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A REVISION OF THE AUSTRALIAN SPECIES OF *STETHORUS* WEISE (COLEOPTERA: COCCINELLIDAE)

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Abstract

The adult and larva of *Stethorus fenestralis* sp. n. are described and *S. histrio* Chazeau recorded from Australia for the first time. *S. loxtoni* Britton and Lee is shown to be a synonym of *S. nigripes* Kapur. Additional information is given for the adults of *S. vagans* (Blackburn), *S. nigripes* and *S. histrio*, and their larvae are described. Keys are provided to adults and last instar larvae of the Australian species.

Introduction

The large genus *Stethorus* Weise has a world-wide distribution, but only three species have been described from Australia. Blackburn (1892) described *S. vagans* (in *Scymnus* Kugelann), Kapur (1948) described *S. nigripes* and redescribed *S. vagans*, while Britton and Lee (1972) described *S. loxtoni* and figured the male genitalia and larvae of all three species. The adults are minute black beetles and both adults and larvae are predators of tetranychid mites.

In a study of the morphology of larval coccinellids, a new species of *Stethorus* was recognised in material collected from coastal Queensland and is described below. In addition, a number of anomalies noticed between *S. nigripes* Kapur and *S. nigripes sensu* Britton and Lee, similarities between the latter and *S. histrio* Chazeau, and similarities between *S. nigripes* Kapur and *S. loxtoni* indicated that a revision of the Australian species of *Stethorus* was warranted.

The following abbreviations are used for institutions and collectors: ANIC Australian National Insect Collection, CSIRO, Canberra; BM British Museum (Natural History), London; NT Scientific Services Section, Department of Primary Industry, Darwin; ORSTOM Office de la Recherche Scientifique et Technique Outre-Mer, Noumea; QDPI Queensland Department of Primary Industries, Brisbane; QM Queensland Museum, Brisbane; SAM South Australian Museum, Adelaide; TDA Tasmanian Department of Agriculture, Hobart; WAM Western Australian Museum, Perth; AA A. Allwood; JHB J. H. Barrett; RB R. Black; EBB E. B. Britton; PC P. Cochereau; ICC I. C. Cunningham; JJD J. J. Davis; MD M. DeBaar; AD A. Dobson; RHE R. H. Edmonds; BE B. Edwards; RJE R. J. Elder; JF J. Fanika; BAF B. A. Franzmann; HGG H. G. Greening; JFG J. F. Grimshaw; JG J. Gutierrez; KJH K. J. Houston; NMH N. M. Hudson; BI B. Ingram; DAI D. A. Ironside; EJ E. Jarvis; HJ H. Jarvis; BL B. Lee; MM M. MacQuillan; LEM L. E. Markwell; LM L. Miller; DAM D. A. Murray; AJN A. J. Nicholson; MIN M. I. Nikitin; J. R. J. Robb; GR G. Rothschild; JHS J. H. Simmonds; DS D. Smith; MAS M. A. Stephenson; MS M. Stone; GS G. Swaine; RET R. E. Turner; EJW E. J. Watson; GRW G. R. Wearne; GW G. Weave; RW R. Wicks; AW A. Wilson; VJW V. J. Wright; FRW F. R. Wylie; RAY R. A. Yule.

Keys to Australian species of *Stethorus*

The term "pseudotruncate" is applied to larval setae with a basal truncate part and a bluntly pointed apical part (Fig. 30).

Adults

1. Elytral setae sparse and semierect (Britton and Lee 1972, Plate 1C); femoral line complete (Figs 3, 27); antennae and mouthparts yellow; punctures on midposterior part of metasternum deep (Fig. 1) 2

   Elytral setae denser and depressed (Britton and Lee 1972, Plate 1A, 1B); femoral line usually incomplete (Figs 4, 28); antennae and mouthparts light brown to black (yellow in some *S. histrio*); punctures on midposterior part of metasternum shallow (Fig. 2) .. 3

2. Femoral line reaching about half distance between hind coxa and posterior margin of abdominal sternite 1 (Fig. 3); lateral part of metasternum and area within femoral line partly reticulate

(Figs 1, 3); femora brown to dark brown; male abdominal sternite 6 evenly rounded .. .. **fenestralis** sp. n.

Femoral line reaching about three-quarters distance between hind coxa and posterior margin of abdominal sternite 1 (Fig. 27); lateral part of metasternum and area within femoral line without reticulation (Fig. 27); femora yellow (sometimes brown); male abdominal sternite 6 with a deep triangular emargination .. .. **vagans** (Blackburn)

3. Antennae, mouthparts and tibiae grey black to black; metasternum convex posteriorly with oblique grooves anteriorly on either side of midline (Fig. 2); male abdominal sternite 6 evenly rounded .. .. **nigripes** Kapur

Antennae, mouthparts and tibiae light brown to yellow; metasternum flat posteriorly, without anterior grooves; male abdominal sternite 6 truncate posteriorly .. .. **histrio** Chazeau

Last instar larvae

1. Head unpigmented dorsolaterally; pigmentation scattered on pronotal and mesonotal plates (Fig. 10); dorsal setae simple (Fig. 29) 2

Head pigmented dorsolaterally; pigmentation fused at inner posterior corner of pronotal plates; mesonotal plates mostly pigmented; most dorsal setae pseudotruncate (Fig. 30) 3

2. Metanotal plate pigmented except for a clear circular area midlaterally; dorsal tubercles of abdominal segment 1 with much fusion of pigment (Fig. 10); lateral tubercles of meso- and metathorax with one long seta .. .. **fenestralis** sp. n.

Metanotal plate with scattered pigment; dorsal tubercles of abdominal segment 1 with little fusion of pigment (Britton and Lee 1972, Fig. 1); lateral tubercles of meso- and metathorax with two to three long, zero to two short setae .. . **vagans** (Blackburn)

