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The Naucoridae (Insecta: Heteroptera) of the Philippine Islands

H. Zettel*, N. Nieser** & D.A. Polhemus***

Abstract

The Naucoridae s.str. of the Philippine Islands are reviewed taxonomically. Keys to genera and species, distribution maps, and notes on ecology and conservation status of species are provided. The Philippine fauna contains five genera, fourteen species, and three subspecies, of which eight species and three subspecies are described as new: *Naucoris pumilus* sp.n. (from Luzon, Polillo, Marinduque, Masbate, Ticao, and Leyte), *Philippinocoris sumaldei* sp.n. (Luzon), *Stalocoris schoedli* sp.n. (Negros), *S. tansiongcoi* sp.n. (Sibuyan and Panay), *S. ticaoensis* sp.n. (Ticao), *Asthenocoris australis* sp.n. (Mindanao, Camiguin), *A. luzonensis leyticus* ZETTEL & NIESER ssp.n. (Leyte), and *A. luzonensis paradisianus* ZETTEL & NIESER ssp.n. (Mindoro), *A. medius medius* sp.n. (Leyte), *A. medius samarensis* ZETTEL & NIESER ssp.n. (Samar), and *A. montanus* sp.n. (North Luzon). All other species are redescribed. *Naucoris scutellaris* STÅL, 1859, is recorded from the Philippine Islands for the first time. The genus *Stalocoris* is also newly recorded from Leyte (based on two males), and the genus *Asthenocoris* from Cebu (based on one immature). For the first time *Asthenocoris luzonensis luzonensis* USINGER, 1938, is recorded from Samar and Catanduanes, and *Naucoris obscuripennis* STÅL, 1854, from Mindanao.

Key words: Naucoridae, *Naucoris*, *Laccocoris*, *Asthenocoris*, *Philippinocoris*, *Stalocoris*, new species, new subspecies, taxonomy, description, distribution, new record, habitats, endangering, Philippines.

Zusammenfassung

Die Naucoridae s.str. der Philippinen werden taxonomisch revidiert. Bestimmungsschlüssel zu den Gattungen und Arten, Verbreitungskarten sowie Anmerkungen zur Ökologie und Gefährdung der Arten werden präsentiert. Die philippinische Naucoridae-Fauna besteht aus fünf Gattungen, vierzehn Arten und drei Unterarten, wovon acht Arten und drei Unterarten neu beschrieben werden: *Naucoris pumilus* sp.n. (von Luzon, Polillo, Marinduque, Masbate, Ticao und Leyte), *Philippinocoris sumaldei* sp.n. (Luzon), *Stalocoris schoedli* sp.n. (Negros), *S. tansiongcoi* sp.n. (Sibuyan und Panay), *S. ticaoensis* sp.n. (Ticao), *Asthenocoris australis* sp.n. (Mindanao, Camiguin), *A. luzonensis leyticus* ZETTEL & NIESER ssp.n. (Leyte), *A. luzonensis paradisianus* ZETTEL & NIESER ssp.n. (Mindoro), *A. medius medius* sp.n. (Leyte), *A. medius samarensis* ZETTEL & NIESER ssp.n. (Samar) und *A. montanus* sp.n. (Nord Luzon). Alle anderen Spezies werden wiederbeschrieben. *Naucoris scutellaris* STÅL, 1859, wird erstmals für die Philippinen nachgewiesen. Die Gattung *Stalocoris* wird auch erstmals für Leyte (anhand zweier Männchen), die Gattung *Asthenocoris* für Cebu (anhand eines immaturen Exemplares) festgestellt. *Asthenocoris luzonensis luzonensis* USINGER, 1938 wird erstmals für Samar und Catanduanes gemeldet, und *Naucoris obscuripennis* STÅL, 1854, für Mindanao.

Introduction

Sixty-one years ago, Robert L. Usinger published a paper with the same title (USINGER 1938); it contains descriptions of four species, three of them new, in three genera: *Naucoris* FABRICIUS, 1775, *Asthenocoris* USINGER, 1938, and *Aphelocheirus* WESTWOOD,

* Dr. Herbert Zettel, Naturhistorisches Museum, 2. Zool. Abteilung, Burgring 7, A-1014 Vienna, Austria.

** Dr. Nico Nieser, Htg. Eduardtsr. 16, 4001 RG, Tiel, The Netherlands.

*** Dr. Dan A. Polhemus, Department of Entomology, Smithsonian Institution, National Museum of Natural History, MRC 165, 10th & Constitution Ave., N.W., Washington, DC 20560-0165, U.S.A.

1833. Subsequently, three Philippine Naucoridae s.str. species were added by LA RIVERS (1969, 1970a, b).

In the present study, we follow the opinions of ŠTYS & JANSSON (1988) and MAHNER (1993) by excluding the genus *Aphelocheirus* from the Naucoridae and placing it in a separate family, the Aphelocheiridae, although this interpretation is not shared by one of the authors (D.A. Polhemus). The Philippine species of *Aphelocheirus* are treated by POLHEMUS & POLHEMUS (1988) and ZETTEL (1998, 1999). These aside, five species (six species taxa) of Philippine Naucoridae s.str. have been described so far, all of which are endemic and represent five different genera. Three of these genera, *Asthenocoris*, *Philippinocoris* POLHEMUS & POLHEMUS, 1987, and *Stalocoris* LA RIVERS, 1969, are endemic to the Philippines as well.

Previous records of Philippine Naucoridae were from the two main islands of Luzon and Mindanao, except for one record from Leyte. Various collecting trips by the authors during the last fifteen years have brought specimens from fourteen different islands. A good collection, mainly from Luzon, is housed in the University of the Philippines, Los Baños. Based on this material the number of Philippine Naucoridae increased to fourteen species and three subspecies, and a complete revision of the Philippine taxa became necessary.

Phylogeny and adaptation

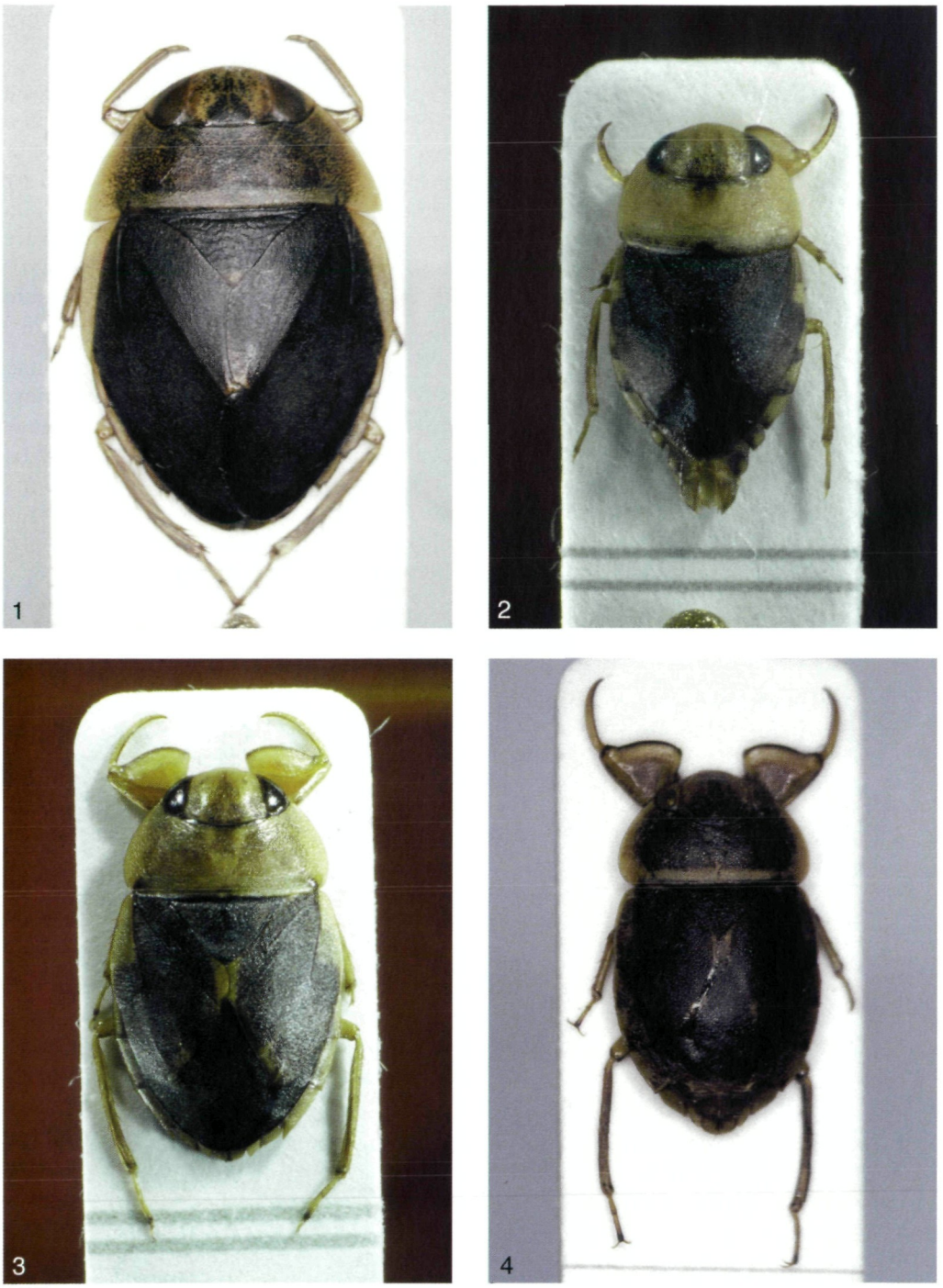
Laccocoris and *Naucoris* are widely distributed, species-rich Old World genera belonging to the Laccocorini and Naucorini, respectively.

The genus group *Philippinocoris-Stalocoris-Asthenocoris* was placed into the subfamily Cheirochelinae MONTANDON, 1897, tribe Sagocorini LA RIVERS, 1971, by ŠTYS & JANSSON (1988). POLHEMUS & POLHEMUS (1987) stated that these genera had evolved from *Naucoris*-like ancestors, which is confirmed by a similar morphology of male genitalia. The phylogenetic position of this genus group is presently under discussion.

It is not a main target of this paper to interprete the difficult phylogenetic higher level relationships of Naucoridae. Moreover, the authors' interpretations of presently available results are not congruent. Many genera (in the Philippines: *Philippinocoris*, *Stalocoris*, and *Asthenocoris*) are mainly defined by adaptative characteristics associated with a lotic existence (i.e. to current):

* a flattened body to reduce resistance against water flow, and consequent modifications of the forehead (prolongation of anteclypeus, back-shifting of labrum, and insertion of rostrum into a groove) and asymmetry of male genitalia and male and female pregenital abdominal segments (supposedly for a modified mating position)
* partial loss of flight ability as adaptation to stable habitats, and consequently hindwing- or even forewing-brachyptery
* plastron respiration due to the difficulties of swimming to the water surface in swift streams

Most of these characteristics are convergently developed in *Aphelocheirus*, which prefers similar habitats. In the following, two contradictory interpretations are presented:



Figs. 1 - 4: Habitus, dorsal, of (1) *Laccocoris hoogstraali*, (2) *Naucoris pumilus* sp.n., (3) *Stalocoris schoedli* sp.n., and (4) *Asthenocoris australis* sp.n.

1) The adaptations are relatively young. The genus group has evolved from *Naucoris* species (leaving *Naucoris* s.l. as a polyphyletic group) or *Naucoris*-like ancestors (with *Naucoris* as adelphotaxon) in the Philippines. This thesis is supported by one possible synapomorphy of *Naucoris* and the *Philippinocoris-Stalocoris-Asthenocoris* group, i.e. the basally strongly anteriad widened forefemur. Some characteristics of *Naucoris pumilus* sp.n., like reduction of erect pilosity on abdominal sternites, hind-wing-brachyptery, and a minute tooth on the anterior end of the prosternal carina show that in *Naucoris* s.l. an adaptative trend has started which may have led to stronger adaptations in *Philippinocoris* and *Stalocoris* and has its strongest expression in *Asthenocoris*. Consequently, the genus group should be transferred from the Sagocorini to the subfamily Naucorinae tribus Naucorini POPOV, 1970. Similarities with the New Guinean Sagocorini, Tanycricini and the Oriental Cheirochelini sensu ŠTYS & JANSSON (1988) are convergences (analogies). This thesis is favoured by the first author.

2) The primary adaptations are phylogenetically old homologies and synapomorphic characters of a possible new tribe "Philippinocorini" and the New Guinean Tanycricini, both forming the subfamily Tanycricinae and originating from ancestors inhabiting a historical land connecting New Guinea with the Philippines (see also POLHEMUS 1995). This thesis is supported by one further possible synapomorphy, i.e. the prolongation of antennal segments 3 and 4. It is favoured by the second and the third author, who is presently preparing a computer supported cladistical analysis of the Naucoridae.

Wing polymorphism

Many Naucoridae have wing polymorphism. In Philippine species, we find both predominately hind-wing-macropterous and predominately hind-wing-brachypterous species. Hind-wing-macropterous specimens (with long alae) have well developed claval sutures, embolar sutures, and nodal furrows in the hemelytra (see Fig. 32). In hind-wing-brachypterous specimens alae are shortened in a differing degrees and the sutures of hemelytra are lacking (nodal furrow, sometimes claval suture) or incompletely developed (embolar suture, sometimes claval suture); the hemelytra also may be conspicuously shortened in some taxa (fore-wing-brachyptery; in the Philippines only in the *Asthenocoris luzonensis* species group). Species inhabiting unstable or stagnant water bodies are usually macropterous, which enables the specimens to change their habitats when conditions become worse. *Naucoris scutellaris* and *N. obscuripennis* were found only or mainly in the macropterous morph. In contrast, stream- and river-inhabiting species are usually hind-wing-brachypterous. This is especially true for *Asthenocoris* species which are most adapted to stable stream habitats. Only species of the *Asthenocoris luzonensis* species group show a considerable variation in development of the hemelytra, as already observed by USINGER (1938) for *A. l. luzonensis*.

In the paragraphs "material examined," the macropterous/brachypterous condition of the hind-wing is stated after the characteristics of the hemelytron (presence of sutures), whereas the development of alae was verified only in some specimens.

Zoogeography

Data presently are too scarce to give a complete picture of the distribution patterns of genera and species. *Naucoris scutellaris* is the only species so far known from outside

the Philippines and has an Oriental-Wallacean distribution; it is the only naucorid species so far known from the Palawan Region. The other *Naucoris* species are more widely distributed within the Philippine archipelago. *Laccocoris hoogstraali* is restricted to Mindanao and Leyte, and *Philippinocoris* to the mountains of North Luzon. The species of the genera *Stalocoris* and *Asthenocoris* often are allopatric, except in Samar and Leyte where *Asthenocoris luzonensis* and *A. medius* sp.n. were found together syntopically, and in North Luzon where an overlapping of the ranges of *A. luzonensis luzonensis* and *A. montanus* is observed. In North Luzon, both *Philippinocoris* species are found together with *Asthenocoris montanus*; and in southern Mindanao, *A. australis* and *S. breviceps* occur sympatrically, but probably not syntopically. Only four of the ten rheobiontic species are recorded from more than one island.

Ecology and conservation

Nearly all collections of Naucoridae by the authors were done in running waters or stagnant water bodies with relations to streams. Additional material from ponds is available from other samplings. There is a scale from lentic to lotic conditions: *Naucoris* – *Laccocoris* – *Stalocoris*/*Philippinocoris* – *Asthenocoris*. The scale is continued by *Aphelocheirus*, now belonging to the Aphelocheiridae, which is restricted to the most lotic sections of streams. Further information on the habitats of genera and species are given below. There are only such Naucoridae genera found in the same area, which have different demands on current conditions. *Philippinocoris* and *Stalocoris* are allopatric. Only a few times were two species found in the same stream, and only once three species (Mountain Province, loc. # 185: *Asthenocoris montanus* sp.n., *Philippinocoris usingeri*, and *P. sumaldei* sp.n.).

Most Philippine water bugs are at least potentially endangered by loss of habitats. Exceptions are only those species which have a wide range of possible habitats including paddy fields and other stagnant waters in a human-changed environment (pasture pools, artificial water reservoirs, etc.); these are usually widely distributed species and not characteristic of the unique Philippine fauna. Destruction of the natural vegetation by man reduces the water-receptive abilities of the soil and changes the regional climate, both of which have disasterous affects to the stability of running waters; a rapid reduction of permanent stream habitats is observed on all islands. Pollution effects mainly large rivers (many of them are actually "dead"), mangroves, and marine shore habitats. Many Philippine water bugs, including most Naucoridae, are not very sensitive to small environmental changes, but a loss of a higher vegetation (trees) in the vicinity of a stream reduces species numbers considerably. Species at greatest risk are those which have low migration abilities (high rate of brachyptery) and therefore cannot leave inadequate habitats. In Naucoridae, this is true for all species of *Philippinocoris*, *Stalocoris*, *Asthenocoris*, and for *Naucoris pumilus* sp.n. Plastron respiration, as developed in the naucorid genera *Philippinocoris*, *Stalocoris*, and *Asthenocoris*, requires a high oxygen content of the water which is negatively influenced by organic pollution and high water temperature (produced by lack of shade after cutting of trees). According to field observations, relatively high resistance to organic water pollution is supposed for some naucorid species (e.g. *Philippinocoris usingeri*, *Stalocoris* spp., *Asthenocoris luzonensis luzonensis*, *A. australis* sp.n., *A. montanus* sp.n.). In adequate habitats, Naucoridae species occur in

large populations; collecting specimens for scientific reasons (to an ethically justifyable extent) is therefore no cause for concern. Judging from present results, the following species are at risk (in order of their vulnerability):

1. *Stalocoris ticaoensis* sp.n. (very small distribution in Ticao island, only a few habitats left)
2. *Stalocoris tansingcoi* sp.n. (only the Panay population with possible subspecific status, because of destruction of the last remaining habitats; the Sibuyan population has sufficient habitats of presently good protection status)
3. *Philippinocoris sumaldei* sp.n. (small distribution, probably specialized habitat requirements)
4. *Philippinocoris usingeri* (rapid reduction of habitats, especially in Benguet; relatively specialized habitat requirements)
5. *Laccocoris hoogstraali*, *Naucoris pumilus* sp.n., *Stalocoris schoedli* sp.n., *Asthenocoris luzonensis luzonensis*, *A. luzonensis leyticus* ssp.n., *A. luzonensis paradisianus* ssp.n., *Asthenocoris medius medius* sp.n., *Asthenocoris medius samarensis* ssp.n., and *A. montanus* sp.n. suffer from a continuing destruction of habitats by man.

Stalocoris breviceps has not been considered because the authors lack information on its habitat requirements. If *Asthenocoris* sp. from Cebu, presently only known from a single immature, represents an undescribed species (which is likely because of its isolated occurance), it would be the most endangered Philippine naucorid species.

The Philippine Naucoridae fauna is unique, with thirteen of the fourteen species and three of the five genera endemic. Over millions of years, Naucoridae have developed to creatures well-adapted to life in tropical streams. The authors hope that they will get a chance to survive, even in a man-made future.

Diagnostic characteristics

Diagnoses of the genera *Laccocoris* and *Naucoris* mainly refer to Philippine species, although some other Oriental species were studied. However, these diverse genera may contain some species which do not totally fit the diagnoses.

Species may be identified mainly by the male genitalia and by the female subgenital plate (= sternite 7), as well as by some other characteristics of the abdomen. In *Naucoris* and *Philippinocoris*, the male left paramere proved to be most useful for identification of species; its shape is constant. In *Asthenocoris* species, whose intraspecific taxonomy presently is not completely understood, the left paramere is more variable; in *Stalocoris* it provides only weak differences for species identification. The male right paramere is complicately twisted, and therefore difficult to compare; although at least three views of the right paramere are presented, the situation of lobes, hooks, and curves may not be easy to understand by the drawings. Therefore, the keys use the right paramere only when necessary, especially for identification of *Stalocoris* males. The aedeagus is predominately soft and without many structures, and serves only as a weak characteristic for species identification. In the genus *Stalocoris*, the females are more distinct than are the males: The subgenital plate (Figs. 60 - 64) is the main character for identification of

females, and its shape varies only slightly. In *Asthenocoris*, which has only two types of subgenital plates (Figs. 73, 74), the female gonapophyses 2 (Figs. 90 - 104) have to be studied, because they are the most reliable characteristic for species discrimination: The gonapophyses 2 are medially fused in Naucoridae (for terminology see: LARSÉN 1938: 105: "hintere Gonapophysen"; figs. 57-59: "mG"; TUXEN 1970: gonapophyses posteriores, second gonapophyses). Special attention has been paid to the shape of the distal process of gonapophyses 2: Although the stout bristles also seem to be important characteristics, they break off easily, and therefore the number of bristles was not used for identification of taxa. Other structures on the abdominal connexiva (especially in females) are also valuable characteristics for recognition of certain species.

Colour, although variable, provides additional distinguishing characters. Species usually are quite constant in size, and females on average are larger than males.

Material and methods

More than 800 adult specimens were studied for the taxonomic part of the study, mostly from the collections under curation of the authors (NHMW, CNT, JTPC, USNM). Immatures, although often present in the samples, were not included in this study, except for two faunistically important records not represented by adults. Parts of the material (including all holotypes) are dry mounted, others preserved in 70 % ethanol.

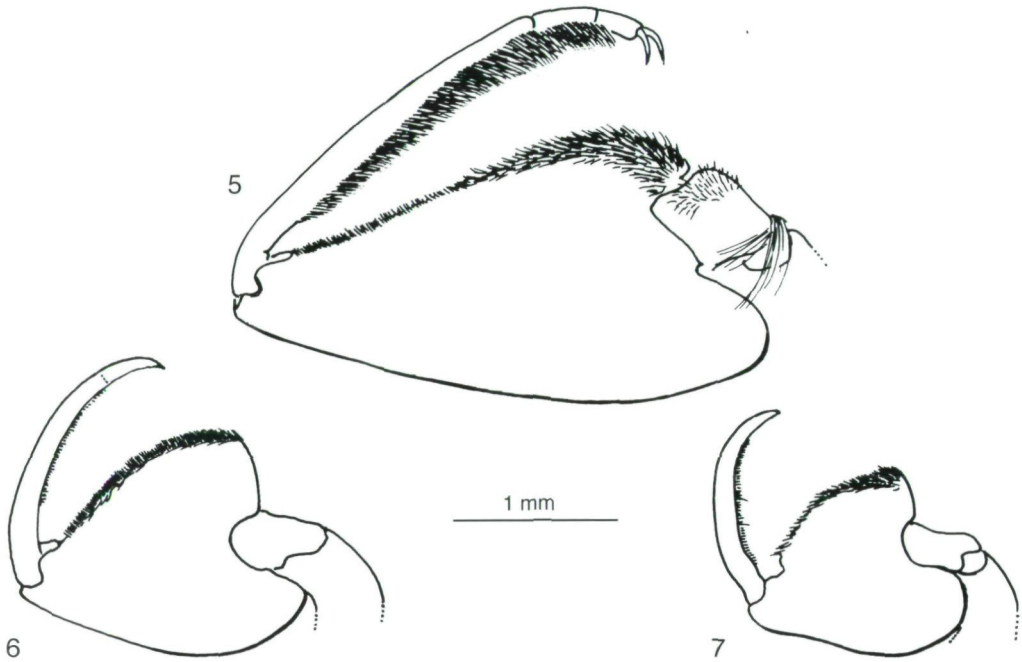
Measurements of body dimensions are given in 0.05 mm increments, as higher precision is useless because of different preparation of specimens. Other measurements are given in comparisons and mainly refer to the holotypes. A Leica WILD M10 binocular microscope with magnifications up to 128 x was used for most of the studies; drawings were made by using a camera lucida.

