

**THREE NEW SPECIES OF *SALDUNCULA* BROWN
FROM THE MALAY ARCHIPELAGO, WITH A KEY
TO THE KNOWN SPECIES
(HETEROPTERA: SALDIDAE)**

John T. Polhemus

ABSTRACT. - Three new species of the intertidal genus *Salduncula* Brown are described; *S. fasciata* from Sabah, *S. murphyi* from Singapore, and *S. palawanensis* from Palawan. Habitat notes are given. A key to the known species is provided.

INTRODUCTION

The genus *Salduncula* was established by Brown (1954) to hold *S. seychellensis* Brown from the granitic Seychelles, a species now known to occur in other parts of the Seychelles Archipelago (Polhemus & Polhemus, in press) and Madagascar (Brown, 1960). Drake (1957) added *S. woodwardi* from Samoa, and later (Drake, 1961) transferred *Saldula swezeyi* Usinger to the genus, the latter known from Guam and Australia. The latest species to be added was *S. decempunctata* Miyamoto (1963) from the Tokara Islands southwest of Kyushu. Polhemus (1985) established the tribe Saldunculini to hold this odd genus, based on the very short pronotum and lack of derived characters characterizing other genera of Saldinae.

Three additional species, two from Malaysia and one from Palawan, are here added to the genus, and their habitats are described. A key to the known species is given, based on representatives of all known species held in the Polhemus Collection (JTPC).

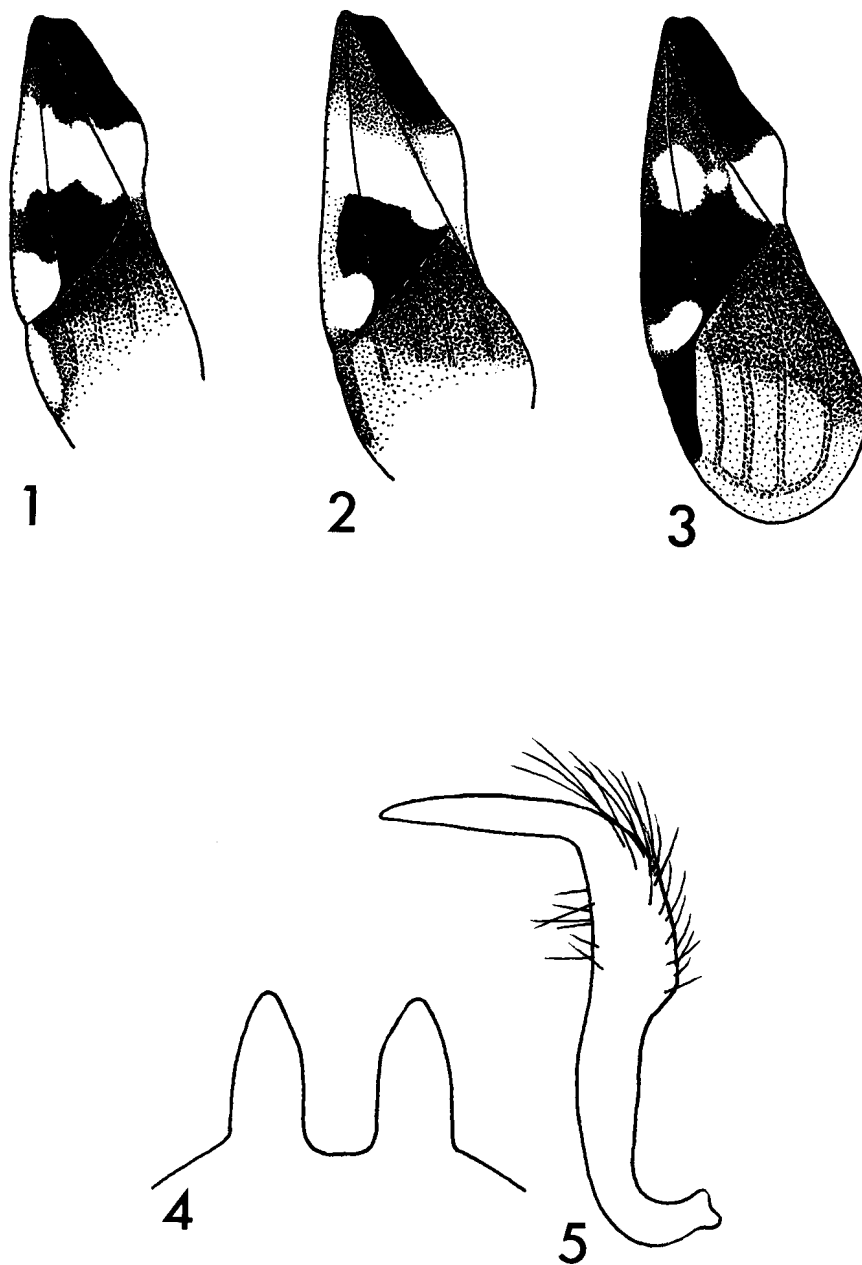
All measurements are in millimetres. Institutional abbreviations are as follows: USNM - Smithsonian Institution, Washington, D.C.; ZRC - Zoological Reference Collection, Department of Zoology, National University of Singapore; and AMNH - American Museum of Natural History, New York.

