

NOTES ON MARINE WATER-STRIDERS WITH DESCRIPTIONS OF NEW SPECIES

Part I. Gerridae (Hemiptera)

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Abstract. Nomenclatural and distributional notes are given for 15 described species of marine Gerridae, 1 species of *Asclepios* and 14 species of *Halobates*. Two new species are described, *Halobates herringi* and *Stenobates insularis*.

During 1976-1979 the authors made field studies and collections of marine Hemiptera in Australia, Samoa, Tahiti, Fiji, Tonga, Singapore and Tanzania. This report is based primarily on those studies; however, some additional records are given, based on material in our collections, those of the California Academy of Sciences, and specimens donated by A.R. Gillogly, M.S. Polhemus and C.L. Hogue. Unless otherwise noted, all materials are in the Polhemus Collection; the dispositions of types and other specimens are indicated by abbreviations as follows: Australian National Collection, Canberra (ANC); British Museum (Natural History) (BMNH); California Academy of Sciences (CAS); Cheng Collection (LC); Polhemus Collection (JTP); United States National Museum (USNM); University of Colorado Museum (CU); University of Queensland, St. Lucia (UQ); Bishop Museum, Honolulu (BPBM).

All measurements given in the descriptions are in units (60 units = 1 mm) unless otherwise noted.

***Asclepios annandalei* Distant**

Asclepios annandalei Distant, 1915, Ann. Mag. Nat. Hist. (8) 15: 504.

The specimens reported here are the first known to us since Distant's original records from near Calcutta and Ennar, India, and represent a substantial extension of the known geographic range of this species. The mating pair was taken from a mangrove stream in Singapore.

Andersen & Polhemus (1976) differentiated *Asclepios* from *Halobates* by the absence of a hair fringe on the middle tarsi of the former. This character is unreliable; *A. annandalei* has a hair fringe on each middle tarsus, whereas *Halobates mjobergi* Hale does not. Of the 5 characters proposed by Herring (1961) for separating the genera, only the shape of the male tergum 9 is diagnostic (cylindrical in *Asclepios*, always dilated laterally in *Halobates*). The other characters are all shared to some degree.

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The suture between the mesonotum and metanotum is as distinct in some specimens of *H. mjobergi* and *H. zephyrus* as in *Asclepios* species. The same *Halobates* species have the anterior tarsal segment 1 as short as that in *Asclepios* species. The modification of the front femur of *Asclepios annandalei* is, as Herring stated, a spinelike angulation beyond the middle on the inner face. However, the other *Asclepios* species lack the spine, and the base of the fore femur is abruptly widened (*A. shiranui* Esaki) or angulate (*A. apicalis* Esaki). Moreover, the fore femur of *Halobates formidabilis* Distant is abruptly widened basally, incrassate for most of its length, and is modified to receive the large spine of the fore tibia. Thus, unusual fore-leg modifications are not diagnostic for the 2 genera, and they can be distinguished only by the morphology of the male genitalia.

A possible partitioning of habitats (i.e., *Halobates* being confined to ocean waters whereas *Asclepios* occurs on brackish waters) is refuted by the discovery of a freshwater species of *Halobates* (Polhemus, in prep.).

Material examined. SINGAPORE: 10♂, 7♀, Mandai, 5.VIII.1976 (L. Cheng) (JTP, LC, BPBM).

***Halobates katherinae* Herring**

Halobates katherinae Herring, 1958, Dana Report No. 44: 8, fig. 4; 1961, Pac. Insects **3**: 255.

Halobates katherinae has so far been found only around New Caledonia and the nearby Loyalty Islands. Our specimens match Herring's description very well. We have found this species occurring together with *H. panope* in several bays around Noumea.

Material examined. NEW CALEDONIA: 17♂, 2♀, 1N, Isle des Pins, 6–8.VII.1979, tidal saltwater pool (Tom W. Davies) (CAS, JTP); 14♂, 2♀, Noumea, night light, inshore bay along road, 18.IV.1976 (L. Cheng) (JTP, LC); 3♂, 1♀, inshore bay near Chateau Royal, Bay of Citron, 18–19.IV.1978 (Cheng) (JTP, LC, BPBM).

***Halobates salotae* Herring**

Halobates salotae Herring, 1961, Pac. Insects **3**: 260, fig. 103–107.