Material is referred by citing the original labels. Each single label is marked with ""; the backslash sign \ indicates a break of a line; geographical explanations, additions, or corrections are added in squared brackets [ ].

Abbreviations

Repositories:

AMNH	American Museum of Natural History, New York, U.S.A.
BMNH	The Natural History Museum [formerly British Museum of Natural History], London, United Kingdom
CAS	California Academy of Science, Berkeley, California, U.S.A.
CNT	Coll. Nico Nieser, Tiel, The Netherlands
CSW	Coll. Franz Seyfert, Vienna, Austria
CZW	Coll. Herbert Zettel, Vienna, Austria
FMNH	Field Museum of Natural History, Chicago, Illinois, U.S.A.
JTPC	Colorado Entomological Museum, Coll. John T. Polhemus, Englewood, Colorado, U.S.A.
MNHN	Muséum National d'Histoire Naturelle, Paris, France
NHMW	Naturhistorisches Museum in Wien, Vienna, Austria
UPLB	Museum of Natural History (part of the non-holotype material presently in Coll. V.P. Gapud), University of the Philippines, Los Baños, Laguna, Philippines
USNM	National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.



Figs. 5 - 7: Foreleg, ventral view, of (5) *Laccocoris hoogstraali*, ♂, (6) *Stalocoris schoedli* sp.n., and (7) *Naucoris pumilus* sp.n.

Characters in figures:

ae	aedeagus	mxp	maxillary plate	ro	rostrum
ey	eye	pm	paramere	sph	specialized hairs
lb	labrum	pr	proctiger	sgp	subgenital plate of female

Key to the genera of Naucoroidea of the Philippine Islands (adults)

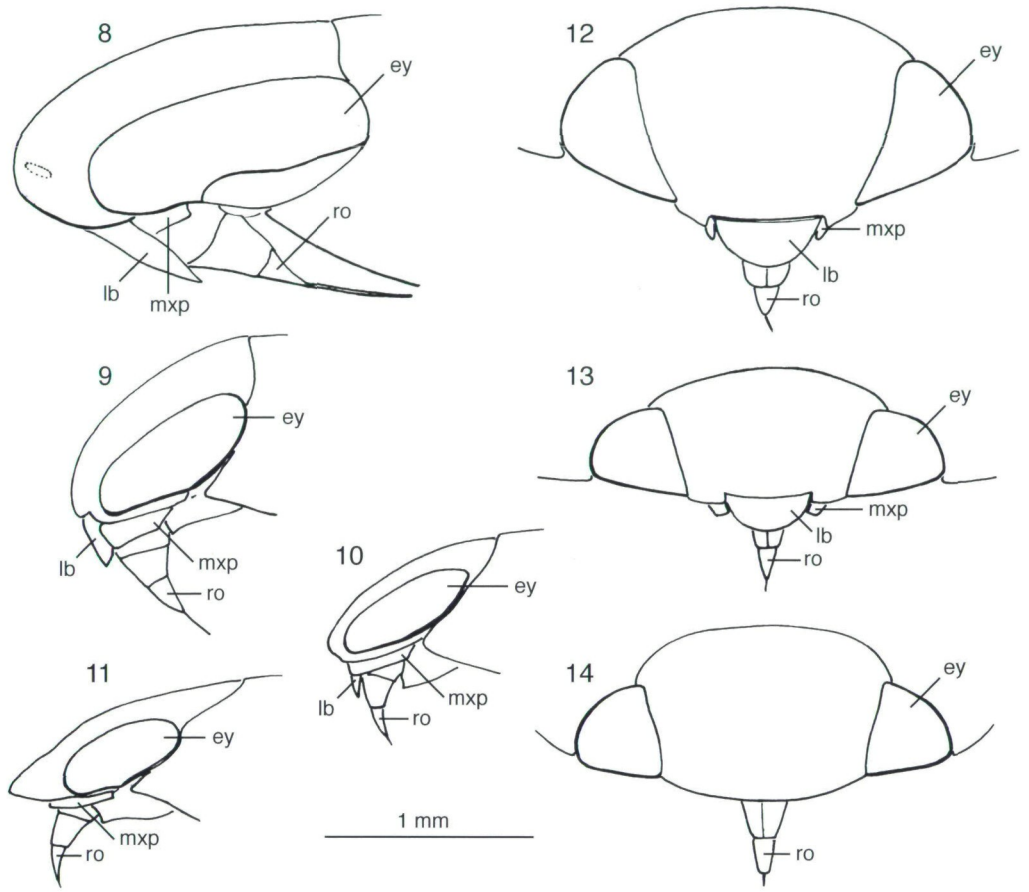
Note: A key to the Philippine families of Leptopodomorpha, Nepomorpha, and Gerromorpha was published by GAPUD (1986); in this key the Aphelocheiridae are included in the Naucoridae.

1 Rostrum very long and slender, reaching posteriad at least to mesosternum; profemur not strongly thickened (**Aphelocheiridae**)..... ***Aphelocheirus***

\- Rostrum short and stout, not reaching posterior half of prosternum (Figs. 8 - 11); profemur strongly thickened (Figs. 5 - 7, 36, 37) (**Naucoridae**)..... **2**

2 Protarsus not fused with straight protibia, with two distinct claws, two-segmented in male, one-segmented in female; profemur antero-basally not widened (Fig. 5); rostrum and labrum directed caudad (Fig. 8); large (body length more than 10.8 mm), broad-ovate, flat species (Fig. 1)..... ***Laccocoris***

\- Protarsus immovably fused with curved protibia (but suture usually present), without or with a minute single claw, one-segmented in both sexes; profemur antero-

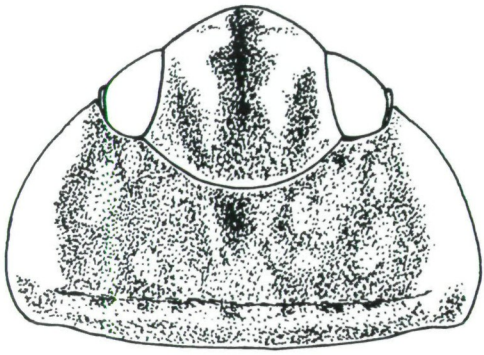


Figs. 8 - 14: (8 - 11) Head, lateral view, of (8) *Laccocoris hoogstraali*, (9) *Naucoris pumilus* sp.n., (10) *Stalocoris schoedli* sp.n., and (11) *Asthenocoris luzonensis*; (12 - 14) head, frontal view, of (12) *Naucoris pumilus* sp.n., (13) *Stalocoris schoedli* sp.n., and (14) *Asthenocoris luzonensis*.

basally strongly widened (Figs. 2, 3, 36, 37); rostrum and labrum directed ventrad (Figs. 9 - 14); smaller species (body length rarely more than 10.8 mm), usually with more elongate shape (Figs. 2 - 4) **3**

3 Labrum large, inserted at anterior margin of head and in front of maxillary plates, and rostrum inserted just behind labrum and not in deep excavation (Figs. 9, 12); abdominal sternites with erect pilosity in addition to appressed hair layer; body not conspicuously flat (Fig. 2) ..... ***Naucoris***

\- Labrum inserted behind anterior margin of head and between maxillary plates, more or less deepened within ventral excavation of head; rostrum inserted in this ventral excavation, removed from anterior margin of head (Figs. 10 - 11); abdominal sternites with very dense appressed hair layer, usually without erect pilosity (sparse erect hairs present in *Philippinocoris* laterally on sternites 5 - 7); body very flat (Figs. 3, 4) **4**



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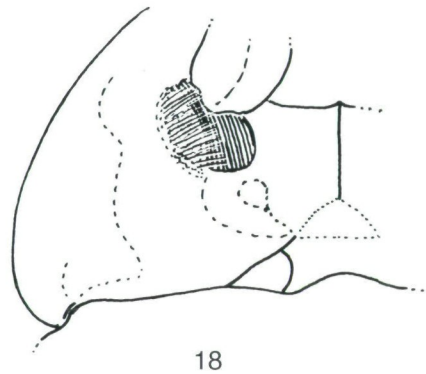

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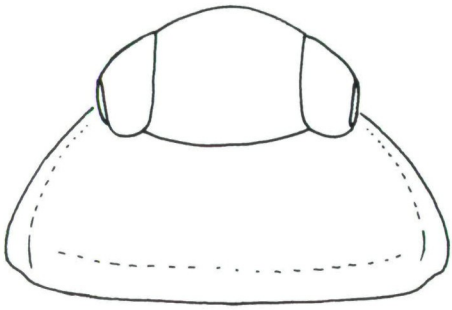

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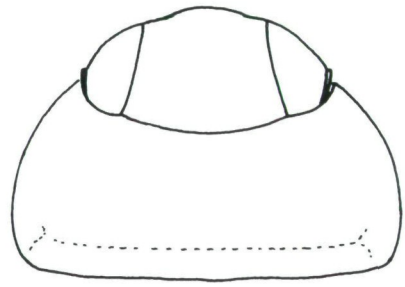

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Figs. 15 - 18: (15 - 17) Head and pronotum, dorsal view, of (15) *Asthenocoris luzonensis paradisianus* ssp.n. (with colour pattern), (16) *Philippinocoris usingeri*, and (17) *Stalocoris tansiongcoi* sp.n.; (18) ventral view of right side of prothorax in *Stalocoris tansiongcoi* sp.n. showing the hirsute area close to coxal cavity (different scales).

4 Anterior margin of pronotum medially deeply emarginated, forming a distinct bend at inner eye margin; head anteriorly produced, distinctly (at least 1.2 times) longer than pronotum along midline (Figs. 4, 15); in frontal view, anterior margin of head evenly convex and produced, completely covering maxillary plates and labrum (Fig. 14), which is inserted deeply in ventral excavation of head and not visible in lateral view (Fig. 11); rostrum far removed from anterior margin of head (Fig. 11); medial margin of propleural plate next to procoxal cavity bare or with inconspicuous pubescence ..... ***Asthenocoris***

- Anterior margin of pronotum at most slightly emarginated, without distinct bend at inner eye margin; head subequal in length to pronotum along midline (Figs. 3, 16, 17); in frontal view, anterior margin of head not evenly convex and not produced, maxillary plates and labrum visible (Fig. 13); labrum inserted not much deeper than anterior margin of head, visible in lateral view, although partly covered by maxillary plate (Fig. 10); rostrum less far removed from anterior margin of head (Fig. 10); medial margin of propleural plate next to procoxal cavity with long pilosity (Fig. 18) **5**

5 Large species, body length more than 9.0 mm; head in front of eyes relatively long (more than 0.25 times eye length) (Fig. 16); hind margin of female subgenital plate narrowly rounded, with narrow medial incision (Figs. 38, 39) ..... ***Philippinocoris***

- Small species, body length less than 7.0 mm; head in front of eyes very short (less than 0.15 times eye length) (Figs. 10, 17); hind margin of female subgenital plate broadly truncate, without or with wide medial emargination (Figs. 60 - 64) ..... ***Stalocoris***

Genus *Laccocoris* STÅL, 1856

Type species: *Naucoris* (*Laccocoris*) *spurcus* STÅL, 1856 (by monotypy)

Diagnosis: Body large, broad-ovate, strongly flattened (Fig. 1); head with triangular plate-like margin at postero-lateral margin of eye (more prominent in brachypterous specimens); anterior margin of head with a pair of grooves, rounded ventrad; labrum large, triangular, with base not much longer than its sides (Fig. 19), inserting close to anterior margin of head, directed caudad; rostrum very short, directed caudad (Fig. 8), inserted in a rostral cavity; head ventrally without median carina, with some specialized hairs close to rostrum (Fig. 19); maxillary plates small; pronotum widest at base, with acute hind corners (more acute in brachypterous specimens); protrochanter with a posteriad directed tuft of long hairs; profemur thickened, but without special antero-basal dilatation; protibia straight, mesally with very dense pilosity; protarsus in male two-segmented, in female one-segmented, not fused with protibia, bearing two claws (Fig. 5); spines on meso- and metatibia not extraordinarily thickened; prosternum with carina in posterior three fourths; mesosternum without carina, with long, dense, erect pubescence; metasternum largely visible; hind-wing-brachyptery common; forewing-brachyptery unknown; abdomen with appressed hair layer and numerous erect hairs; male genital capsule apically truncated; parameres symmetrical, reduced (Fig. 20).

Comparative notes: From other Philippine genera, *Laccocoris* is easily distinguishable by the structures of head and foreleg (see key), and by the reduced male parameres (Fig. 20). *Laccocoris* may be distinguished from other Southeast Asian Laccocorinae genera either by less spinose legs and a more posteriad directed labrum (from *Ctenipocoris* MONTANDON, 1897); or by a longer, (equilaterally) triangular, apically (more or less) pointed labrum (from *Heleocoris* STÅL, 1876) (NIESER & CHEN 1991); these genera are so far unknown from the Philippines. The monophylies of the genera *Laccocoris* and *Heleocoris* - presently solely distinguished by the labrum - should be confirmed by other characteristics; in *L. hoogstraali* the shape of the labrum is somewhat intermediate and the position of this species in *Laccocoris* seems to be morphologically arbitrary, although zoogeographically justified because of the close relationship with the Bornean species of *Laccocoris*.

Taxonomy and distribution: *Laccocoris* is distributed in the tropical areas of the Old World. It is the only known genus of the Laccocorini in the Philippines. There is no modern revision of its species. Only one species is known from the Philippines: *Laccocoris hoogstraali* occurs in Mindanao and Leyte and is closely related with the species from North Borneo. Its ancestors have probably invaded the area via the Sulu Archipelago (POLHEMUS & POLHEMUS 1987).

Habitats: Species of *Laccocoris* inhabit streams, where they are found on the river bed and along the edge.

Laccocoris hoogstraali La Rivers, 1970 (Figs. 1, 5, 8, 19 - 21, 149)

Laccocoris hoogstraali La Rivers, 1970b: 269.
Laccocoris hoogstraali: Polhemus & Polhemus (1987).

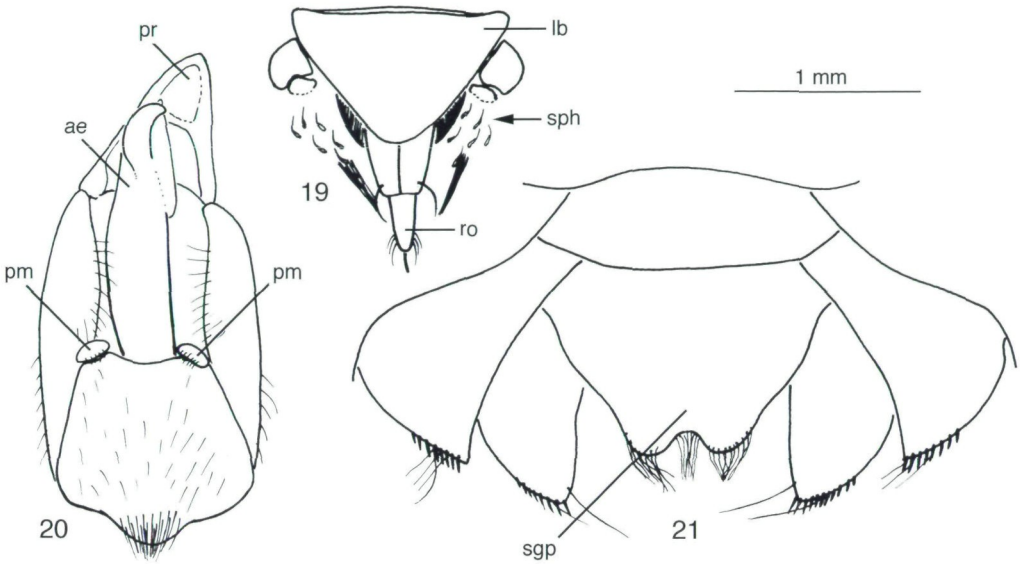
Material examined (all brachypterous): 3 ♂♂, 3 ♀♀ "PHILIPPINES, Mindanao\ [Zamboanga del Sur Prov., 7 km. NW of Zamboanga City, 100m,] Bituti River, CL 1998\ VII-22-85, J.T. + D.A.Polhemus" (USNM, JTPC); 6 ♂♂, 5 ♀♀ "Philippinen: Mindanao\ Zamboanga d.Sur, 12 km\ N Pagadian, Alegria Falls\ 9.3.1997,lg. Zettel (126)" (CZW, UPLB); 3 ♂♂, 2 ♀♀ "Philippinen: Mindanao\ Misamis occ., W Ozamiz\ Tangub, Lumban, 6.3.\ 1997, leg.H.Zettel (124)" (CZW, UPLB); 2 ♂♂ "PHILIPPINEN: Mindanao\ Lanao del Norte, W Iligan\ Tinago Falls, 13.11.1996\ leg. H. Zettel (95)" (NHMW); 2 ♂♂ "PHILIPPINEN: Mindanao\ Bukidnon Pr., Malaybalay\ Kaamulan Site, 650m,6.11.\ 1996, leg. H. Zettel (90a)" (NHMW); 5 ♂♂, 5 ♀♀ "PHILIPPINEN: Mindanao\ Bukidnon Pr., Malaybalay\ Kaamulan Site, 650m,7.11.\ 1996, leg. H. Zettel (90b)" (NHMW, UPLB); 6 ♂♂, 7 ♀♀ "PHILIPPINEN: Mindanao\ Bukidnon Pr., Malaybalay\ Kaamulan Site,650m,6.-7.\ 11.1996, leg. H. Zettel (90c)" (NHMW, UPLB); 1 ♂, 2 ♀♀ "PHILIPPINEN: Mindanao\ Bukidnon Pr., Malaybalay\ Spring Site, 650m,\ 7.11.1996 \leg. H. Zettel (91)" (NHMW); 2 ♂♂, 3 ♀♀ "PHILIPPINEN Mindanao\ Bukidnon, 18km W Lantapan\ Pasak, Tugasan River, 850m\ 10.11.1996,leg.H.Zettel (94)" (NHMW, UPLB); 3 ♂♂, 2 ♀♀ "PHILIPPINES, Mindanao [South Cotabato]\ Cacob River [550 m, SE of Koronadal]\ CL 1995, VII-20-85\ J.T. & D.A.Polhemus" (USNM, NHMW); 1 ♂, 3 ♀♀ "PHILIPPINES, Mindanao\ South Cotabato Province\ Luhib River, 13 km. SW. of\ Surallah 600m. VII-19-85\ CL 1993 J.T.&D.A.Polhemus" (AMNH); 1 ♂ "Burungkot, Upi,\ Cotabato Province,\ MINDANAO\ 1500ft. I: 1-6 :47","CNHM-Philippine\ Zool.Exped.(1946-47)\ F.G.Werner leg." (FMNH); 3 ♂♂, 6 ♀♀ "PILIPINAS: Mindanao [Sarangani], Lake Se-\bu area, leg: N. Nieser 1993", N9375 [N9375A] 8.XII.\ "Cold River"\ mountain strm\ feeding Lake" (NCTN, NHMW); 1 ♀ "PILIPINAS: Mindanao\ Sarangani Pr., Danau Sebu\ Bakdolong, 3.XII.1993\ leg. N.Nieser N9366" (NCTN); 1 ♀ "PILIPINAS: Mindanao\ Sarangani Pr., Danau Sebu\ 3rd waterfall, 7.XII.1993\ leg. N.Nieser N9371" (NCTN); 1 ♀ "PILIPINAS: Mindanao\ Sarangani Pr., Danau Sebu\ nr. Lopo, 9.XII.1993\ leg. N.Nieser N9377B" (NCTN); 1 ♂, 1 ♀ "Todaya,E.slope Mt.Apo,\ Davao Province,\ MINDANAO\ 2800ft. XI: :47","CNHM-Philippine\ Zool.Exped.(1946-47)\ H. Hoogstraal &\ F.G.Werner leg." (FMNH).

Description: see La Rivers (1970b).

Diagnosis (brachypterous form): body size: length 10.90 - 12.80 mm; maximum width (at embolar margin): 7.30 - 8.80 mm; pronotal width 6.95 - 8.40 mm (females subequal in size to males); colour: head yellowish, close to hind margin with a pair of roundish, sometimes confluent, black marks anteriad produced in thin lines, additional small blackish marks common, anterior margin of head with thin black transverse line; disc of pronotum (except hind margin) with numerous small blackish marks giving pronotum a diffuse dark appearance; mesoscutellum blackish brown with yellow apex; hemelytron blackish brown with small yellow dot on apex of clavus and with posteriad narrowed yellow margin on embolium; venter, rostrum, antenna, and legs (brownish-)yellow.

Dorsal surface of head densely reticulate, otherwise rugulose, matt; labrum length 0.5 times basal width; rostral segment 3 about 1.5 times as long as segment 4; pronotum very flat, 3.6 times as wide as long, with anteriad strongly convergent lateral margins, anterior margin with shallow emarginations behind eyes; hemelytron with sutures variably developed, but longitudinal fracture of clavus and distal suture of embolium never complete; abdomen behind embolium laterally largely surpassing hemelytra; connexiva of abdominal segments 4 - 6 with shallow emarginations near postero-lateral corners; mesotibia mesally with dense pilosity and with a few long spines in distal third, externally with three rows of long spines plus two additional longer spines at base; metatibia mesally with swimming hair fringe, externally with three rows of spines of different lengths, longest spines longer than on mesotibia; mesosternum medially bulbous, not distinctly carinate, notched in anterior fifth; metasternum weakly carinate; abdomen symmetrical.

Male: aedeagus stout, apex strongly curved; parameres small, ovate (Fig. 20).



Figs. 19 - 21: *Laccocoris hoogstraali*: (19) labrum, rostrum, maxillary plates and specialized hairs, (20) male genitalia (proctiger turned up to expose the aedeagus), (21) abdominal segments 6 and 7, ventral view (pilosity partly omitted).

Female: tergite 7 deeply emarginated, middle of emargination slightly convex; sternite 7 relatively short, hind margin with roundish emargination separating two roundish lobes (Fig. 21); gonapophyses 2 distally triangular, apically narrow, with long pilosity, and medioapically deeply and narrowly incised.

Comparative notes: We follow the opinion of previous authors, recognizing *L. hoogstraali* is a distinct species. A taxonomic revision of the related Bornean *Laccocoris* species is presently prepared by J.T. Polhemus.

