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## A Contribution to the Knowledge of Philippine Semiaquatic Hemiptera-Heteroptera.

By

N. Møller Andersen

Zoological Museum, Copenhagen, Denmark.

Among the insects collected in the Philippine Islands by the Danish "Noona Dan" Expedition in 1961 (Petersen 1966) is the small collection of semiaquatic Hemiptera discussed in this report. According to personal information from Dr. Børge Petersen, fresh-water biotopes were rather scarce in the areas where collecting took place, viz. the islands Palawan and Balabac, the island Tawi Tawi in the Sulu Group, and the Zamboanga Province of Mindanao.

Family **GERRIDAE** Leach, 1817.

Subfamily **Gerrinae** Amyot & Serville, 1843.

**Limnogonus (s. str.) fossarum** (Fabr., 1775).

(For synonyms see Lundblad 1933, p. 374 and Esaki 1937, p. 360).

MINDANAO: Sapamoro, Curuan district, 16 Dec. 1961. 3 ♀ apt., 1 ♂, 2 ♀ macr.

This widespread oriental Gerrid was, in the Philippines, formerly reported only from Manila, Luzon (type locality for *Gerris discolor* Stål, 1859, which proved to be a synonym of *L. fossarum* according to Lundblad 1933, p. 377).

Distribution (compiled from Lundblad 1933, Esaki 1937, Usinger 1946, and Miyamoto 1964b.): Ryukyu Islands (south of Amami Oshima), Taiwan, S. China, Ceylon, India, Burma, Thailand, Malaya, ? Nicobar Islands, Sumatra, Java, Celebes, Philippines (Luzon, Mindanao; new record), Mariana Islands (Guam, Saipan), and Fiji Islands.

**Limnogonus (s. str.) luctuosus** (Montr., 1864).

(For synonyms see Lundblad 1934, p. 123).

PALAWAN: Brooke's Point, Uring Uring, 14 Aug. 1961; caught by Mercury-light 19.00—21.00. 1 ♀ macr.

This is the first record outside the Pacific and Papuan areas of this widely distributed species, the nearest locality (so far known) being the Palau Islands.

Distribution (compiled from Esaki 1937, Usinger 1946, and Laird 1956): Philippines (Palawan; new record), Mariana Islands (Guam), Palau Islands (Babelthuab), Murray Islands, New Caledonia, New Hebrides (Malekula), Fiji Islands (Viti Levu), Samoa Islands (Upolu), and Society Islands (Tahiti, Raiatea).

I have also seen a specimen from Bora Bora in the Society Islands.

**Tenagogonus (Limnometra) ciliatus** (Mayr, 1865).

(For synonyms see Hungerford &amp; Matsuda 1958, p. 409).

BALABAC: Dalawan Bay, 12 Oct. 1961. 2 ♀ macr.

Previously only reported in the Philippines from Luzon. For distributional data see Hungerford & Matsuda (l.c., p. 411—412) and Andersen (1964, p. 333).

**Tenagogonus (Limnometra) femoratus** (Mayr, 1865).

(For synonyms see Hungerford &amp; Matsuda 1958, p. 413—414).

BALABAC: Dalawan Bay, 12 Oct. 1961. 2 ♀ macr.

Previously recorded from some of the Philippine Islands (Samar, Mindanao, Basilan (Hungerford & Matsuda, l.c., p. 414—415), and Palawan (Banks 1909, p. 582—583)) and from Banguey Island, N. and E. Borneo (Hungerford & Matsuda, l.c.). Additionally, it is reported from Yonaguni and Kashoto Islands east of Taiwan (Miyamoto 1964b., p. 208).

Hungerford & Matsuda (l.c., p. 414) describe the variations in the colour pattern. The Bornean specimens have light reddish pronotum and bluish-black hemelytra with black veins, while individuals from Banguey and the Philippine archipelago only have a trace of pink on the pronotum, light brown hemelytra, and slightly darker veins. The specimens from Balabac are apparently intermediate between these two forms, having a light brownish pronotum with a faint tint of red, hemelytra brownish black with veins a little lighter. Unfortunately, the author has not been able to examine the specimens from Palawan.

**Tenagogonus (Limnometra) nigripennis** (Mayr).*Limnometra nigripennis* Mayr, 1865, p. 443.*Gerris ?anadyomene*, Banks, 1909, p. 583, pl. II, fig. 1.

PALAWAN: Mantalingajan, Pinigisan, 600 m., 14 Sept. 1961; (small, shallow puddle fed by a spring). 9 ♂, 17 ♀ apt., 9 nymphs.

A quite variable but very characteristic large water-strider endemic to the Philippines and reported from most of the larger islands (Hungerford & Matsuda 1958, p. 417—418). Banks (l.c) refers with doubt two Gerrids from Iwahig, Palawan to "*Gerris*" *anadyomene* Kirkaldy. However, judging from his figure of a macropterous individual and the short descriptive notes where he mentions the white annulations of the antennae, these specimens do not belong to this species but to *T. nigripennis*. Thus, the only record of *Tenagogonus (Limnometra) anadyomene* (Kirkaldy) from the Philippines is still that of Distant's (1904, p. 178).

Subfamily **Ptilomerinae** Esaki, 1927.**Ptilomera (s. str.) hungerfordi** sp. nov. (Figs. 1—9).

Colour in apterous forms: Typical for the genus as described by Hungerford & Matsuda (1965, p. 399—400). The specimens of the type series quite dark owing to the black markings being larger than usual. Ground colour ferrugineous. In side view the longitudinal, black band on meso- and metapleuron has usually only a very faint longitudinal, yellowish stripe in middle. Abdominal tergites black, matt, except 8th segment above and anal cone in male, which are light brownish medially, and the small median spots on 2nd—4th and most of 7th tergite in female, which are ferrugineous. The black parts of the dorsal surface, the pleural area, and venter heavily covered with a short, silvery pile.