This species has so far been found only around the Tonga Islands. Our specimens match Herring's description.

Material examined. TONGA IS: 2♂, 3♀, Nuku a'lofa Harbor, night light, 17.VI.1976 (L. Cheng) (JTP, LC). Additional locality data: Mangrove lagoon at Nuku a'lofa (LC).

***Halobates fijiensis* Herring**

Halobates fijiensis Herring, 1958, Dana Rep. 44: 10, fig. 5; 1961, Pac. Insects **3**: 257.

Halobates fijiensis is apparently restricted to the Fiji Islands.

Material examined. FIJI IS: 1♂, 3N, Suva Harbor (A.G. Mayer); 4♂, 2♀, Suva, USP Harbor, night light, 13.IV.1976 (L. Cheng); 12♂, 4♀, Suva, Mangroves, university marine laboratory, 13.IV.1976 (Cheng); 12♂, 13♀, USP Pier, 13.IV.1976 (Cheng) (JTP, LC, BMNH, USNM, BPBM).

Halobates panope Herring

Halobates panope Herring, 1961, Pac. Insects **3**: 295, fig. 55–57.

Herring (1961) noted considerable variation in this species. Our specimens agree with paratypes of the nominate form.

Material examined. NEW CALEDONIA: 1♂, 7♀, Noumea, mangrove bay, night light, 18.IV.1976 (L. Cheng); 1♂, 5♀, Noumea, Nearshore Bay, 18.IV.1976 (Cheng) (JTP, LC, BPBM).

Halobates kelleni Herring

Halobates kelleni Herring, 1961, Pac. Insects **3**: 266, fig. 94–96.

Halobates kelleni is known only from the Samoan islands of Tutuila and Upolu. Our material is from the same islands.

Material examined. AMERICAN SAMOA: 6♂, 7♀, 3N, Tutuila, Pala Lagoon, CL1515, 24.I.1978 (J.T. & M.S. Polhemus). WESTERN SAMOA: 9♂, 7♀, 3N, Upolu, Lotofuga Lagoon, CL1511, 22.I.1978 (J.T. & M.S. Polhemus) (CU, JTP, BPBM).

Halobates sericeus Eschscholtz

Halobates sericeus Eschscholtz, 1822, Entomographien, p. 107, pl. 2, fig. 3 [see Herring (1961) for complete synonymy].

This species is widely distributed in the Pacific and Indian oceans (see Cheng 1973, Andersen & Polhemus 1976, Cheng & Shulenberger 1980); however, the record below is apparently the first for the Vietnam coast.

Material examined. VIETNAM: 1♂, 5 mi [8 km] E of Quang Tri, Wonder Beach, 12.IV.1971, hopping on sand at wave line during period of strong onshore wind (A.R. Gillogly).

Halobates micans Eschscholtz

Halobates micans Eschscholtz, 1822, Entomographien, p. 107, pl. 2, fig. 3 [see Herring (1961) for complete synonymy].

Halobates micans is distributed circumglobally both north and south of the Equator (see Cheng 1973, Andersen & Polhemus 1976, Cheng & Shulenberger 1980). It is rarely found near shore, except during storms. The nymph reported below is assumed to be *micans* because this is the only known Atlantic species. It is the first record for the Texas coast, in spite of its common occurrence offshore.

Material examined. USA: Texas; 1N, nr Surfside, CL857, 20.VI.1977, blowing across beach during inshore wind (J.T. Polhemus).

Halobates nereis Herring

Halobates nereis Herring, 1961, Pac. Insects **3**: 272, fig. 82–84.

Halobates nereis is distributed throughout the Palau Islands and northeastern New Guinea.

Material examined. MICRONESIA: CAROLINE IS: PALAU IS: 1 ♂, Koror, Causeway, 7.VII.1975 (A.R. Gillogly); 2 ♂, 2 ♀, Koror, 17.II.1964 (T. Uchida) (JTP). Additional locality data: Palau, mangroves at West Passage (LC).

Halobates flaviventris Eschscholtz

Halobates flaviventris Eschscholtz, 1822, Entomographien, p. 109, pl. 2, fig. 5 [see Herring (1961) for complete synonymy].