John T. Polhemus - University of Colorado Museum, 3115 S. York, Englewood, Colorado 80100, U.S.A.

KEY TO THE SPECIES OF *SALDUNCULA* BROWN

1. White transverse hemelytral band very broad, broader than width of clavus, not distinctly interrupted on inner corium, at most with faint longitudinal brown streaks 2
 - White transverse hemelytral markings narrower, either distinct spots or a broad band; if the latter then distinctly interrupted on inner corium, or about the width of the clavus 3
2. Vertex of head reddish or reddish brown. Embolium usually broadly white except basally *murphyi*, new species
 - Vertex of head dark. Embolium dark on most of distal part *fasciata*, new species
3. Clavus with a prominent light sub-basal spot *seychellensis* Brown
 - Clavus without a prominent light sub-basal spot, at most with a faint light colored indication 4
4. Light hemelytral markings consisting of at most six to eight small spots; middle of outer corium, clavus distally without light markings *woodwardi* Drake
 - Light hemelytral markings more pronounced, consisting of ten spots or a large distal spot on outer corium plus a broad transverse stripe or series of spots; middle of outer corium, clavus distally usually with light markings 5
5. Light hemelytral markings broken up into ten distinct spots; clavus with distinct subdistal light spot at level of apex of scutellum *decempunctata* Miyamoto
 - Light hemelytral markings coalesced into a broad transverse band usually interrupted on middle of inner corium; clavus without distinct subdistal light spot, but may be light distally or have distal light spot 6
6. Broad transverse hemelytral band angled posteriorly to extreme tip of clavus, involving anterior angle of membrane *swezeyi* (Usinger)
 - Broad transverse hemelytral band more linear, involving entire tip of clavus, but not anterior angle of membrane *palawanensis*, new species

The above key is operative for specimens in the Polhemus collection, however variability should be expected, and individuals or populations will undoubtedly be found that deviate from the above key. The type specimen of *S. swezeyi* figured by Drake (1961: fig. 1), for instance, does not show the light hemelytral band interrupted on the inner corium as in the specimen at my disposal. Habitus figures exist for all previously described species so they are not repeated here; all of these are given with the original descriptions except for *S. swezeyi* and *S. woodwardi* which were later illustrated by Drake (1961).



Figs. 1-3. *Salduncula* species, hemelytral pattern. 1, *S. fasciata*, new species; 2, *S. murphyi*, new species; 3, *S. palawanensis*, new species. Figs. 4-5. *Salduncula palawanensis*, male genitalia. 4, Parandria; 5, Right paramere.