Distribution: Leyte (Leyte) (POLHEMUS & POLHEMUS 1987); Mindanao (Zamboanga del Sur, Misamis Occidental, Lanao del Norte, Bukidnon, Davao, South Cotabato, Sarangani) (Fig. 149).

Habitats: Specimens were collected in middle sized streams, mainly at their edge, if there are structures to hide (e.g., N9377B: grassy overhanging banks), upstream of boulders (e.g., N9371) or among floating plant debris. Only rarely are specimens found at the stream bottom. Apparently, the species is not highly sensitive to water quality. It is found also in agricultural areas (N9366). The conductivity of the water, measured by the second author, was 270 µS in site no. N9371, and 350 µS in site no. N9366.

Genus *Naucoris* GEOFFROY, 1762

Type species: *Naucoris maculatus* FABRICIUS, 1792 (designation by Opinion 681/1963)

Diagnosis: Body usually small, ovate, not strongly flattened; head with narrow sclerite at postero-lateral margin of eye, anterior margin simple; labrum large, semi-circular, in-

serting at anterior margin of head, directed ventrad (Figs. 9, 12); rostrum short, directed ventrad, not inserted in a rostral cavity; head ventrally with median carina; maxillary plates large, more or less posterior of labrum in lateral view; pronotum widest at posterior third or fourth, with right-angled to rounded postero-lateral corners; profemur strongly thickened, with strong antero-basal dilation (Fig. 7); protibia curved, mesally with two sharp ridges and with an inconspicious row of short bristles; protarsus one-segmented, fused with protibia, with suture visible or not, bearing one inconspicuous, minute claw; prosternum with median carina over entire length, with anterior end simple or (in *N. pumilus* sp.n.) with a small tooth; mesosternum with high median carina be set with long, posteriad curved hairs; hind-wing-brachyptery rare (in the Philippines only in *N. pumilus* sp.n.); forewing-brachyptery unknown; abdomen with appressed hair layer and numerous erect hairs (number reduced in *N. pumilus* sp.n.); male genital capsule apically acuminate (Fig. 25); parameres asymmetrical, long; left paramere with one or two distal lobes (Figs. 23, 27, 30), right paramere twisted around aedeagus (Fig. 25), usually with rounded tip (Figs. 24, 28, 31); female subgenital plate simple, hind margin with weak emargination or straight (Figs. 33 - 35); gonapophyses 2 without process, posteriorly triangular, apically densely set with stout spines.

Comparative notes: Thus far, *Naucoris* is the only genus of Naucorinae (sensu ŠTYS & JANSSEN 1988) known from Southeast Asia. It differs from most genera of the area (except genera of Laccocorini) in the plesiomorphic position of the base of the rostrum close to the anterior margin of the head (see also key by NIESER & CHEN 1991).

Taxonomy and distribution: *Naucoris* is widely distributed in the Old World, mainly in tropical and subtropical areas. There is no modern revision of the genus. Three species presently are known from the Philippines.

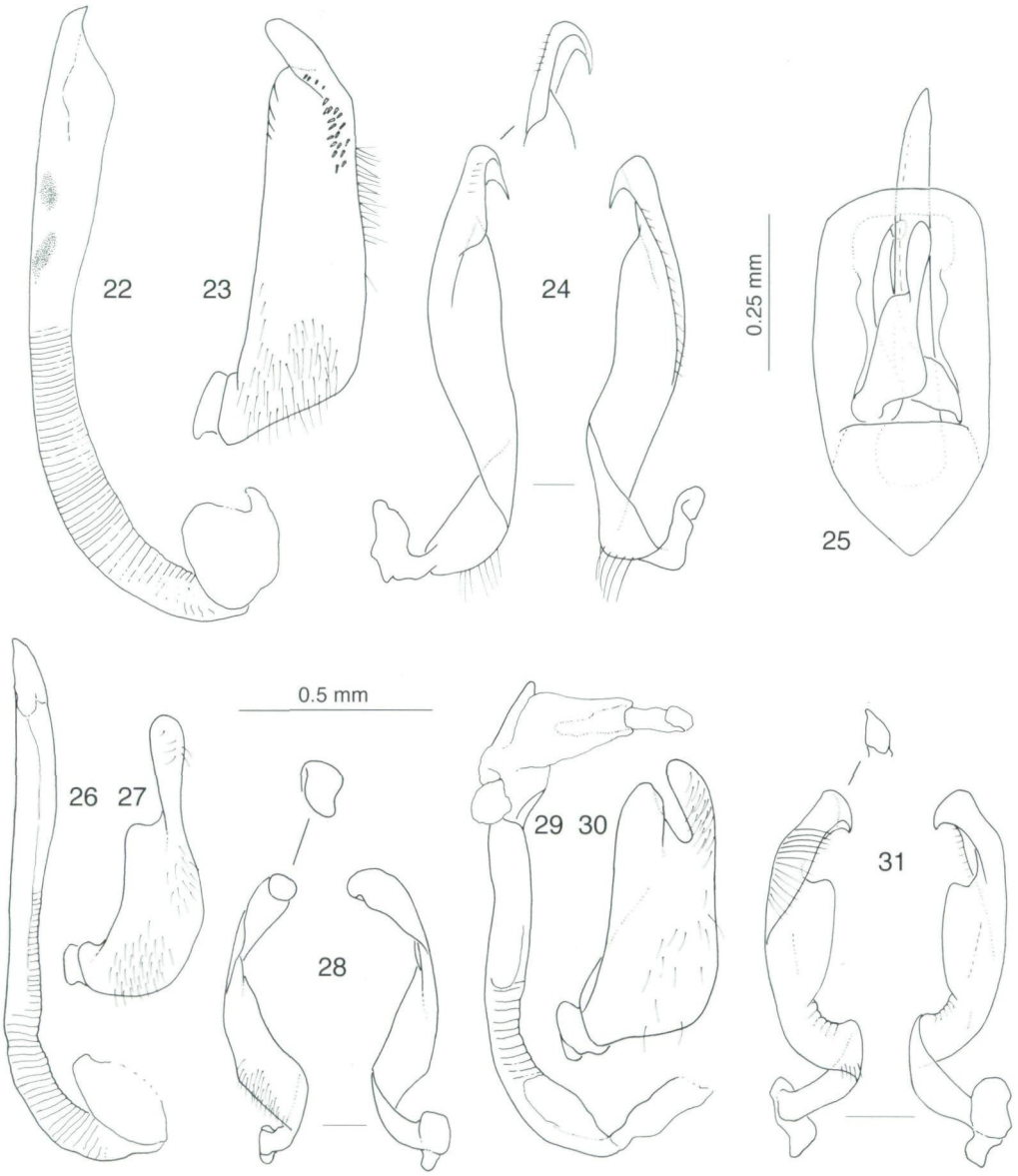
Habitats: Most species are found in stagnant waters. *Naucoris* is the only Philippine naucorid genus inhabiting these habitats, although two of the three species were mostly found in lentic sections of streams.

Key to the Philippine species of *Naucoris*

1 Posterior corners of connexiva of abdominal segments 4 - 6 acute, spine-like produced (Fig. 33); head and pronotum with more prominent dark marks, especially with a blackish mark at anterior third of lateral margin of pronotum; left paramere with long hairs and row of stout bristles (Fig. 23); right paramere apically with recurved hook (Fig. 24); female subgenital plate distally slender, weakly indented at posterior margin (Fig. 33) (widespread)..... ***N. scutellaris***

\- Posterior corners of connexiva of abdominal segments 4 - 6 not spine-like produced, right-angled to weakly acute; head and pronotum without prominent dark marks, or with smaller, scattered spots, but lateral margin of pronotum always completely yellowish; left paramere without long hairs and without stout bristles (Figs. 27, 30); right paramere apically without or with shortly recurved hook (Figs. 28, 31); female subgenital plate distally broader, evenly rounded or broadly emarginated at posterior margin (Figs. 34, 35)..... **2**

2 Body length 6.5 - 7.8 mm; pronotal width more than 3.5 mm; left paramere distally with two lobes of nearly equal length (Fig. 30); female subgenital plate evenly rounded (Fig. 34). (Luzon, Mindanao)..... ***N. obscuripennis***



Figs. 22 - 31: *Naucoris*: male genitalia: (22 - 24) *N. scutellaris*, (25 - 28) *N. pumilus* sp.n., (29 - 31) *S. obscuripennis* (cotype); (22, 26, 29) aedeagus, (23, 27, 30) left paramere, (24, 28, 31) right paramere, two different views and apex in full face view, (25) genital capsule with aedeagus and parameres in situ (pilosity and proctiger omitted).

- Body length 5.1 - 6.4 mm; pronotal width at most 3.5 mm; left paramere distally with one long and one reduced lobe (Fig. 27); female subgenital plate weakly emarginated (Fig. 35) (widespread) ..... ***N. pumilus* sp.n.**

Naucoris scutellaris STÅL, 1860 (Figs. 22, 24, 33, 149)

Naucoris scutellaris STÅL, 1860: 266 (type locality: Java).
Naucoris scutellaris: LUNDBLAD 1933: 63 (for further synonymies see in this publication); NIESER & CHEN 1991: 53.
Naucoris obscuripennis: USINGER 1938 (misidentification).

Material examined (from Philippines, all macropterous): 2 ♂♂ "LAGUNA: NAGCARLAN\ DIMAYUBA FARMS\ ON STREAM: 18 JUNE\ '77: A.A.BARROSO" (UPLB); 2 ♂♂ "Philippinen: Catanduanes\ W Virac, Sto. Domingo\ Pajo River area, 10.3.\ 1999, leg. Zettel (199)" (NHMW, UPLB); 3 ♂♂, 1 ♀ "Philippinen: Ticao Isl.\ Monreal, Real, Matang\ Tubig Spring, 28.2.1998\ leg. H. Zettel (151)" (NHMW, UPLB); 2 ♂♂, 1 ♀ "LEYTE: BAYBAY\ VISCA: CALBI-\GA-A RIVER\ (on quiet pool)\ 30 OCT. 1980\ A.A.BARROSO" (UPLB, USNM); 1 ♀ "PHILIPPINEN: Palawan Pr.\ Busuanga Is.,13 rd.km WNW\ Coron,Balulu Falls,24.2.\ 1996, leg. H. Zettel (81)" (CZW); 1 ♀ "PHILIPPINES, Mindanao [South Cotabato Prov.]\ Luhib River [13 km. SW Surallah], CL 1993\ VII-19-85 J.T. & D.A. Polhemus" (JTPC); 1 immature: Sarangani Prov., Danau Sebu area, Barangay Bakdolong, N9366, 3.XII.1993, leg. N. Nieser (sent to Department of Environment and Natural Resources, Manila).

Description: see LUNDBLAD (1933).

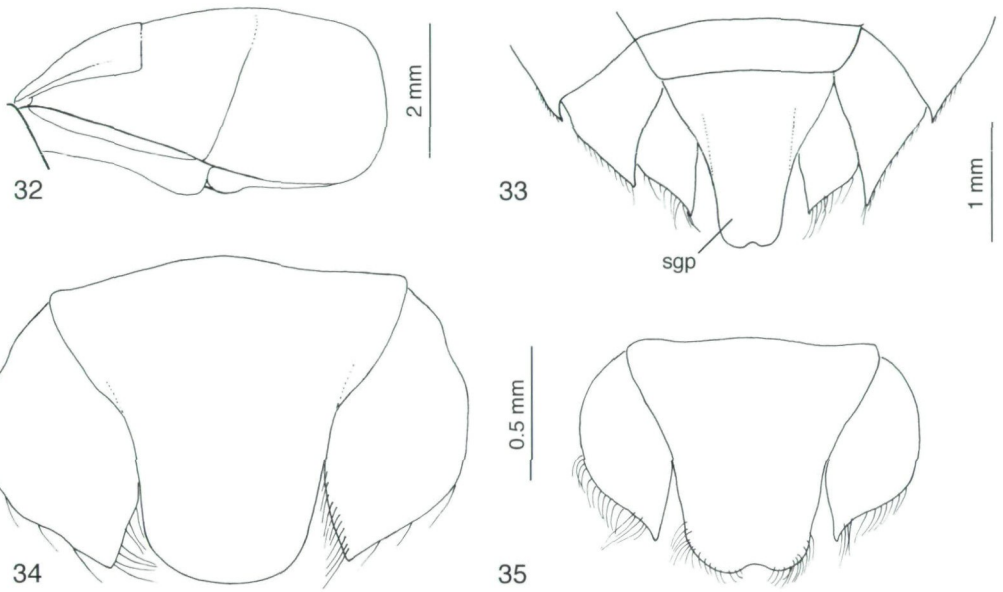
Diagnosis (macropterous form): body size: length 6.50 - 7.20 mm; maximum width (at abdominal segment 3): 4.10 - 4.50; pronotal width 3.60 - 3.90 mm (females subequal in length to males but wider at abdomen); colour of head and pronotum yellow, both with variable dark marks, those of pronotum larger, posterior margin of pronotum with longitudinal marks, on pronotum two pairs of dark marks in anterior and posterior third of lateral margin always best developed; hemelytron with large yellow patch on embolium and with indistinct, varying, elongate yellowish marks on clavus and corium.

Dorsal surface rugulous, matt; labrum length 0.6 times width; ventral extension of maxillary plate 0.65 times length of labrum; rostral cavity circular; rostral segment 3 about 1.4 times as long as segment 4; pronotum 2.5 times as wide as long, with strongly convex, anteriad converging lateral margins, with distinct swellings mesally of postero-lateral corners; abdomen laterally largely surpassing hemelytra; postero-lateral corners of connexiva of abdominal segments 4 - 6 spine-like produced; mesotibia with ventro-mesal row of 6 - 7 spines in distal three fourths, dorso-mesally with row of similar stout bristles; mesosternal carina anteriorly strongly notched, posteriorly weakly elevated, with long curved hairs.

Male: aedeagus long and slender, with acuminate tip (Fig. 22); left paramere with inner apical process finger-like, separated by a small notch from the much broader outer process, with numerous stout bristles (Fig. 23); right paramere with long recurved apical hook (Fig. 24).

Female: subgenital plate slender, apically narrow, with distinct small median notch (Fig. 33).

Comparative notes and discussion: The species and its synonymies were discussed in detail by LUNDBLAD (1933), who described and illustrated material from Java and compared it with the type. USINGER's (1938) re-description of a male of "*N. obscuripennis*" from Luzon (Laguna) is based on this species. *Naucoris scutellaris* presently is seen as one widely distributed species, although some regional differentiations may be stable. A comparison of the Philippine specimens with material from Thailand did not reveal stable differences. The characteristics mentioned in the key enable an easy distinction of *N. scutellaris* from other Philippine *Naucoris* species.



Figs. 32 - 35: (32) Hemelytron of *Naucoris obscuripennis* (holotype of *N. seminiger*, hind-wing-macropterous morph); (33 - 35) *Naucoris*: female abdominal segments (6 and) 7, ventral view: (33) *N. scutellaris*, (34) *N. obscuripennis*, (35) *N. pumilus* sp.n. (pilosity partly omitted).

Distribution: Oriental Region and Wallacea; records from Sri Lanka, India, Thailand, and Indonesia (Java [type locality], Sulawesi); first records for the Philippine Islands: Luzon (Laguna) (see also USINGER 1938: as *N. obscuripennis*), Catanduanes, Ticao, Leyte, Mindanao (South Cotabato, Sarangani), Busuanga (Fig. 149).

Habitats: *Naucoris scutellaris* typically inhabits the edge of lentic parts of streams, where plant material is accumulating. USINGER (1938) collected a single specimen "in a quiet pool beneath some floating [!] dead vegetation" in the Molawin Creek in Los Baños, Laguna. Specimens in Ticao were collected in a section of the stream where the water was deep and stagnant and its bed muddy and covered with a layer of dead plant material. In Catanduanes, specimens were collected at the edge of a stream; the water was stagnant and shallow, and the substrate was muddy. The habitat in Busuanga was a remnant pool of a drained stream. In Sarangani, an immature was found at the edge of a mountain stream with water whitish turbid and conductivity 350 µS. The first and second author collected a large series of *N. scutellaris* in a very slowly flowing, muddy stream in Khon Kaen Province, Northeast Thailand.

Naucoris obscuripennis STÅL, 1854 (Figs. 29 - 32, 34, 149)

Naucoris obscuripennis STÅL, 1854: 239 (type locality: Manila).
Naucoris seminiger LETHIERRY, 1877: 101 (type locality: Manila) (syn. by USINGER 1938).
nec: *Naucoris obscuripennis*: USINGER 1938 (misidentification).

Material examined: cotype of *Naucoris obscuripennis* (♀, macropterous): "Manilla" [Manila], "Kinb.", "Chr. Aurivillius", "128", "Naucoris\ obscuripennis Stål [in Stål's handwriting]\ cotype [in another hand-

writing]", "Montandon\ Coll.\ 1901-233." (BMNH); **holotype** of *Naucoris seminiger* (♂, macropterous): "Manile" [Manila], "MUSEUM PARIS\ Coll. Noualhier 1898", "seminigra Leth.", "Holotypus\ Naucoris\ seminiger Leth.\ etik. Zettel 1998" (MNHN); **further material** (macropterous, if not otherwise stated): 6 ♂♂, 2 ♀♀ "Nord-Luzon\ Tuau [locality unknown to the authors]\ leg.G.Böttcher\\ 16.II.17", "Taeuber Coll.\ B.M.1949-474" (BMNH, NHMW); 1 ♂, 2 ♀♀ "NUEVA ECIJA\ CARRANGLAN\ Maringalo BFD Sta.\ SWAMP: 5 NOV.76\ H. SAN VALENTIN" (UPLB, USNM); 22 ♂♂, 12 ♀♀ "ILOCOS SUR:BANTAY\ Caniaw BFD Sta.\ POND: 20 OCT. 1976\ D.C. CABALLES" (UPLB, NHMW, CNT, USNM); 3 ♂♂, 3 ♀♀ "ILOCOS SUR:BANTAY\ Caniaw BFD Sta.\ POND: 20 OCT. 1976\ A.A. BARROSO" (UPLB); 7 ♂♂, 3 ♀♀ "ILOCOS SUR:BANTAY\ Caniaw BFD Sta.\ 21 OCTOBER 1976\ artificial pond HSV" (UPLB, CZW, USNM); 2 ♂♂ (brachypterous) "PILIPINAS: Sarangani\ Lake Sebu village\ 7.XII.1993, N9374\ leg. N. Nieser" (CNT).

Description:

Macropterous male: body size: length (incl. hemelytra) 6.50 - 7.10 mm; maximum width (at embolar margin): 4.25 - 4.55 mm; pronotal width: 3.70 - 3.90 mm; colour: head and pronotum yellow, with weak brownish markings in posterior half of head and on pronotum except lateral and posterior margins; mesoscutellum black; hemelytron medium brown with yellow patch on embolium; connexiva (dorsally) yellow, brown in posterior part; ventral surface brown, on head and prothorax yellowish brown; labrum, rostrum, antenna, and legs yellowish brown.

Head dorsally with fine reticulation, shiny, width across eyes 2.05 times head length, synthlipsis 0.7 times head width across eyes, ventrally carinate; head margin at postero-lateral eye margin thin; labrum inserted at anterior margin of head, length 0.55 times width; ventral extension of maxillary plate 0.65 times length of labrum; rostral cavity circular; rostral segments 3 and 4 of same length at anterior margin, segment 4 posteriorly with two tufts of hairs close to apex, segment 3 ventro-apically bare.

Pronotum evenly, but weakly convex, subtrapezoidal, with weakly curved lateral margins, which slightly more converging anteriad; 2.2 times wider than long, maximum width close to posterior corners, with more distinct reticulation than on head, on disc each mesh with a small central fovea, shining, at hind margin surface more rugulose; mesoscutellum 2.0 times wider than long, rugulose, matt; hemelytron with completely separated embolium and clavus, clavus longitudinally divided by a suture (Fig. 32), with clavus, corium, and embolium rugulose, matt, membrane coriaceous, matt, weakly surpassing posterior end of abdomen; abdomen laterally weakly surpassing the hemelytra; postero-lateral corners of connexiva right-angled, each with a minute apical spine.

Profemur largely expanded, maximum width 0.75 times maximum length; protibia evenly curved, protarsus weakly separated from protibia, claw reduced; mesotibia ventro-mesally in distal two thirds with row of 5 - 6 suberect long spines, dorso-mesally with row of longer, less stout bristles; metatibia mesally in distal two thirds with row of 7 - 8 suberect long spines; claws of hind leg 0.55 times as long as segment 3 of metatarsus.

Mesosternum with anteriorly notched, posteriorly high median carina; pregenital abdomen weakly asymmetrical; genital capsule triangularly acuminate; aedeagus long and slender, with weakly left-curved apex (Fig. 29); left paramere distally with two slender lobes of subequal length, separated by a deep incision, without stout bristles (Fig. 30); right paramere with shortly recurved apical hook (Fig. 31).

Macropterous female: body size: length 7.50 - 7.80 mm; maximum width (at or shortly behind embolar margin): 4.50 - 4.70 mm; pronotal width: 3.95 - 4.15 mm; abdomen

symmetrical; subgenital plate relatively short and broad, at posterior margin evenly rounded (Fig. 34); other characteristics as in male.

Brachypterous male: body size: length 6.60 - 6.70 mm; maximum width: 3.90 mm; pronotal width: 3.50 mm; hemelytron nearly as long as in macropterous morph, only claval fracture incompletely developed; other characters as in macropterous morph.

Brachypterous female unknown.

Comparative notes and discussion: The original descriptions of *Naucoris obscuripennis* by STÅL (1854) and of *Naucoris seminiger* by LETHIERRY (1877) are insufficient. Types of both taxa were studied to confirm the identity of the species. "*Naucoris obscuripennis*" was redescribed by USINGER (1938), who synonymized *N. seminiger* with *N. obscuripennis* without studying the types. Usinger had only a single male at hand (from Los Baños) and stated a similarity with *N. scutellaris*; however he found differences between his specimen and the male genitalia drawings by LUNDBLAD (1933), which are probably due to different positions of the complicately twisted parameres. In the paper by USINGER (1938) the figure plates have been mistakenly changed by the editors: the figures 2a-c show clearly that Usinger's specimen belongs to *N. scutellaris* (figures 1a-c show the genitalia of *Asthenocoris luzonensis*). USINGER's (1938) synonymy of *N. obscuripennis* and *N. seminiger* was correct by chance.

Distribution: Luzon (Ilocos Sur, Nueva Ecija, Manila, "Tuau"); Mindanao (Sarangani) (Fig. 149).

Habitats: Only two specimens were collected by the authors (leg. N. Nieser). They were found in a village pond which was used for bathing water buffaloes. Half of it was a shallow marsh, the other half a shallow pond with dense vegetation. Some studied specimens are labelled as being from "swamp" or "artificial pond", all indicating that *N. obscuripennis* is a species of stagnant waters.