Halobates flaviventris is widely distributed in the Indian Ocean and Western Pacific. Our specimens from Tanzania were taken from a sheltered area adjacent to steep, sharp rocks on a very small island that is part of an offshore reef. One specimen of *H. poseidon*, many *Halovelgia pauliani* Poisson, and a few specimens of a *Hermatobates* sp. were taken in the same place. This species was found in great abundance around Palau (Cheng 1981).

A male from the New Hebrides, and a few females and many males in the long series from Palau have a few scattered black bristles on the posterior acetabula but not on the margin. The New Hebrides locality is the closest recorded to the Tuamotu Archipelago, where the closely related *H. hawaiiensis* occurs. It would be of interest to examine specimens from intermediate localities to determine whether further character gradations occur.

Material examined. SRI LANKA (CEYLON): 1 ♂, Gonagala, 1906 (B. Fletcher); 1 ♀, Weligama, 31.XII.1907, T.B. Fletcher. VANUATU (NEW HEBRIDES): 1 ♂, Aurora, 27.I.1927 (F.P. Drowne). TANZANIA: 21 ♂, 2 ♀, 28N, Sange I, nr Mkwaja, CL994, 10.III.1979 (J.T. Polhemus). CAROLINE IS, PALAU: 25 ♂, 29 ♀, Koror, N of Ngell Channel, 14.IX.1979 (L. Cheng) (JTP, LC, BPBM).

Halobates poseidon Herring

Halobates poseidon Herring, 1961, Pac. Insects **3**: 287, fig. 52-54.

Herring (1961) had only a few specimens before him when he described this species. However, it is abundant around mangroves in Kenya (C.L. Hogue, in litt.) and Tanzania at high tide. At low tide (at Tanga, Tanzania) the mangroves had no water around them, and the few specimens seen were on broad, shallow, exposed tide pools. We did not find any beyond the low-tide line on open water. When the tide came in, flooding mangrove roots, *H. poseidon* specimens were abundant again among them. Where they go at low tide remains an enigma. Studies on the nearshore *Halobates robustus* Barber at the Galapagos Islands have shown that these insects are able to distribute themselves with relation to the tides (Birch et al. 1979).

Material examined. KENYA: 2 ♀, Mombasa, Tudor House, 9.IV.1954 (L.F. Brown); 9 ♂, 6 ♀, Kilifi Distr, Kilifi Cr, 7.II.1968 (C.L. Hogue). TANZANIA: 1 ♂, Sange I, nr Mkwaja, CL994, 10.III.1979 (J.T. Polhemus); 29 ♂, 19 ♀, 62N, Tanga, CL996, 11.III.1979 (J.T. Polhemus & D. Gates) (JTP, BPBM).

Halobates hawaiiensis Usinger

Halobates hawaiiensis Usinger, 1938, Proc. Hawaii. Entomol. Soc. **10**: 79.—Herring, 1961, Pac. Insects **3**: 288.

Halobates hawaiiensis has a much wider distribution than most inshore *Halobates* species.

Our adult material from Tahiti is separable from *flaviventris* on the basis of Herring's (1961) key. The posterior coxae provide characters consistently diagnostic for our material, e.g., curved and $1\frac{1}{2}\times$ as long as anterior tarsal segment 1 in *hawaiiensis*, straight and less than $1\frac{1}{2}\times$ as long as anterior tarsal segment 1 in *flaviventris*. The dense black bristles on the margin of the posterior acetabula are evident in all specimens of *hawaiiensis* seen, but not in *flaviventris*. The male terminalia, however, are so similar that they are difficult to rely on, and the yellow band on the venter of the intermediate acetabula is also too variable to be a key character.

Material examined. HAWAIIAN IS: HAWAII: 3♂, 10N, Kailua, Kona Bay, CL1362, 13.III.1973 (M.S. Polhemus); 2♂, 1♀, Kona Bay, nr pier at night, 8.III.1975 (M.S. Polhemus). SOCIETY IS: TAHITI: 7N, lagoon nr Papara, CL1521, 27.I.1978 (J.T. & M.S. Polhemus); 4♂, 6♀, 10N, Fare Huahine, 17°43'S, 151°W, 26.XII.1978 (P. Larkin) (JTP, LC, BPBM).

***Halobates formidabilis* (Distant)**

Euratus formidabilis Distant, 1910, Ann. Mag. Nat. Hist. (8) 5: 146.

