codes defined*. *New Zealand Journal of Zoology* 3: 69 and map.
- Gordon, R. D.; Anderson, D. M. 1979: *The genus Sethorus Weise (Coleoptera: Coccinellidae) in Chile*. *The Coleopterists bulletin* 33(1): 61-67.
- Gordon, R. D.; Chapin, E. A. 1983: *A revision of the New World species of Sethorus Weise (Coleoptera: Coccinellidae)*. *Transactions of the American Entomological Society* 109: 229-276.
- Houston, K. J. 1980: *A revision of the Australian species of Sethorus Weise (Coleoptera: Coccinellidae)*. *Journal of the Australian Entomological Society* 19(2): 81-91.

- Kapur, A.P. 1948: On the Old World species of the genus *Sarkarar* Weise (Coleoptera: Coccinellidae). *Bulletin of Entomological Research* 39: 297-320.
- Whithead, V. B. 1947a: The validity of the higher taxonomic categories of the tribe Scymnini (Coleoptera: Coccinellidae). Dissertation, Doctor of Philosophy in Entomology, University of California, Berkeley. 312 p.
- 1947b: The validity of the higher taxonomic categories of the tribe Scymnini (Coleoptera: Coccinellidae). *Dissertation Abstracts* 8: 2884; 1948.