Naucoris pumilus sp.n. (Figs. 2, 7, 9, 12, 25 - 28, 35, 149)

Holotype (brachypterous ♂): "leg. Jäch (11)\ PHILIPPINEN - Luzon\ 30km E Lucena City\ Quezon NP 23.11.1992" (NHMW); **paratypes** (brachypterous, if not otherwise stated): 1 ♀, same locality data (UPLB); 1 ♂ "PHILIPPINEN: Quezon Pr.\ W Atimonan, Quezon NP\ Old Zigzag Road, 12.2.\ 1996,leg.H.Zettel (79a)" (CZW); 1 ♀ "Philippinen: Luzon, Quezon\ Atimonan, Quezon NP\ Old Zigzag Rd., 24.-30.3.\ 1998, leg. Zettel (165)" (CZW); 1 ♀ "NBG, Real,\ Quezon\ 10 Apr 87" (UPLB); 1 ♂ "Paeta [Paete]\ Luzon", "13545", "Taeuber Coll.\ B.M.1949-474" (BMNH); 13 ♂♂, 6 ♀♀ "LUZON\ Mt. Makiling\ CALAMBA: PUTING\ LUPA: MT.STREAM\ 13 Oct. 1976\ A.A.BARROSO" (UPLB, CZW); 14 ♂♂, 4 ♀♀ same label data except "H.O.SAN VALENTIN" (UPLB, USNM); 3 ♂♂, 3 ♀♀ "PHILIPPINES: LAGUNA\ Calamba:Puting Lupa\ m. 13 OCT. 1976\ mt. stream: A.A.BARROSO" (UPLB, NHMW); 2 ♂♂, 6 ♀♀, and 1 ♀ (macropterous) "CAVITE: ALFONSO\ SMALL STREAM\ 17 MAY 1977\ A.A.BARROSO" (UPLB, CZW, JTPC); 2 ♀♀ "PHILIPPINES, Luzon\ Cavite Province\ Tapat River, 2 km S of\ Alfonso VII-24-85\ CL 2003 J.T.&D.A.Polhemus" (JTPC); 2 ♂♂, 3 ♀♀, and 1 ♀ (macropterous) "CAVITE : Alfonso\ Pajo:Humayao Cr\ BROOK; 17 MAY 1977\ V.P.GAPUD" (UPLB, USNM); 4 ♂♂, 3 ♀♀, and 1 ♀ (macropterous), same label data except "H. SAN VALENTIN" (UBLB, USNM); 1 ♂ (macropterous), 1 ♀ "ILOCOS SUR:BANTAY\ Caniaw BFD Sta.\ stream: 21 oct. 1976\ H. SAN VALENTIN" (UPLB, JTPC); 2 ♂♂, same label data except "A.A.BARROSO" (USNM); 1 ♀ "PHILIPPINES, Luzon/ Benguet Province/ km. 219 1/2, Kennon Road/ 30 km. S. of Baguio City/ VII-8-85 CL 1962 200m./ J.T. & D.A.Polhemus" (JTPC); 4 ♂♂, 1 ♀ "ALBAY: RONGA\ 6 DEC 1976\ H.O.SAN VALENTIN" (UPLB, USNM); 2 ♂♂ "QUEZON: Polillo\ 3 APRIL 1977\ H. SAN VALENTIN" (JTPC); 1 ♀ "Philippinen: Marinduque\ NE Boac, 7 km SE Mogpog\ Bocboc, Paadyan Falls\ 17.2.1998,leg.Zettel(140)" (NHMW); 1 ♂, 1 ♀ "Philippinen: Masbate Isl.\ 3.5 km

SE Masbate, Tugbo\ Tugbo River, 2.3.1998\ leg. H. Zettel (152)" (NHMW, UPLB); 1 ♀ "Philippinen: Ticao Isl.\ W San Fernando, Ipil\ Diwata Spring, 27.2.1998\ leg. H. Zettel (149)" (NHMW); 2 ♂♂, 1 ♀ "PHILIPPINES, Leyte\ Leyte Province\ Lusig River at Hilusig\ VII-15-85 CL 1979\ J.T. & D.A.Polhemus" (JTPC).

Description:

Brachypterous male: body size: length 5.10 - 5.65 mm; maximum width (at abdominal segment 3): 3.05 - 3.35 mm; pronotal width: 2.75 - 3.0 mm; colour: head and pronotum yellow; head with a pair of weak brownish elongate marks medianly in posterior third, and with two indistinct marks in front of them in anterior half; pronotum with two short stripes anteriorly, continuing the marks on head, and with several more or less developed markings along posterior margin, sometimes with additional scattered small spots on head and pronotal disc; mesoscutellum black; hemelytron dark brown or blackish, with yellow patch on embolium, and with apex of claval area yellowish; connexiva (dorsally) yellow, brown in posterior third; ventral surface of head and thorax yellowish (except mesothorax laterally blackish), of abdomen dark brown (except connexiva); labrum, rostrum, antenna, and legs yellowish, except rostral segment 4 brownish.

Head and pronotum dorsally with fine vermiculate rugulae, matt, except pronotum anteriorly between some transverse wrinkles weakly shining; head width across eyes 2.25 times head length, synthlipsis 0.8 times head width across eyes; head ventrally carinate; head margin at postero-lateral eye margin thin; labrum inserted at anterior margin of head, length 0.55 times width; width of maxillary plate 0.6 times length of labrum; rostral cavity circular; length of rostral segment 4 about 0.9 times length of segment 3 at anterior margin, segment 4 posteriorly with two tufts of hairs close to apex, segment 3 ventro-apically with a pair of long tufts of hairs.

Pronotum evenly convex, with curved lateral margins more converging anteriad; 2.5 times wider than long, maximum width close to posterior corners; mesoscutellum 2.1 times wider than long, rugulose, matt; hemelytron with embolium separated laterally, but not posteriorly, basally rugulose, matt, membrane area punctate, shining, nearly reaching posterior end of abdomen; abdomen laterally weakly surpassing the hemelytra; posterior connexival corners right-angled.

Profemur largely expanded, maximum width 0.85 times maximum length; protibia evenly curved, protarsus weakly separated from protibia, claw reduced; mesotibia ventro-mesally in distal two thirds with row of 6 appressed long spines, dorso-mesally with row of similar spines; metatibia mesally in distal two thirds with row of 7 - 8 appressed long spines; claws of hind leg 0.5 times as long as segment 3 of metatarsus.

Mesosternum with anteriorly notched, posteriorly medium high median carina, with long posteriad curved hairs; pregenital abdomen weakly asymmetrical; genital capsule triangularly acuminate; aedeagus long and slender, with straight apex (Fig. 26); left paramere distally with one long slender, basally constricted median lobe and with reduced, truncate lateral lobe, without stout bristles (Fig. 27); right paramere without distinct recurved apical hook (Fig. 28).

Brachypterous female: body size: length 5.50 - 6.40 mm; maximum width (at or shortly behind embolar margin): 3.20 - 3.65 mm; pronotal width: 2.90 - 3.30 mm; abdomen symmetrical; subgenital plate relatively long and narrow, with posterior surface convex, posterior margin with weak emargination and conspicuous lateral pilosity (Fig. 35); other characters as in male.

Macropterous male: body size: length 5.80 mm; maximum width (at embolar margin): 3.35 mm; pronotal width: 3.05 mm; shape of pronotum as in brachypterous morph; hemelytron reaching apex of abdomen, with fully developed embolar and claval sutures and with large membrane; clavus longitudinally divided by a suture, distinctly elevated over level of corium; other characters as in brachypterous male.

Macropterous female: body size: length 5.90 - 6.40 mm; maximum width (at embolar margin): 3.65 - 3.85 mm; pronotal width: 3.25 - 3.50 mm; other characters as in brachypterous female or macropterous male, respectively.

Comparative notes: This is the smallest known species of *Naucoris* in the Philippines. The male left paramere and female subgenital plate are very diagnostic. It is similar to *N. obscuripennis*, but smaller and flatter. Further, *N. pumilus* sp.n. is predominately brachypterous, and *N. obscuripennis* predominately macropterous.

Distribution: Luzon (Ilocos Sur, Benguet, Cavite, Laguna, Quezon), Polillo, Marinduque, Masbate, Ticao; Leyte (Leyte) (Fig. 149).

Habitats: The specimen from the Quezon NP (site # 79a) was collected in a shallow forest pool with a bed covered by leaf litter; the pool was part of a small, slowly flowing rivulet. In 1998, this rivulet was nearly completely dried up; another specimen was collected in remnant pools in the lower part of the rivulet (site # 165). Specimens from Masbate (site # 152) lived below a rocky washed-out bank of a middle sized stream. The specimen from Ticao (site # 149) was found in a very small, shallow (about 5 cm deep) pool at an artificial water source with extremely little water flow. A single specimen was discovered in Marinduque (site # 140) in a stream at the outlet of a pool below a waterfall; however, the microhabitat was very lentic due to accumulated dead plant material. *Naucoris pumilus* sp.n. shows affinities to limestone areas.

Etymology: *pumilus* (Latin, adjective) meaning dwarfish, referring to the small size of the species.

Genus *Philippinocoris* POLHEMUS & POLHEMUS, 1987

Philippinocoris POLHEMUS & POLHEMUS, 1987: 265.

Type species: *Sagocoris usingeri* (LA RIVERS, 1970) (by monotypy)

Diagnosis: Body middle-sized, elongate-ovate, strongly flattened; head with narrow margin at postero-lateral margin of eye; head ventrally with median carina; dorso-posterior margin of head weakly convex; anterior margin of head slightly downcurved; labrum middle-sized, half-ovate, inserting in a groove shortly behind anterior margin of head and between anterior apices of maxillary plates, directed ventrad; rostrum short, directed ventrad, inserted in a rostral cavity; rostral cavity circular, but anteriorly weakly convex; maxillary plates small, ventrad surpassing ventral surface of head, anterior end more or less covering labrum in lateral view (comp. Figs. 10, 13); pronotum widest at posterior fourth to seventh, with broadly or narrowly rounded hind corners; procoxa anteriorly with patch of short stout bristles; profemur strongly thickened, with strong antero-basal dilatation; protibia curved, mesally with two sharp ridges and with an inconspicious row of short bristles; protarsus one-segmented, fused with protibia, with suture visible, bearing one inconspicuous, minute claw (Figs. 36, 37); prosternum over

entire length with median carina, anteriad produced; medial margin of propleural plate next to procoxal cavity with long pilosity (comp. Fig. 18); mesosternum with high carina, notched in anterior fourth, set with long, posteriad directed hairs; hind-wing-brachyptery common; forewing-brachyptery unknown; abdomen with appressed hair layer, with erect hairs only laterally on sternites 5 - 7 (not obvious and sparse); male genital capsule apically acuminate; parameres asymmetrical, long; left paramere distally long and slender, with one or two distal lobes (Figs. 43, 46), right paramere twisted around aedeagus, with acuminate or narrowly rounded apex (Figs. 44, 47); female subgenital plate subtriangular with deep apical emargination between two pointed tips (Figs. 38, 39); gonapophyses 2 without process, posteriorly triangular, apically with numerous long slender setae.

Comparative notes: *Philippinocoris* is similar to *Stalocoris* in several characteristics, but much larger. The female subgenital plate and the elongated parameres resemble certain species of *Asthenocoris*, from which *Phillipinocoris* differs strongly in the structures of the head (see key). Using the key by NIESER & CHEN (1991), which does not include the Philippine fauna, *Philippinocoris* keys out with the strictly New Guinea genus *Sagocoris* MONTANDON, 1911; POLHEMUS & POLHEMUS (1987) showed that the similarities between these two genera are analogous rather than homologous.

Taxonomy and distribution: POLHEMUS & POLHEMUS (1987) erected *Philippinocoris* to exclude *P. usingeri* from *Sagocoris*. Morphologically and ecologically, *Philippinocoris* shows strong similarities with *Stalocoris*. Both known species, *Philippinocoris usingeri* and *P. sumaldei* sp.n., are restricted to the mountainous areas of North Luzon.

Habitats: In or close to lotic sections of mountainous streams and rivers, often hidden below large rocks or logs; for more information see habitat associations of species.

Key to the species of *Philippinocoris*

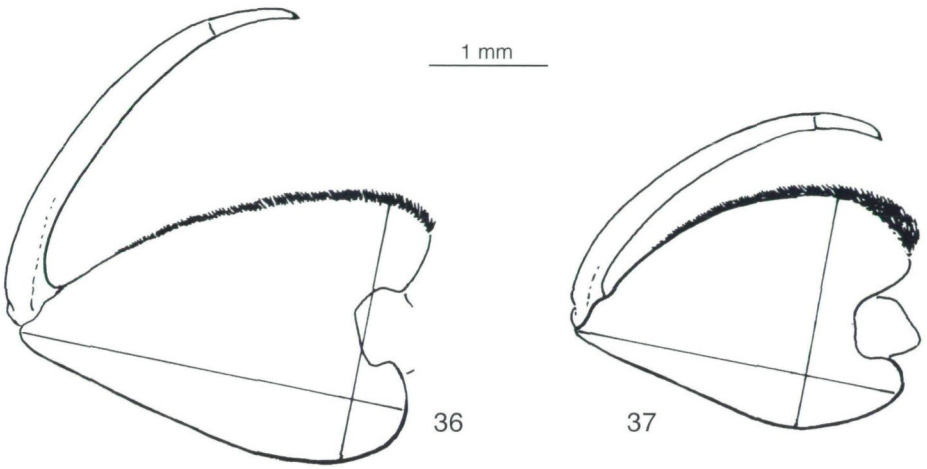
1 Maximum width of profemur at basal third (Fig. 37); yellow marks on hemelytra strongly contrasting; female laterotergites 6 strongly curved ventrad (Fig. 40), (less distinct in macropterous morph); female laterotergite 7 with finger-shaped apex (Fig. 38); male left paramere ca. 0.9 mm long, with one long and one short distal lobe (Fig. 43); body length of male 9.5 - 10.2 mm, of female 10.3 - 11.4 mm ..... ***P. usingeri***

\- Maximum width of profemur close to base (Fig. 36); yellow marks on hemelytra faded; female laterotergites 6 not curved ventrad (Fig. 41); female laterotergite 7 with triangular apex (Fig. 39); male left paramere ca. 1.2 mm long, with one long distal lobe (Fig. 46); body length of male 10.8 - 11.5 mm, of female 12.0 - 12.2 mm ..... ***P. sumaldei* sp.n.**

Philippinocoris usingeri (LA RIVERS, 1970) (Figs. 16, 37, 38, 40, 42 - 44, 150)

Sagocoris usingeri LA RIVERS, 1970: 167.
Philippinocoris usingeri: POLHEMUS & POLHEMUS 1987: 268.

Material examined (brachypterous, if not otherwise stated): **holotype** (♂): "Mt.Prov.PI\ Benguet", "15.VII.46\ DGFrey", "SAGOCORIS\ USINGERI\ HOLOTYPE" (AMNH); **further material:** 7 ♂♂, 9 ♀♀, and 1 ♀ (macropterous) "PHILIPPINES, Luzon\ Benguet Province\ stream below Camp John\ Hay hydro,



Figs. 36 - 37: Foreleg, ventral view, of (36) *Philippinocoris sumaldei* sp.n. and (37) *P. usingeri* (pilosity partly omitted).

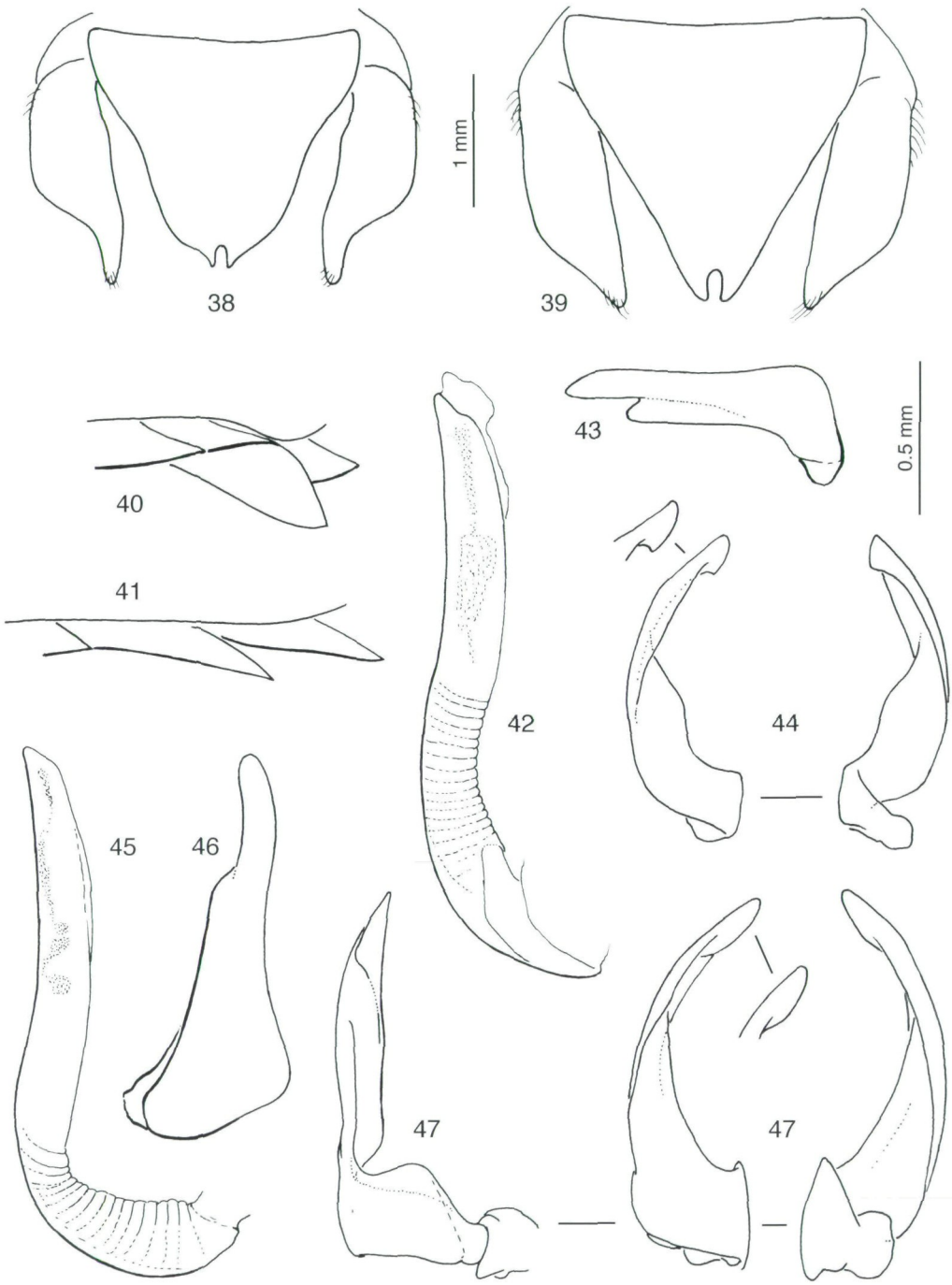
nr. Tuba mines\ VII-8-85 CL 1968 900m,\ J.T. & D.A. Polhemus" (AMNH, CNT, JTPC); 3 ♂♂, 3 ♀♀ "PHILIPPINES, Luzon\ Benguet Province\ km. 230, Kennon Road\ 20 km. S. of Baguio City\ VII-8-85, CL 1966\ J.T. & D.A. Polhemus" (JTPC); 1 ♀ (macropterous), 1 ♂ "Philippinen: LZ, Benguet\ Kennon Road-km 31 S Baguio\ Camp 1, Bridal Falls, 16.2.\ 1999, leg. H. Zettel (177)" (CZW); 4 ♂♂, 5 ♀♀ "Philippinen: LZ, Mount.Pr.\ NE Sagada, Banga'an\ Bomod-ok Wf., 22.2.1999\ 1500 m, leg.H.Zettel (185)" (UPLB, CZW, NHMW); 1 ♀, same locality data, except "leg.F.Seyfert (9)" (CSW).

Description:

Brachypterous male: body size: length 9.50 - 10.20 mm; maximum width (at base of abdominal segment 4): 5.30 - 5.90 mm; pronotal width: 5.10 - 5.50 mm; colour: head and pronotum yellow, head at posterior margin with two distinct, more or less confluent brown marks, which sometimes extended anteriad in thin dark lines; disc of pronotum with brownish marks; mesoscutellum dark brown with yellow midline; hemelytron brown, with distinct yellow colour pattern, especially mark on anterior three fourths of embolium, clavus, and a distinct stripe along distal margin of corium yellow; abdomen dorsally dark brown; connexiva broadly yellowish; ventral surface yellowish to brownish, on thorax (except lateral margins of prothorax) darker than on head and abdomen; labrum, rostrum, antenna, and legs yellowish.

Head dorsally densely and very finely rugose-punctate, matt, only in anterior third finely reticulate and weakly shining; head width across eyes 1.7 times head length, synthlipsis 0.65 times head width across eyes; labrum about twice as wide as long; ventral extension of maxillary plate subequal to half length of labrum; rostral segment 3 weakly (1.1 times) longer than segment 4 at anterior margin, bare; rostral segment 4 postero-apically with two pairs of short bristles.

Pronotum with disc weakly convex, with lateral areas flat, with lateral margins anteriorly weakly, posteriorly strongly convex, with very dense punctation as on head, matt; maximum pronotal width at posterior seventh of lateral margin, 2.8 - 3.0 times median pronotal length; mesoscutellum 2.0 times wider than long, rugose-punctate, matt; hemelytron



Figs. 38 - 47: (38, 40, 42 - 44) *Philippinocoris usingeri* and (39, 41, 45 - 47) *P. sumaldei*; (38, 39) female subgenital plates; (40, 41) female left laterotergites 5 - 6; (42, 45) aedeagus; (43, 46) left paramere; (44, 47) right paramere, different views (pilosity omitted).

(nearly) reaching end of abdomen; embolar and claval sutures always indicated, but incomplete; clavus, corium, and embolium rugulose, weakly shining, membrane smooth, shining; posterior corners of connexiva 3 - 5 right-angled to slightly acute; tergite 5 covered by hemelytra, short and medially truncate.

Profemur largely expanded, maximum width (in basal third) 0.75 times maximum length (Fig. 37); protibia evenly curved; protarsus clearly separated from protibia, claw reduced, tooth-like; mesotibia ventro-mesally with numerous short, stout spines not arranged in distinct rows, dorso-mesally with a single row of longer spines; metatibia mesally in distal two thirds with row of about 20 appressed spines; claws of hind leg 0.5 times as long as segment 3 of metatarsus.

Mesosternum with anteriorly notched, well developed median carina; pregenital abdomen asymmetrical; genital capsule posteriorly acutely pointed; aedeagus long and slender (Fig. 42); left paramere distally with one very elongate, and one short lobe separated by a distinct incision (Fig. 43); right paramere with stout middle part, with pointed apex (Fig. 44).

Brachypterous female: body size: length 10.30 - 11.40 mm; maximum width (at embolar margin or base of abdominal segment 4): 5.90 - 6.60 mm; pronotal width: 5.40 - 6.00 mm; most characters as in male; hemelytra reaching middle of tergite 7; tergite 7 posteriorly with large, semi-circular emargination; laterotergites 6, especially the left, strongly curved ventrad (Fig. 40); female laterotergite 7 with finger-shaped apex (Fig. 38); subgenital plate subtriangular, apically with small, deep incision, leaving two slender processes (Fig. 38).