Herring (1961) furnished a synonymy and discussion of this species. He was not able to study any specimens and had notes on males only, furnished to him by Dr W.E. China of the British Museum. With both males and females now available, we present the following additional notes.

In Herring's key, couplet 1 fails for *formidabilis*. The head is distinctly broader than long. However, the interocular space is much less than $4\times$ the width of an eye, and the venter is marked with yellow; therefore, one may proceed to couplet 7. The key also fails at couplet 24 (♀). There are 40 stout bristles on the meso-metanotum; the body is truncate, and slightly less than 5.0 mm long. From couplet 26 the species "keys out" satisfactorily.

The female fore femora and tibia are not modified as they are in the male. However, the fore femur bears 8–10 stiff black setae ventrally, and the fore tibia has 6–8 such setae.

Material examined. SOUTH INDIA: 1♂, 1♀, Bay of Bengal, 14.XII.1977 (M. Selvanayagam). SRI LANKA: 3♂, 3♀, Nai-arua Lagoon, Mulative, N.P., 1.V.1968 (P.B. Karunaratne) (JTP).

***Halobates mariannarum* Esaki**

Halobates mariannarum Esaki, 1937, Tenthredo 1: 357, pl. 31, fig. 1, text fig. 2.—Unger, 1946, Insects Guam 2: 97.—Herring, 1961, Pac. Insects 3: 262.

Herring (1961) noted a rather widespread distribution for this species in the Mariana, Caroline and Marshall islands.

Material examined. MICRONESIA: MARIANA IS: GUAM I: 3♂, 1♀, Pago Bay, 4.IX.1975 (M. Rowley, L. Chang); 13♂, 4♀, 59N, Gabgab Beach, Orote Point, Naval Station, in sheltered bay, 30.I.1981 (A.R. Gillogly) (JTP, BPBM).

Halobates (Hilliella) zephyrus Herring

Halobates zephyrus Herring, 1961, Pac. Insects 3: 276, fig. 28-30.

As Herring (1961) pointed out, *H. zephyrus* is close to *H. mjobergi* Hale, from which it may be easily distinguished by the presence on the middle tarsi of a hair fringe, lacking in *mjobergi*. This species is provisionally assigned to the subgenus *Hilliella* China.

Material examined. AUSTRALIA: Gladstone, Queensland: 12♂, 5♀, Auckland Cr (tidal), 18.V.1976 (L. Cheng) (JTP, LC); 3♂, 2♀, Townsville, 3-mile Creek, night light, 20.VII.1976 (Cheng) (JTP, LC, UQ, BPBM).

Halobates herringi Polhemus & Cheng, new species

Fig. 1

Apterous ♂. Blackish gray; head fuscous to blackish gray; margined with orange-brown, interrupted medially on posterior margin. Anterolateral portion of head, basal 1/3 of 1st antennal segment, coxal cavities beneath, fore and middle coxae, trochanters and abdominal sternites yellow. Posterior coxae distally and base of fore femur orange-brown. Remainder of antennae and legs, fuscous to black. Body without black hairs or spines. First antennal segment with 2 short black spines (only 1 on right 1st antennal segment). Most of middle tibia and 1st tarsal segment with swimming hairs typical of *Halobates*.

Length of head (33) subequal to narrowest interocular space (35). Width of eye, 19; eyes extending posteriorly about 1/2 length of propleura. Rostrum short, reaching between anterior coxae. Pronotum short (17), wide (59), anterior and posterior margins sinuate. Mesonotum fused with abdominal tergites 1 and 2, but segments demarcated laterally by short sulci. Mesonotum length 17 (measured from posterior margins of lateral sulci separating segments). Tergite 1 long (10); tergites 2-3 shorter, subequal (6-7, measured laterally); tergite 4 long (12, measured on midline, as are segments 5-7); tergites 5-7 subequal in length (5-7); tergite 8 projecting dorsally, length 7; tergite 9 expanded laterally, lateral expansions terminating in long digitate processes (Fig. 1A-D). Connexiva raised at about a 45° angle, consisting of long basal part along metanotum and abdominal tergites 1-3, with a shorter distal part adjacent to tergite 4. Pleura and thoracic sternum silvery gray. Posterior margin of sternite 7 broadly but shallowly arched anteriorly. Genital segments slightly asymmetrical (Fig. 1A-B). Antennae long, segments subequal in width (4-5); lengths of segments 1-4, 70:26:20:28. Anterior femur slightly flattened on inner face, slightly bowed; anterior tibia widened distally, as is typical in this genus. Measurements of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of anterior leg, 92:73:10:26; of middle leg, 260:197:80 (curved):29; of posterior leg, 225:102:8:22.