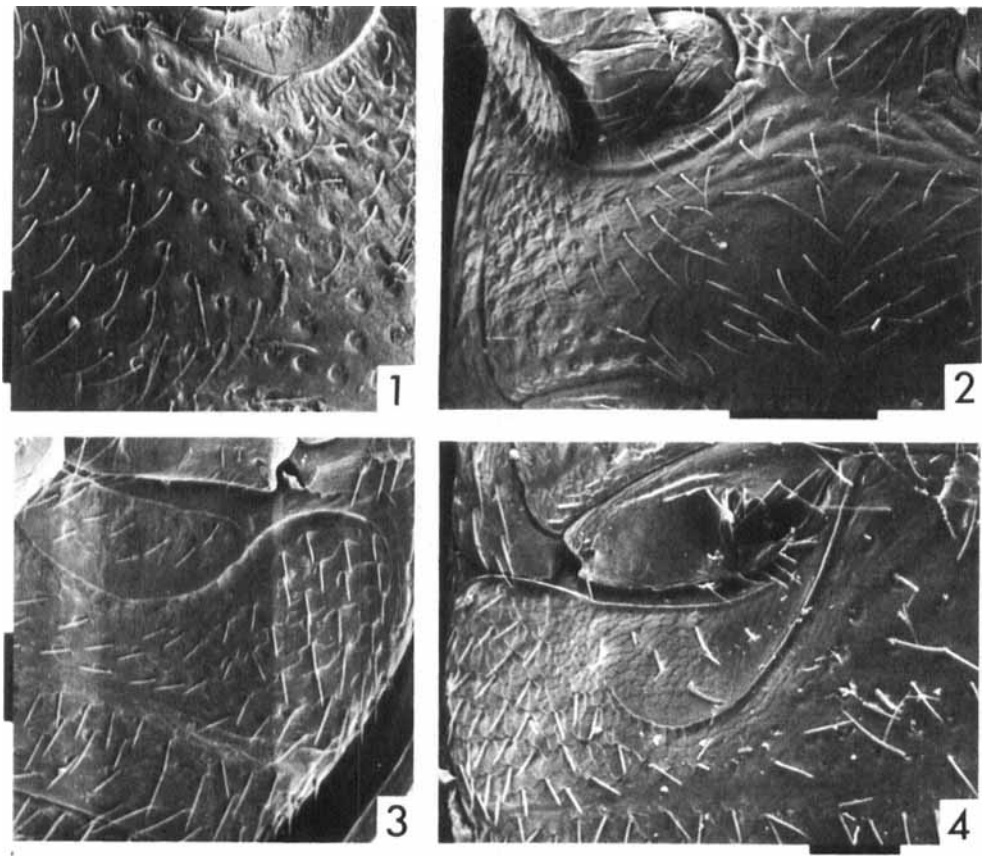
3. Dorsal abdominal tubercles and abdominal segment 9 with no pigment or some setae with pigmented bases (Britton and Lee 1972, Fig. 2); dorsal abdominal tubercles with three long, zero to one minute setae; dorsolateral abdominal tubercles with two long, one to two short setae .. .. **nigripes** Kapur

Pigment fused on dorsal abdominal tubercles and abdominal segment 9 with two dorsal pigmented plates fused anteriorly (Britton and Lee 1972, Fig. 3); dorsal abdominal tubercles with four to five (mostly four) long, zero to two small setae; dorsolateral abdominal tubercles with two to four (mostly three) long, zero to two short setae .. .. **histrio** Chazeau

Stethorus fenestralis sp. n. (Figs 1,3,5-14,29)

Types.—QUEENSLAND: *holotype* ♂, Brisbane, iv.1978, K. J. Houston, ex mites on mulberry tree, in QM (T.8198). *Paratypes:* 30, same data as holotype, five in ANIC, five in BM, 10 in QDPI, five in QM (T.8199-8203), five in SAM; 52, Brisbane, iii.1978, K. J. Houston, ex mites on mulberry tree, 10 in ANIC, five in BM, 12 in QDPI, 10 in QM (T.8204-8213), 10 in SAM, five in WAM.

Other non-type specimens examined.—QUEENSLAND: three, Innisfail, 21.iii.1976, KJH, on *Morus alba* L.; 113, Mission Beach, 4.iv.1976, KJH, on *Musa*; four, Tully, 4.viii.1970, BAF, on *Musa*; three, Sarina, viii.1926, JHS, on *Manihot esculenta* Crantz; one, Rockhampton, 4.x.1974, RJE, on cucurbit; four, Yarwun, 8.ii.1973, RW, on *Carica papaya* L.; Biloela Research Station, on *Ricinus communis* L.; two, 15.x.1974, MS, 18, 9.iv.1976, KJH; five, Gympie, 5.i.1937; three, Coolum, 22.viii.1934; one, Nambour, 12.vii.1972, DAM, on *Musa*; seven, Maroochydore Horticultural Research Station, 26.viii.1959, HGG, on *Carica papaya*; two, Maroochydore Horticultural Research Station, 2.i.1964, JJD, on *Musa*; two, Maroochydore, 8.i.1977, KJH; two, Woombye, 11.v.1974, DS; N. rangba, predator of *Tetranychus lambi* Pritchard and Baker on *Musa*, three, 14.i.1971, GS, four, 13.i.1972, AD; two, Brisbane, 12.viii.1943, HJ, on madagascar beans; two, Brisbane, 15.i.1947, predator of *T. urticae* Koch on *Carica papaya*; one, Brisbane, 23.ii.1975, KJH, predator of *T. lambi* on *Carica papaya*; 37, Brisbane, 15.iv.1976, KJH, predator of *Tetranychus* sp. on *Morus alba*; Brisbane, KJH, on *Morus alba*, three, 17.iv.1976, one, 23.ii.1978; two, Brisbane, 20.x.1976, JG, predator of *T. hydrangeae* Pritchard and Baker on *Convolvulus* (ORSTOM); 23, Brisbane, ii-iii.1978, KJH, on *Carica papaya*; one, Brisbane, 8.vi.1978, JFG, on *Brachychiton*; one, Redland Bay, 16.ii.1950, on *Musa*; one, Mt Tamborine, 11-17.v.1935, RET (BM); one, Mt Gipps area, 4.iii.1975, KJH. All in QDPI except as indicated.



FIGS **1-4**—*Stethorus* spp.: **(1,2)** metasternum: **(1)** *S. fenestralis* sp.n., right side; **(2)** *S. nigripes* Kapur, left side; **(3,4)** femoral line of abdominal sternite 1: **(3)** *S. fenestralis*; **(4)** *S. nigripes*. (Scale = 40μm for 1,3,4; = 100μm for 2.)

Larval (non-type) material examined.—QUEENSLAND: Mossman, 25.iii.1976, KJH; Innisfail, 21.ii.1976, KJH, on *Morus alba*; Mission Beach, 4.iv.1976, KJH, on *Musa;* Biloela Research Station, 15.x.1974, MS, on *Ricinus communis*; Biloela Research Station, 9.iv.1976, KJH, on *Ricinus communis*; Brisbane, 20.xi.1947. HJ, predator of *T. urticae*; Brisbane, 15.iv.1976, KJH, predator of *Tetranychus* sp. on *Morus alba*. All in QDPI.

Adult

Body black. Antennae, labrum, mouthparts yellow to reddish yellow. Trochanters and femora brown to dark brown, tibiae and tarsi yellow to reddish yellow. Body shortly oval, length 0.9-1.1 mm, width 0.65-0.8 mm. Elytra with long, sparse, semierect pubescence, denser, short, depressed pubescence ventrally. Punctures small, sparse, moderately deep on elytra, closer, small, shallow on pronotum and navel-like laterally. Metasternum and abdomen reticulate laterally, with small, deep punctures becoming shallower laterally (Fig. 1). Femoral line complete, extending about half distance between hind coxa and posterior margin of abdominal sternite 1 (Fig. 3); area within femoral line punctate and reticulate anteriorly, posterior quarter smooth. Abdominal sternite 6 evenly curved in both sexes. Wings (Fig. 9) similar to those of *S. vagans* but with R3 only faintly reaching and extending along or not reaching margin, and Mr often pointed and detached from M4 + Cu distally; R1 absent.

Male genitalia.—Sipho (Fig. 5) long, strongly curved basally; most of apex membranous with sharply pointed sclerotised part; siphonal capsule quadrangular, edges often unpigmented. Trabes about as long as tegmen (Figs 6,7) with small knob basally. Height, length and width of basal piece about equal. Median lobe about four times longer than basal width, cone-shaped in dorsal view and dagger-shaped in side view with distal quarter slightly concave. Parameres longer than median lobe; ventrally with eight to 10 long apical setae, smaller scattered setae, and pores on basal two-thirds.