Macropterous female: body size: length 10.80 - 10.90 mm; maximum width (at segment 4): 6.10 - 6.50 mm; pronotal width: 5.80 - 6.10 mm; most characters as in brachypterous female except following:

Pronotum slightly longer, with maximum width at posterior fourth, convex along posterior margin, with lateral margins more convex in middle part, very weakly incised at hind corners; hemelytra reaching end of abdomen, with well developed claval and embolar suture, clavus bipartite longitudinally; in one female right laterotergite 6 only weakly downcurved.

Comparative notes: see under *Philippinocoris sumaldei* sp.n.

Distribution: Luzon (Mountain Province, Ifugao [POLHEMUS & POLHEMUS 1987], Benguet) (Fig. 150).

Habitats: *Philippinocoris usingeri* occurs in fast flowing mountain streams and rivers, where it is usually found hidden below overhanging rocks or in narrow bays. It is conspicuously rheophilous, but less so than *Asthenocoris montanus* sp.n. living in the same streams.

***Philippinocoris sumaldei* sp.n.** (Figs. 36, 39, 41, 45 - 47, 150)

Holotype (brachypterous ♂): "Philippinen: LZ, Mount.Pr.\ S Sagada, Bagnen, slopes of \ Mt.Polis, 1600 m, 26.2.\ 1999, leg. H. Zettel (189)" (UPLB); **paratypes** (all brachypterous): 1 ♂, 2 ♀♀, same label data as holotype (NHMW, UPLB); 1 ♂, same label data, except "leg. F. Seyfert (15)" (CSW); 1 ♂ "Philippinen: LZ, Mount.Pr.\ NE Sagada, Banga'an\ Bomod-ok Wf., 22.2.1999\ 1500 m, leg.H.Zettel (185)" (CZW).

Description:

Brachypterous male: body size: length 10.80 - 11.50 mm; maximum width (at embolar margin or posterior end of abdominal segment 3): 6.30 - 6.40 mm; pronotal width: 5.60 - 5.90 mm; colour: head, pronotum, and mesoscutellum light brown, head at anterior margin and pronotum at lateral margins yellow, disc of pronotum slightly darker; hemelytron brown, with indistinct yellowish marks on anterior three fourths of embolium, distal end of clavus, and distal margin of corium; abdomen dorsally dark brown; connexiva broadly yellowish; ventral surface brownish, medial areas of meso- and metathorax lighter; labrum, rostrum, antenna, and legs yellowish.

Head dorsally densely and finely reticulate, weakly shining; head width across eyes 1.95 times head length, synthlipsis 0.65 times head width across eyes; labrum about twice as wide as long; ventral extension of maxillary plate subequal to half length of labrum; rostral cavity semi-circular, anteriorly straight; rostral segment 3 weakly (1.1 times) longer than segment 4 at anterior margin, bare; rostral segment 4 postero-apically with two pairs of short bristles.

Pronotum with disc weakly convex, with lateral areas flat, with lateral margins anteriorly weakly, posteriorly strongly convex, with fine reticulation, meshes on disc larger than laterally, on lateral areas of disc with a point in centre, weakly shining; maximum pronotal width at posterior fourth of lateral margin, 2.7 - 2.8 times median pronotal length; mesoscutellum 1.9 times wider than long, laterally rugose, medially smooth and shining; hemelytron nearly reaching end of abdomen; embolar and claval suture indicated, both incomplete; clavus, corium, and embolium finely rugulose, weakly shining, membrane smooth, shining; posterior corners of connexiva 3 - 5 slightly acute; tergite 5 covered by hemelytra, short and medially truncate.

Profemur largely expanded, maximum width at base 0.7 times maximum length (Fig. 36); protibia evenly curved; protarsus clearly separated from protibia, claw reduced, tooth-like; mesotibia ventro-mesally with numerous short, stout spines not arranged in distinct rows, dorso-mesally with single row of longer spines; metatibia mesally with row of about 20 appressed spines; claws of hind leg 0.5 times as long as segment 3 of metatarsus.

Mesosternum with anteriorly notched, well developed median carina; pregenital abdomen *asymmetrical*; *genital capsule posteriorly narrowly rounded*; *aedeagus long and slender* (Fig. 45); left paramere distally with one very elongate lobe, without incision (Fig. 46); right paramere with pointed apex (Fig. 47).

Brachypterous female: body size: length 12.00 - 12.20 mm; maximum width (at embolar margin or posterior end of abdominal segment 3): 6.70 - 6.80 mm; pronotal width: 5.90 - 6.00 mm; most characters as in male; hemelytra reaching middle of tergite 7; tergite 7 posteriorly with large, semi-circular emargination; laterotergites 6 not curved ventrad (Fig. 41); female laterotergite 7 with triangular apex (Fig. 39); subgenital plate subtriangular, apically with small, deep incision, leaving two triangular processes (Fig. 39).

Macropterous morphs: unknown.

Comparative notes: *Philippinocoris sumaldei* sp.n. differs from *P. usingeri* in the characteristics mentioned in the key. Further, it is slightly larger, has a glabrous centre of the mesoscutellum, and a longer female subgenital plate with a slightly different apex (comp. Figs. 38 and 39).

Distribution: Luzon (Mountain Province) (Fig. 150).

Habitats: The type series was collected below a log laying in a deep pool of a small mountain stream (in average 1 m wide) below a waterfall in the surroundings of Sagada at an elevation of 1600 m a.s.l. The site furnished also other very interesting mountainous water bugs, e.g. *Enithares freyi* BROOKS, 1948 (Notonectidae), *Rhagovelia akrita* POLHEMUS, 1976 and the first Philippine *Rhagovelia* species (undescribed) belonging to the *R. borneensis* group (Veliidae). One additional male of *P. sumaldei* sp.n. was collected together with specimens of *P. usingeri* in the same area at a slightly lower elevation at 1500 m a.s.l.

Etymology: This species is dedicated to Prof. Dr. Augusto C. Sumalde, director of the Museum of Natural History, University of the Philippines, Los Baños.

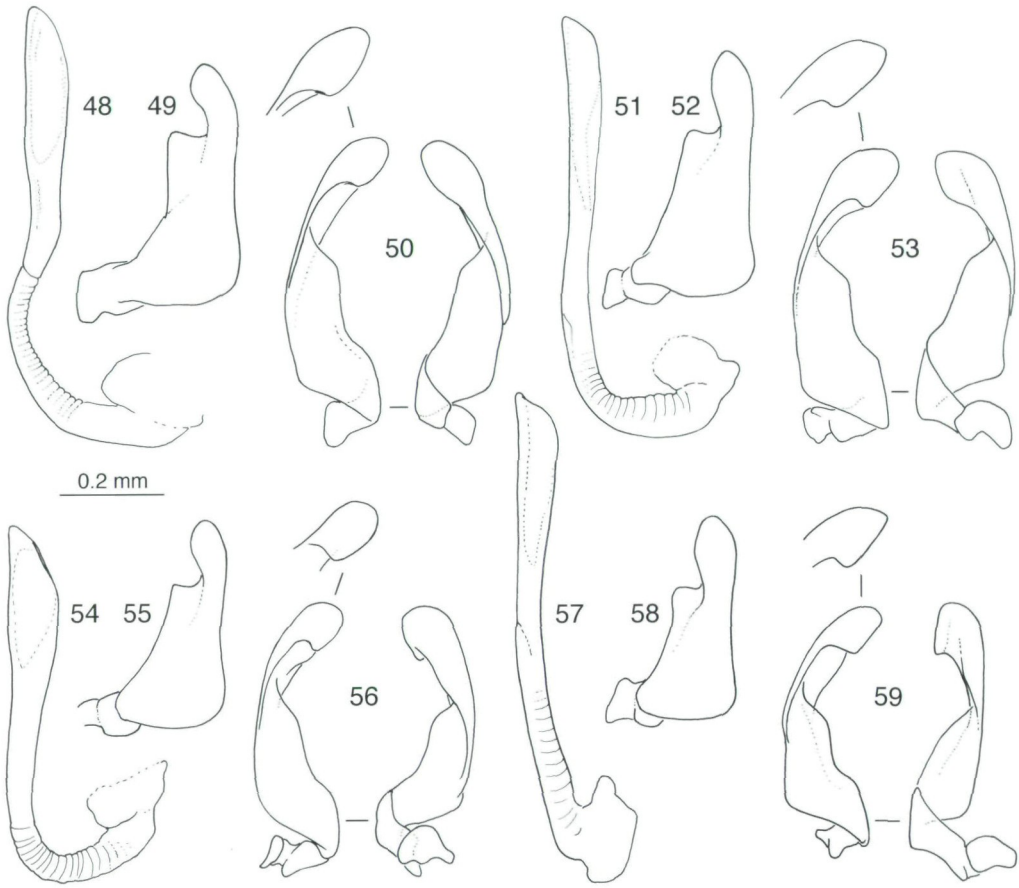
Genus *Stalocoris* LA RIVERS, 1969

Stalocoris LA RIVERS, 1969: 1.

Type species: *Stalocoris breviceps* LA RIVERS, 1969 (by monotypy)

Diagnosis: Body small, ovate (Fig. 3), strongly flattened; head with narrow margin at postero-lateral margin of eye; head ventrally with a median carina; dorso-posterior margin of head weakly convex; anterior margin of head slightly downcurved; labrum middle-sized, half-ovate, inserting in a groove behind anterior margin of head and between anterior apices of maxillary plates, directed ventrad (Fig. 13); rostrum short, directed ventrad, inserted in a rostral cavity; maxillary plates small, ventrad surpassing ventral surface of head; their anterior end covering the labrum in lateral view partly (Fig. 10); pronotum widest at posterior third to two fifths, with narrowly rounded hind corners; procoxa anteriorly with patch of short stout bristles; profemur strongly thickened, with strong antero-basal dilatation (Fig. 6); protibia curved, mesally with two sharp ridges and with an inconspicious row of short bristles; protarsus one-segmented, fused with protibia, with suture visible, bearing one inconspicuous, minute claw; prosternum over entire length with median carina, which anteriad produced; medial margin of propleural plate next to procoxal cavity with long pilosity; mesosternum with high keel, notched in anterior fourth, set with long, posteriad directed hairs; hind-wing-brachyptery common; fore-wing-brachyptery unknown; abdomen with appressed hair layer, without erect hairs; male genital capsule apically acuminate; parameres asymmetrical, long; left paramere distally stout with one distal lobe and deep subapical incision (e.g. Fig. 49), right paramere twisted around aedeagus, with relatively broad and stout apex (e.g. Fig. 50); female subgenital plate short, truncate, with hind margin straight or broadly and weakly concave, in one species with shallow median emargination (Figs. 60 - 64); gonapophyses 2 posteriorly long-triangular, apically with long, slender setae.

Comparative notes: *Stalocoris* is similar to *Philippinocoris*, but smaller and with the female subgenital plate aberrant from all other Philippine genera. The head in front of the anterior eye margin is extremely short. External similarities are also found with *Naucoris pumilus* sp.n., from which *Stalocoris* species differ in the lack of an erect pilosity on the abdominal venter. Using the key by NIESER & CHEN (1991), which does not include the Philippine genera, *Stalocoris* keys out with the New Guinea genus *Aptinocoris* MONTANDON, 1897.

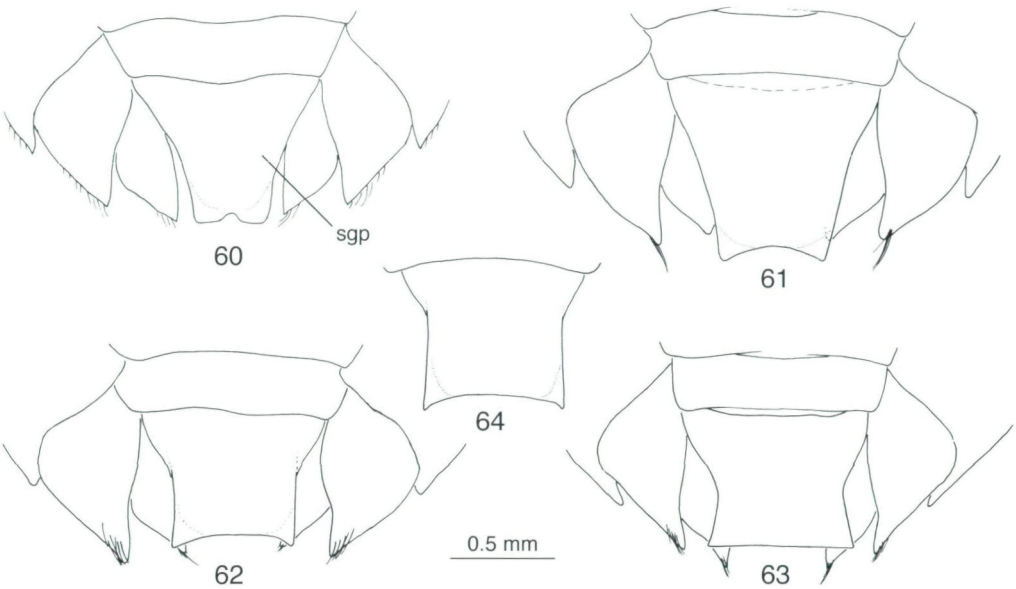


Figs. 48 - 59: *Stalocoris*: male genitalia: (48 - 50) *S. breviceps*, (51 - 53) *S. schoedli* sp.n., (54 - 56) *S. ticaoensis* sp.n., (57 - 59) *S. tansiongcoi* sp.n.; (48, 51, 54, 57) aedeagus, (49, 52, 55, 58) left paramere, (50, 53, 56, 59) right paramere, two different views and apex in full face view (pilosity omitted).

Taxonomy and distribution: *Stalocoris breviceps* was the only previously described species in the genus. Three species are added in this paper; one further species is questionable. Females are easily distinguishable by the typical shapes of their subgenital plates, but males show only minute differences in the parameres.

Stalocoris inhabits two isolated areas: *Stalocoris breviceps* from Mindanao and *Stalocoris* sp. from Leyte occur in an area formerly being part of the Pleistocene "Southeast-Philippines"; the other species live on islands which are remnants of the pleistocene island "Western Visayas" (see Fig. 152).

Habitats: Species of *Stalocoris* live in streams under stones, similar to species of *Asthenocoris* (see below). However, they are less specialized to current conditions and frequently found at the edge of the streams or at the edge of larger pools below waterfalls.



Figs. 60 - 64: (60 - 63) *Stalocoris*: female abdominal segments 6 and 7, ventral view: (60) *S. breviceps*, (61) *S. schoedli* sp.n., (62) *S. tansiongcoi* sp.n. (from Sibuyan), (63) *S. ticaoensis* sp.n.; (64) female sternite 7 of *S. tansiongcoi* sp.n. (from Panay) (pilosity partly omitted).

Key to the species of *Stalocoris*

1 ♀ **2**

- ♂ **5**

2 Median length of sternite 7 about 0.9 - 1.0 times basal width, sides of sternite 7 in distal half converging, distance of obtuse posterior corners ca. 0.5 times basal width (Figs. 60, 61) **3**

- Median length of sternite 7 about 0.7 times basal width, sides of sternite 7 in distal half parallel or diverging, distance of acute posterior corners ca. 0.6 - 0.7 times basal width (Figs. 62 - 64) **4**

3 Body length 4.9 - 5.7 mm; hind margin of sternite 7 with small medial emargination (Fig. 60) (Mindanao) ..... ***S. breviceps***

- Body length 6.7 - 7.4 mm; hind margin of sternite 7 evenly concave (Fig. 61) (Negros) ..... ***S. schoedli* sp.n.**

4 Sternite 7 with concave hind margin and posteriorly parallel sides, posterior corners pointing caudad (Figs. 62, 64); posterior corners of laterosternites 5 - 6 acute triangular; tip of left laterosternite 5 straight or weakly downcurved (Fig. 69); laterosternites 6 weakly downcurved (Figs. 69, 70) (Sibuyan, Panay) ..... ***S. tansiongcoi* sp.n.**

- Sternite 7 with straight hind margin and posteriorly diverging sides, posterior corners pointing laterad (Fig. 63); posterior corners of laterosternites 5 - 6 spine-like; tip of left laterosternite 5 slightly upcurved (Fig. 71); laterosternites 6 distinctly downcurved (Figs. 71, 72) (Ticao) ..... ***S. ticaoensis* sp.n.**

5 Clavus and corium (except embolium) uniformly dark brownish; parameres as in Figures 49 - 50 (Mindanao) ..... ***S. breviceps***

Here also *Stalocoris* sp. from Leyte (see below).

- Clavus blackish, at apex with contrasting yellow patch, corium at distal margin often with triangular yellow patch; species from other areas **6**

6 Tip of right paramere in full face view evenly rounded (Fig. 56) (Ticao) ..... ***S. ticaoensis* sp.n.**

- Tip of right paramere in full face view laterally truncate (Figs. 53, 59) **7**

7 Left paramere elongate, part distal of incision ca. 2.0 times longer than wide (Fig. 52) (Negros) ..... ***S. schoedli* sp.n.**

- Left paramere relatively short and stout, part distal of incision ca. 1.7 times longer than wide (Fig. 58) (Sibuyan, Panay) ..... ***S. tansiongcoi* sp.n.**

Stalocoris breviceps La Rivers, 1969 (Figs. 48 - 50, 60, 65, 66, 150)

Stalocoris breviceps La Rivers, 1969: 1.

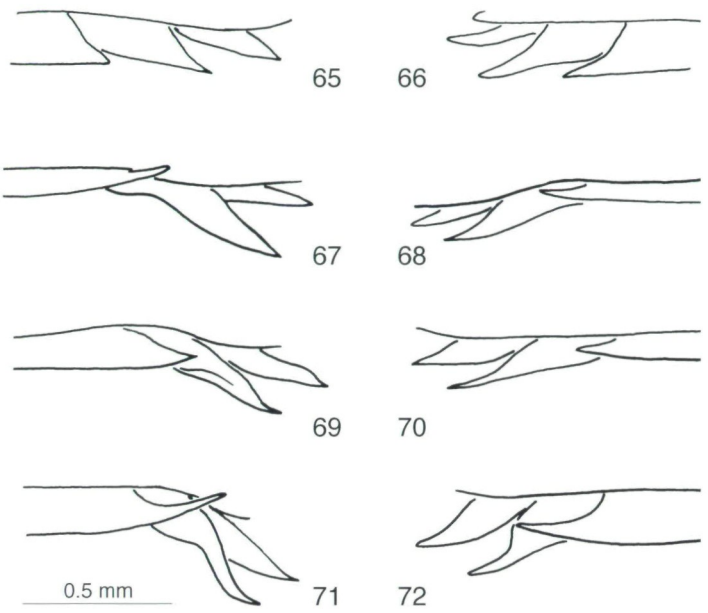
Material examined: holotype (brachypterous ♂): "CNHM-Philippine\ Zool.Exped.(1946-47)\ H.Hoogstraal leg.", E.slope Mt.McKinley [Mt. Apo area],\ Davao Province,\ MINDANAO\ :46", "stream through\ original forest", "STALOCORIS\ BREVICEPS ♂\ HOLOTYPE" (FMNH); **further material:** 2 ♀♀ (brachypterous), 1 ♀ (macropterous) "PHILIPPINES, Mindanao\ South Cotabato Province\ Cacob River, 550m., SE of\ Koronadal, VII-20-85\ CL 1995 J.T.&D.A.Polhemus" (JTPC, NHMW).

Description:

Brachypterous male: body size: length 5.80 mm; maximum width (at embolar margin): 3.45 mm; pronotal width: 3.20 mm; colour: head and pronotum yellow; pronotum with three dark patches at posterior margin, medially and close to hind corners; mesoscutellum and hemelytron dark brown, with yellow patch on anterior two thirds of embolium, clavus evenly and inconspicuously lighter; abdomen dorsally yellowish; ventral surface, labrum, rostrum, antenna, and legs yellow.

Head dorsally reticulate, with large meshes, shiny; head width across eyes 1.85 times head length, head in front of eyes 0.12 times head length; synthlipsis 0.65 times head width across eyes; labrum inserted close to anterior margin of head, at anterior margin of rostral cavity, twice as wide as long; ventral extension of maxillary plate anteriorly subequal to half length of labrum; rostral cavity semi-circular, anteriorly weakly convex; rostrum short, segment 3 as long as segment 4 at anterior margin, segment 4 bare, segment 3 anteroapically with one pair of bristles.

Pronotum evenly, but weakly convex, with strongly curved lateral margins more converging anteriad; 2.9 times wider than median length, maximum width at posterior two fifths of lateral margin; with similar reticulation as on head, most meshes with a small central fovea, shining, at hind and lateral margins surface more rugulose, matt; mesoscutellum 1.9 times wider than long, rugulose, matt; hemelytron nearly reaching end of abdomen; embolium distinctly indicated, clavus indicated by indistinct light stripe; clavus, corium, and embolium rugulose, matt, membrane coriaceous, matt; posterior corners of connexiva 3 - 5 (nearly) right-angled; tergite 5 in middle of posterior margin broadly convex.



Figs. 65 - 72: *Stalocoris*: left (65, 67, 69, 71) and right (66, 68, 70, 72) laterosternites 5 - 7, in lateral view, of brachypterous females: (65, 66) *S. breviceps*, (67, 68) *S. schoedli* sp.n., (69, 70) *S. tansiongcoi* sp.n., (71, 72) *S. ticaoensis* sp.n. (pilosity omitted).

Profemur largely expanded, maximum width 0.8 times maximum length; protibia evenly curved, protarsus distinctly separated from protibia, claw reduced, inconspicuous; mesotibia ventro-mesally with double row of numerous short, stout spines, dorso-mesally with single row of long spines; metatibia mesally in distal three fourths with row of 10 subcumbent long spines; claws of hind leg 0.5 times as long as segment 3 of metatarsus.

Mesosternum with anteriorly notched median carina; pregenital abdomen nearly symmetrical; genital capsule posteriorly angulate; aedeagus long and slender (Fig. 48); left paramere distally with one elongate lobe separated by a deep incision from reduced, truncate second lobe (Fig. 49); right paramere stout, especially apically, with roundish, laterally inconspicuously truncate apex (Fig. 50).

Brachypterous female: body size: length 4.90 - 5.50 mm; maximum width (at embolar margin): 2.90 - 3.15 mm; pronotal width: 2.65 - 2.85 mm; most characters as in male; clavus apically at most with small indistinct yellow-brownish mark; hind margin of tergite 5 broadly and weakly concave; tergite 7 with deep emargination, with angular hind corners; laterosternites 5 straight, laterosternites 6 very weakly curved ventrad (Figs. 65, 66); subgenital plate with length about 1.0 times basal width, with sides evenly converging to slightly rounded posterior corners, with posterior margin straight, length subequal to half basal width, with distinct roundish medial incision (Fig. 60).