Length, 3.57 mm; width, 1.45 mm.

Apterous ♀. Similar to ♂ in coloration and structure except fore femora more slender, body broader and longer.

Length, 4.80 mm; width, 2.20 mm.

Types. Holotype ♂, allotype ♀, AUSTRALIA: Queensland: Gladstone, Auckland Crk, 18.V.1976 (L. Cheng) (ANC). Paratypes as follows: 3♂, 1♀, same data as holotype (JTP, LC).

Remarks. *Halobates herringi* differs from all other *Halobates* species by the extremely long digitate lateral projections of the male tergite 9. In *Halobates eschscholtzi* Herring, a member of the open-ocean group (known only from females), the anterior tarsal segments are equal in length, whereas in *H. herringi* the anterior tarsal segment 2 is 2.5× as long as segment 1.

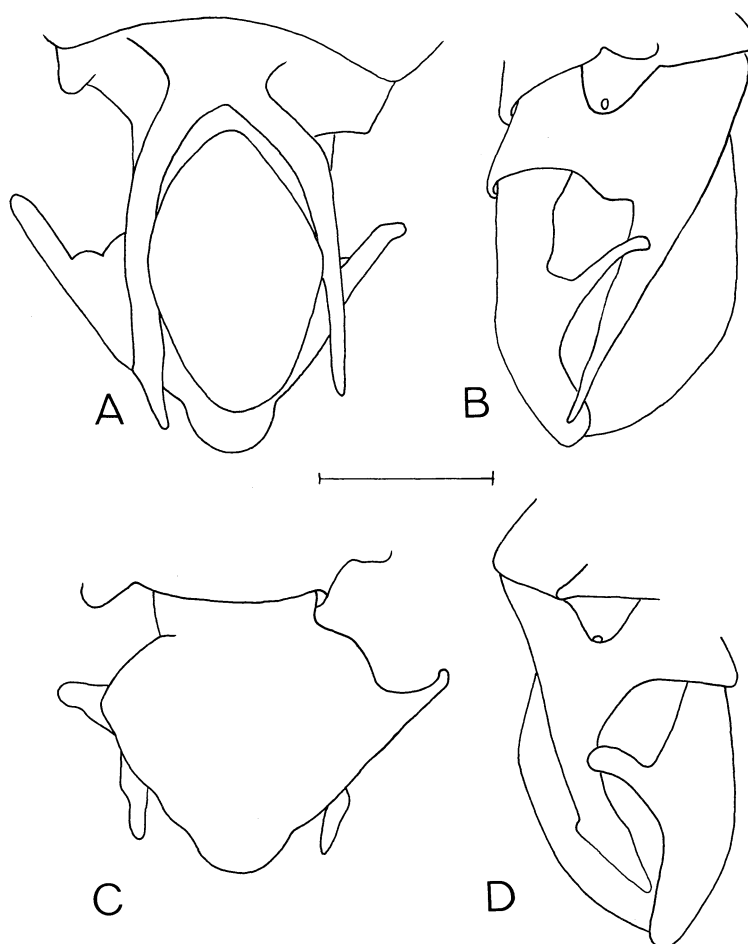


FIG. 1. *Halobates herringi*, ♂ genitalia, 4 views: **A**, ventral; **B**, right side; **C**, dorsal; **D**, left side.

Derivation of name. This species is named in honor of Dr Jon Herring, who published a splendid monograph and other works on *Halobates*.

