STETHORUS LOXTONI SP. N. (COLEOPTERA: COCCINELLIDAE) A NEWLY-DISCOVERED PREDATOR OF THE TWO-SPOTTED MITE

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Abstract

Stethorus loxtoni sp. n., a predator on *Tetranychus urticae* (Koch), is described and the Australian species of *Stethorus* are reviewed.

INTRODUCTION

Stethorus spp. are minute black Coccinellidae commonly found in orchards and notable for the voracity with which they prey upon the two-spotted mite [*Tetranychus urticae* (Koch)]. The population dynamics of the *Stethorus*/mite relationship is the subject of study by Dr. J. L. Readshaw of this Division. This work has demonstrated the prime importance of *Stethorus* spp. in the control of mites in orchards. In the course of the work it became apparent that, in addition to *Stethorus vagans* (Blackburn) and *Stethorus nigripes* Kapur, a third, apparently undescribed species was present. The purpose of the present work is to describe this species in order to provide a name and means of identification for the use of orchard ecologists.

The existence of the third species was first detected in cultures started from material collected in a peach orchard at Loxton, South Australia by Mr. Noel Richardson of the South Australian Department of Agriculture and Dr. G. Rothschild of this Division. The orchard was unusual in that it had never been treated with insecticide. The third species was recognised in culture (by Mrs. B. Lee) by the fact that the elongate eggs were attached to the leaf by their ends instead of being placed on their sides.

The genus *Stethorus* is placed in the tribe Scymnini and is characterised by Kapur (1948).

Twenty-seven species of *Stethorus* were described up to, and including the review of the Old World species by Kapur (1948). Since that date a further 13 species (and one subspecies) have been described, which, together with the species described here, make a world total of 41 species.

The additional species and subspecies are as follows:

Stethorus aptus ssp. *tsutsuii* Nakane & Araki, 1959, *Scient. Rep. Kyoto prefect. Univ. (Nat. Sci.)* **3:** A48, figs. JAPAN

Stethorus cantonensis Pang, S. F., 1966, *Acta zootax. sin.* **3:** 80, fig. (in Chinese, English summary) CHINA

Stethorus chengi Sasaji, 1968, *Etizenia No.* 32: 2, 4, figs. FORMOSA

Stethorus emarginatus Mujatake, 1966, *Trans. Shikoku ent. Soc.* **9:** 51-54, figs. JAPAN

Stethorus guatemalensis Hall & Fleschner, 1958, *Pan-Pacif. Ent.* **34:** 98, figs. GUATEMALA

Stethorus hirashimai Sasaji, 1968, *Etizenia* **32:** 1, 5, figs. FORMOSA

Stethorus indira Kapur, 1950, *Proc. R. ent. Soc. Lond.* [*B*] **19:** 148, figs. INDIA

Stethorus japonicus Kamiya, 1959, *Kontyû* **27:** 140, figs. JAPAN

Stethorus keralicus Kapur, 1961, *Entomophaga* **6:** 35, figs. S. INDIA

Stethorus loi Sasaji, 1968, *Etizenia* **32:** 2, figs. FORMOSA

Stethorus longisiphonulus Pang, S. F., 1966, *Acta zootax. sin.* **3:** 80, fig. (in Chinese, English summary) CHINA

Stethorus parapauperculus Pang, S. F., 1966, *Acta zootax. sin.* **3:** 81, fig. (in Chinese, English summary) CHINA