Macropterous female: body size: length 5.70 mm; maximum width (at embolar margin): 3.30 mm; pronotal width: 3.05 mm; most characters as in brachypterous female except following: Head and pronotum with large, weakly contrasting brownish marks; pronotum with swelling close to posterior corners, lateral margins at hind corners weakly emarginate; mesoscutellum much larger; hemelytron not distinctly longer than in brachypterous morph, with well developed claval and embolar suture.

Macropterous male unknown.

Comparative notes and discussion: The description of the type species was based on a single male from the Mt. Apo area, Mindanao. The holotype differs distinctly from the newly described species in the uniformly brownish corium and clavus. Three females from South Cotabato, which correspond well with the male holotype, are provisionally identified as *S. breviceps*. Their identity should be confirmed by samples containing males and females. These females have a very diagnostic sternite 7 (Fig. 60). Interspecific differences in male genitalia are as minute as between the other species. See also notes under *Stalocoris* sp. from Leyte.

Distribution: Mindanao (Davao, South Cotabato) (Fig. 150).

Stalocoris schoedli sp.n. (Figs. 3, 6, 10, 13, 51 - 53, 61, 67, 68, 150)

Holotype (brachypterous ♂): "PHILIPPINEN: Negros\ SE Bacolod,Mambucal\ Seven Falls,15.-16.3.\ 900m,lg.Zettel 1994(39a)" (NHMW); **paratypes** (brachypterous, if not otherwise stated): 4 ♂♂, 2 ♀♀, same locality data (NHMW, UPLB); 3 ♂♂, 2 ♀♀ "PHILIPPINEN: Negros\ SE Bacolod,Mambucal\ Health Resort, 15.3.\ 900m,lg.Zettel 1994(39b)" (NHMW); 6 ♂♂, 4 ♀♀ "PHILIPPINEN: Negros\ SE Bacolod,Mambucal\ 1000m, 16.3.1994\ leg. H. Zettel (39d)" (NHMW, UPLB); 4 ♂♂, 9 ♀♀ "PHILIPPINEN: Negros\ W[E] Bacolod, Lizares/ Bago riv.,550m,17.3./ leg. Zettel 1994 (40)" (NHMW, UPLB, CNT); 5 ♂♂, 6 ♀♀ "PHILIPPINEN: Negros\ SE Murcia, Barangay\ Caliban riv.,250m,18.3.\ leg. H. Zettel 1994 (41)" (NHMW, CNT); 1 ♂, 3 ♀♀ "PHILIPP. 15.III.1994\ Negros occ., Mambucal\ SE Bacolod, ca. 900m\ leg. Schödl (1)" (NHMW, UPLB); 1 ♀ "PHILIPP. 16.III.1994\ Negros occ., Mambucal\ Seven Falls, ca. 900m\ leg. Schödl (2)" (NHMW); 7 ♂♂, 4 ♀♀, and 1 ♂ (macropterous) "PHILIPP. 17.III.1994\ Negros occ., Lizares\ W[E] Bacolod, Bago river\ ca. 500m; leg. Schödl (4)" (NHMW, UPLB); 2 ♂♂, 1 ♀, and 1 ♂ (macropterous) "PHILIPP. 18.III.1994\ Negros occ., Caliban\ river SE Murcia\ ca. 900m; leg. Schödl (5)" (NHMW); 7 ♂♂, 5 ♀♀, and 3 ♂♂ (macropterous) "Philippinen: Negros or.\ W Dumaguete, Valencia\ Banica Valley Resort\ 25.2.1997,lg. Zettel (117)" (CZW, UPLB); 5 ♂♂, 4 ♀♀, and 3 ♂♂, 5 ♀♀ (macropterous) "PHILIPPINES\ Amulan [Amlan]\ Is. Neglos [Negros]\ July 16-18,1970\ M.SATO leg." (JTPC, NHMW).

Description:

Brachypterous male: body size: length 6.30 - 7.10 mm; maximum width (at embolar margin): 3.70 - 4.05 mm; pronotal width: 3.35 - 3.65 mm; colour: head and pronotum yellow, head in middle and pronotum anteriorly on disc at most diffusely and inconspicuously darkened; mesoscutellum and hemelytron blackish, hemelytron with yellow marks on anterior two thirds of embolium and apex of clavus, corium distally without or with very small yellow patch; abdomen dorsally yellowish; ventral surface yellowish except medial areas of thorax more or less infuscated; labrum, rostrum, antenna, and legs yellow.

Head dorsally reticulate, with large meshes, shiny; head width across eyes 1.9 - 2.1 times head length, head in front of eyes 0.10 - 0.12 times head length; synthlipsis 0.65 times head width across eyes; labrum inserted close to anterior margin of head, at anterior margin of rostral cavity, twice as wide as long; ventral extension of maxillary plate anteriorly subequal to half length of labrum; rostral cavity semi-circular, anteriorly weakly convex; rostrum short, segment 3 as long as segment 4 at anterior margin, segment 4 posteroapically with a few hairs, segment 3 anteroapically with one pair of bristles.

Pronotum evenly, but weakly convex, with strongly curved lateral margins more converging anteriad; 2.8 times wider than median length, maximum width in posterior two fifth of lateral margin; with similar reticulation as on head, most meshes with a small

central fovea, shining, at hind and lateral margins surface more rugulose, matt; mesoscutellum 2.0 times wider than long, rugulose, matt; hemelytron nearly reaching end of abdomen; embolium and claval sutures indicated in varying extension, but never both absent or complete; clavus, corium, and embolium rugulose, matt, membrane coriaceous, matt; posterior corners of connexiva 3 - 4 right-angled, of connexivum 5 weakly acute; tergite 5 in middle of posterior margin broadly convex.

Profemur largely expanded, maximum width 0.8 times maximum length; protibia evenly curved, protarsus distinctly separated from protibia, claw reduced, inconspicuous or tooth-like; mesotibia ventro-mesally with double row of numerous short, stout spines, dorso-mesally with single row of long spines; metatibia mesally in distal three fourths with row of about 10 appressed long spines; claws of hind leg 0.6 times as long as segment 3 of metatarsus.

Mesosternum with anteriorly deeply notched, blunt median carina with posteroventrad directed hairs; pregenital abdomen weakly asymmetrical; genital capsule posteriorly angulate; aedeagus long and slender (Fig. 51); left paramere distally with one elongate lobe separated by a deep incision from reduced, truncate second lobe (Fig. 52); right paramere stout, especially distally, with broad, roundish, weakly truncate apex (Fig. 53).

Brachypterous female: body size: length 6.70 - 7.40 mm; maximum width (at embolar margin or abdominal segment 4): 3.90 - 4.25 mm; pronotal width: 3.45 - 3.75 mm; most characters as in male; hind margin of tergite 5 broadly and weakly concave; tergite 7 with deep rectangular emargination, with angular hind corners; laterosternites 5 straight, laterosternites 6 curved ventrad, left stronger than right (Fig. 67, 68); subgenital plate with length about 0.9 times basal width, with sides evenly converging to nearly right-angled postero-lateral corners, with posterior margin slightly concave, length subequal to half basal width (Fig. 61).

Macropterous male: body size: length 6.70 - 7.30 mm; maximum width (at embolar margin): 3.90 - 4.05 mm; pronotal width: 3.50 - 3.70 mm; most characters as in brachypterous male except following: Pronotum with swelling close to posterior corners, lateral margins at hind corners slightly emarginate; hemelytron not distinctly longer than in brachypterous morph, with well developed claval and embolar suture.

Macropterous female: body size: length 6.70 - 7.10 mm; maximum width (at embolar margin): 3.90 - 4.10 mm; pronotal width: 3.55 - 3.70 mm; laterosternites 6 weakly down-curved; other characters as in brachypterous female or macropterous male, respectively.

Comparative notes: *Stalocoris schoedli* sp.n. is larger than the other known species of the genus, without overlapping of sizes of different morphs and sexes. Females are easy to distiguish by the shape of the subgenital plate (Fig. 61). Males have a slightly truncate apex of the right paramere (Fig. 53) and relatively slender left paramere (Fig. 52), but are otherwise very similar to the other species.

Distribution: Negros (Occidental and Oriental) (Fig. 150).

Habitats: *Stalocoris schoedli* sp.n. lives in streams in both the forested and open areas of Negros. It seems to have no high demands regarding water quality as it occurs also in organically polluted streams. In some localities *Stalocoris schoedli* sp.n. was found together with *Aphelocheirus zamboanga visayasensis* ZETTEL, 1998, although generally occuring in less lotic sections.

Etymology: This species is named after Dr. Stefan Schödl, myrmecologist and coleopterist in NHMW (Vienna), who accompanied the first author during his field trip to Negros, Panay, and Palawan in 1994 and on this occasion collected additional paratype material of this species.

Stalocoris tansiongcoi sp.n. (Figs. 17, 18, 57 - 59, 62, 69, 70, 150)

Holotype (brachypterous ♂): "PHILIPPINEN: Romblon Prov.\ Sibuyan, S Magdiwang\ Jao-asan, Fatoo river, 19.11.\ 1994, leg. H. Zettel (67a)" (UPLB); **paratypes**: 5 ♂♂, 9 ♀♀ (brachypterous), 4 ♂♂, 3 ♀♀ (macropterous), same label data (CNT, CZW, NHMW, UPLB); 1 ♂ (macropterous), 1 ♀ (brachypterous) "PHILIPPINEN:Panay,Antique\ 50km NE San Jose d.B.\ San Remigio,Napula Falls\ lg.Zettel,20.3.1994 (43)" (NHMW); 2 ♀♀ (brachypterous) "PHILIPPINEN:Panay,Ilo-Ilo\ 10km NE Igbaras, Nadsadan\ Falls, 500m, 22.3.1994\ leg. H. Zettel (47)" (NHMW, UPLB).

Description:

Brachypterous male: body size: length 5.90 - 6.30 mm; maximum width (at embolar margin or abdominal segment 4): 3.35 - 3.50 mm; pronotal width: 3.15 - 3.25 mm; colour: head and pronotum yellow, head in middle and pronotum anteriorly on disc at most diffusely and inconspicuously darkened; mesoscutellum and hemelytron blackish, hemelytron with yellow marks on anterior two thirds of embolium and apex of clavus, corium distally with more or less yellowish margin and with triangular yellow patch; abdomen dorsally yellowish; ventral surface yellowish except medial areas of thorax in some specimens more or less infuscated; labrum, rostrum, antenna, and legs yellow.

Head dorsally reticulate, anteriorly with relatively small meshes, in middle meshes often reduced, shiny; head width across eyes 1.75 - 1.9 times head length, head in front of eyes 0.09 - 0.12 times head length; synthlipsis 0.65 times head width across eyes; labrum inserted close to anterior margin of head, at anterior margin of rostral cavity, twice as wide as long; ventral extension of maxillary plate anteriorly subequal to two thirds of length of labrum; rostral cavity semi-circular, anteriorly weakly convex; rostrum short, segment 3 as long as segment 4 at anterior margin, segment 4 posteroapically with a few hairs, segment 3 antero-apically with one pair of bristles.

Pronotum evenly, but weakly convex, with strongly curved lateral margins more converging anteriad; 2.8 times wider than median length, maximum width at posterior two fifths of lateral margin; with similar reticulation as on posterior half of head, most meshes with a small central fovea, shining, at hind and lateral margins surface more rugulose, less shining; mesoscutellum 2.0 times wider than long, rugulose, weakly shining; hemelytron nearly reaching end of abdomen; all sutures of embolium and clavus indicated, but not completely impressed; clavus, corium, and embolium rugulose, weakly shining, membrane coriaceous, shining; postero-lateral corners of connexiva 3 - 5 (nearly) right-angled; tergite 5 in middle of posterior margin broadly convex.

Profemur largely expanded, maximum width 0.8 times maximum length; protibia evenly curved, protarsus distinctly separated from protibia, claw reduced, toothlike; mesotibia ventro-mesally with double row of numerous short, stout spines, dorso-mesally with single row of long spines; metatibia mesally in distal three fourths with row of about 10 appressed long spines; claws of hind leg 0.5 times as long as segment 3 of metatarsus.

Mesosternum with anteriorly deeply notched, blunt median carina; pregenital abdomen weakly asymmetrical; genital capsule posteriorly angulate; aedeagus long and slender (Fig. 57); left paramere distally with one elongate lobe separated by a deep incision from reduced, truncate second lobe (Fig. 58); right paramere stout, with broad, laterally truncate apex (Fig. 59).

Brachypterous female: body size: length 6.10 - 6.50 mm; maximum width (at embolar margin or abdominal segment 4): 3.35 - 3.70 mm; pronotal width: 3.05 - 3.35 mm; most characters as in male; hind margin of tergite 5 broadly and weakly concave; tergite 7 with deep rectangular emargination, with angular hind corners; apices of laterosternites 5 - 6 triangular; laterosternites 5 straight or weakly curved ventrad, laterosternites 6 weakly curved ventrad, left more than right (Figs. 69, 70); subgenital plate with length about 0.7 times basal width, with sides in distal half subparallel, with posterior corners acute (more acute in specimens from Panay), with posterior margin concave, apical width ca. 0.6 times basal width (Figs. 62, 64).

Macropterous male: body size: length 6.30 - 6.50 mm; maximum width (at embolar margin): 3.45 - 3.65 mm; pronotal width: 3.25 - 3.40 mm; most characters as in brachypterous male except following:

Pronotum with smooth swelling close to posterior corners, lateral margins at hind corners weakly emarginate; hemelytron not distinctly longer than in brachypterous morph, with well developed claval and embolar suture.

Macropterous female: body size: length 6.40 - 6.70 mm; maximum width (at embolar margin or abdominal segment 4): 3.55 - 3.65 mm; pronotal width: 3.30 - 3.40 mm; characters as in brachypterous female or macropterous male, respectively. Connexiva not different from those of brachypterous female.

Comparative notes and discussion: The female subgenital plate is diagnostic. The process of the left laterosternite 6 is slightly bent ventrad, that of the right nearly straight (Figs. 69, 70). Males differ from congeners only by minute differences in the parameres: specifically by the slender, straight distal part of the left paramere and the laterally truncate (more distinct than in *S. schoedli* sp.n.) apex of the right paramere (Figs. 58, 59). All three females from Panay differ weakly in the shape of subgenital plate from the Sibuyan type series (comp. Figs. 62 and 64), which should be confirmed in larger series before postulating a subspecific status. According to results in other aquatic Heteroptera, no close zoogeographical connections between Panay and Sibuyan could be observed. During the Pleistocene Sibuyan was never connected with the Western Visayas[1], but was isolated from all other land masses. In *Rhagovelia* species (Veliidae), Sibuyan shows more affinities to Luzon than to the Western Visayas.

Distribution: Sibuyan, Panay (Antique, Ilo-Ilo Prov.) (Fig. 150).

Habitats: In Sibuyan and Panay this species was found in the lotic areas of streams in agricultural areas with some trees along the river banks. In Panay (site # 43) it was also collected at the edge of a pool below a waterfall.

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[1] "Visayas" is the name for the central Philippine islands from Panay in the west to Samar in the east, including the major islands Negros, Cebu, Bohol, and Leyte.

Etymology: This species is named after Dr.med. Arthur R. Tansiongco, Mayor of Magdiwang, for his hospitality to the first author and his exemplary and admirable enthusiasm for the protection of the unique natural resources of Mt. Guiting-guiting.

Stalocoris ticaoensis sp.n. (Figs. 54 - 56, 63, 71, 72, 150)

Holotype (brachypterous ♂): "Philippinen: Ticao Isl.\ Monreal, Real, Matang\ Tubig Spring, 28.2.1998\ leg. H. Zettel (151)" (UPLB); **paratypes** (all brachypterous): 3 ♂♂, 10 ♀♀, same locality data (CNT, NHMW, UPLB).

Description:

Brachypterous male: body size: length 5.80 - 5.90 mm; maximum width (at embolar margin or abdominal segment 4): 3.35 - 3.40 mm; pronotal width: 3.10 mm; colour: head and pronotum yellow, head in middle at most diffusely and inconspicuously darkened; mesoscutellum and hemelytron blackish, hemelytron with yellow marks on anterior two thirds of embolium and apex of clavus, corium distally with more or less yellowish margin and with triangular yellow patch, with additional short yellowish stripe close to angle of embolar sutures often present; abdomen dorsally infuscated, with yellow connexiva; ventral surface yellowish, or thorax and abdomen more of less infuscated; labrum, rostrum, antenna, and legs yellow.

Head dorsally reticulate, with relatively small meshes, weakly shining; head width across eyes 1.80 - 1.85 times head length, head in front of eyes 0.10 - 0.11 times head length; synthlipsis 0.65 times head width across eyes; labrum inserted close to anterior margin of head, at anterior margin of rostral cavity, twice as wide as long; ventral extension of maxillary plate anteriorly subequal to half length of labrum; rostral cavity semi-circular, anteriorly weakly convex; rostrum short, segment 3 about 1.1 times longer than segment 4 at anterior margin, segment 4 postero-apically with a few hairs, segment 3 antero-apically with one pair of bristles.

Pronotum evenly, but weakly convex, with strongly curved lateral margins more converging anteriad, 2.9 times wider than median length, maximum width at posterior two fifth of lateral margin; with similar reticulation as on posterior half of head, most meshes with a small central fovea, shining, at hind and lateral margins surface more rugulose, weakly shining; mesoscutellum 1.9 times wider than long, rugulose, matt; hemelytron nearly reaching end of abdomen; sutures of embolium and clavus weakly indicated or absent; clavus, corium, and embolium rugulose, matt, membrane coriaceous, weakly shining; posterior corners of connexiva 3 - 4 right-angled, of connexivum 5 acute; tergite 5 in middle of posterior margin broadly convex.

Profemur largely expanded, maximum width 0.8 times maximum length; protibia evenly curved, protarsus distinctly separated from protibia, claw reduced, toothlike; mesotibia ventro-mesally with double row of numerous short, stout spines, dorso-mesally with single row of long spines; metatibia mesally in distal three fourths with row of 9 appressed long spines; claws of hind leg 0.6 times as long as segment 3 of metatarsus.

Mesosternum with anteriorly deeply notched, blunt median carina; pregenital abdomen weakly asymmetrical; genital capsule posteriorly angulate; aedeagus long and slender (Fig. 54); left paramere distally with one elongate lobe separated by a deep incision from reduced, truncate second lobe (Fig. 55); right paramere stout, with broad, roundish apex (Fig. 56).

Brachypterous female: body size: length 6.00 - 6.20 mm; maximum width (at embolar margin or abdominal segment 4): 3.45 - 3.55 mm; pronotal width: 3.05 - 3.20 mm; most characters as in male; hind margin of tergite 5 broadly and weakly concave; tergite 7 with deep rectangular emargination, with angular hind corners; apices of laterosternites 5 - 6 spinelike; left laterosternite 5 weakly curved dorsad, right one nearly straight; laterosternites 6 curved ventrad, left one more than right one (Figs. 71, 72); subgenital plate with length about 0.7 times basal width, with sides in distal half diverging, with posterior corners acute, with posterior margin straight, apical width ca. 0.8 times basal width (Fig. 63).

Macropterous morphs unknown.

Comparative notes: *Stalocoris ticaoensis* sp.n. is similar to *S. schoedli* sp.n. and *S. tansingcoi* sp.n., but smaller. The female subgenital plate is very characteristic (Fig. 63). The process of the left laterosternite 5 is upcurved in lateral view, that of the right one is straight, that of both laterosternites 6 distinctly bent ventrad (Figs. 71, 72). Males show minute interspecific differences in the parameres (see key and Figs. 58, 59).

Distribution: Ticao (Fig. 150).

Habitats: Although *S. ticaoensis* sp.n. was found in the same stream as *Naucoris scutellaris*, it was living in a completely different microhabitat, in the lotic sections, mainly under stones in the current. The stream was polluted by the washing of clothes by numerous people upstream of the studied section.

Etymology: This species is named after the island of origin, Ticao.

Stalocoris sp. (from Leyte) (Fig. 150)

Material examined: 1 ♂ (brachypterous), 1 ♂ (macropterous) "PHILIPPINES\ Baybay, Leyte\ alt. Pangasugan\ Bato Cruz, 380 m.\ 22.V.1984 LAC Raros" (JTPC).

Diagnosis: body size (macropterous male larger): length 5.70 - 6.15 mm; maximum width (at abdominal segment 4 or embolar margin): 3.45 - 3.70 mm; pronotal width: 3.10 mm; hemelytron with apex of clavus only narrowly yellowish, distal margin of corium only in macropterous specimen with a minute yellow dot; aedeagus slender; left paramere with distal process broader than in *S. breviceps* (similar as in Fig. 58); right paramere with apex broad, roundish.

Notes: The two males are externally similar to *S. breviceps*, but differ slightly in the structures of the left paramere. They may represent an undescribed species, but more specimens, preferably females which have more distinct characteristics, are necessary to decide the status of the Leyte population.

Distribution: Leyte (Leyte) (Fig. 150).

Genus *Asthenocoris* USINGER, 1938

Type species: *Asthenocoris luzonensis* USINGER, 1938 (by monotypy)

Diagnosis: Body small, elongate-ovate (Fig. 4), strongly flattened; head with narrow margin at postero-lateral margin of eye; head ventrally carinate; dorso-posterior margin of head strongly convex, completely set within a deep concavity of anterior margin of

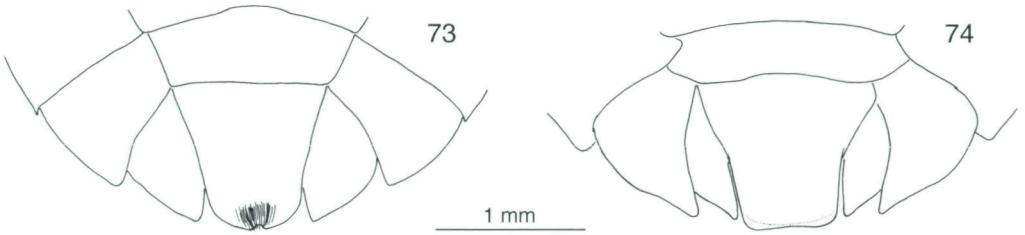
pronotum (Fig. 15); anterior margin of head not downcurved; labrum short, transverse, inserting deep in a groove far behind anterior margin of head and between anterior apices of maxillary plates, not visible in frontal and lateral view (Figs. 11, 14), directed ventrad; rostrum short, directed ventrad, inserted in a rostral cavity; maxillary plates small, ventrad very shortly surpassing ventral surface of head, anterior end covering labrum in lateral view (Fig. 11); pronotum widest at posterior sixth to third, with narrowly rounded hind corners; procoxa anteriorly with patch of short stout bristles; profemur strongly thickened, with strong antero-basal dilatation; protibia curved, mesally with two sharp ridges and with inconspicuous row of short bristles; protarsus one-segmented, fused with protibia, with suture weakly visible, bearing one small, toothlike claw; prosternum with median carina anteriad produced, posteriorly blunt; medial margin of propleural plate next to procoxal cavity without long pilosity; mesosternum without sharp keel, but low median tumescence notched at anterior fourth; hind-wing-brachyptery common; forewing-brachyptery only in *A. luzonensis* species group; abdomen with appressed hair layer, without erect hairs; male genital capsule apically roundish to obtusely acuminate; parameres asymmetrical, long; left paramere distally stout with one distal process, without or with deep subapical incision (e.g. Figs. 106, 128); right paramere twisted around aedeagus, with acute, rarely with obtuse triangular or even rounded apex (e.g. Figs. 107, 129, 138); female subgenital plate relatively long, either subtriangular, with rounded, medially indented hind margin (Fig. 73), or apically truncate with straight, not indented hind margin (Fig. 74); gonapophyses 2 posteriorly with medial process (rarely triangular), with stout lanceolate setae (Figs. 90 - 104).