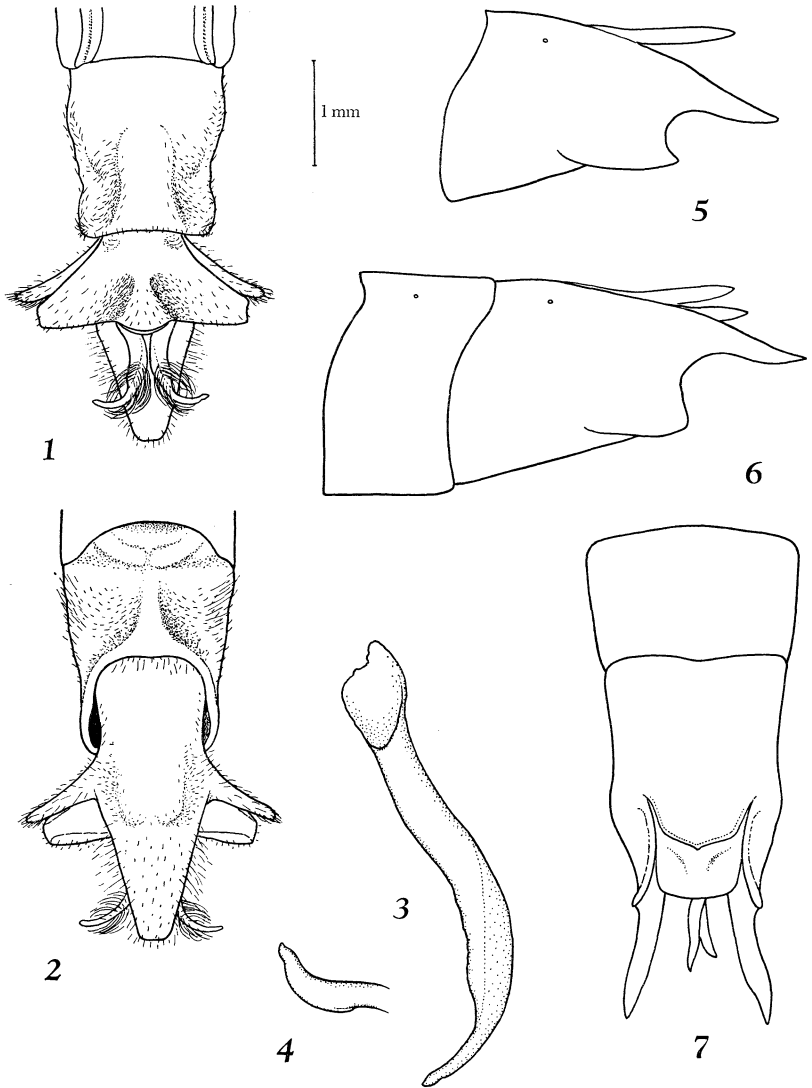
## Structure of apterous forms:

	Measurements of the appendages. (Actual lengths in mm.).	
	Male holotype.	Female allotype.
Antennal formula (1st:2nd:3rd:4th):	8.80:2.00:2.45:1.70	7.40:1.60:2.00:1.48
Front leg (fem. :tib.:ta.1.:ta.2.):	9.05:7.85:4.50:1.90	7.78:6.70:4.15:1.65
Middle femur:	25.15	21.00
Hind femur:	33.30	24.65

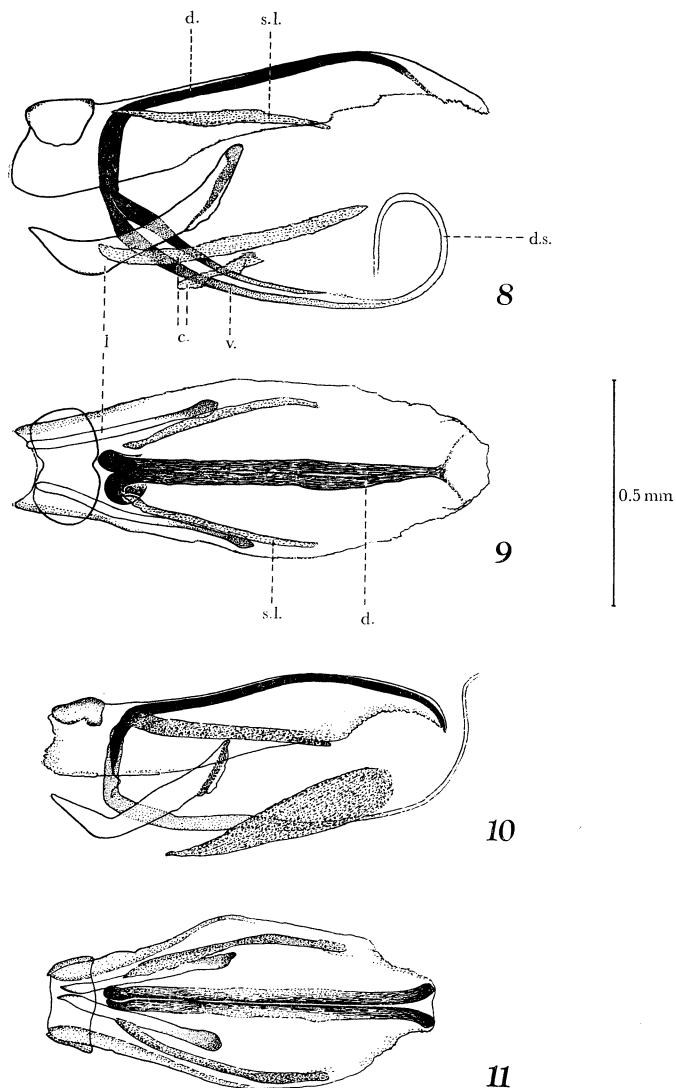
**Aptero us male:** Relative lengths of thorax, 1st—7th tergite, and genital segments (dorsal view) in holotype: 269:192:135\*); 7th tergite about twice as long as 6th; hind coxae reaching to about middle of 4th abdominal segment. Anal cone (fig. 1) relatively broad, greatest width: head width: 79:86 (holotype), with median part longitudinally raised, especially towards the rear margin; lateral wings rather long, pointing obliquely upwards, hind margins straight and pointing slightly in a posterior direction, not parallel with the front margins; median lobe small, slightly surpassing the lateral wings in some individuals; however, the 10th segment may protrude to a greater or lesser extent below the median lobe, reaching or surpassing an imaginary line between the posterior corners of the lateral wings. Pygofer as seen from below (fig. 2) moderately broad basally with faint, lateral impressions behind the dorsolateral projections and with apical half moderately slender and somewhat pointed; dorsolateral projections long and stout, in most specimens subparallel with the lateral wings of the anal cone and surpassing these by about one seventh of their length. 8th abdominal segment with a prominent median keel ventrally, above with short, lateral impression. Clasper densely haired toward apex with shaft much longer and broader than the arm, which turns obliquely laterad as seen from above (fig. 3); seen from behind the arm is curved obliquely dorsad, its sides not parallel (fig. 4). The apical part of phallus (endosoma) with a structure as shown in figs. 8 and 9, with endosoma surrounded by conjunctiva and the conjunctival sclerites thus superimposed on the endosomal sclerites.

**Aptero us female:** Relative lengths of thorax and abdomen (dorsal view) in allotype: 240:264. Hind coxae reaching the middle of 3rd abdominal segment; 7th tergite a little longer than 6th. Connexival spine a little shorter than 7th tergite (40:48 in allotype); both dorso- and ventrolateral lobes present; dorsolateral lobe rather long; its upper margin from base of the connexival spine to the tip much less than twice as long as connexival margin of 7th abdominal segment; base of dorsolateral lobe broad, apical part tapering to a more or less downward-curved spine; incision between dorso- and ventrolateral lobes not as deep as wide; tip of the short ventrolateral lobe truncate or pointed, the variation

\*) 1 unit = 0.025 mm.



Figs. 1—7. *Ptilomera (s.str.) hungerfordi* sp. nov. — Fig. 1. Apical part of male abdomen from above; most of the pubescence omitted. Fig. 2. do. from below. Fig. 3. Left clasper in male, dorsal view; hairs omitted. Fig. 4. do., seen from behind. Figs. 5—6. Outline of the apical part of female abdomen, lateral view, showing the variation of the ventrolateral lobe. Fig. 7. do., ventral view. Figs. 3—4 drawn in double magnification in relation to the other figures. Figs. 1—2 holotype, figs. 6—7 allotype, other figures paratypes, all from Palawan.