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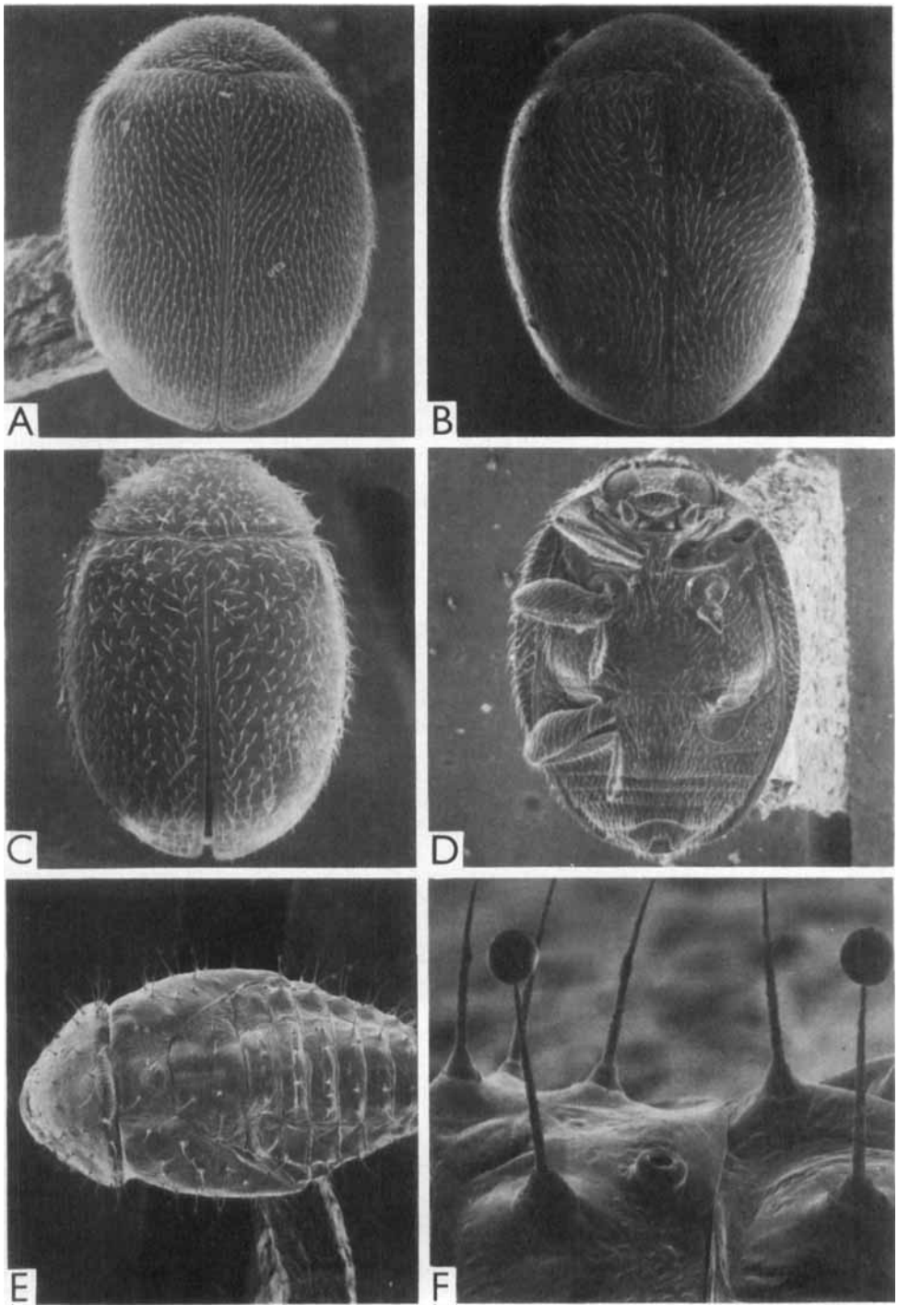


PLATE I

(A) *Stethorus nigripes* Kapur, adult, dorsal, × 72. (B) *S. loxtoni* sp. n., adult, dorsal, × 90. (C) *S. vagans* (Blackburn), adult, dorsal, × 70. (D) *S. vagans* (Blackburn), adult ♂, ventral, × 70. (E) *S. nigripes* Kapur, pupal exuviae, dorsal, × 65. (F) *S. vagans* (Blackburn), pupal exuviae, setae bearing drops of fluid, and spiracle of 2nd abdominal segment, × 350.

Stethorus weisei Mader, 1950, *Explor. Parc. natn. Albert Miss. G. F. de Witte, fasc.* **34:** 67, figs. CONGO

Stethorus yezoensis Mujatake, 1966, *Trans. Shikoku ent. Soc.* **9:** 51-54, figs. JAPAN

Two species, *S. vagans* Blackburn and *S. nigripes* Kapur, are so far known in Australia.