Comparative notes: The genus is easy to recognize by the characteristics mentioned in the generic key. It is most adapted to lotic sections of streams by the characteristics listed in the section "Phylogeny and adaptation". In the key by NIESER & CHEN (1991), which does not treat the Philippine genera, *Asthenocoris* keys out with the strictly New Guinean genus *Warisia* LA RIVERS, 1971.

Taxonomy and distribution: The genus *Asthenocoris* and the single species *Asthenocoris luzonensis* were described by USINGER (1938) based on specimens from the Molawin Creek in Los Baños (Laguna, Central Luzon). Three new species and three new subspecies are added in this paper. In this taxonomically difficult genus, which is endemic to the Philippines, two species complexes are recognized:

1. The *A. luzonensis* group with a northern distribution (Luzon southward to Leyte) includes *A. montanus* sp.n. (from the mountains of North Luzon) and *A. luzonensis* with three subspecies (from Luzon, Mindoro, Catanduanes, Samar, and Leyte). The sub-/specific rank of these taxa is evaluated by their sympatric or allopatric distribution; the rank of *A. montanus* sp.n. remains under discussion.
2. The *A. australis* group with a southern distribution (Mindanao northwestward to Samar) contains *A. australis* sp.n. from Mindanao and Camiguin and *A. medius* sp.n. with two subspecies from Leyte and Samar. *Asthenocoris australis* sp.n. shows some intraspecific variability within its wide distribution area, which presently could not be classified in a satisfactory subspecies concept.

It seems most probable that the ancestors of the two species groups inhabited the large pleistocene islands "Great-Luzon" and "Southeast-Philippines" respectively (see Fig. 152). Diversification took place after the splitting up of these large islands; and *A. luzonensis*



Figs. 73 - 74: *Asthenocoris*: female abdominal segments 6 and 7, ventral view: (73) *A. luzonensis luzonensis*, (74) *A. australis* sp.n. (pilosity partly omitted).

invaded Mindoro, Samar, and Leyte by dispersing across relatively narrow sea channels. Except for one record from Cebu, the genus does not occur in the Western Visayas, which are dominated by *Stalocoris* species.

Habitats: *Asthenocoris* species inhabit the gravel beds of clean forest streams, but sometimes also occur in larger, unshaded rivers. They can be collected by elevating larger stones in the current, and are only rarely found at the edge of the water. Of all the Philippine genera, *Asthenocoris* is most adapted to the life in fast flowing water.

Key to species and subspecies of *Asthenocoris*

1 ♀ **2**

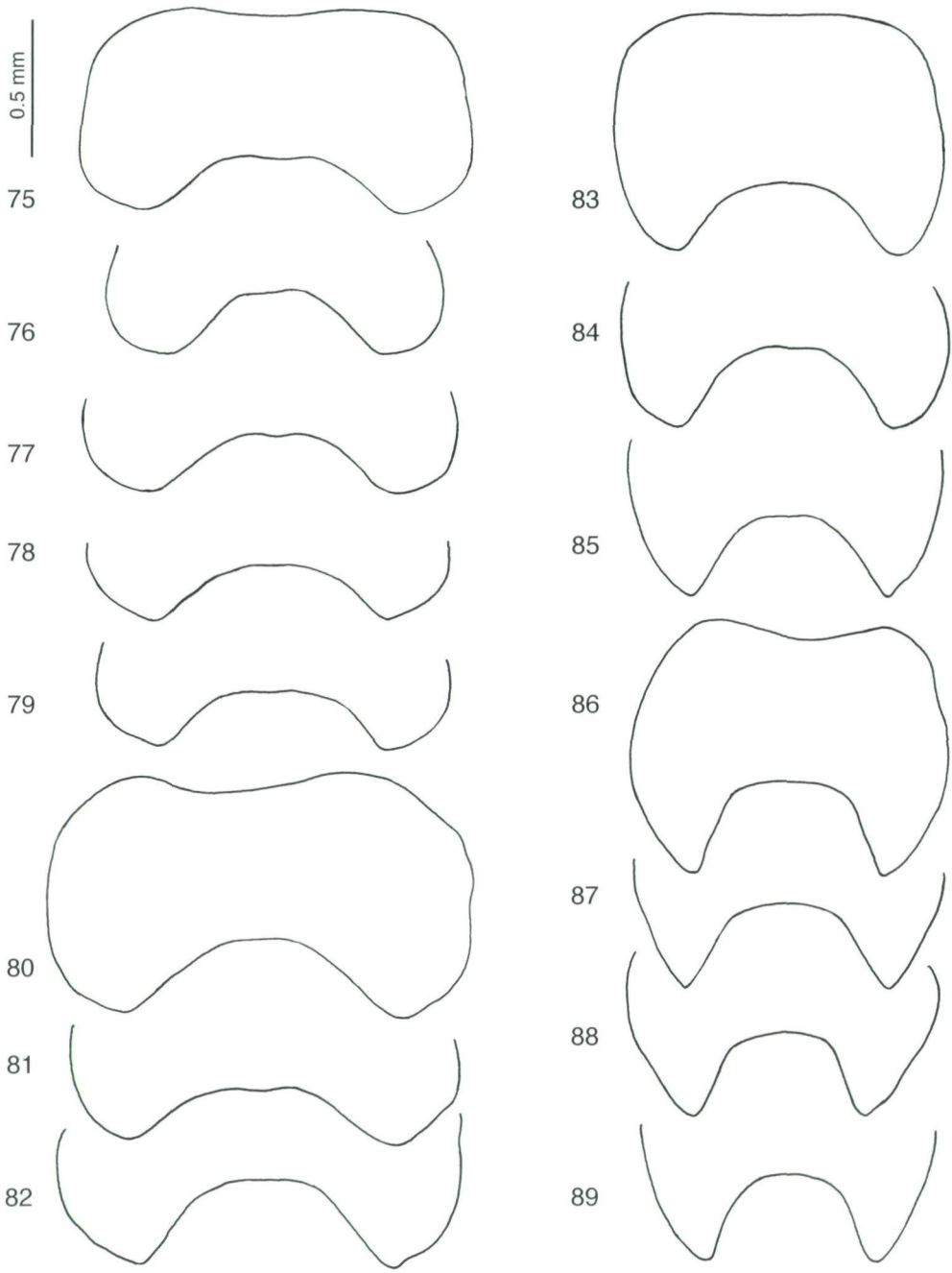
- ♂ **8**

2 Hind margin of sternite 7 narrowly rounded, with small median indentation usually covered by long pubescence (Fig. 73); tergite 7 broad, with hind margin broadly emarginated, with weakly produced hind corners (Figs. 75 - 82); gonapophyses 2 with short stout setae (Figs. 90 - 97); forewing-brachyptery common (*A. luzonensis* group) **3**

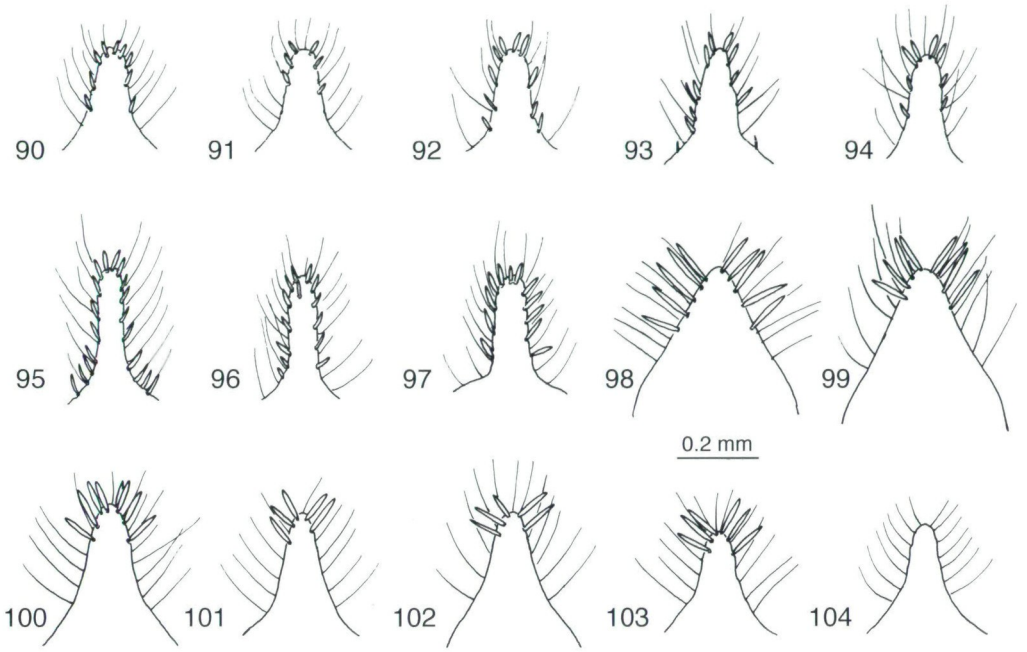
- Hind margin of sternite 7 broad, more or less truncated, without median indentation, without long pubescence (Fig. 74); tergite 7 narrow, with hind margin more deeply emarginated, often with strongly produced hind corners (Figs. 83 - 89); gonapophyses 2 with long stout setae (Figs. 98 - 103); forewing-brachyptery unknown (*A. australis* group) **6**

3 Process of gonapophyses 2 (very) long and slender, with subparallel sides (Figs. 95 - 97); postero-lateral corner of left laterosternite 6 slightly curved ventrad (not in rare macropterous morph, but usually distinct in brachypterous specimens); large species from the mountains of North Luzon; body length 7.8 - 9.2 mm; head usually with complete dark stripe along midline and pronotum at most with indistinct brownish markings in anterior middle of pronotum; embolium usually dark; corium distally with relatively large triangular yellowish mark. ..... ***A. montanus* sp.n.**

- Process of gonapophyses 2 long triangular, with distinctly convergent sides (Figs. 90 - 94); postero-lateral corner of left laterosternite 6 not obviously curved; usually distinctly smaller and with different colour pattern, if large and similarly coloured, then from other areas (*A. luzonensis*) **4**



Figs. 75 - 89: *Asthenocoris*: hind margin of female tergite 7: (75, 76) *A. luzonensis luzonensis*: (75) from Luzon, (76) from Samar; (77) *A. luzonensis paradisianus* ssp.n.; (78, 79) *A. luzonensis leyticus* ssp.n.; (80 - 82) *A. montanus* sp.n.; (83, 84) *A. medius medius* sp.n.; (85) *A. medius samarensis* ssp.n.; (86 - 89) *A. australis*: (86) from Davao, (87) from Bukidnon, (88) from Agusan Norte, (89) from Camiguin (pilosity omitted).



Figs. 90 - 104: *Asthenocoris*: apex of female gonapophyses 2: (90 - 92) *A. luzonensis luzonensis*: (90) from South Luzon (Albay), (91) from Catanduanes, (92) from North Luzon (loc. # CL 1966); (93) *A. luzonensis paradisianus* ssp.n.; (94) *A. luzonensis leyticus* ssp.n.; (95 - 97) *A. montanus* sp.n. (97 from loc. # CL 1966); (98) *A. medius medius* sp.n.; (99) *A. medius samarensis* ssp.n.; (100 - 102) *A. australis*: (100) from Davao, (101) from Bukidnon, (102) from Agusan Norte, (103, 104) from Camiguin (except lanceolate setae, setae indicated schematically by thin lines, hairs omitted).

4 Head and pronotum mainly yellowish; if dark stripe on head present, then rarely reaching posterior half; pronotum (usually) without or with indistinct brownish markings in anterior middle of pronotum; body length 6.0 - 7.9 mm (Luzon, Catanduanes, Samar) ..... ***A. luzonensis luzonensis***

\- Head with complete dark stripe along midline which may be widenened posteriad; pronotum differently coloured; subspecies from other areas **5**

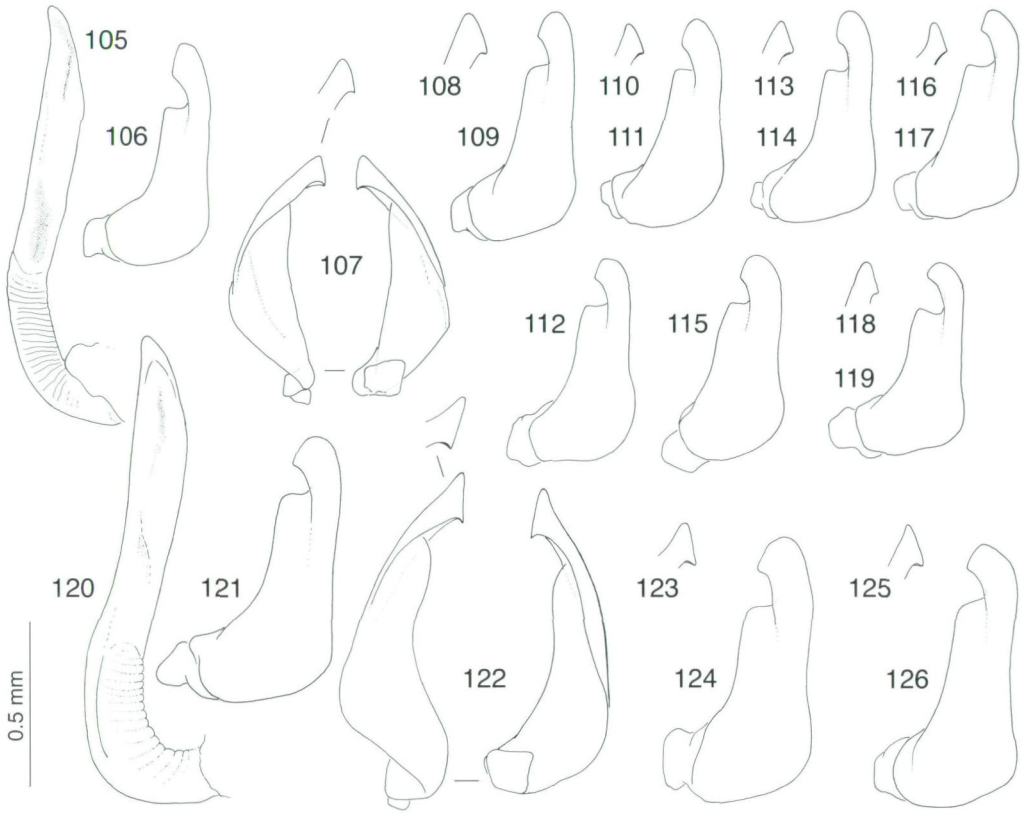
5 Pronotum except broad lateral margins and narrow hind margin dark (Fig. 15); body length 7.2 - 7.9 mm (Mindoro) ..... ***A. luzonensis paradisianus* sp.n.**

\- Pronotum mainly light coloured, typically with two narrow longitudinal dark stripes from posterior eye margin backward to middle of pronotum; body length 7.4 - 8.1 mm (Leyte) ..... ***A. luzonensis leyticus* sp.n.**

6 Gonapophyses 2 posteriorly with narrow triangular process (Figs. 100 - 104); head and pronotum distinctly infuscated; body length 6.5 - 7.7 mm (Mindanao, Camiguin) ..... ***A. australis* sp.n.**

\- Gonapophyses 2 posteriorly triangularly produced, without pronounced process (Figs. 98 - 99); head and pronotum weakly infuscated (Leyte, Samar) (*A. medius* sp.n.) **7**

7 Tergite 7 with relatively shallow emargination; body length 7.0 - 7.8 mm (Figs. 83, 84) (Leyte) ..... ***A. medius medius* sp.n.**



Figs. 105 - 126: *Asthenocoris luzonensis* group: male genitalia: (105 - 112) *A. luzonensis luzonensis*: (105 - 107) from Central Luzon, (108, 109) from North Luzon (loc. # CL 1966), (110, 111) from Catanduanes, (112) from South Luzon; (113 - 115) *A. luzonensis paradisianus* ssp.n.; (116 - 119) *A. luzonensis leyticus* ssp.n.; (120 - 126) *A. montanus* sp.n.; (105, 120) aedeagus; (106, 109, 111, 112, 114, 115, 117, 119, 121, 124, 126) left paramere; (107, 122) right paramere, two different views and apex in full face view; (108, 110, 113, 116, 118, 123, 125) apex of right paramere in full face view (pilosity omitted).

- Tergite 7 with relatively deep emargination; body length 6.7 - 7.0 mm (Fig. 85) (Samar)..... ***A. medius samarensis* ssp.n.**

8 Left paramere with deep subapical excavation (e.g. Fig. 106); forewing-brachyptery common (*A. luzonensis* group)..... **9**

- Left paramere without subapical excavation (e.g. Fig. 128); forewing-brachyptery unknown (*A. australis* group)..... **12**

9 Large species from the mountains of North Luzon (body length 7.7 - 9.0 mm); head with complete dark stripe along midline and pronotum at most with indistinct brownish markings in anterior middle of pronotum; embolium usually dark; corium distally with relatively large triangular yellowish mark; apex of right paramere in average more acute (Figs. 122, 123, 125); distal process of left paramere relatively stout (Figs. 121, 124, 126)..... ***A. montanus* sp.n.**

- Smaller species (body length 5.9 - 7.8 mm) with other colour pattern, or, if relatively large or similarly coloured, from other islands; apex of right paramere in average stouter (e.g. Figs. 107, 113, 118); distal process of left paramere varying (e.g. Figs. 106, 115, 119) (*A. luzonensis*). **10**

10 Pronotum except broad lateral margins and narrow hind margin dark; distal process of left paramere usually short (Fig. 115), rarely more elongate (Fig. 114); head with complete dark stripe along midline; body length 7.1 - 7.8 mm (Mindoro)..... ..... ***A. luzonensis paradisianus* sp.n.**

- Pronotum mainly light coloured; distal process of left paramere usually long (e.g. Figs. 106, 111, 119); subspecies from other islands. **11**

11 Distal process of left paramere slender, subapical excavation deep (Figs. 117, 119); head with complete dark stripe along midline; pronotum light, typically with two narrow longitudinal dark stripes from posterior eye margin backward to middle of pronotum; body length 7.1 - 7.8 mm (Leyte)..... ***A. luzonensis leyticus* sp.n.**

- Distal process of left paramere variable, but usually not so slender, subapical excavation usually not so deep (Figs. 106, 108, 111, 112); head and pronotum mainly yellowish; if a dark stripe on head present, then not reaching posterior half; disc of pronotum (usually) without or with indistinct brownish markings; body length 5.9 - 7.6 mm (Luzon, Catanduanes, Samar)..... ***A. luzonensis luzonensis***

12 Apex of right paramere roundish (Figs. 129, 130, 132); body length 6.8 - 7.6 mm (Leyte)..... ***A. medius medius* sp.n.**

- Apex of right paramere triangular, often blunt (Figs. 134, 143, 145). **13**

13 Head and pronotum usually distinctly infuscated; apex of right paramere in average more acute (Figs. 138, 143, 145); body length 6.3 - 7.8 mm (Mindanao, Camiguin) ..... ***A. australis* sp.n.**

- Head and pronotum light coloured, at most weakly infuscated; right paramere relatively blunt (Fig. 134); body length 6.3 - 6.7 mm (Samar) ..... ***A. medius samarensis* sp.n.**

The *Asthenocoris luzonensis* species group

Diagnosis: relatively slender-ovate species with forewing-brachyptery; male: aedeagus distally slender (Figs. 105, 120); left paramere with large subapical excavation (e.g. Fig. 106); right paramere broad in middle, with apex acuminate to blunt triangular (e.g. Figs. 108, 122); female: subgenital plate with hind margin rounded and medially incised (Fig. 73); tergite 8 broad, with shallow concavity of hind margin (Figs. 75 - 82); process of gonapophyses 2 elongate, with short stout bristles (Fig. 70 - 97).