Figs. 8—9. *Ptilomera* (*s. str.*) *hungerfordi* sp. nov., paratype, and  
 figs. 10—11. *Pt. (s. str.) harpyia* Schmidt, plesiotype. Apical part of  
 phallus (endosoma) surrounded by conjunctiva showing the various  
 sclerites. *c.* conjunctival sclerites, *d.* dorsal plate, *d. s.* ductus seminis,  
*l.* lateral plate, *s. l.* secondary lateral plate, *v.* ventral plate.

as shown on figs. 5—6. In lateral view the ventrolateral lobe is not as long as the 7th sternite before its base; distal lobe of 7th sternite keeled medially at base and directed obliquely dorsad, not hidden by the ventrolateral lobes (fig. 7).

Size of apterous forms (actual measurements in mm., holo- and allotype in paranthesis; M. = mean):

	Males:	Females:
Total length:	14.13—16.78 (16.50) M. 16.39	16.15—16.50 (16.45) M. 16.34
Width of head:	1.90—2.20 (22.15) M. 2.09	1.95—2.00 (1.96) M. 1.98
Width of pronotum:	1.98—2.45 (2.25) M. 2.25	2.00—2.10 (2.10) M. 2.06
Length of mesonotum:	3.00—3.70 (3.50) M. 3.45	3.15—3.35 (3.15) M. 3.25
Width across meso-acetabula:	3.20—3.95 (3.65) M. 3.62	3.63—3.78 (3.78) M. 3.73

Winged forms unknown.

Type material: Holotype male, allotype female, 5 ♂ 5 ♀ paratypes, all apterous, and 5 nymphs. Locality: Philippines, PALAWAN: Brooke's Point, Makagwa, 22 Aug. 1961, Noona Dan Exp. 1961—62. The locality was a small, swift-running river through párang-landscape. The types belong to the Zoological Museum of Copenhagen, 1 ♂ 1 ♀ paratypes are now in Field Museum of Natural History, Chicago.

Comparative notes: The new species is very similar to *Ptilomera harpyia* Schmidt, 1926 quoted by Hungerford & Matsuda (l.c., 467—470) from Burma, Thailand, Malaya, Cambodia, Laos, and the Philippines and to *Pt. harpyia ceramensis* Hung. & Mats., 1965 from Ceram. Unfortunately I have not been able to examine the single male specimen from the Philippines; this is probably not *Pt. harpyia* but belongs instead to the new species. Through the kindness of Dr. George W. Byers, Lawrence, Kansas the author has been able to compare some specimens of *Pt. harpyia* from "Laos, Tonkin" labeled "Plesiotype" by Hungerford with the type series of *Pt. hungerfordi* sp. nov. The new species is somewhat larger and the dark areas are more prominent. The anal cone in the male has more slender and longer lateral wings in *hungerfordi* (greatest width of anal cone 0.92× head

width in holotype,  $0.85\times$  in *harpyia* male plesiotype); median part of anal cone longitudinally raised in *hungerfordi*, suppressed in *harpyia*. Pygofer with lateral impressions ventrally, a feature absent in *harpyia*, distal half not as slender as in *harpyia*; dorso-lateral projections of pygofer longer, surpassing lateral wings of anal cone. Claspers very similar, but the structure of the phallus shows some very marked differences (figs. 8—11): In *hungerfordi* (figs. 8—9) the dorsal plates (d.) are only partly separated, the ventral plate (v.) is well sclerotized and clearly bifid, and the conjunctival sclerites (c.) are divided and relatively small; the dorsal, sclerotized part of endosoma extending over the distal part of the dorsal plates. In *harpyia* the dorsal plates are well separated, especially at the apex, the ventral plate is apparently single and the conjunctival sclerites are large and distinct; dorsal part of endosoma not extended. The females of the two species are almost indistinguishable.

In the key to males of *Ptilomera* by Hungerford & Matsuda (l.c., p. 406—408) the new species run easily through to couplet 24, but compared with *Pt. harpyia* the distal half of pygofer is not unusually slender, its caudal tip not as pointed as in *harpyia* though not as blunt as in *Pt. dromas* Breddin. In the key to females *hungerfordi* runs out in couplet 55 to *Pt. dorceus* Breddin from N. Celebes as the ventrolateral lobe is shorter than the venter of 7th abdominal segment before it. However, I have seen females of a *Ptilomera* from Thailand with males which agree with the *harpyia* plesiotype and these, too, run out to *dorceus* instead of to the *tigrina-harpyia* couplet; thus, this character appears to be quite variable and not very useful in separating these obviously very similar species. The male of *dorceus* is unknown.

This is the second *Ptilomera* species reported from the Philippines (excluding the probably dubious *harpyia* specimen). The other species, *Pt. wernerii* Hung. & Mats., 1958, also from Palawan is very characteristic, with a bifurcated clasper in male.

The new species is named in honour of the late Prof. H. B. Hungerford, Lawrence, Kansas in recognition of his great contribution to the clarification of the taxonomy of this very difficult genus.

**Rheumatogonus borneensis** Esaki, 1927. (Figs. 12—14, 16—17).

PALAWAN: Brooke's Point, Makagwa, 22 Aug. 1961; (small, swift-running river through párang-landscape). 1 ♂ 1 ♀ apt.



*Rh. borneensis* was formerly known only from the single female type from Pontianak, N. Borneo (Esaki 1927, p. 267—268, fig. 3d.). Through the kindness of Dr. P. Viette of Museum National d'Histoire Naturelle, Paris the author has been able to compare the Palawanese female specimen with the type of *borneensis*, and has found agreement in most respects. Apart from the specimens of the Danish expedition I have examined 3 ♂ 3 ♀ apterous labeled "Dimaniang, Busuanga Is., P.I. (Calamianes Group); nr. sea level; III: : 47; stream through forest; CNHM-Philippine Zool. Exped. (1946—47) H. Hoogstraal leg." from the Field Museum of Natural History, Chicago, and determined "*Rheumatogonus luzonicus* ? (Kirk.)" by Prof. H. B. Hungerford. However, they too agree with the *borneensis* type. These specimens have been given some consideration in the descriptive notes below.

**Description of apterous male (fig. 13):** Colour: Dorsal surface orange, venter light yellowish. Antennae, two small spots on vertex, anterior margin of pronotum lateral, and a longitudinal stripe in the middle of posterior half of mesonotum and on metanotum, blackish brown; the last mentioned stripe more or less widened at the meso-metanotal suture, reduced to a diamond-shaped spot in the male from Palawan. Front leg bluish-black except coxa, trochanter, and basal third of inner surface of femur; middle and hind legs bluish-black except coxae, trochanters, and proximal parts of femora. Dorsal surface of the basal three to five abdominal tergites yellowish brown except whole 1st tergite and parts of 2nd and 3rd tergite, as well as median parts of 4th and 5th tergite in some specimens, which are blackish brown; connexivum yellowish brown.

**Structure:** Much smaller than female, nearly parallel-sided. Eyes large, head a little broader than pronotum (36:33); proportional lengths of antennal segments: 1st:2nd:3rd:4th: 55:31:31:23.5. Pronotum short, as long as an eye, lateral margins sub-parallel, without long hairs, only slightly constricted posteriorly, with rear margin faintly trilobated; mesonotum parallel-sided, prolonged (about 2.2 times as long as metanotum). Proportional lengths of leg segments:

	Femur	Tibia	Tarsus
Front leg:	83	59	11:13
Middle leg:	228	149 (?curved)	51:7 (?c.)
Hind leg:	238	66 (?c.)	3:5 (?c.)