***Stenobates insularis* Polhemus & Cheng, new species**

Fig. 2

Apterous ♂. Ground color leucine to yellow-brown; dorsum extensively marked with black. Head with 2 (1+1) anterolateral stripes anterad of eyes, an irregular median stripe terminating posteriorly between eyes, flanked posteriorly by 2 oblique streaks, brown. A median line on pronotum, and a wide median stripe on anterior ½ of mesonotum evanescent posteriorly except narrowly on midline, lateral and posterior margins of mesonotum, metanotum and abdominal tergites 1–7, connexiva black. Pronotum over most of disc, most of broad median stripe on posterior ½ of mesonotum (except for a median black line), 2 small patches (1+1) on abdominal tergite 1, broad transverse regions on tergites 2–6, and dorsal areas on middle

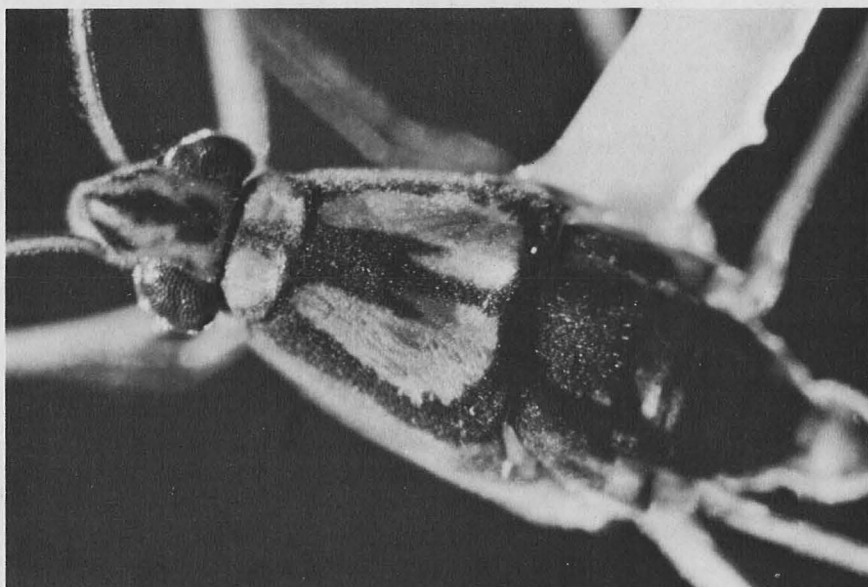


FIG. 2. *Stenobates insularis*, dorsal view.

and posterior coxal cavities "frosted." Pleura black overlaid with "frost." First antennal segment with 15-20 dark stiff setae; segment 2 with 3-5 similar setae. All femora and middle tibia set with short stiff black setae. Fore tibia flattened on both dorsal and ventral surfaces, set with a regular row of 3-4 long stiff setae and an anterior brush of stiff setae on distal $\frac{1}{2}$.

Length of head (33), much longer than interocular space (25). Width of eye, 17; eyes extending posteriorly less than $\frac{1}{2}$ the length of propleura. Rostrum stout, curved, reaching middle of mesosternum. Pronotum short (17), broad (43), posterior margin almost straight. Mesonotum long (60), broad across posterior part (80), demarcated from metanotum by distinct suture. Metanotum length 20, indistinctly separated from abdominal tergite 1. Length of tergites 1-2 subequal (12-13); tergites 3-4 shorter (7-8); tergite 5 longer (10); tergite 6 short (6), tergite 7 even shorter (4); tergite 8 long (24), projecting but not raised; tergite 9 with conspicuous suranal plate bearing sharp lateral, anteriorly directed projections (see Matsuda 1960, Fig. 1053). Connexiva slightly raised, continuous along abdomen, without distal spines or processes. Antennae long, segment 1 slightly stoutest. Segment 1 with anterior and posterior brown stripes on luteous background; segments 2-4 brown, segment 2 lighter basally, segment 4 with broad ($\frac{1}{2}$ length), median, yellowish annulus; lengths of segments 1-4, 60:40:33:35. Legs yellowish, all femora and tibia with anterior and posterior brown stripes. Anterior tarsi marked with brown. Tips of middle and posterior tibia and middle and posterior tarsi brown. Measurements of legs as follows: Femur, tibia, tarsal 1, tarsal 2 of anterior leg, 63:58:1:34; of middle leg, 180:210:63:58; of posterior leg, 191:66:12:22.

Length, 3.83 mm; width, 1.45 mm.

Apterous ♀. Similar to ♂ but dorsum of mesonotum differently colored, i.e., broad median portion, widening posteriorly, light brown, not heavily sclerotized (wrinkled and sunken in specimens at hand).