***Salduncula murphyi*, new species**

(Fig. 2)

Material examined. - Holotype - macropterous male (USNM) and allotype macropterous female (JTPC), rock beach, Labrador Park, Singapore, CL 2055, J. T. & D. A. Polhemus, 12.viii.1985.

Paratypes - 8 macropterous males, 4 macropterous females, 5 nymphs (JTPC, ZRC), same data as holotype. — 2 macropterous males (JTPC), rocky seashore, Labrador Park, Singapore, D. H. Murphy, ii-6l.

Description. - Size normal for genus, shape ovate, length 2.71-3.12 mm; maximum width (across hemelytra) 1.18-1.28 mm; ground color black, extensively marked with white and reddish brown.

Head reddish brown, vertex darker in females, width/length 0.67/0.36; ocelli large, separated by 3X the width of an ocellus; eyes elongate, moderately protrusive, pale grey, set with scattered erect setae, width/length 0.13/0.20; frons and vertex clothed with very short inconspicuous pubescence, anteriorly with longer dark setae; antennae slender, segments I-II yellowish, thickly set with semierect setae not longer than width of segment, segments III-IV dark brown, thickly covered with short recumbent gold setae and longer dark setae, lengths of segments I-IV = 0.13; 0.51; 0.41; 0.36.

Pronotum short, black, width/length (midline) 0.97/0.31; lateral margins almost straight except curved anteriorly; collar absent; anterior lobe scarcely raised, weakly demarcated from weakly convex posterior lobe; posterior margin of posterior lobe broadly shallowly concave; callus with deep median depression; humeri prominent; entire pronotum thickly covered with semi-erect gold setae. Scutellum deep brown to black, faintly shining, width/length 0.61/0.56; anterior lobe raised, demarcated from posterior lobe only laterally, with depressions anterolaterally; both lobes thickly covered with semi-erect gold setae.

Hemelytra mat, black, extensively marked with white, dominated by a fascia broader than width of clavus, extending from tip scutellum to apex of clavus, reaching completely across hemelytra (Fig.2); clavus length along outside margin 0.92, length of commisure 0.36, entire distal part white faintly tinged with brown on margins; endocorium mat, basally brown to light brown, crossed by white fascia medially, distally blackish; exocorium brownish basally, largely white, with one large dark area at distal 3/4; embolium white, brownish basally, faintly (male) to heavily (female) tinged with brownish at distal 3/4; wing membrane fumate, basally blackish, veins darker, forming 4 distinct closed cells; surface of entire hemelytra set with numerous evenly spaced medium length semi-erect setae, appearing dark against white background but golden against dark, sparser on membrane.

Ventral surface of head and thorax black, margins of abdominal ventrites and hypocostal ridge light colored; rostrum brown, length 1.28, reaching onto base of abdomen; entire ventral surface covered with short fine recumbent gold setae, longer, denser caudally. Legs predominantly yellowish brown with following portions marked with brown: coxae, all femora except distally; all leg segments covered with fine semierect gold setae, plus scattered erect black spines on middle and hind tibiae; claws slender, gently curving, yellowish.

Male genitalia not diagnostic, similar to Figs. 4-5.

Etymology. - The species name honors my friend and colleague Associate Professor D. H. "Paddy" Murphy, who discovered this species, shared the discovery with us, and guided our efforts to collect additional material. Paddy Murphy has done a remarkable amount of excellent original investigation on the marine arthropod fauna of Southeast Asia, and we take great pleasure in dedicating this species to him on the occasion of his 60th birthday.

Distribution. - This species is so far known only from a single locality in Singapore.

Remarks. - This species and *S. fasciata* clearly are more closely related to each other than to the remainder of the genus, as shown in the key. See comparative notes under the latter.