Front femur thickened, greatest width (11 units) around middle; ventral surface of trochanter and femur with several long, black bristles; middle femur regularly tapering towards apex; hind femur thinner than middle femur, only slightly thickened in the basal part, elsewhere tapering. Abdomen shortened (notum about  $1.8\times$  tergite 1—7); 7th tergite a little longer than preceding two segments together (12:9.5); connexivum raised almost vertically. Sternite 2—6 very short; 7th sternite slightly shorter than sternites 3—6 together (8.5:9.5), its posterior margin simply concave; 8th abdominal and the genital segment extended, together longer than 7th sternite, structurally simple, without any modifications; claspers blackish, in resting position slightly protruding and just visible from above, falciform with a broad shaft and a slender, curved apical blade (fig. 14).

**Size:** Total length 4.08—4.23 mm. (apical abdominal segments protruding; length of body from anterior margin of pronotum to posterior margin of 7th tergite 3.10—3.38 mm.); width of head 0.86—0.91 mm.; width across mesoacetabula 1.05—1.11 mm.

**Descriptive notes on female** (fig. 12): The apterous females before me show some deviations from the type specimen, both in colour and structure.

**Colour:** Two dark spots on vertex; dark area on mesonotum broader, somewhat trilobate in front.

**Structure:** Esaki (l.c., p. 268) emphasizes the diagnostic value of the "strongly constricted conjunction between the head and prothorax" in the type female. However, an examination of the type revealed that this constriction is due to an extension of the head, probably caused by the preparation. Fig. 12 of the Palawanese female shows the head in normal position. Antennal formula: 72:37:35:28 beginning with the first segment. Pronotum transversely constricted posteriorly, lateral margins with long hairs; mesonotum about 2.0 times as long as metanotum. Proportional lengths of leg segments:

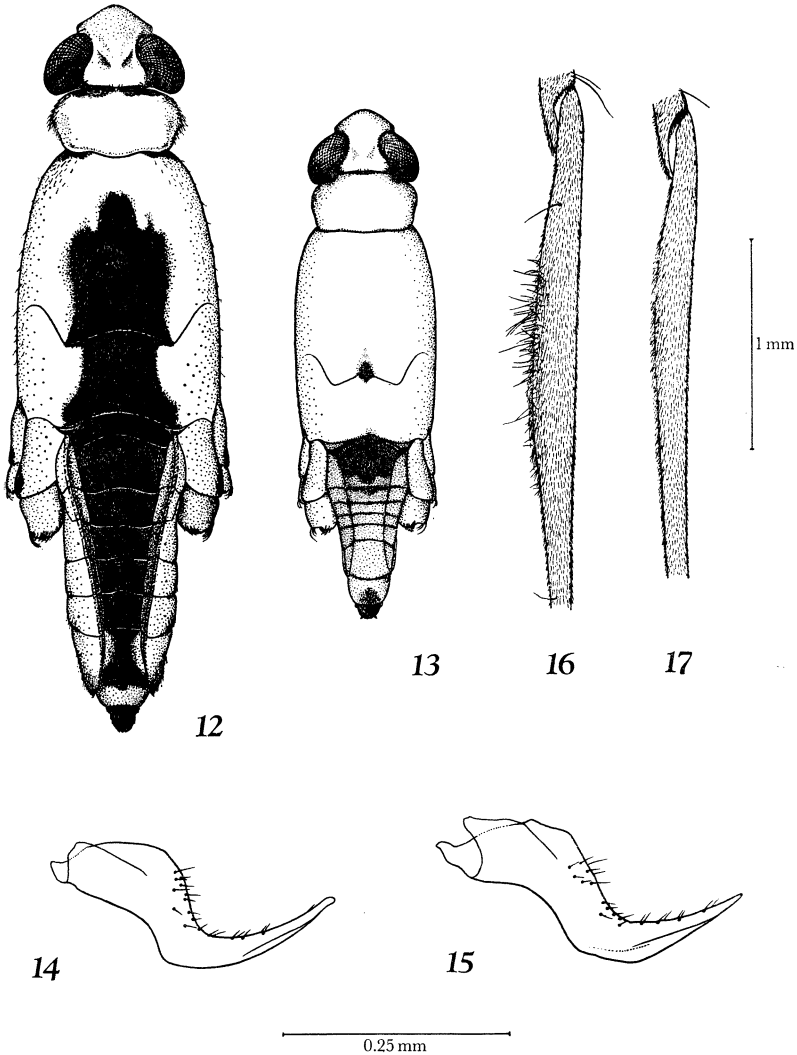
	Femur	Tibia	Tarsus
Front leg:	103	80	22:18.5
Middle leg:	290	190 (?curved)	56:18 (?c.)
Hind leg:	290	111 (?c.)	3.5:6 (?c.)

Front femur not as wide as in male (maximal 10.5 units); middle femur somewhat flattened and thickened basally, especially in the type female; hind femur dorso-ventrally flattened and

thickened in proximal fourth (figs. 16—17). In the females from Palawan and Calamianes (fig. 16) this dilatation is broader than middle femur basally (8:6.5) and provided with long hairs (only slightly shorter than femur width) on the ventral and dorsal surfaces near the inferior margin; in type female (fig. 17) the dilatation is not as broad as middle femur (6.5:8), the pubescence is more sparse and the hairs only half as long as width of dilatation. Abdomen shortened (notum about 1.2 times as long as tergite 1—7); tergites not entirely shiny, the shiny areas are reduced to an oval spot on each segment, while the lateral parts are covered with a pubescence of whitish hairs; 7th sternite longer than the preceding three sternites, posterior margin lobately produced in middle, covering ventral part of 8th segment; 9th segment bent downwards.

**Size:** Total length 5.43—6.00 mm. (type female 5.85, not 5.5 mm. as given in the original description); width of head 1.08—1.18 mm. (type female 1.18 mm.); width across mesoacetabula 1.60—1.79 mm. (type female 1.60 mm.).

**Comparative notes:** *Rh. borneensis* is obviously very closely related to *Rh. luzonicus* (Kirkaldy, 1909). Esaki (l.c., p. 266, fig. 3a-c) together with a redescription gives a figure of an apterous female of *luzonicus* with sides of pronotum evenly rounded in contrast to the posteriorly constricted pronotum in the former species. However, I have seen an apterous female from Naturhistoriska Riksmuseum, Stockholm which would appear to be the type of *luzonicus* (labeled "Manila" and "Type of *Ptilomera luzonica* K.") and which is very similar to the *borneensis*-type in this respect. From the Field Museum of Natural History, Chicago the author has obtained 3 ♂, 2 ♀ apt. and 1 nymph labeled: "Barungkot, Upi, Cotabato Province, Mindanao, 1500 ft.; :47; CNHM-Philippine Zool. Exped. (1946—47), F. G. Werner leg; stream through original forest", and determined "*Rheumatogonus luzonicus* ? Kirk." by H. B. Hungerford which agree perfectly with the *luzonicus*-type. A comparison of the types and the other specimens of the two species discussed discloses only minute differences. *Rh. luzonicus* is a somewhat bigger form (see table 1.) with larger and more conspicuous dark markings, a thicker pubescence on pleura, venter, and abdominal tergites especially in female, but with connexival corners not obscured by hairs. Hind femur of female in all specimens with dilatation like the *borne-*



Figs. 12—14 and 16—17. *Rheumatogonus borneensis* Esaki. — Figs. 12—13 Apterous female (left) and male (right) from Palawan. Fig. 14. Left clasper in male from Calamianes Isl. Figs. 16—17. Basal one third of hind femur in female, dorsal view (fig. 16, female from Palawan, fig. 17, type female from N. Borneo). Fig. 15. *Rh. luzonicus* (Kirk.). Left clasper in male from Mindanao.