Female genitalia.—Genital plates (Fig. 8) reticulate, median half with many pores, apex with two to five setae (mostly three to four), inner margin unpigmented. Spermatheca absent.

Last instar larva

Body length 1.69-2.34 mm; head width 0.26-0.28 mm; length of fore tibiotarsus 0.1-0.12 mm. Body narrow, fusiform, moderately convex. Dorsal setae long and simple (i.e. tapering uniformly to a point) with many minute spicular branches (Fig. 29).

Head poorly pigmented but bases of some setae pigmented; often with pair of small, dorsal, yellowish brown spots midanteriorly; pale ventrolaterally except for light brown, triangular areas from base of maxillae to ocelli. Two large ocelli just posterior to antennae and much smaller ocellus posterior to them, separated by about diameter of large ocellus (Van Emden 1949, Fig. 35). Antennae (Fig. 11) with single, narrow, ring-shaped segment, apex membranous with number of small sensilla and one large sensillum five to six times as long as basal width. Mandibles (Fig. 12) with membranous prostheca, mandibular apex acute and entire. Maxillary palps (Fig. 13) three-segmented, two short ring-shaped segments and elongate tapering apical segment more than twice as long as basal width; fused stipo-cardes with four setae, one on median sclerotised inner margin which reaches base of maxilla; mala large, membranous, apically rounded. Labial palps (Fig. 14) two-segmented, with short ring-shaped segment and elongate tapering terminal segment more than twice as long as basal width; each palp with basal sclerotised band with large median seta and small lateral seta; fused mentum-submentum with three pairs of setae, anterior pair small and posterior pair longest.

Thorax.—Pronotal and mesonotal plates ill-defined with scattered pigmentation; metanotal plates dark brown with unpigmented circular area midlaterally, this sometimes so reduced as to be barely indicated (Fig. 10). Both meso- and metathorax with pair of lateral tubercles each bearing single long seta with pigmented base. Legs short and robust with 12 long, clavate, apical setae (similar to those of *S. nigripes*, Fig. 15) on tibiotarsus; claws toothed basally.

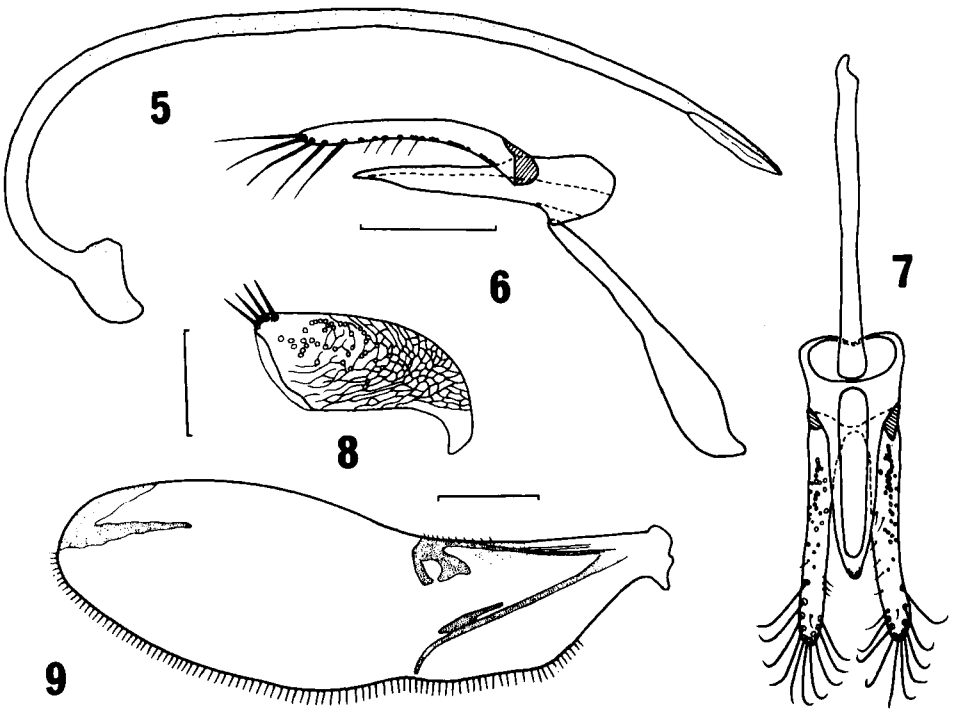
Abdomen.—Abdominal segments 1-8 with three pairs of pigmented setiferous dorsal tubercles; pigmentation heaviest on segment 1, progressively reduced posteriorly. Dorsal tubercles with incomplete ring of pigmentation enclosing clear oval area. Dorsal tubercle 3-4 (3)L, 0-1M; dorsolateral tubercle 3L, 1-2S; lateral tubercle 2-4 (3)L, 1-3S-M (L, S and M are long, short and minute setae respectively, number in parentheses is number of setae most commonly found). Abdominal segment 9 with scattered setae and pigmentation dorsally.

Distribution

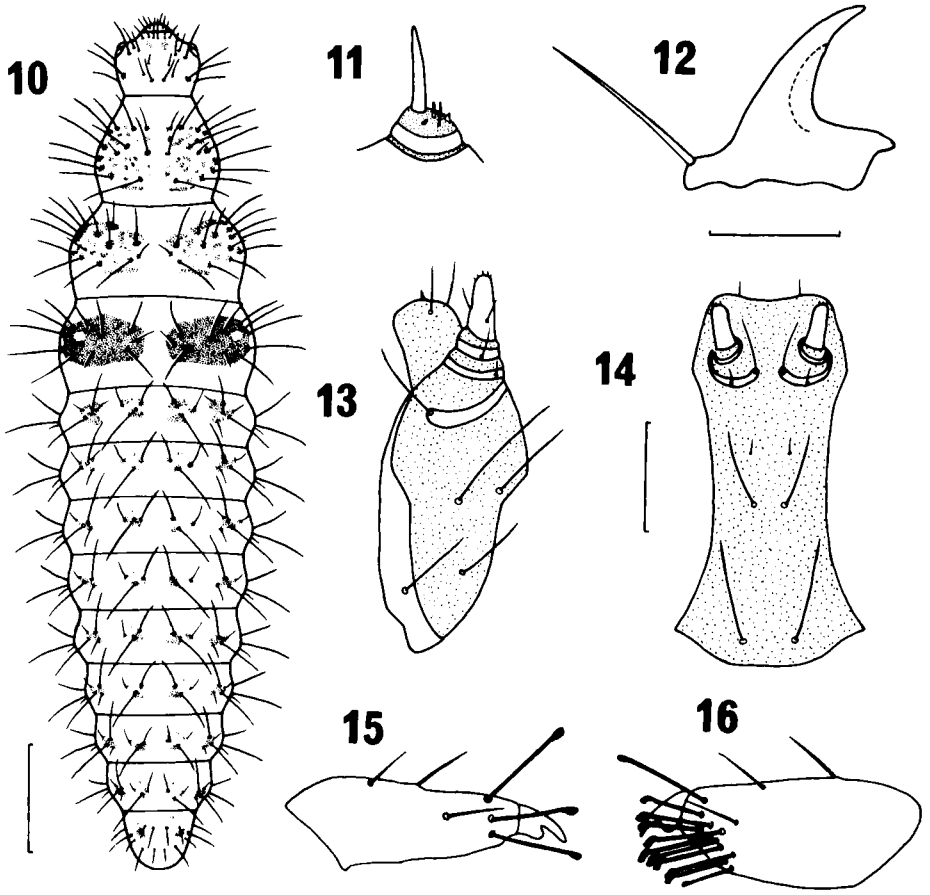
S. fenestralis appears to be restricted to coastal and subcoastal Queensland with the Queensland part of the Mt Gipps area being the most southern known record.