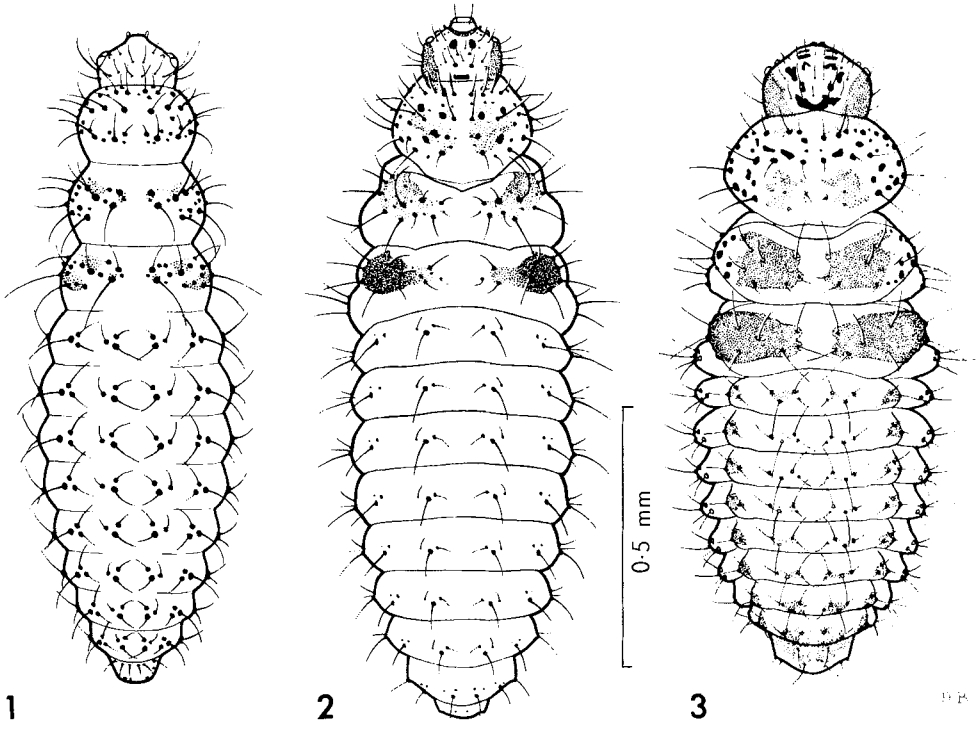
As the genus is widely distributed throughout the world and because the species in Australia are common on non-indigenous trees, feeding on an introduced species of mite, there is a possibility that the Australian *Stethorus* are also introduced species which may have been described elsewhere.

Kapur differentiated *S. vagans* and *S. nigripes* from the other Old World species and it therefore appears unlikely that they were previously described. The third Australian species, described below as *Stethorus loxtoni* sp. n., is distinguishable from all but one of the 40 known species by the fact that the antennae and mouthparts are black (colour is notably constant in *Stethorus* spp.). The one other species with black antennae and mouthparts is the Californian *S. picipes* Casey, but this is distinguishable by its larger size (1.3-1.4 mm) and by the fact that the femoral lines do not extend beyond half the length of the proximal ventrite. It is therefore clear that *S. loxtoni* has not been described before, although the possibility that it has been introduced into Australia is not excluded.

Stethorus loxtoni sp. n.

Types.—Holotype and 20 *paratypes* ex culture originating from Loxton, South Australia.

The *holotype* is in the Australian National Insect Collection. *Paratypes* are deposited in the Australian National Insect Collection, the British Museum (Natural History), the California Academy of Sciences, the United States National Museum, Washington, the South Australian Museum, Adelaide, the Australian Museum, Sydney, and the Western Australian Museum, Perth.



FIGS. 1-3.—Last instar larvae, dorsal: (1) *Stethorus vagans* (Blackburn); (2) *S. loxtoni* sp. n.; (3) *S. nigripes* Kapur.

Adult (Figs. 5, 6, 9; Plate IB).

Length.—0.90 mm (S.D. 0.14 mm). Body colour entirely shining black; trochanters and femora black; tarsi, tibiae and mouthparts dark brown to black. Antennae black. Pronotum and elytra densely and uniformly setose, the setae colourless, curved, tapered, length *c.* 0.03 mm, each arising from a small puncture; density of the setiferous punctures on the middle of the elytral disc *c.* 1200/sq mm; ventral surface similarly, but less uniformly setose; the middle of the metasternum more faintly punctured, shining, without setae; the arcuate "femoral line" on the proximal ventrite reaching $\frac{2}{3}$ of the length of the segment from the base and not complete externally; ratio of maximum width of head including eyes/minimum width of frons between the eyes 2.4/1; terminal ventrite similar in ♂ and ♀ without trace of an emargination; wings with microspicules on lamina colourless so that wing appears white; wing without traces of veins at apex; with a rudiment of vein Mr parallel to the main vein (M_4 + Cu).