*ensis*-type (fig. 17). The claspers in male (fig. 15) stronger, with a relatively short and broad blade. The phallus-structure, which is relatively simple, is practically identical in the two forms.

Table 1. Table of comparison between *Rh. borneensis* Esaki and *luzonicus* (Kirk.); actual measurements in mm.

		<i>borneensis</i>	<i>luzonicus</i>
Body length (notum + tergite 1—7)	♂	3.10—3.38	3.68—3.73
	♀	4.40—4.93	5.23—5.85
Head width	♂	0.86—0.91	0.99—1.01
	♀	1.08—1.18	1.20—1.29
Width across meso-acetabula	♂	1.05—1.11	1.29—1.35
	♀	1.60—1.79	1.91—2.18
Distribution		N. Borneo, Philippines (Palawan, Calamianes Isl.)	Philippines (Luzon, Mindanao)

Whether these two forms deserve specific rank or whether they are allopatric subspecies is difficult to say without breeding experiments. In fact the only clear-cut differences, though small, lie in the body proportions and in the structure of the claspers in the male, while the *borneensis*-females from Palawan and Calamianes are different from the N. Bornean female in the structure of the hind femur.

#### Family VELIIDAE Amyot & Serville, 1843.

##### Subfamily Rhagoveliinae China & Usinger, 1949.

Upto now no species of the genus *Rhagovelia* Mayr have been reported from the Island of Palawan, though 14 species, representing both the recognized subgenera, have been described from other islands of the Philippine archipelago, chiefly Luzon and Mindanao.

#### **Rhagovelia (s. str.) ?hoberlandti** Hungerford & Matsuda, 1961. (Fig. 18).

PALAWAN: Mantalingajan, Pinigisan, 600 m., 14 Sept. 1961; (small, shallow puddle fed by a spring). 1 ♀ macr.

*Rh. hoberlandti* was described from Dimaniang, Busuanga Island in the Calamianes Group just north of Palawan (Hungerford

& Matsuda 1961, p. 260), but only on apterous specimens. In the absence of males, I refer (with some doubt) to this species one macropterous female caught together with two other macropterous females of an unidentified species (see below).

**Notes on macropterous female:** Compared with an apterous female paratype of *hoberlandti* there are similarities in most characters, including relative measurements of antennal and leg segments. Pronotum blackish; anterior one seventh with a yellowish white transversal band only very slightly interrupted in middle and reaching propleura laterally; rear margin of pronotum brownish. Forewings blackish brown with darker veins and a longitudinal whitish band basally. Venter matt and blackish except 7th sternite, which is yellowish brown and shiny.

Hind femur (fig. 18) armed with several teeth and one spine, while a female paratype of *hoberlandti* has two curved spines on hind femur (fig. 19). However, this and other deviations may be due to geographic or individual variation.

Total length 3.80 mm.; width of head 0.80 mm.; width across humeri of pronotum 1.50 mm.

**Rhagovelia (s. str.)** sp. nov.? (Fig. 20).

PALAWAN: Mantalingajan, Pinigisan, 600 m., 14 Sept. 1961. 2 ♀ macr., (same locality as above).

This species is rather closely related to *Rh. hoberlandti*, but shows several dissimilarities compared with an apterous paratype of the latter and with the macropterous female just described. In the absence of both apterous females and male specimens I hesitate to name this species as new, and must limit myself to giving a short description of the specimens concerned.

**Descriptive notes on macropterous female:**  
**Colour:** Head and pronotum yellowish brown. Pronotum anteriorly with a dark orange transversal band which does not reach the yellowish brown propleura; disc of pronotum with numerous brownish punctures. Forewings blackish brown with a whitish longitudinal band basally, greatly surpassing tip of pronotum; veins darker and membrane dark greyish. Venter yellowish brown, matt; 7th sternite brownish yellow and shiny. Colour of the appendages as in *hoberlandti*.

**Structure:** Relative lengths of antennal and leg segments almost the same as in *hoberlandti*. Greatest width of interocular