Affinities

This species may be grouped with *S. fijiensis* Kapur from Fiji on the basis of similarities in the male genitalia, the narrow complete femoral lines and the absence of a spermatheca in the female.



FIGS 5-9—*Stethorus fenestralis* sp.n.: (5-7) male: (5) sipho, lateral aspect; (6) tegmen, lateral aspect; (7) tegmen, ventral aspect; (8) female, genital plate; (9) wing. (Scale = 0.1 mm for 5-7; = 0.05 mm for 8; = 0.3 mm for 9.)



FIGS **10-16**—*Stethorus* spp., last instar larvae: **(10-14)** *S. fenestralis* sp.n.: **(10)** dorsum; **(11)** antenna; **(12)** mandible; **(13)** maxilla; **(14)** labium; **(15,16)** tibiotarsus, showing setae on one side only: **(15)** *S. nigripes* Kapur; **(16)** *S. histrio* Chazeau. (Scale = 0.3 mm for 10; = 0.04 mm for 11,12; = 0.05 mm for 13-16.)

Stethorus vagans (Blackburn) (Figs 17-21, 27)

Scymnus vagans Blackburn, 1892: 248, 250; Korschefsky, 1931:149.
Stethorus vagans: Weise, 1908:13; Kapur, 1948:316, designated lectotype; Britton and Lee, 1972:56-59.

Types.—Lectotype ♂, Australia, Blackburn Coll., B.M. 1910-236, 4501 T, Vict., in BM. *Other members of syntypic series studied:* one *S. vagans* ♂ and two *S. histrio* on one card labelled "Australia, Blackb's Coll." and "co-types" in SAM (specimens remounted separately).

Other specimens examined.— NEW CALEDONIA: two, Noumea, 1973, PC. AUSTRALIA: four, Croyden, 7.iii.1892, W.W. Froggatt Collection, on lily; 1971, BL, ex culture, 62 (ANIC), one (WAM); 78, 10.v.1976, BL, bred CSIRO lab.; 24, no collection data. NORTHERN TERRITORY: two, Darwin, 23.vii.1978, AA, on *Carica papaya* (NT). QUEENSLAND: Rockhampton, 4.x.1974, RJE, one on *Carica papaya*, five on *Rosa* sp. (QDPI); one, Biloela Research Station, 9.iv.1976, KJH, on *Ricinus communis* (QDPI); one, Montville, 1.iv.1963, JJD and DAI, on *Morus alba* (QDPI); five, near Beerburrum, 30.viii.1978, per MD, predator of *Oligonychus* sp. on *Pinus caribaea* Morelet. (QDPI); three, Narangba, 13.i.1972, AD, predator of *T. lambi* on *Musa* (QDPI); four, Brisbane, 22.x.1909, EJ, on flowers (QDPI); five, Brisbane, 12.viii.1943, HJ, on madagascar beans (QDPI); one, Brisbane, x.1974, KJH (QDPI); 12, Brisbane, 23.ii.1975, KJH, predator of *T. lambi* on *Carica papaya* (QDPI); Brisbane, KJH, on *Morus alba*, 28, 15.iv.1976, two, 15.iv.1977, eight, iv. 1978 (QDPI); one, Brisbane, 24.x.1976, JG, predator of *T. hydrangeae* on *Eichhornia crassipes* (Mart.) Solms-Laub. (ORSTOM); two, Brisbane, ii-iii.1978, KJH, on *Carica papaya* (QDPI); 11, Redland Bay, 28.viii.1974, LEM, predator of *T. urticae* on *Fragaria* x *ananassa* Duchesne (QDPI); one, Toowoomba, xii.1938 (QDPI); one, Applethorpe, vii.1974, BI, predator of *T. urticae* on *Glycine max* (L.) Merr. in glasshouse (QDPI); three, Applethorpe, 18.iii.1975, KJH, on *Malus sylvestris* Mill. (QDPI). NEW SOUTH WALES: one, Murwillumbah, 18.iv.1960, GW; one, Sydney, 27.i.1965, VJW, on *Citrus limon* (L.) Burm.f. (BM); one, Cabramatta Valley of Georges River, 13.ix.1960, MIN (BM); one, Griffith, 14.iii.1972, MM, on *Malus sylvestris*; 115, Griffith, 20.iv.1972, BE; three, Leeton District, 2.iii.1951, EJW (BM). AUSTRALIAN CAPITAL TERRITORY: 15 ♂♂, Lyneham, 11.vii.1972; one, Narrabundah, 20.i.1966, AW; Narrabundah, ix.