The only known habitat of this species is a large boulder on the beach below Labrador Park that is fully exposed at low tide. This boulder is riddled with crevices and small holes in which the bugs secrete themselves at high tide and most of the time when the rock is exposed. A considerable amount of time was expended watching for movement of the saldids that revealed their presence. Mr Murphy explained that, rather sadly, this few yards of shoreline is the only remaining undeveloped stretch on Singapore.

Salduncula fasciata, new species

(Fig. 1)

Material examined. - Holotype - macropterous male, allotype - macropterous female (JTPC), rocky beach, Kudat, Sabah, Malaysia, CL 2031, J. T. & D. A. Polhemus, 4.viii.1985.

Paratypes - 2 macropterous females, 2 nymphs (JTPC), same data as holotype; 1 macropterous female (USNM), on intertidal rocks & mud flats, in sunshine, 10 km SW Sandakan, Sabah, Malaysia, leg. G. F. Hevel & W. E. Steiner, 17.viii.1983.

Description. - Size normal for genus, shape ovate, length 2.26-3.17 mm; maximum width (across hemelytra) 0.97-1.18 mm; ground color black, extensively marked with white.

Head black, width/length 0.61/0.26; ocelli large, separated by 2X the width of an ocellus; eyes slightly elongate, moderately protrusive, reddish, width/length 0.15/0.18; frons and vertex clothed with very short inconspicuous pubescence, anteriorly with longer dark setae; antennae slender, brown, segments I-II thickly set with semi-erect setae not longer than width of segment, segments III-IV thickly covered with short recumbent gold setae and longer dark setae, lengths of segments I-IV = 0.15; 0.41; 0.38; 0.41.

Pronotum short, black, width/length (midline) 0.92/0.31; lateral margins almost straight, sharply curved anteriorly; collar absent; anterior lobe scarcely raised, weakly demarcated from almost planar posterior lobe; callus with large median depression, open posteriorly; posterior margin of posterior lobe broadly shallowly concave; humeri prominent; entire pronotum thickly covered with semi-erect gold setae. Scutellum deep brown to black, faintly shining width/length 0.61/0.51; anterior lobe raised, with depressions anterolaterally, demarcated from posterior lobe by a broad weak depression, posterior lobe slightly depressed; both lobes thickly covered with semi-erect gold setae.

Hemelytra mat, black, extensively marked with white, dominated by a fascia broader than width of clavus, extending from tip of scutellum to apex of clavus, reaching completely across hemelytra (Fig.1); clavus length along outside margin 0.87, length of commissure 0.31, entire distal part white; endocorium mat, black basally, crossed by white fascia medially, distally blackish; exocorium brownish basally, largely white, with one large dark area at distal 3/4; wing membrane fumate, basally blackish medially, outer margin basally lighter to white, veins darker, forming 4 distinct closed cells; surface of entire hemelytra set with numerous evenly spaced medium length semi-erect setae, appearing dark against white background but golden against dark, sparser on membrane.

Ventral surface of head and thorax black, margins of abdominal ventrites and hypocostal ridge light colored; rostrum brown, length 1.28, reaching onto base of abdomen; entire ventral surface covered with short fine recumbent gold setae, longer, denser caudally. Legs predominantly yellowish brown with following portions marked with brown; coxae, all femora except distally; all leg segments covered with fine semierect gold setae, plus scattered erect black spines on middle and hind tibiae; claws slender, gently curving, yellowish.

Male genitalia not diagnostic, similar to figs. 4-5.

Etymology. -The name *fasciata* refers to the prominent white fascia on the hemelytra.

Distribution. - Known only from Sabah, the northern part of the island of Borneo.

Remarks. - *S. murphyi* and *S. fasciata* are more closely related to each other than to other species of *Salduncula*. The latter has a dark instead of reddish head, the broad hemelytral fascia is clear unblemished white lacking any medial brown tinges, the outer margin of the membrane is light instead of dark, and the callus has a large pit open posteriorly. The specimens collected by J.T. and D.A. Polhemus were found on large rocks in a bay near Kudat. These rocks were part of a series of horizontal rock layers that have been tilted to a vertical position and weathered, and were riddled with crevices in which the bugs hid. As with *S. murphyi* from Singapore, marine beetles were also present, but no other insects were seen.