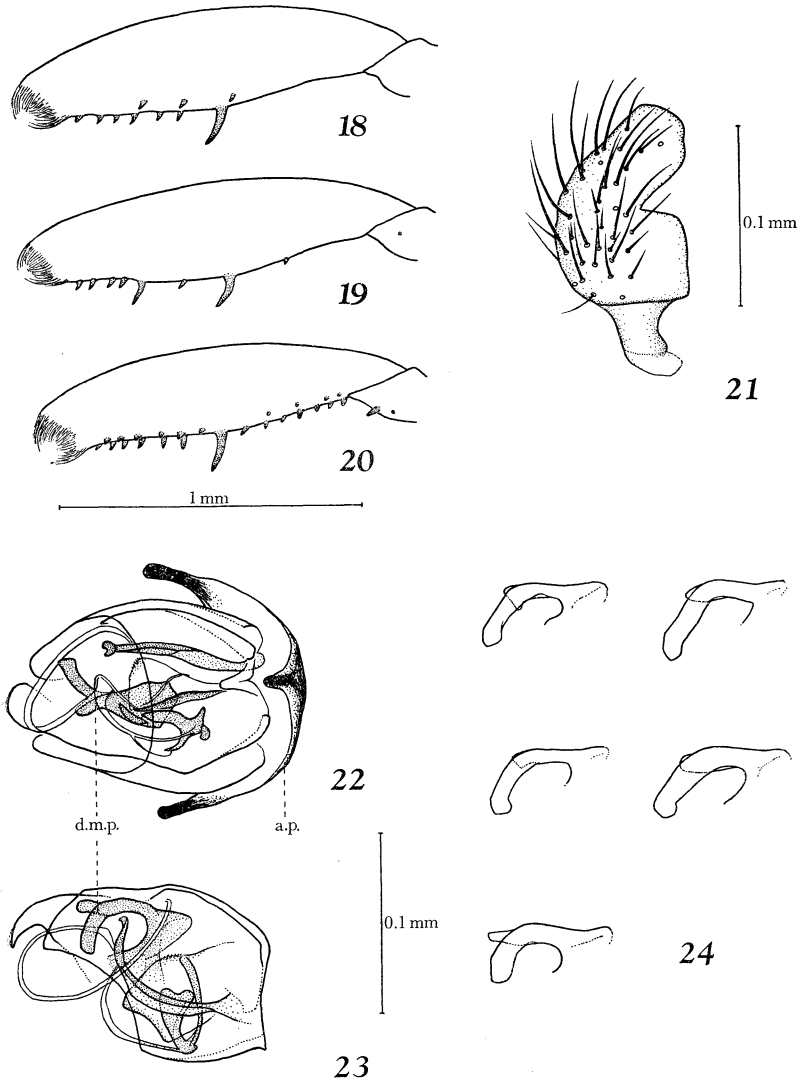
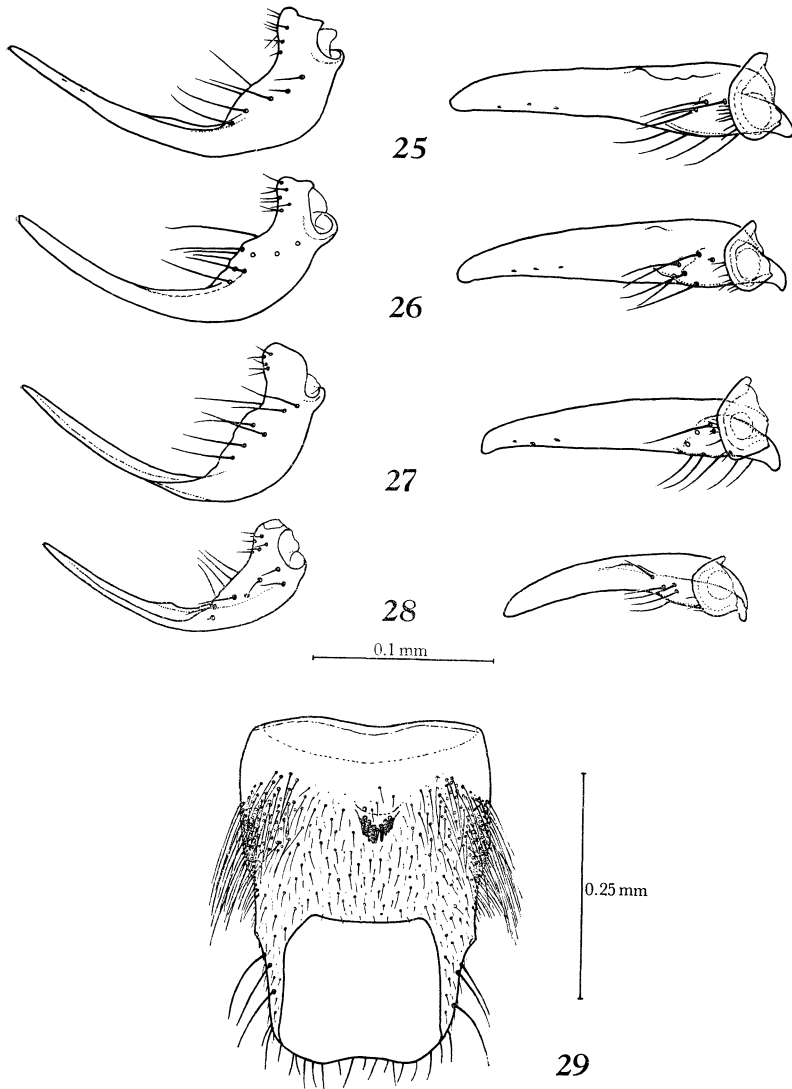


Fig. 18. *Rhagovelia* (*s. str.*) ?*hoberlandti* Hung. & Mats., macropterous female from Palawan; right hind femur in ventral view, pubescence omitted. Fig. 19. do. in *Rh. (s. str.) hoberlandti* Hung. & Mats., apterous female paratype from Calamianes Isl. Fig. 20. do. in *Rh. (s. str.) sp. nov.* ?, macr. female from Palawan. Fig. 21. *Rh. (Neorhagovelia) minutissima* Hung. & Mats. Right clasper in apterous male from Palawan. Figs. 22—24. *Microvelia (s. str.) douglasi* Scott. — Fig. 22. Phallus in the resting position (ventral view) showing the various endosomal sclerites (diagrammized). Fig. 23. Phallus in lateral view, articular plate omitted. Fig. 24. The variation of the dorso-median plate, lateral view. *a. p.* articular plate, *d. m. p.* dorso-median plate.



Figs. 25—28. *Microvelia (s. str.) douglasi* Scott. Variation of the right clasper in male; left, lateral view, right, dorsal view. Figs. 25—27 from Sulu Isl., fig. 28 from Palawan. Fig. 29. *Mesovelia vittigera* Horv., macropterous male from Nigeria. 8th abdominal segment, seen from below.



space slightly greater than in *hoberlandti* apterous paratype and macropterous ?*hoberlandti* female; in relation to the total width of head 0.32 (mean):1, 0.25:1, and 0.25:1 respectively. The armature of hind femur and trochanter as shown on fig. 20, presents several peculiarities compared with *hoberlandti* paratype (fig. 19) and ?*hoberlandti* female (fig. 18); e.g., the trochanter is armed with one conspicuous- and one smaller tooth and basal half of femur has several smaller teeth in two rows. Size: Total length 3.73—3.75 mm.; width of head 0.74—0.76 mm.; width across humeri 1.44—1.50 mm.

Macropterous individuals in *Rhagovelia* have as a rule fewer and shorter spines and teeth on the posterior margin of hind femur compared with apterous individuals. For this reason these specimens cannot belong to *hoberlandti* with its much weaker armature in the wingless form; further, in the latter species the anterior transversal band of pronotum reaches the propleura, while this is not so in the specimens under examination.

**Rhagovelia (Neorhagovelia) minutissima** Hungerford & Matsuda, 1961. (Fig. 21).

PALAWAN: Brooke's Point, Makagwa, 22 Aug. 1961; (small, fast-running river through párang-landscape). 1 ♂, 2 ♀ apt. and 5 nymphs.

Described from Busuanga Island (Calamianes Group) (Hungerford & Matsuda 1961, p. 267). This species is one of the smallest hitherto described in the genus. As the clasper of the male was not figured in the original description (owing to an accident with the single male type) the author here gives a figure (fig. 21) of the right clasper of the male from Palawan. Its shape is quite different from those of the other two Philippine species of the subgenus *Neorhagovelia* (Hungerford & Matsuda l.c., p. 277).

Subfamily **Hydroessinae** Fieber, 1860.

(Microveliinae China & Usinger, 1949.)

**Microvelia (s. str.) douglasi** Scott, 1874. (Figs. 22—28).

(For synonymy see Lundblad 1933, p. 347 and Miyamoto & Lee 1963, p. 35).

PALAWAN: Brooke's Point, Uring Uring, 17—23 Aug. 1961. 4 ♂, 4 ♀ macr. — TAWI TAWI: Tarawakan, 21 Oct.—15 Nov. 1961. 19 ♂, 37 ♀ macr.; Lapid Lapid, 19 Nov. 1961, 2 ♂, 2 ♀ macr.

All specimens caught by either Mercury or Petromax light between 18.30 and 03.00.

**Notes on variation:** Lundblad (l.c., p. 347—357) paid great attention to the geographic variation of this widespread species, examining specimens from Japan (type locality), India, Samoa, and Sumatra. He found, in particular, a considerable variation in the shape of the right clasper in male and in the proportional length and width of abdomen.