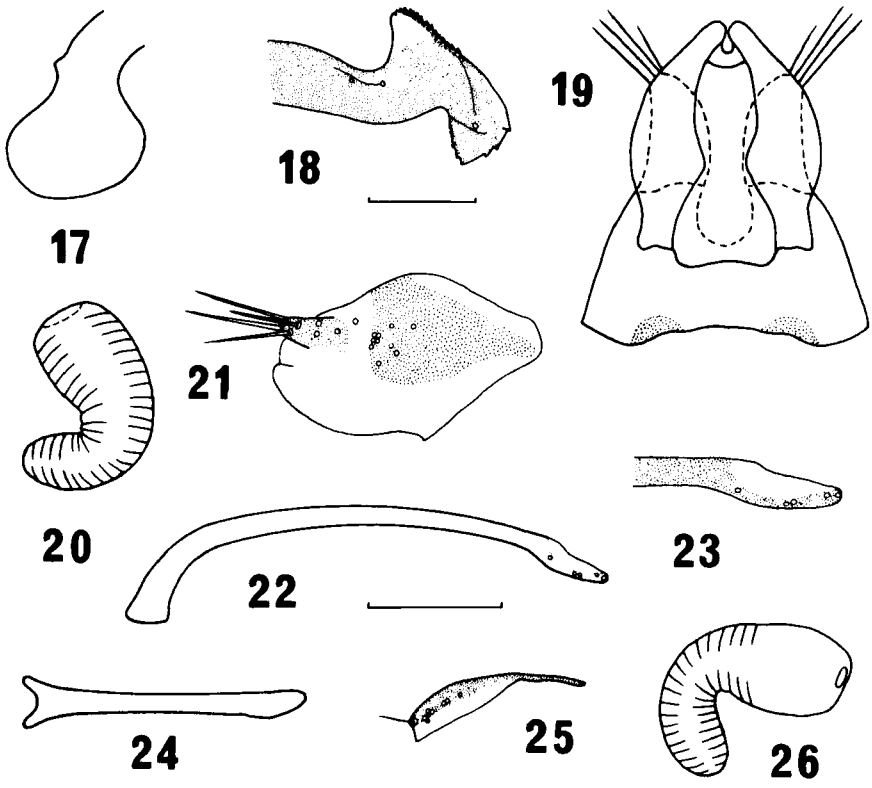
1970, BL, in apple orchard, 28 (ANIC), two (WAM); nine, Narrabundah, 1970; seven, Narrabundah, 18.iii.1971, EBB; 10, Weise orchard, 13.ii.1969, in apple leaves. SOUTH AUSTRALIA: 20, Berri, 26.iv.1972, MM, on *Pyrus communis* L.; nine, Loxton, 2.ii.1972, GR, on *Prunus persica* (L.) Batsch.; two, Blackwood, 6.ii.1967. WESTERN AUSTRALIA: two, Pemberton, 4.iv.1973, RHE, on *Prunus persica* and *Rubus fruticosus* L. agg.; 18, Denmark, 4.iv.1973, RHE, on *Ficus*; Albany, 3.iv.1973, RHE, seven on *Malus sylvestris*, 11 on *Prunus persica*; 22, Albany, 4.iv.1973, JR, on *Ficus*; four, Albany, 4.iv.1973, RHE, on *Malus sylvestris* and *Prunus persica*; five, in orchards, 1972; 11, in orchards. VICTORIA: one, Ardmona-Mooroopna, 20.i.1937, AJN, on *Quercus*; three, Tatura, 26.viii.1966, AW; seven, Tatura, 16.ii.1967, on *Malus sylvestris*; Hastings, 9.ii.1967, four (ANIC), two on *Malus sylvestris* (BM). TASMANIA: three, Legana, 7.iv.1977, LM, in orchard litter (TDA); three, Glenorchy, 20.iii.1973, MAS, on *Rubus idaeus* L. (TDA); one, West Hobart, 30.iii.1973, MAS, with *T. urticae* on runner bean (TDA); Grove, 8.ii.1967, two (ANIC), one (BM); seven, Grove, 29.viii.1968, in dead leaves at bases of *Malus sylvestris* trees in orchard; one, Grove, 29.iv.1968, NMH; Grove, MAS, one, 8.iv.1971, one, 13.iv.1971, one, 23.ix.1971, one, 29.x.1971 (TDA); two, litter (QM). All in ANIC except as indicated.

Larval material examined.—AUSTRALIA: no collection data (ANIC). QUEENSLAND: Rockhampton, 4.x.1974, RJE, on *Rosa* sp.; Brisbane, x.1974, KJH; Brisbane, 23.ii.1975, KJH, predator of *T. lambi* on *Carica papaya*; Brisbane, 15.iv.1976, KJH, predator of *Tetranychus* sp. on *Morus alba*; Redland Bay, 28.viii.1974, LEM, predator of *T. urticae* on *Fragaria* x *ananassa*. All in QDPI except as indicated.

Adult

As described by Kapur (1948) and Britton and Lee (1972) with the following qualifications or additions: femora and tibiae yellow but light brown to brown in some specimens; close, deep, large punctures ventrally but shallower and sparser laterally on abdominal sternites; abdomen lightly reticulate laterally; area within femoral line with punctures basally, posterior half smooth (Fig. 27); abdominal sternites 5, 6 sometimes brown; wings as in Britton and Lee (1972, Fig. 8) except distal part of Mr may be detached from M4 + Cu as in *S. fenestralis* and R1 may be present.

Male genitalia.—Sipho stout with right-angled curve proximally; hammer-shaped distally in lateral view (Fig. 18) with dorsal corner and outer ventral edge partly unpigmented, small crenulations on outer dorsal edge, small teeth on inner ventral and ventral edges; apex flattened and thinner than rest of sipho in



FIGS **17-26**—*Stethorus* spp.: **(17-19)** *S. vagans* (Blackburn), male: **(17)** siphonal capsule, lateral aspect; **(18)** apical part of sipho, lateral aspect; **(19)** tegmen, ventral aspect (trabes not shown); **(20,21)** *S. vagans*, female: **(20)** spermatheca; **(21)** genital plate; **(22-24)** *S. nigripes* Kapur, male: **(22)** sipho, lateral aspect; **(23)** apical part of sipho, lateral aspect; **(24)** trabes, dorsal aspect; **(25,26)** *S. nigripes*, female: **(25)** genital plate; **(26)** spermatheca. (Scale = 0.05 mm for 17-21,23,25,26; = 0.1 mm for 22,24.)

dorsal view; siphonal capsule (Fig. 17) knob-shaped, slightly larger on outer side and divided in ventral view. Trabes longer than tegmen, narrowing and divided proximally, one arm short and unpigmented. Basal piece about twice as wide as long and about one and a half times as deep as long. Median lobe longer than parameres; dome-shaped in ventral view (Fig. 19), as long as wide and apically cleft; about half as deep as long in lateral view with a small rise ventrally at about one-third length from base. Parameres with three to four apical setae, most pores ventrally on proximal outer side.

Female genitalia.—Genital plates (Fig. 21) largely unpigmented, pointed posteriorly with three to four setae, pores in posterior half. Spermatheca (Fig. 20) bent, proximal arm longer and wider than distal arm.

Last instar larva

Body length 1.82-2.34 mm; head width 0.22-0.25 mm; length of fore tibiotarsus 0.1-0.13 mm. Body and setae similar to those of *S. fenestralis*.

Head usually unpigmented but some setae may have lightly pigmented bases. Antennae, mouthparts similar to those of *S. fenestralis* but less pigmented, terminal segments of maxillary and labial palps longer (less than three times as long as basal width) and anterior pair of setae on mentum-submentum relatively longer than those of *S. fenestralis* but still shorter than median pair.

Thorax with scattered pigment at bases of setae; pronotum with two weakly defined plates; mesonotal plates often with lightly pigmented area on midanterior margin; metanotal plate often with lightly pigmented areas on midanterior and posterolateral margins (Britton and Lee 1972, Fig. 1), fused in some larvae. Lateral tubercles of meso- and metathorax with 2-3(3)L, 0-2S (one or two setae with pale pigmented bases). Legs with 10 long, clavate, apical setae.

Abdomen.—Bases of setae lightly pigmented, tending to fuse on dorsal and dorsolateral tubercles. Dorsal tubercle 3L, 0-1M; dorsolateral tubercle 3L, 1-3(2)S; lateral tubercle 2-4(4)L, 1-3S. Abdominal segment 9 with scattered setae and pigmentation dorsally.

Distribution

S. vagans is a very widespread and common species in Australia and is also found in New Caledonia.

Affinities

S. vagans is closely related to *S. bifidus* Kapur from New Zealand, having similar male and female genitalia, complete and wide femoral lines and male abdominal sternite 6 with a deep triangular emargination.

Comments

Blackburn's description of *S. vagans* is inadequate; the only useful character for recognising which species he described is the complete femoral lines (=abdominal lamellae).

Stethorus nigripes Kapur (Figs 2,4,15,22-26)

Stethorus nigripes Kapur, 1948:316,317.
Stethorus loxtoni Britton and Lee, 1972:56-59. Syn.n.