The species has also been found at Narrabundah, A.C.T. feeding on mites on apple and oak, and at Stanley, Victoria.

The species is named after W. C. Loxton, whose name was given to the town of Loxton at its foundation in 1907.

Larva (Fig. 2)

The distinguishing characters of the larva are given in the comparative tables below:

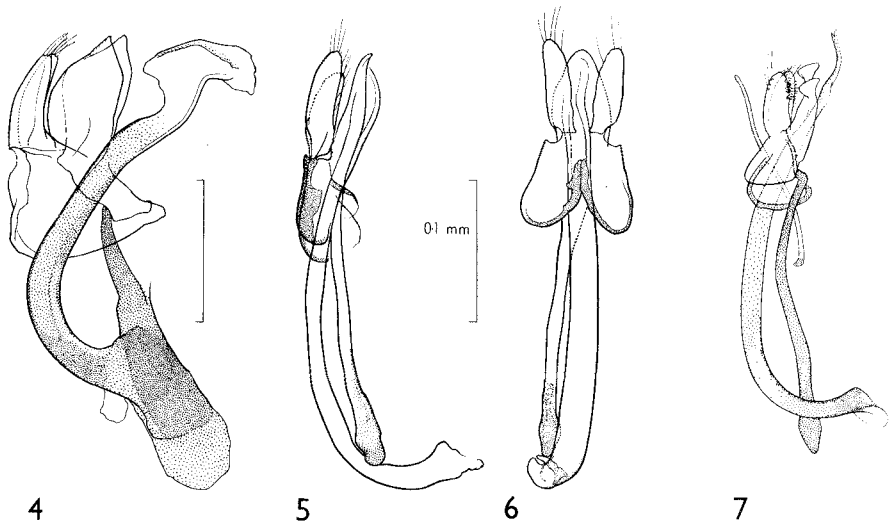
COMPARATIVE CHARACTERS OF *Stethorus vagans, loxtoni* AND *nigripes*

Stethorus vagans

1. Femora and trochanters pale brown or yellowish, tibiae and tarsi pale yellowish.
2. Antennae, mandibles and palpi pale yellowish.
3. Labrum pale yellowish.
4. Body length: mean 1.12 mm (S.D. 0.15 mm).
5. Setae on dorsal surface less dense (*c.* 1,000/sq mm).
6. Frons narrower (ratio of maximum width of head including eyes/minimum width of frons *c.* 2.8/1).
7. Terminal ventrite of ♂ with a deep V-shaped emargination (Plate ID).
8. Microspicules on wing lamina pigmented so that wing under low magnification appears pale grey.
9. Larva very pale creamy-white, without obvious dark brown sclerotised areas on the head and thoracic terga. Setiferous tubercles dark brown and obvious on the thoracic and abdominal terga (Fig. 1), the groups of tubercles not united by dark pigmented areas.
10. Egg (2-day) white, surface shining, *c.* 0.38 × 0.20 mm, position on leaf prostrate, attached by the longer side.
11. Blood of larva and adult colourless.
12. Aedeagus, Fig. 4.
13. Wing venation as Fig. 8, M_r (Forbes 1922) diverging from M_4 + Cu; R_5 present at apex.
14. Femoral line on proximal ventrite complete (Plate ID).

Stethorus loxtoni sp. n.

1. Femora, trochanters, tibiae and tarsi black.
2. Antennae black.
3. Labrum black.
4. Body length: mean 0.90 (S.D. 0.14 mm).
5. Setae on dorsal surface more dense (*c.* 1,200/sq mm).
6. Frons wider (ratio of maximum head width including eyes/minimum width of frons between the eyes *c.* 2.4/1).
7. Terminal ventrite of ♂ without an emargination.
8. Microspicules on wing lamina colourless so that wing under low magnification appears white.
9. Larva pinkish grey, with obvious dark brown sclerotised areas on head (at sides) and on the three thoracic terga (most obvious on the metanotum); setiferous tubercles on the abdominal terga fainter than in *vagans* and not united by dark areas (Fig. 2).