***Salduncula palawanensis*, new species**
(Figs. 3-5)

Material examined. - Holotype - macropterous male (JTPC) and allotype macropterous female (JTPC), N. of Mt. St. Paul, Sabang, Palawan, Philippines, M. Sato, 11-13.vii.1977.

Paratypes - 9 macropterous males, 2 macropterous females (JTPC), same data as holotype.

Description. - Size normal for genus, shape ovate, length 2.66-3.02 mm; maximum width (across hemelytra) 1.13-1.33 mm; ground color black, extensively marked with white.

Head black, width/length 0.67/0.31; ocelli large, separated by 2X the width of an ocellus; eyes slightly elongate, moderately protrusive, reddish brown, width/length 0.15/0.20; frons and

vertex clothed with very short inconspicuous pubescence, anteriorly with slightly longer setae; antennae slender, orange brown, darker distally, segment I set with short semierect setae, segments II-IV thickly covered with short recumbent gold setae and longer dark setae, lengths of segments I-IV = 0.20; 0.46; 0.46; 0.46.

Pronotum short, black, width/length (midline) 0.92/0.33; lateral margins almost straight medially, broadly curved anteriorly; collar faintly indicated; anterior lobe scarcely raised, weakly demarcated from weakly convex posterior lobe; callus with small median depression; posterior margin of posterior lobe broadly shallowly concave; humeri scarcely raised; entire pronotum thickly covered with semi-erect gold setae. Scutellum black, faintly shining, width/length 0.72/0.61; anterior lobe raised, without depressions anterolaterally, demarcated from posterior lobe by weak transverse depression, posterior lobe slightly depressed posteriorly; both lobes thickly covered with semi-erect gold setae.

Hemelytra mat, black, extensively marked with white tinged with brown, dominated by an interrupted fascia with width on corium about as wide as clavus, wider on tip of clavus, extending from tip of scutellum to apex of clavus, reaching across hemelytra to embolium (Fig.3); clavus length along outside margin 0.90, length of commissure 0.36, entire distal part white; endocorium, mat, black basally, crossed by broken white fascia medially, distally blackish; exocorium broadly brownish basally, black distally, with one elongate white spot along R + M before middle, another more yellowish spot almost filling distal angle; embolium brownish basally, black distally except distal extreme white tinged with brown; wing membrane fumate, basally blackish medially, outer margin black, veins darker, forming 4 distinct closed cells; surface of entire hemelytra set with numerous evenly spaced medium length semi-erect dark setae, sparser on membrane.

Ventral surface of head and thorax black to brown, lighter caudally, margins of abdominal ventrites and hypocostal ridge light colored; rostrum brown, length 1.42, reaching onto base of abdomen; entire ventral surface covered with short fine recumbent gold setae, longer, denser caudally. Legs predominantly yellowish brown with following portions marked with darker brown; coxae, all femora except distally, all tibia basally; all leg segments covered with fine semierect gold setae, plus scattered erect black spines on middle and hind tibiae; claws slender, gently curving, yellowish.

Male genitalia as in Figs. 4-5.

Etymology. - The name *palawanensis* refers to the place of origin.

Distribution. - Presently known only from the type locality, Palawan.

Remarks. - This species is most closely related to *S. swezeyi* but may be separated by the nature of the light colored hemelytral fascia which in *S. palawanensis* is more transverse and involves the entire whitish tip of the clavus, whereas in *swezeyi* the clavus is entirely dark and the fascia angles posteriorly, roughly in the shape of a shallow chevron, traversing the hemelytra behind the tip of the clavus and involving the anterior angle of the membrane.

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