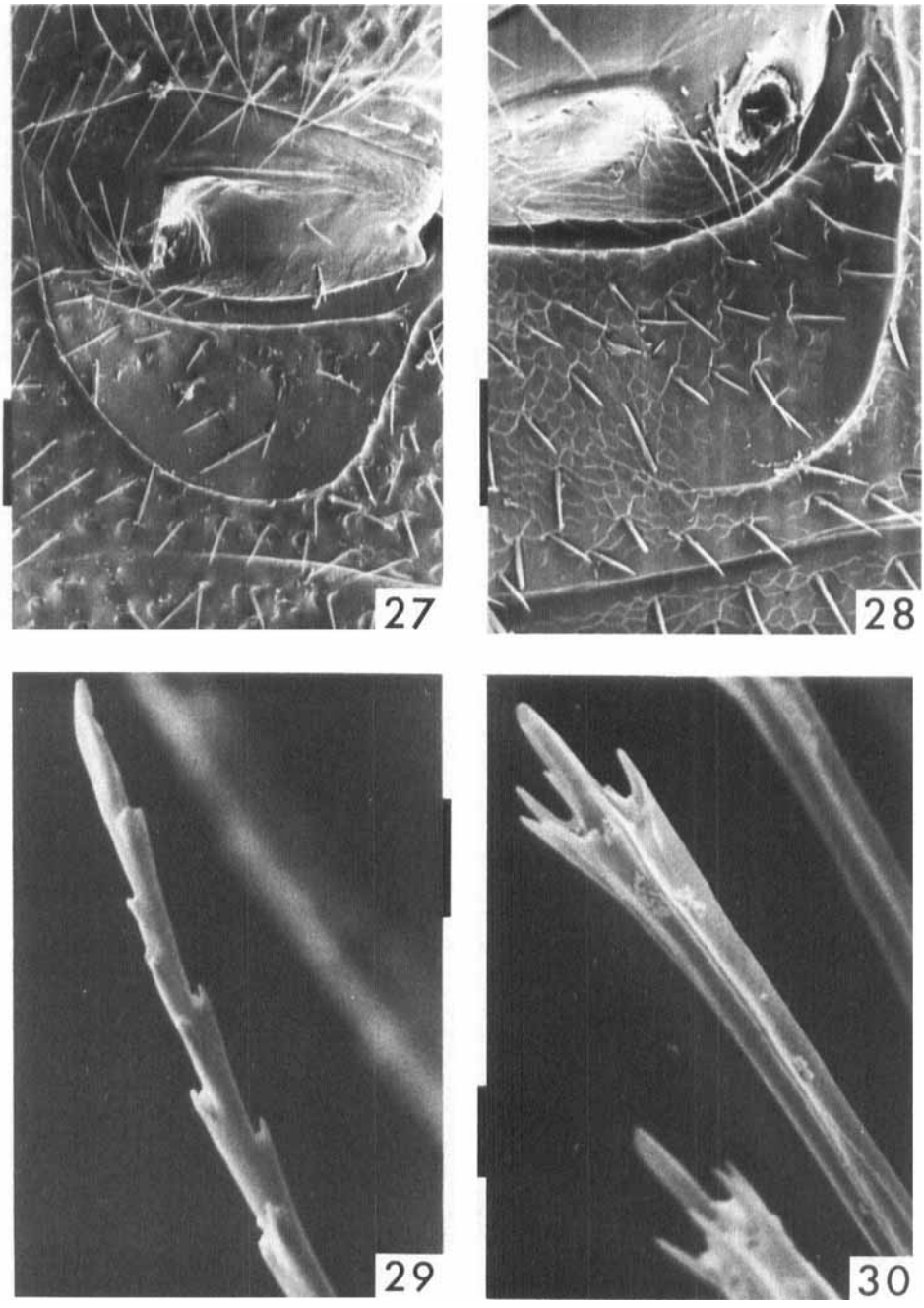
Types.—*Holotype* ♀ of *S. nigripes*, Albany, W. Australia, 91-88, in BM. *Holotype* of *S. loxtoni*, ex culture, 1971, B. Lee, in ANIC (specimen brown, as it is not fully pigmented). *Specimens of S. loxtoni labelled as paratypes*: 17 with same data as holotype, in ANIC; one ex culture, B. Lee, in ANIC; four, no collection data, in ANIC; two, no collection data but with hand-written paratype labels, in BM; 20 adults plus larvae, ex CSIRO culture, 1970, B. Lee, in ANIC [ethanol-preserved specimens with a single hand-written paratype label determined by Britton (1970)].

Other specimens examined.—AUSTRALIA: 16, 10.v.1976, BL, bred CSIRO lab.; four, no collection data. QUEENSLAND: eight, Narangba, 13.i.1972, AD, predator of *T. lambi* on *Musa* sp. (QDPI); one, Applethorpe, vii.1974, BI, predator of *T. urticae* on *Glycine max* in glasshouse (QDPI); five, Applethorpe, 18.iii.1975, KJH, on *Malus sylvestris* (QDPI). NEW SOUTH WALES: 14, Griffith, 14.iii.1972, MM, on *Malus sylvestris;* 41, Griffith, 20.iv.1972, BE. AUSTRALIAN CAPITAL TERRITORY: two, Canberra, 28.iv.1960, GW (BM); four, Narrabundah, 20.i.1966, A.W. WESTERN AUSTRALIA: three, Stoneville, 13.ii.1974; Donnybrook, in orchard, seven, 29.iv.1971, one, 12.iv.1972. SOUTH AUSTRALIA: 15, Berri, 26.iv.1972, MM, on *Pyrus communis;* Loxton, GR, on *Prunus persica*, 11, 10.iii.1970, 23, 2.ii.1972. VICTORIA: one, Tatura, 16.ii.1967, on *Malus sylvestris*. All in ANIC except as indicated.

Larval material examined.—AUSTRALIA: 1970, BL, ex CSIRO culture (ANIC) (with paratype label in tube). QUEENSLAND: Applethorpe, vii.1974, BI, predator of *T. urticae* on *Glycine max* in glasshouse (QDPI); Applethorpe, 18.iii.1975, KJH, on *Malus sylvestris* (QDPI). AUSTRALIAN CAPITAL TERRITORY: Canberra, 9.ii.1966, AW, on *Malus sylvestris* (ANIC). SOUTH AUSTRALIA: Loxton, 10.iii.1970, GR, on *Prunus persica* (ANIC).

Adult

As described by Kapur (1948) and Britton and Lee (1972, under the synonym *S. loxtoni*) with the following qualifications or additions: shallow, small punctures ventrally, but nearly impunctate in midposterior part of metasternum; anterior part of metasternum with oblique grooves on either side of midline (Fig. 2); metasternum and abdominal sternites reticulate laterally; femoral line incomplete (Fig. 4) (one side sometimes complete, rarely both sides complete); reticulate within femoral line with some shallow punctures basally; wings lightly pigmented, most with Mr similar to that of *S. fenestralis* but usually less fusion to M4 + Cu, some specimens with small reduced R1 and/or R3 (Britton and Lee 1972, Fig. 9).



FIGS **27-30**. *Stethorus* spp.: **(27,28)** femoral line of abdominal sternite 1: **(27)** *S. vagans* (Blackburn); **(28)** *S. histrio* Chazeau; **(29,30)** dorsal setae of last instar larvae: **(29)** *S. fenestralis* sp.n.: **(30)** *S. histrio*. (Scale = 40 μm for 27,28; = 4 μm for 29,30.)