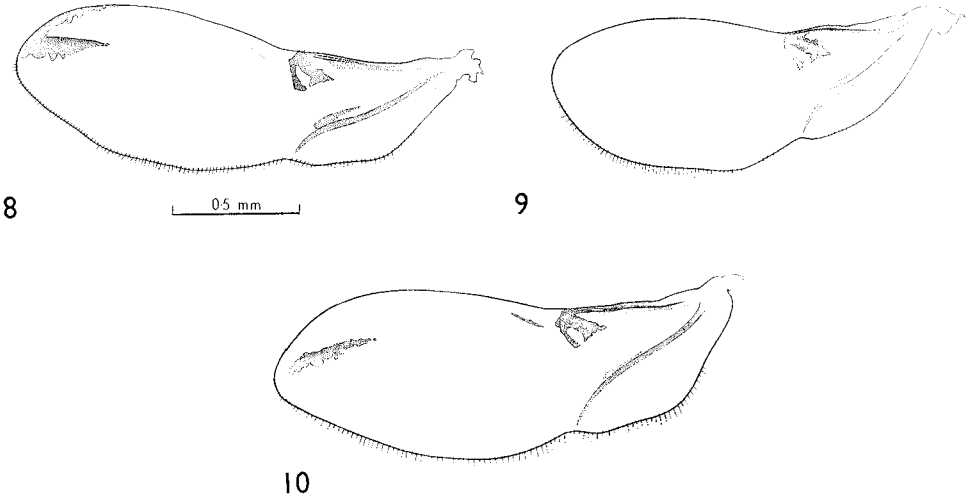


FIGS. 4-7.—Aedeagus: (4) *S. vagans* (Blackburn), lateral; (5) *S. loxtoni* sp. n., lateral; (6) *S. loxtoni* sp. n., dorsal; (7) *S. nigripes* Kapur, lateral.

10. Egg (2-day) pale pink, surface shining; size as in *vagans*, position on leaf erect, attached by end.
11. Blood of larva and adult pale pink.
12. Aedeagus, Figs. 5, 6.
13. Wing venation as Fig. 9, M_r (Forbes, 1922) separate from and parallel to M_4 + Cu. R_s absent.
14. Femoral line on proximal ventrite incomplete on outer side.

Stethorus nigripes

1. Femora brown to dark brown, trochanters yellowish brown, tibiae brown, or yellowish towards their distal ends; tarsi pale, yellowish.
2. Antennae pale yellowish brown.
3. Labrum brown.
4. Body length: mean 1.15 mm (S.D. 0.13 mm).
5. Setae on dorsal surface more dense (*c.* 1,500/sq mm).
6. Frons wider (ratio of maximum width across head including the eyes/minimum width of frons between the eyes *c.* 2.2/1).



FIGS. 8-10.—Wing: (8) *S. vagans* (Blackburn); (9) *S. loxtoni* sp. n.; (10) *S. nigripes* Kapur.

7. Terminal ventrite in ♂ without an emargination.
8. Microspicules on wing lamina pigmented so that wing under low magnification appears pale grey.
9. Larva yellowish grey, with obvious dark brown sclerotised areas on the head (at sides) and on the three thoracic terga, and with smaller dark areas uniting the groups of three setiferous tubercles on the abdominal terga (Fig. 3).
10. Egg (2-day) pale pink, with dull, pruinose surface; shorter than in *vagans* and *loxtoni* (*c.* 0.32 × 0.20 mm); position on leaf prostrate, attached by long side.
11. Blood of larva and adult pale pink.
12. Aedeagus, Fig. 7.
13. Wing venation as Fig. 10, M_T fused to M_4 + Cu, R_5 present at apex.
14. Femoral line on proximal ventrite incomplete on outer side.

The pupae of all three species bear long, stout, erect setae on the thorax, elytra and abdomen. These setae are remarkable in that each bears at its tip a drop of fluid (Plate IF). The drops are easily removed by wiping but are evidently of very low volatility because they persist long after the pupal exuviae are shed. They persist also under vacuum in the process of coating and examination in the scanning electron microscope.

ACKNOWLEDGMENTS

We are indebted to Mr. R. D. Pope [British Museum (Natural History)] for comparison of specimens with the holotypes of *Stethorus vagans* (Blackburn) and *S. nigripes* Kapur, and for assistance with literature. We wish also to express thanks to Mr. Hugh B. Leech [California Academy of Sciences] and Dr. R. Gordon [Systematic Entomology Laboratory, U.S. Department of Agriculture] for help with the comparison of *S. loxtoni* with the holotype of *S. picipes* Casey.

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