The numerous specimens from Tawi Tawi offer an opportunity for some notes on the individual variation in one small area in order to establish a better foundation for evaluating the meaning of the geographic variation. Only the variability of diagnostic features such as the total length, the proportional length and width of abdomen, and the genital apparatus in the male are treated here. All examinations and measurements are made on 10 macropterous individuals from Tarawakan, Tawi Tawi and comparisons are made with specimens from Brooke's Point, Palawan.

**Size:** The total length (from tip of head to tip of wings) in the male ranges from 1.48 to 1.60 mm. (mean 1.53 mm., S.D. 0.04 mm.) and in the female from 1.58 to 1.74 mm. (mean 1.67 mm., S.D. 0.05 mm.). In the Palawanese specimens the corresponding figures are: 4 ♂; 1.39—1.53 mm. (mean 1.45 mm., S.D. 0.06 mm.), 6 ♀; 1.55—1.98 mm. (mean 1.76 mm., S.D. 0.16 mm.). The comparatively high figures for the Palawanese females are caused by two significantly larger specimens (1.88 and 1.98 mm.) which, however, do not appear to be separated in other ways from the bulk of the material.

**Abdomen in male:** The ratio between the greatest width and the length of abdomen in males, as expressed in per cent, ranges from 72 to 81 (mean 76%, S.D. 2.7%). Similar figures were obtained for the specimens from Palawan. These measurements were made on individuals cleared in KOH and mounted flat under a coverglass with the tergites and paratergites detached from the rest of the specimen.

**Genital apparatus:** Characteristic of the group of *Microvelia*-species (*pygmaea*-group) to which *M. douglasi* belongs is the strongly asymmetrical genital apparatus in the male. The large, right, falciform clasper (figs. 25—28) has a proximal thickened shaft with numerous short bristles on the posteriorly

directed margin of the base and several long bristles on the dorsal surface before the beginning of the blade. To obtain standardized visual angles of the clasper it was first placed under a coverglass in a drop of clover oil with lateral surface up, then kept between the edges of two pieces of coverglass in dorsal view with base and tip in focus. As shown in the figures the general shape of the clasper does not vary much and none of the aberrant types figured by Lundblad (l.c.) was found. The blade is usually flat and somewhat twisted in relation to the shaft, and the degree of rotation may vary considerably (from an inward slope in figs. 25 and 26 to the right-angled position in figs. 27 and 28). The clasper in fig. 28 is drawn from a Palawanese specimen and is distinguished by the considerably smaller size, though the individual itself is of approximately the same length as the specimens shown in the other figures. However, this must be an individual departure because another male from the same locality has a normal-sized right clasper.

The phallus of a male cleared in KOH is figured in fig. 22 showing the resting position in the genital capsule. It is strongly asymmetrical, as is the rest of the genital apparatus, and is composed of a basal articulatory plate (*a. p.* in the figure), an outer, proximal tube (phallotheca), and an inner or distal part (endosoma) with a complex structure of sclerotized plates. Owing to the ill-defined limits of the plates it is somewhat difficult to make use of them taxonomically, but at least three plates can be adequately distinguished, as shown in figs. 22 and 23. The most characteristic is the plate arbitrarily designated dorso-median plate (*d.m.p.*). The variation of this sclerite is shown in fig. 24. The phallus-structure has not been used formerly in the taxonomy of *Microvelia*, but it may have some value in case of species with small and inconspicuous claspers.

Distribution (compiled from Lundblad 1933, pp. 357 and 476, Esaki & Miyamoto 1955, p. 185, Miyamoto 1964a. & b., and Fernando 1961, p. 20): Japan (Honshu, Shikoku, Kyushu), Ryukyu Islands, Taiwan (Formosa proper, Kashoto, Kotosho), Philippines (Palawan, Sulu Islands; new records), India, Ceylon, ?Seychelles, Malaya, Indonesia (Sumatra, Java\*, Bali\*), Guam, and Samoa Islands.

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\*) These two distributional records in Lundblad (l.c., pp. 357 and 476) are overlooked by Esaki & Miyamoto in their revision of the Japanese *Microvelia* (l.c., p. 185).

Family **MESOVELIIDAE** Douglas & Scott, 1867.**Mesovelia vittigera** Horváth, 1895. (Fig. 29).

*Mesovelia vittigera* Horváth, 1895, p. 160 (Egypt); Horváth, 1915, pp. 544 and 550; Bergroth, 1918, p. 121 (Luzon: Mt. Maquiling); Horváth, 1924, p. 135; Horváth, 1929, p. 6—7 (full synonymy); Jaczewski, 1936, p. 193—196; Brown, 1951, p. 238; Poisson, 1958, p. 213 (as subspecies).

*Mesovelia orientalis* Kirkaldy, 1901, p. 808 (Sumatra); Horváth, 1924, p. 135—136; Horváth, 1929, p. 6 (synonymy); Lundblad, 1933, p. 186—190; Usinger, 1946, p. 92—93 (Guam and Luzon: Montalban); Miyamoto & Lee, 1963, p. 34.

*Mesovelia proxima* Schouteden & Bergroth, 1905, p. 388 (Congo).

*Mesovelia vittigera orientalis* Poisson, 1958, p. 213.

PALAWAN: Brooke's Point, Uring Uring, 14 Aug. 1961; caught by Mercury light 19.00—21.00. 1 ♂, 4 ♀ macr.

Since Horváth (1895) described his *M. vittigera* from Egypt and Kirkaldy (1901) his *M. orientalis* from Sumatra there has been some dispute about the taxonomic position of these two very similar forms.

Some authors, such as Jaczewski (1936) and Brown (1951) follow Horváth's point of view in his monograph of the Mesoveliidae (1915) where he reduced *orientalis* to synonymical rank under *vittigera*, while Lundblad (1933) and others agree with Horváth in his later opinion (1924) that the two forms are specifically distinct.

At a later date, Poisson (1958) referring to Jaczewski (1936) and personal investigations of *vittigera*-specimens came to the conclusion that the oriental and ethiopian "form" are two subspecies of one widely distributed species, *M. vittigera* Horv., which only differ in having more hairs in the lateral hair-tufts of 8th abdominal segment in *vittigera orientalis* male specimens.

In order to test this statement the author has compared series of macropterous specimens from Anatolia (Turkey), Upper Volta, Ibadan (Nigeria), Palawan (Philippines), and Shanghai (China), and is unable to find any significant morphological differences at all. The average body length and the colour-markings are approximately the same. Moreover, this and other species of the genus are known to vary extensively in regard to these characters within the same area (e.g. Brown l.c., p. 238). Concerning the development of the lateral hair-tufts on the 8th abdominal segment in the male the specimens from Turkey and Africa do not show any

differences compared with the oriental specimens (Fig. 29 and compare with Lundblad l.c., fig. 70).

The number of spines on the ventral surface of the femora seems to be variable even within the same population, as is the shape of the claspers in male as pointed out by Usinger (1946). The structure of the phallus, which has also been compared, is in the author's opinion too simple to offer any taxonomical clues. Finally, Neering (1954) in a distributional study of the variation in the common American *M. mulsanti* White shows that the morphological variation of the apical abdominal segments in both sexes and the claspers of the male, is individual, and not correlated with definite distributional patterns, and that the previously separated subspecies based on these characters are invalid. On these grounds, therefore, it would appear appropriate to regard the oriental and ethiopian "forms" of *M. vittigera* as belonging to the same widely distributed monotypic species — at least until a study of the variation based on a large material from the whole distributional area has been undertaken, and has shown a taxonomically significant geographic variation which would justify a subspecific segregation.