Male genitalia.—Sipho (Fig. 22) slightly bent basally; distally partly unpigmented and slightly expanded in lateral view (Fig. 23); siphonal capsule small. Trabes (Fig. 24) longer than tegmen and forked proximally in dorsal view. Basal piece (Britton and Lee 1972, Figs 5,6) about as long as parameres, longer than deep, wider than long. Median lobe about as long as parameres, cone-shaped in dorsal view and longer than wide, tongue-like in lateral view. Parameres with long setae on ventral distal half, pores scattered over ventral surface.

Female genitalia.—Genital plates (Fig. 25) long, thin, bow-shaped; partially unpigmented with single seta at apex and five to ten pores in apical half (some specimens with second seta lateral to apical seta). Spermatheca (Fig. 26) bent, proximal arm longer and wider than distal arm.

Last instar larva

Body length 1.56-1.95 mm; head width 0.23-0.25 mm; length of fore tibiotarsus 0.096-0.12 mm. Body narrow, fusiform, moderately convex. Setae shorter than those of *S. fenestralis*, most dorsal setae pseudotruncate (setae including apices longer and thinner than in *S. histrio*, Fig. 30).

Head.—Some setae with pigmented bases; light brown pigmented areas at side of head and smaller patches on frontoclypeus as in Britton and Lee (1972, Fig. 2) except that latter spots usually larger and closer together; ventrolaterally with triangular brown areas from base of maxillae to ocelli. Antennae and mouthparts similar to those of *S. fenestralis* but antennal sensillum about five times as long as basal width, maxillary and labial palps about twice as long as basal width and sclerotised median margin of stipo-cardes reduced posteriorly with pigmentation ending just short of inner seta.

Thorax.—Pronotum with two large plates with brown inner posterior corners which vary in size, with scattered pigmentation on rest of plates. Meso- and metanotum each with pair of sclerotised plates, metanotal darker than mesonotal plate which may be incompletely pigmented; inner edges of both plates often pale as in Britton and Lee (1972, Fig. 2, plates include small inner setae shown in figure). Lateral tubercles of meso- and metathorax with 3L, 2-7S-M; the three large setae with light brown bases. Legs with six long clavate setae (Fig. 15).

Abdomen.—Pigmentation usually lacking but larger setae sometimes with yellow-brown bases. Dorsal tubercle 3L, 0-1M; dorsolateral tubercle 2L, 1-2S; lateral tubercle 2-3(3)L, 1-5S. Abdominal segment 9 with scattered dorsal setae.

Distribution

There are no known records of *S. nigripes* from Tasmania or north of Narangba, south Queensland.

Affinities

S. nigripes has a similar sipho, parameres and median lobe to those of *S. pauperculus* Weise from India and Arabia and *S. parapauperculus* Pang from China; also the genital plates of the former are similar to those of *S. nigripes*. However the only described species besides *S. nigripes* with the trabes forked proximally and the basal piece long is *S. truncatus* Kapur from peninsular Malaysia.

Comments

Britton and Lee (1972) distinguished *S. loxtoni* from other Australian species by the black antennae and mouthparts; however Kapur (1948) stated in his description that *S. nigripes* has piceous (reddish black) antennae and mouthparts. The femoral line is variable and the holotype of *S. nigripes* has the right femoral line complete and the left almost complete, while the holotype of *S. loxtoni* has both femoral lines incomplete. The holotype of *S. nigripes* was dissected and its genital plates and spermatheca are similar to those figured in Figs 25, 26. The genital plate figured by Kapur (1948, Fig. 70) is not that of *S. nigripes*, but is similar to that of *S. histrio*. The holotype of *S. loxtoni* has oblique grooves on the anterior part of the metasternum as in *S. nigripes*. Thus *S. loxtoni* is a junior synonym of *S. nigripes*.

In contrast *S. nigripes sensu* Britton and Lee has light to dark brown antennae, mouthparts and legs, no oblique furrows on the anterior metasternum and the male genitalia (Britton and Lee 1972, Fig. 7) are very similar to those of *S. histrio* (see Chazeau *et al.* 1974, Figs 6,13).

Stethorus histrio Chazeau (Figs 16,28,30)

Stethorus histrio Chazeau in Chazeau *et al.* 1974: 267, 269, 290.
Stethorus nigripes Kapur, *sensu* Britton and Lee, 1972: 56,57,59,60.

Specimens examined.—NEW CALEDONIA: one, Noumea, 1973, PC; three, Ouen. Tozo, 27.x.1977, JF, predator of *Schizotetranychus fauveli* Gutierrez on *Ficus fraseri* Miq. (ORSTOM). AUSTRALIA: two, Blackburn's Collection (SAM) (members of syntypic series of *S. vagans*); one, Croyden, 7.iii.1892, W.W. Froggatt Collection, on lily; 1971, BL, ex culture, 15 (ANIC), two (BM), one (WAM); two, 1971, ex culture; one, 10.v.1976, BL, bred CSIRO lab.; 13, no collection data. NORTHERN TERRITORY: one, Berrimah Experimental Farm, 10.x.1972, with *T. urticae* on *Carica papaya*; five, same data, RB; four, Darwin, 23.vii.1978, AA, on *Carica papaya* (NT). QUEENSLAND: four, Mareeba, 6.xi.1978, ICC, on *Carica papaya* (QDPI); one, Biloela Research Station, 15.x.1974, MS, on *Ricinus communis* (QDPI); one, Gympie, 5.i.1937 (QDPI); one, Coolum, 22.viii.1934 (QDPI); one, Maroochydore Horticultural Research Station, 26.viii.1959, HGG, on *Carica papaya* (QDPI); one, Maroochydore, 8.i.1977, KJH (QDPI); two, Montville, 1.iv.1963, JJD and DAI, on *Morus alba* (QDPI); near Beerburrum, predator of *Oligonychus* sp. on *Pinus caribaea*, four, 30.viii.1978, MD, 66, 13.ix.1978, RAY and FRW (QDPI); five, Narangba, 13.i.1972, AD, predator of *T. lambi* on *Musa* (QDPI); two, Mt Glorious, xii.1976 (QDPI); four, Brisbane, 1.x.1968, JHB, on *Prunus persica* (QDPI); one, Brisbane, 20.x.1976, JG, predator of *T. hydrangeae* on *Convolvulus* (ORSTOM); two, Toowoomba, 10.xii.1938 (QDPI); three, Applethorpe, 18.iii.1975, KJH, on *Malus sylvestris* (QDPI). NEW SOUTH WALES: two, Mt Gibraltar, 5.iii.1960, MIN, sweeping clumps of everlasting daisy (BM). AUSTRALIAN CAPITAL TERRITORY: one, Canberra, 28.iv.1960, GW; two, Narrabundah, 20.i.1966, AW; one, Narrabundah, 18.iii.1971, EBB, in orchard; three, Weise orchard, 13.iii.1969, on *Malus sylvestris*. WESTERN AUSTRALIA: Donnybrook, on orchard, four, 12.iv.1971, three, 29.iv.1971, one, 12.iv.1972; Albany, 3.iv.1973, RHE, two on *Malus sylvestris*, three on *Prunus persica*; one, in orchards. SOUTH AUSTRALIA: 24, Berri, 26.iv.1972, MM, on *Pyrus communis*; nine, Loxton, 2.ii.1972, GR, on *Prunus persica*; one, Blackwood, 6.ii.1967. VICTORIA: one, Ardmona-Mooroopna, 20.i.1937, AJN, on *Quercus*. TASMANIA: two, Spreyton, 8.vi.1977, LM, in shelters on *Malus sylvestris* (TDA); one, Glenorchy, 20.iii.1973, MAS, on *Rubus idaeus* (TDA); one, West Hobart, 30.iii.1973, MAS, on *Helichrysum* (TDA); Grove, 8.ii.1967, two (ANIC), one on *Malus sylvestris* (BM); two, Grove, 29.iv.1968, NMH, on *Malus sylvestris*; 26, Grove, 29.viii.1969, in dead leaves at bases of *Malus sylvestris* in orchard; Grove, 29, 5.ii.1970, one, 12.ii.1974; five, Grove, 13.vi.1971, MAS, one on *Malus sylvestris* (TDA); one, Grove, 7.ix.1971, MAS, in *Trifolium* (TDA); two, Grove, 4.vii.1973, MAS, in shelter on *Malus sylvestris* (TDA); two, Woodbridge, 14.i.1972 (TDA); 156, Woodbridge, 4.ii.1972, BE; one, litter (QM). All in ANIC except as indicated.