Length, 3.55 mm; width, 1.43 mm.

Macropterous forms unknown.

Types. Holotype ♂, and allotype ♀, SINGAPORE: Mandai, mangrove stream, 5.VIII.1976 (L. Cheng) (JTP). Paratypes: 3♂, 2♀, same data as types (JTP, LC).

Remarks. *Stenobates insularis* differs from *S. biroi* (Esaki) in the following respects. The posterior margin of the pronotum is straight, not sinuate. The legs are luteous or yellowish, not brown, with anterior and posterior fuscous stripes on the middle and posterior femora, a posterior stripe being evident only on the anterior femora. The 4th antennal segment has a broad light-colored annulus medially. The 1st rostral segment is luteous, not brown. The dorsal markings are very different from those of *biroi*, with frosted markings not mentioned by either Esaki (1926) or Matsuda (1960) in their descriptions.

Stenobates insularis is the second known species of this rare genus. The generic name "*Stenometra*," proposed by Esaki (1926) to hold *biroi*, was found to be preoccupied and the genus was later renamed *Stenobates* (Esaki 1927). Andersen & Polhemus (1976) noted the occurrence of these water striders in estuaries and nearshore marine localities; the mangrove stream habitat of *S. insularis* further indicates that the genus is marine.

Derivation of name. The name *insularis* is derived from the Latin "*insula*," island.

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**TWO NEW SUBSPECIES OF *PAPILIO CANOPUS*
(LEPIDOPTERA: PAPILIONIDAE)
FROM THE SOLOMONS AND VANUATU**

Chris Samson¹

Abstract. Two new subspecies of *Papilio canopus* are described and figured, 1 from San Cristobal I in the southern Solomons and 1 from Erromango, Tanna, Aneityum and Futuna islands in southern Vanuatu.

Two new subspecies of *Papilio canopus* Westwood (1842) are described below from specimens made available by the following institutions, hereafter abbreviated in the text: British Museum (Natural History) (BMNH); National Butterfly Museum, England (NBM); Bishop Museum, Honolulu (BPBM).

Among those examples studied in the BMNH are specimens collected by Dr Gaden S. Robinson, while participating in the Royal Society and Percy Sladen New Hebrides Expedition 1971. Such specimens are hereafter abbreviated "R. Soc. Exped."

***Papilio canopus cristobalensis* Samson, new subspecies**

Fig. 3

Holotype ♀. Forewing length, 60 mm. *Dorsal surface*: ground-color black-brown; median band of forewing pale yellow in spaces 1a-2 graduating to white costally, extending apically in space 7. Hindwing discal band creamy-white occupying spaces 1a-6, extending distad in spaces 3-5; corresponding outer margins exaggerated and undulated. Yellow-orange scaling at anal angle crescentiform. Tornus vaguely spatulate. *Ventral surface*: forewing basals dark brown graduating to pale brown at submedians; median band similar in extent to that of dorsal surface. Postmedians orange-brown darkening marginally. Hindwing dark brown becoming paler marginally at vein terminations. Cream-white discal band present in spaces 1a-6 although fragmented and reduced in distal extent, cuneiform in spaces 3-5; paralleled distally with blue-white scaling suggestive of a secondary band. Yellow-orange submarginal spots vestigial; yellow-orange scaling at anal angle more extensive than on dorsal surface.

Holotype ♀, SOLOMON IS: San Cristobal, 21.VI.1973 (R. Morgan, BM.1978-27) (BMNH).

Remarks. The taxon described above follows a number of recent discoveries from San Cristobal (Samson 1980), an island group on which are found many endemic Rhopalocera. In size and general extent of markings, *P. canopus cristobalensis* parallels that of *P. fuscus xenophilus* Mathew (1886), which also occurs on San Cristobal (Samson 1980). However, the former possesses clearer demarcation between bands and ground-color and straight configuration of the forewing median band, this having a yellow tinge characteristic of the various *canopus* subspecies. Further examples of *canopus* from the Solomons, including the ♂ of *P. canopus cristobalensis*, may be detected in museum collections possibly having been placed with *P. fuscus*, as was the holotype ♀ described above.

1. National Butterfly Museum, St. Mary's, Bramber, West Sussex, England.