Distribution (compiled from Miyamoto 1964b., Miyamoto & Lee 1963, Fernando 1961, and Brown 1951): Japan (Shikoku, Kyushu), Ryukyu Islands, Taiwan, China (Shanghai; new record), Philippines (Luzon, Palawan; new record), India, Ceylon, Malaya, Indonesia (Sumatra, Java, Lombok), N. Guinea, Guam. — Ethiopian Region, Madagascar, Comores, Mediterranean Europe, and the Middle East.

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### Summary.

12 species of semiaquatic Hemiptera are recorded from the Philippine Islands, 3 of which are new to the islands and one new to science, *Ptilomera* (*s. str.*) *hungerfordi* sp. nov. *Rheumatogonus borneensis* Esaki is redescribed and compared with *Rh. luzonicus* (Kirk.). The individual variation of *Microvelia douglasi* Scott is described and the taxonomic position of *Mesovelia vittigera* Horv. and *orientalis* Kirk. is discussed. The first records of the genus *Rhagovelia* from the island Palawan are given. Full distributional data are compiled for most of the species.

### Literature cited.

- Andersen, N. Møller, 1964: The genus *Tenagogonus* Stål in the collections of the Zoological Museum of Copenhagen (Hemiptera: Gerridae). — Ent. Meddr., København 32, p. 321—334, 18 figs.
- Banks, C. S., 1909: Rhynchota Palawanica, Part. I: Heteroptera. — Philipp. J. Sci. Sect. A, Manila 4(6), p. 553—593, 2 pls.
- Bergroth, E., 1918: Studies in Philippine Heteroptera, I. — Ibid., Sect. D 13(3), p. 75—126.
- Brown, E. S., 1951: Aquatic and semiaquatic Hemiptera. — Exp. South-West Arabia 1937—1938, London 1941—1957 (17), p. 221—273, 25 figs., pl. 12.
- Distant, W. L., 1904: Rhynchota. Vol. II (Heteroptera). — The Fauna of British India including Ceylon and Burma, 503 pp. + xvii pp., 319 figs.
- Esaki, T., 1927: Revision of the *Ptilomera*-Group of the Gerridae, with Descriptions of three New Species (Heteroptera). — Eos, Madrid 3, p. 251—268, 3 figs.
- , 1937: Die Gerroidea Mikronesiens (Hemiptera-Heteroptera). — Tenthredo, Kyoto 1(3), p. 351—362, 3 figs., pl. 30—32.
- & S. Miyamoto, 1955: Veliidae of Japan and Adjacent Territory (Hemiptera-Heteroptera). I. *Microvelia* Westwood and *Pseudovelia* Hoberlandt of Japan. — Sieboldia, Fukuoka 1(3), p. 169—204, 10 figs., pl. 24—29.
- Fernando, C. H., 1961: Notes on Aquatic Insects caught at Light in Malaya, with a Discussion of their Distribution and Dispersal. — Bull. natn. Mus. St. Singapore 30, p. 19—31, 2 pls.
- Horváth, G., 1895: Hémiptères nouveaux d'Europe et des pays limitrophes. — Revue Ent., Caen 14, p. 152—165.
- , 1915: Monographie des Mésoveliides. — Annl. hist.-nat. Mus. natn. hung., Budapest 13, p. 535—556, 9 figs.
- , 1924: Remarques sur trois espèces du genre *Mesovelia* M. R. — Ibid. 21, p. 135—136, 1 fig.
- , 1929: Mesoveliidae. — Gen. Cat. Hemiptera 2, 15 pp.

- Hungerford, H. B. & Ryuichi Matsuda, 1958: The Tena-gogonus-Limnometra Complex of the Gerridae. — Kansas Univ. Sci. Bull., Lawrence 39(9), p. 371—457, 1 fig., 16 pls.
- , 1961: Some New Species of Rhagovelia from the Philippines (Veliidae, Heteroptera). — Ibid., 42(4), p. 257—279, 5 figs.
- , 1965: The genus Ptilomera Amyot and Serville (Gerridae: Hemiptera). — Ibid., 45(5), p. 397—515, 31 pls.
- Jaczeński, T., 1936: Contributions to the knowledge of Aquatic Heteroptera of Egypt. — Annls Mus. zool. pol., Warszawa 11(10), p. 171—211, pl. 27—28.
- Kirkaldy, G. W., 1901: On some Rhynchota, principally from New Guinea, (Amphibicorisae and Notonectidae). — Annali Mus. civ. Stor. nat. Genova (2)20, p. 802—810.
- Laird, M., 1956: Studies of Mosquitoes and Freshwater Ecology in the South Pacific. — R. Soc. N. Z. Bull., Wellington 6, 213 pp., 62 figs. + 3 text-figs.
- Lundblad, O., 1933: Zur Kenntnis der aquatilen und semiaquatilen Hemiptera von Sumatra, Java und Bali. — Arch. Hydrobiol., Stuttgart Suppl. 12, p. 1—194, 263—489, 141 figs., 21 pls.
- , 1934: Aquatic and Semiaquatic Heteroptera of Tahiti. — B. P. Bishop Mus. Bull., Honolulu 113, p. 121—126, 5 figs.
- Mayer, G. L., 1865: Diagnosen neuer Hemipteren II. — Verh. zool.-bot. Ges. Wien 1865, p. 429—446.
- Miyamoto, S., 1964a: Veliidae of the Ryukyus (Hemiptera, Heteroptera). — Kontyû, Tokyo 32(1), p. 137—150, 41 figs.
- , 1964b.: Semiaquatic Heteroptera of the South-West Islands, lying between Kyushu and Formosa. — Sieboldia, Fukuoka 3(2), p. 193—219, 20 figs., pl. 10.
- & Chang-eon Lee, 1963: Water Striders of Korea (Hemiptera, Heteroptera). — Kontyû, Tokyo 31(1), p. 33—47, 4 figs., pl. 3—6.
- NeeRING, T., 1954: Morphological Variations in Mesovelia mulsanti (Hemiptera, Mesoveliidae). — Kansas Univ. Sci. Bull., Lawrence 36(5), p. 125—148, 9 figs.
- Petersen, Børge, 1966: The Noona Dan Expedition 1961—62. Insects and other land arthropods. — Ent. Meddr., København 34, p. 283—304, 12 figs.
- Poisson, R., 1958: Contribution à l'étude des Hydrocorises des Comores (Missions J. Millot 1953—54). — Mém. Inst. scient. Madagascar, Tananarive Sér. E 10, p. 199—224, 19 figs.
- Schouteden, H. & E. Bergroth, 1905: Notes sur les Hémiptères Recueillis à Kinchassa par M. Waelbroek. — Annls Soc. ent. Belg., Bruxelles 49, p. 379—389.
- Uisinger, R. L., 1946: Hemiptera Heteroptera of Guam. — B. P. Bishop Mus. Bull., Honolulu 189, p. 11—103, 27 figs.