Larval material examined.—AUSTRALIA: no collection data (ANIC). QUEENSLAND: Rockhampton, 4.x.1974, RJE, on *Rosa* (QDPI); near Beerburrum, 13.ix.1968, RAY and FRW, predator of *Oligonychus* sp. on *Pinus caribaea* (QDPI); Applethorpe, 18.iii.1975, KJH, on *Malus sylvestris* (QDPI). AUSTRALIAN CAPITAL TERRITORY: Lyneham, 29.xi.1971 (ANIC); Canberra, 9.ii.1966, AW, on *Malus sylvestris* (ANIC). TASMANIA: Grove, 5.ii.1970 (ANIC); Grove, 30.iv.1971, MAS (TDA).

Adult

As described in Chazeau *et al.* (1974) and Britton and Lee (1972, under the name *S. nigripes*) with the following qualifications or additions: antennae, mouthparts, tibiae and tarsi light brown (sometimes yellow); femora and trochanters light to dark brown; close, large, shallow punctures ventrally, shallower and sparser on midposterior part of metasternum and lateral parts of abdominal sternites; abdomen and metasternum reticulate laterally; area within femoral line with many shallow punctures and reticulate except along smooth inner posterior edge (Fig. 28); abdominal sternites 5, 6 sometimes brown; wings as in Britton and Lee (1972, Fig. 10) except some with R3 reaching and lightly extending along margin, Mr often with a small unattached point distally.

Male genitalia.—Sipho with three large and two small prongs apically, siphonal capsule small with large outer lobe. Basal piece wider than long. Median lobe about twice as long as basal width and slightly wider distally. Parameres shorter than median lobe; with three to six long apical and inner subapical setae; ventrally with row of long setae on outer edge, many stout teeth-like setae on distal half, and line of pores on outer side of proximal half.

Female genitalia.—Genital plates largely pigmented with many pores; six to twelve stout setae at apex; darker pigmentation along apicoposterior edge caused by doubling over of plate. Spermatheca absent.

Last instar larva

Body length 1.43-2.21 mm; head width 0.23-0.25 mm; length of fore tibiotarsus 0.096-0.11 mm. Body elongate elliptical, weakly convex. Setae shorter and stouter than in *S. nigripes* and most dorsal setae pseudotruncate (apex often much longer than shown in Fig. 30, especially on head and thorax).

Head.—Some setae with pigmented bases; dorsal brown areas at side of head with smaller patches on frontoclypeus as in Britton and Lee (1972, Fig. 3); ventrolaterally with triangular, brown areas from base of maxillae to ocelli. Antennae and mouthparts similar to those of *S. fenestralis* but antennal sensillum about five times as long as basal width, maxillary and labial palps short but longer than wide, only three setae on stipo-cardes (seta on median pigmented margin absent) and lateral setae on sclerotised bands at base of labial palps minute.

Thorax.—Pronotal plates with midposterior corner brown, with scattered pigment on remainder but often with fused areas on anterior, posterior and lateral edges; mesonotal and metanotal plates brown but former with scattered pigment laterally. Most of meso- and metathoracic lateral tubercles pigmented, with 4-8L, 0-3S. Legs with many short apical setae (Fig. 16) with bowed, trumpet-shaped apices, except for larger pair of clavate dorsal setae.

Abdomen.—All tubercles pigmented. Dorsal tubercle 4-5(4)L, 0-2S; dorsolateral tubercle 2-4(3)L, 0-2S; lateral tubercle 2-5(4)L, 0-3S. Abdominal segment 9 with two large pigmented plates partly fused anteriorly.

Distribution

S. histrio is a very widespread and common species in Australia and is also found on Reunion Island (Indian Ocean) and New Caledonia (Pacific Ocean). Its range was recently extended to Chile by R. D. Gordon (pers. comm.).

Affinities

The male genitalia of *S. histrio* are very similar to those of *S. yunnanensis* Pang and Mao from China. Other species which have a rectangular median lobe with a notched apex are *S. guangxiensis* Pang and Mao from China, *S. indira* Kapur from India, *S. truncatus* Kapur from peninsular Malaysia and *S. emarginatus* Miyatake from Japan. The first species also has, in common with *S. histrio*, short, stout setae ventrally on the parameres.

Comments

Since describing *S. histrio* from Reunion Island, Chazeau (pers. comm.) found that it also occurs in New Caledonia. Specimens from New Caledonia, including their male and female genitalia, are identical with Australian specimens (*S. nigripes sensu* Britton and Lee), except that the elytral setae of the former are more erect, although some Australian specimens also had more erect setae.

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References

BLACKBURN, T. (1892).—Further notes on Australian Coleoptera, with descriptions of new genera and species. Part XII. *Trans. R. Soc. S. Aust.* **15:** 207-261.

BRITTON, E. B. and LEE, B. (1972).—*Stethorus loxtoni* sp.n. (Coleoptera: Coccinellidae) a newly-discovered predator of the two-spotted mite. *J. Aust. ent. Soc.* **11:** 55-60.

CHAZEAU, J., ÉTIENNE, J. and FÜRSCH, H. (1974).—Les Coccinellidae de L'île de la Réunion (Insecta Coleoptera). *Bull. Mus. Hist. nat., Paris* 3e sér., no. 210, Zoologie **140:** 265-297.

KAPUR, A. P. (1948).—On the Old World species of the genus *Stethorus* Weise (Coleoptera: Coccinellidae). *Bull. ent. Res.* **39:** 297-320.

KORSCHEFSKY, R. (1931).—Coccinellidae I. *Coleoptm Cat.* **118:** 1-224.

VAN EMDEN, F. I. (1949).—Larvae of British beetles. VII. (Coccinellidae). *Entomologist's mon. Mag.* **85:** 265-283.

WEISE, J. (1908).—Chrysomelidae and Coccinellidae. *Fauna Südwest-Aust.* **2:** 1-13.

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