Asthenocoris luzonensis luzonensis USINGER, 1938
(Figs. 11, 14, 73, 75, 76, 90 - 92, 105 - 112, 151)

Material examined (brachypterous, if not otherwise stated): **allotype** (♀) and **paratypes** (1 ♂, 4 ♀♀) "Los Banos\ P.I. VII-17-36", "Molawin\ Creek", "R.L.Usinger\ Collector"; "ALLOTYPE [PARATYPE]\ Asthonocoris\ luzonensis\ Usinger" (CAS); 1 **paratype** (sex unknown, abdomen lacking), same locality data (BMNH); **further material:** 6 ♂♂, 4 ♀♀, same locality data, differently labelled, not labelled as paratypes, but possibly belonging to the type series (CAS); 2 ♀♀ "LA UNION:TUBAO\ Alipang River\ 18

OCTOBER 1976\ H. SAN VALENTIN (JTPC, UPLB); 1 ♂, same label data, except "D.C.CABALLES" (USNM); 1 ♀ "PHILIPPINES, Luzon [La Union]\ 14 km. E. of Bauang\ VII-6-85 CL 1957\ J. T. & D. A. Polhemus" (JTPC); 8 ♂♂, 8 ♀♀ "PHILIPPINES, Luzon [La Union]\ 15 km. E. of Bauang\ VII-6-85 CL 1958/ J. T. & D. A. Polhemus" (JTPC, NHMW); 3 ♀♀ "PHILIPPINES: Luzon [Benguet]\ km. 219 1/2, Kennon Road\ CL 1962, VII-8-85\ J.T. & D.A. Polhemus" (JTPC); 2 ♂♂, 2 ♀♀ "PHILIPPINES, Luzon [Benguet, Baguio env.]\ km 230, Kennon Rd.,\ CL 1966, VII-8-85\ J.T. & D.A. Polhemus" (JTPC, NHMW); 2 ♀♀ "PHILIPPINES: Luzon,\ Benguet Province\ km. 223, Kennon Road\ 20 km. S. of Baguio City\ VII-8-85, CL 1966\ J.T. & D.A. Polhemus" (alcohol specimens slightly differently labelled) (JTPC); 5 ♂♂, 1 ♀, 1 ♀ (macropterous) "Philippinen: LZ, Benguet\ Asin Hot Springs\ W Baguio, 17.2.1999\ leg. H. Zettel (180)" (CZW, UPLB); 1 ♀, and 1 ♀ (macropterous), same label data except "leg. F. Seyfert (4)" (CSW, UPLB); 1 ♂ "N. ECIJA: VAL DE FUE\NTE: Pampanga River\ 5 Nov.'76; A.A.BARROSO" (UPLB); 5 ♂♂, 1 ♀ "PHILIPPINES, Luzon\ Pangasinan Province\ Bayaling River, 100 m.\ 15 km. E. of Bauang\ VII-6-85, CL 1958\ J.T. & D.A. Polhemus" (JTPC); 2 ♀♀ "PHILIPPINEN: Bataan [! = Zambales] \ Olongapo, Subic Base [= Bay]\ Riding Stable, 2.12.\ leg. H. Zettel" (NHMW); 1 ♂, 2 ♀♀ "ZAMBALES: SBFR\ Binictican River\ VPG/MGS/4/27/98" (UPLB); 2 ♂♂, and 4 ♀♀, 1 ♂, 1 ♀ (macropterous) "ZAMBALES: SBFR\ Mabayuan River\ VPG/MGS/4/25/98" (UPLB); 1 ♂, 1 ♀ "ZAMBALES: SBFR\ Mabayuan River\ VPG/MGS/14 Mar 98" (UPLB); 1 ♂ "LUZON, R.P.\ Feb. 3 1971\ W.K.Reisen", "PACAF Jungle\ Survival School" (JTPC); 1 ♀ "PHILIPPINE ISLANDS,\ Luzon:Bataan Pen.,\ 100 m.,March 1976\ M. McCullough" (AMNH); 1 ♂ (macropterous), 1 ♀ "BATAAN: BAGAC\ UMAGOL CRK.\ F.A.MULIMBAYAN\ EX. SUBMERGED\ ROOTS ON BANKS" (JTPC); 1 ♂ (macropterous) "Luzon Pr.Rizal\ Montalban\ leg. Böttcher\\ 26.3.14", "Taeuber Coll.\ B.M.1949-474" (BMNH); 3 ♂♂, 1 ♀, and 1 ♀ (macropterous) "ALFONSO, CAVITE\ TALONG MALAPAD\ 17 MAY 1977\ V. P. GAPUD" (UPLB, JTPC); 3 ♂♂, 5 ♀♀, and 15 ♂♂, 19 ♀♀ (macropterous) "PHILIPPINES, Luzon\ Cavite Province\ Tapat River, 2 km. S. of Alfonso\ VII-24-85\ CL 2003, J.T. & D.A. Polhemus" (alcohol specimens slightly differently labelled) (JTPC, NHMW, USNM); 1 ♀ "CAVITE: Alfonso\ Pajo: Humayao Cr\ BROOK: 17 MAY 1977\ V.P. GAPUD" (JTPC); 1 ♂ (macropterous) "CAVITE: Alfonso\ Pajo: Humayao Cr\ TALONS MALAPAD: 17 MAY\ 1977: H. SAN VALENTIN" (JTPC); 1 ♂ "Mt.Makiling\ Luzon, Baker" (JTPC); 1 ♀ "PHILIPPINES: LUZON\ Mt. Makiling: Mola-\ win: 2 DEC. 1976\ A.A.BARROSO" (JTPC); 1 ♀ "LUZON\ Mt. Makiling\ MUD-SPRING\ 9 NOV. 1976\ C.R. REALON" (JTPC); 2 ♂♂, 1 ♀ "Philippinen: Luzon, Laguna\ Los Banos, Mt. Makiling\ Flat Stones [Flat Rocks], 10.2.1998\ leg. H. Zettel (132)" (NHMW, UPLB); 3 ♂♂, 1 ♀ "PHILIPPINEN: Quezon\ Infanta, Irrigation\ Canal, 4.4.1993\ leg. N.Nieser N9336" (CNT, NHMW); 1 ♂ "QUEZON PRO-\ VINCE: DOLO-\ RES: LAKSAN\ RIVER: 7 APR.'79\ L.S.SANCHEZ" (JTPC); 1 ♀ (macropterous), same label data except "M.B.ENDIAPE" (JTPC); 9 ♂♂, 5 ♀♀ "PHILIPPINES, Luzon\ Quezon Province,\ National Botanic Gardens\ Llavac, CL 1973, VII-10-85 J.T. & D.A. Polhemus" (alcohol specimens slightly differently labelled) (JTPC, USNM); 5 ♂♂, 2 ♀♀ "Philippinen: LZ, Camarines\ Sur, Lupi, Alanao\ Bahi River, 3.3.1999\ leg. H. Zettel (191)" (NHMW, UPLB); 3 ♂♂, 2 ♀♀ "Philippinen: Camarines Sur\ 20km E Naga, 3km E Carolina\ Mainit Spring ("Hydro")\ 20.2.1998, leg.Zettel (142)" (NHMW); 5 ♂♂, 7 ♀♀ "Philippinen: LZ, Albay\ Malinao, Palali Falls\ 200 m, 14.3.1999\ leg. H. Zettel (201)" (NHMW, UPLB); 9 ♂♂, 5 ♀♀, and 1 ♀ (macropterous) "Philippinen: Luzon, Albay\ 40 km N Legaspi, 1 km W\ Malilipot, Busai Falls\ 23.2.1998,leg.Zettel(143)" (NHMW, UPLB); 10 ♂♂, 12 ♀♀ "Philippinen: Luzon, Albay\ 15 km SW Manito, S Cawayan\ river, 24.2.1998\ leg. H. Zettel (144)" (CNT, JTPC, NHMW, UPLB, USNM); 1 ♂, 1 ♀ "Philippinen: Catanduanes\ W Bato, Maribini Falls\ 6.3.1999\ leg. H. Zettel (194)" (NHMW); 1 ♂ "Philippinen: Catanduanes\ N Bato, S San Miguel\ Balongbong Falls, 7.3.\ 1999, leg. H. Zettel (195)" (NHMW); 28 ♂♂, 23 ♀♀, and 2 ♀♀ (macropterous) "Philippinen: Catanduanes\ W Virac, Sto. Domingo\ Pajo River area, 10.3.\ 1999, leg. Zettel (199)" (NHMW, UPLB, CNT, USNM); 6 ♂♂, 5 ♀♀, same label data except "leg. Seyfert (24)" (CSW, UPLB); 1 ♂ "Philippinen: Catanduanes\ E San Andres\ 11.-12.3.1999\ leg. H. Zettel (200)" (NHMW); 5 ♂♂, 3 ♀♀ "Philippinen: N. Samar\ Veriato, El Amigo\ Veriato Falls, 16.3.\ 1998, leg.Zettel (162)" (CZW, UPLB).

Description:

Brachypterous male: body size: length 5.90 - 7.60 mm; maximum width (at embolar margin or base of abdominal segment 4): 3.55 - 4.20 mm; pronotal width: 3.30 - 3.80 mm; colour: head and pronotum brownish yellow, sometimes with more or less developed brownish longitudinal stripe in anterior half of head which always indistinct in posterior

half; head rarely diffusely darkened posteriorly; pronotum at most with weak dark areas in middle; mesoscutellum blackish; hemelytron brown to blackish, with yellow patch on anterior two thirds of embolium and more or less yellowish along claval margin, especially at claval suture, corium distally with indistinct yellowish mark; abdomen dorsally dark brown; connexiva yellowish, brown in posterior part; ventral surface blackish brown, on head and lateral margins of prothorax yellow; labrum, rostrum, antenna, and legs yellowish.

Head postero-dorsally with fine reticulation, shiny, antero-dorsally finely rugulose, matt, width across eyes 1.45 - 1.60 times head length, synthlipsis 0.65 times head width across eyes; labrum much wider than long; mesal extension of maxillary plate subequal to length of labrum; rostral cavity semi-circular, anteriorly weakly convex; rostral segment 3 weakly (1.1 times) longer than segment 4 at anterior margin, segment 4 postero-apically with some hairs, segment 3 antero-apically with one pair of bristles.

Pronotum evenly, but weakly convex, with strongly curved lateral margins, which are much more convergent anteriad; 2.8 - 3.1 times wider than median length, maximum width at posterior third to sixth of lateral margin; with more distinct reticulation than on head, on disc each mesh with a small central fovea, shining, anteromedially with some transverse wrinkles, at hind and lateral margins surface more rugulose, matt; mesoscutellum 2.2 times wider than long, rugulose, matt; hemelytron variable in length, reaching base of tergite 4 to basal third of tergite 5; embolium and/or clavus weakly indicated in some specimens; clavus, corium, and embolium rugulose, matt, membrane coriaceous, matt; posterior corners of connexiva 3 - 5 right-angled; tergite 5 broadly convex posteriorly, often medially weakly truncate.

Profemur largely expanded, maximum width 0.75 times maximum length; protibia evenly curved, protarsus weakly separated from protibia, claw reduced, tooth-like; mesotibia ventro-mesally with double row of numerous short, stout spines, dorso-mesally with single row of longer spines; metatibia mesally in distal two thirds with row of about 12 suberect long spines; claws of hind leg 0.50 - 0.55 times as long as segment 3 of metatarsus.

Mesosternum with anteriorly notched, obtuse and low median carina over entire length; pregenital abdomen asymmetrical; genital capsule posteriorly angularly rounded; aedeagus long and relatively slender (Fig. 105); left paramere distally with one elongate, more or less curved, and differently broad distal process, separated from the main part by a deep subapical excavation (Figs. 106, 109, 111, 112); right paramere with stout middle part, with (blunt) triangular, weakly recurved apex (Figs. 107, 108, 110).

Brachypterous female: body size: length 6.00 - 7.55 mm; maximum width (at embolar margin or base of abdominal segment 4): 3.55 - 4.20 mm; pronotal width: 3.35 - 3.90 mm; most characters as in male; hemelytra variable in length, reaching base of tergite 5 to base of tergite 6; tergite 7 with hind margin broadly emarginated, with weakly produced hind corners (Figs. 75, 76); subgenital plate relatively long, tapered posteriad, with small incision in middle of relatively narrow, convex posterior margin, and with dense subapical pubescence often covering incision (Fig. 73); gonapophyses 2 postero-medially with slender triangular process bearing short lanceolate setae (Figs. 90 - 92).

Macropterous male: body size: length (incl. hemelytra) 6.90 - 7.60 mm; maximum width (at embolar margin): 3.90 - 4.25 mm; pronotal width: 3.65 - 3.90 mm; most characters as in brachypterous male except following: Pronotum slightly longer, convex

along posterior margin, very weakly incised at hind corners; mesoscutellum large; hemelytra nearly reaching or, rarely, slightly surpassing end of abdomen, with well developed claval and embolar suture, clavus bipartite longitudinally.

Macropterous female: body size: length (incl. hemelytra) 7.30 - 7.80 mm; maximum width (at embolar margin): 4.10 - 4.30 mm; pronotal width: 3.90 - 4.10 mm; most characters as in brachypterous female or macropterous male, respectively.

Variability: This widely distributed subspecies varies more in size than other Philippine taxa. However, most of the extremely small specimens (less than 6.5 mm in male, less than 6.8 mm in female) are from Usinger's original samplings in Los Baños. This series also contains the specimens with the most reduced hemelytra; it is regarded as a population living under extreme conditions. Colouration varies regionally and individually. Although most specimens have a light coloured head and pronotum, specimens with relatively dark head are intermixed in several samplings, especially in those from North Luzon, and are dominating in populations from South Luzon (Camarines Sur, Albay).

Comparative notes and discussion: *Asthenocoris luzonensis* is easy to distinguish from species of the *A. australis* group only (see key). For distinction of *A. montanus* sp.n. and of the subspecies *paradisianus* ssp.n. and *A. leyticus* ssp.n. see comparative notes of these subspecies. No significant and stable differences could be found between populations from Luzon, Catanduanes, and Samar.

USINGER (1938) gave an excellent description of this species. However, the figure plates of male genitalia have been mistakenly changed by the editors; the figures 1a-c depict the male genitalia of *A. luzonensis luzonensis*.

Distribution: Luzon (La Union, Benguet, Nueva Ecija, Pangasinan, Zambales, Bataan, Rizal, Cavite, Laguna, Quezon, Camarines Sur, Albay), Catanduanes, Samar (Northern Samar) (Fig. 151).

Habitats: The type locality, the Molawin Creek at the University of the Philippines, Los Baños, is one of the best-known sampling sites for aquatic insects in the Philippines. Since Usinger's times, *Asthenocoris luzonensis* became quite rare in this place, which may be due to the reduced flow after change of the local climate and after the draw off for human water supply. *Asthenocoris luzonensis* is still found in lotic sections of the Molawin Creek, but the more specialised *Aphelocheirus philippinensis* USINGER, 1938, is probably extinct, because it could not be found after intensive investigations by V.P. Gapud, J.T. & D.A. Polhemus, and H. Zettel. *Asthenocoris luzonensis* is a typical inhabitant of middle sized streams, usually occuring in forested areas, where it is often found together with different species of *Aphelocheirus*, but mostly in less lotic sections.

Asthenocoris luzonensis paradisianus ZETTEL & NIESER ssp.n.
(Figs. 15, 77, 93, 113 - 115, 151)

Holotype (brachypterous ♂): "PHILIPPINEN: Mindoro\ 20km W Calapan 1993 [= 1992]\ Hidden Parad. 20.-21.11.\ leg. Schillhammer (10)" (NHMW); **paratypes** (brachypterous, if not otherwise stated): 1 ♂, 3 ♀♀, same locality data (NHMW); 4 ♂♂, 2 ♀♀ "leg. Jäch 20.-21.11.\ PHILIPPINEN - Mindoro\ 20km W Calapan 1992\ Hidden Paradise (10)" (CNT, NHMW); 2 ♂♂, 5 ♀♀ "PHILIPPINEN - Mindoro\ 28km S Calapan 1993 [= 1992]\ Balete 100-700m (19)\ leg. Jäch 27.-29.11." (NHMW); 1 ♂, 9 ♀♀ "PHILIPPINEN:

Mindoro or.\ Baco, Hidden Paradise\ 19.-20.11.1993\ leg. H. Zettel (27)" (NHMW, CNT, UPLB); 29 ♂♂, 11 ♀♀, and 1 ♂, 2 ♀♀ (macropterous) "PHILIPPINES, Mindoro\ Mindoro Oriental Prov.\ Apararai Cr., 22 km. SW\ of Calapan, VII-13-85\ CL 1977, J.T. & D.A. Polhemus" (alcohol material slightly differently labelled) (USNM, JTPC, NHMW).

Description: as in the nominate subspecies except the following characteristics:

Brachypterous male: body size: length 7.10 - 7.70 mm; maximum width (at embolar margin or base of abdominal segment 4): 3.90 - 4.15 mm; pronotal width: 3.65 - 3.85 mm; colour: head and pronotum strongly infuscated (Fig. 15); head anteriorly with dark stripe along midline which trifurcate close to anterior margin; posterior half of head and disc of pronotum (except broad lateral margins, but reaching anterior corners) with numerous confluent brownish dots, appearing more or less uniformly brownish; ventral surface of head posteriorly infuscated; embolium at most with weakly contrasting light patch.

Head an average longer, width across eyes 1.40 - 1.55 times head length; mesal extension of maxillary plate anteromedially slightly longer than length of labrum; width of pronotum 3.0 - 3.1 times wider than median length; hemelytron only slightly variable in length, reaching to basal fifth to third of tergite 5.

Aedeagus as in the nominate subspecies; left paramere usually with stouter distal process (Fig. 115), but sometimes slender (Fig. 114); right paramere as in the nominate subspecies (apex see Fig. 113).

Brachypterous female: body size: length 7.20 - 7.90 mm; maximum width (at base of abdominal segment 4): 3.85 - 4.20 mm; pronotal width: 3.60 - 3.80 mm; most characters as in male; hemelytra not strongly variable in length, reaching to basal fifth to distal third of tergite 5; tergite 7 (Fig. 77), subgenital plate, and gonapophyses 2 (Fig. 93) as in the nominate subspecies.

Macropterous male: body size: length 7.80 mm; maximum width (at embolar margin): 4.30 mm; pronotal width: 4.00 mm; most characters as in brachypterous male except following: Pronotum slightly longer, very weakly incised at hind corners; hemelytra nearly reaching end of abdomen, with well developed claval and embolar suture, clavus bipartite longitudinally.

Macropterous female: body size: length 7.60 - 7.70 mm; maximum width (at embolar margin or base of abdominal segment 4): 4.25 - 4.30 mm; pronotal width: 3.95 - 4.00 mm; characters as in macropterous male or brachypterous female, respectively.

Comparative notes: *Asthenocoris luzonensis paradisianus* ssp.n. is very similar to *A. luzonensis luzonensis* in most characters, although it is well recognizable by the striking darker colour pattern of the head and pronotum (Fig. 15). Although dark specimens of *A. luzonensis luzonensis* rarely occur, especially in Bicol (Albay, Camarines Sur), their dark colouration is never so extensive as in ssp. *paradisianus*. However, only a few additional characteristics were found to separate those two taxa, which is the reason for treating them as two subspecies: in *paradisianus* the maxillary plates are anteriorly slightly wider than the labrum length (view into the rostral cavity), and in typical specimens the left paramere of the male, especially its apex, is shorter and stouter than in *luzonensis*. However, the latter character is varying in both taxa, indicating that a specific separation has not yet taken place. Female terminalia (tergite 7, laterotergites 6 - 7, subgenital plate, apex of gonapophyses 2) are indistinguishable from the nominate sub-

species, but the gonapophyses 2 differ from *A. montanus* sp.n. which has a similar dark colouration of the head. In size and development of hemelytra studied material of *paradisianus* is less variable than of *luzonensis*.

Distribution: Mindoro (Mindoro Oriental) (Fig. 151).

Habitats: The type locality is in a middle sized stream flowing through remnants of secondary rain forest; it was reported by local people to have been destroyed by mud sedimentation after heavy rainfall and erosion on the slopes of Mount Halcon in 1995. The locality at Calapan is a large, fast flowing stream through agricultural land just below forested areas.

Etymology: *Asthenocoris luzonensis paradisianus* sp.n. is named after the type locality "Hidden Paradise" in East Mindoro.

Asthenocoris luzonensis leyticus ZETTEL & NIESER ssp.n.
(Figs. 78, 79, 94, 116 - 119, 151)

Holotype (brachypterous ♂): "PHILIPPINES, Leyte\ Lusig River at Aboyo\ VII-15-85, CL 1979\ J.T. & D.A.Polhemus" (USNM); **paratypes** (brachypterous, if not otherwise stated): 19 ♂♂, 25 ♀♀, and 5 ♂♂, 5 ♀♀ (macropterous), same label data as holotype (USNM, JTPC, NHMW, CNT); 9 ♂♂, 11 ♀♀ "PHILIPPINES, Leyte\ Leyte Prov.\ Lusig River at Hilusig\ VII-15-85 CL 1979\ J.T. & D.A.Polhemus" (JTPC, UPLB); 1 ♀ (macropterous) "PHILIPPINES, Leyte\ Leyte Province\ Higuluan, 15 km. SE of\ Baybay CL 1982 VII-16-85\ J.T.&D.A.Polhemus" (JTPC).

Description: as in the nominate subspecies except the following characteristics:

Brachypterous male: body size: length 7.10 - 7.80 mm; maximum width (at embolar margin or base of abdominal segment 4): 4.00 - 4.35 mm; pronotal width: 3.80 - 4.05 mm; colour: head strongly infuscated between eyes and with a broad medial stripe (nearly) reaching anterior margin; pronotum predominately light coloured, without numerous brownish dots, but typically with a pair of narrow dark longitudinal stripes from anterior margin at eyes backward to middle, anterior margin in some specimens weakly infuscated; embolium with very distinct light patch, and corium distally with relatively large triangular yellowish mark.

Head in average longer, width across eyes 1.40 - 1.45 times head length; width of pronotum 3.0 - 3.1 times wider than median length; hemelytron only slightly variable in length, reaching basal fifth to third of tergite 5.

Aedeagus as in Figure 105; left paramere with slender distal lobe, subbasal incision deep (Figs. 117, 119); right paramere with apex blunt (Figs. 116, 118).

Brachypterous female: body size: length 7.40 - 8.10 mm; maximum width (at base of abdominal segment 4): 4.05 - 4.45 mm; pronotal width: 3.85 - 4.05 mm; most characters as in male; hemelytra not strongly variable in length, reaching basal quarter to end of tergite 5; emargination of tergite 7 very shallow (Figs. 78, 79); subgenital plate and gonapophyses 2 (Fig. 94) not different from the nominate subspecies.

Macropterous male: body size: length 7.40 - 7.70 mm; maximum width (at embolar margin): 4.10 - 4.30 mm; pronotal width: 3.90 - 4.05 mm; most characters as in brachypterous male except following: Pronotum with dark stripes broader and diffuse, with

anterior margin stronger infuscated, slightly longer, very weakly incised at hind corners; hemelytra nearly reaching end of abdomen, with well developed claval and embolar suture, clavus bipartite longitudinally.

Macropterous female: body size: length 7.80 - 8.10 mm; maximum width (base of abdominal segment 4): 4.20 - 4.45 mm; pronotal width: 3.95 - 4.20 mm; characters as in macropterous male or brachypterous female, respectively.

Comparative notes: *Asthenocoris luzonensis leyticus* ssp.n. is similar to *A. luzonensis luzonensis* in most characters. It is a relatively large and broad form with a dark mark on head, which resembles that in *A. montanus* sp.n. from North Luzon. Males differ from the nominate subspecies and from *A. l. paradisianus* ssp.n. in a more slender apical process of the left paramere (subapical incision relatively large, at least as deep as width of process at incision; Figs. 117, 119), and in a more blunt apex of the right paramere (Figs. 116, 118). Females have a comparatively shallow emargination of tergite 7 (Figs. 78, 79); no significant differences in female genitalia have been found.

Distribution: Leyte (Leyte Prov.) (Fig. 151).

Habitats: The Lusig River at the type locality was a broad, clear river in an area of disturbed rain forest, flowing at moderate speed through a mostly unshaded bed of rocks, cobbles and sand, intermixed with a few larger boulders. The type series of *A. luzonensis leyticus* ssp.n. and *A. medius medius* sp.n. (see below) were taken from shallow, open riffles along the main channel.

Etymology: *Asthenocoris luzonensis leyticus* ssp.n. is named after its endemic occurence in Leyte Island.

Asthenocoris montanus sp.n. (Figs. 15, 80 - 82, 95 - 97, 120 - 126, 151)

Holotype (brachypterous ♂): "Philippinen: LZ, Mount.Pr. [Luzon, Mountain Province]\ 5km S Bontoc, Balitian Riv.\ 900 m, 27.2.1999\ leg. H. Zettel (190)" (UPLB); **paratypes** (brachypterous, if not otherwise stated): 1 ♂ (macropterous), same label data as holotype (NHMW); 6 ♂♂, 3 ♀♀ "Philippinen: LZ, Mount.Pr.\ Chico River, Gonogon\ 1100 m, 21.2.1999\ leg. H. Zettel (184)" (UPLB, CZW); 1 ♀ (macropterous), 3 ♂♂ "Philippinen: LZ, Mount.Pr.\ Chico River, Gonogon\ 1100 m, 21.2.1999\ leg. F. Seyfert (8a)" (CSW, UPLB); 4 ♂♂, 9 ♀♀, and 2 ♂♂, 2 ♀♀ (macropterous) "Philippinen: LZ, Mount.Pr.\ NE Sagada, Banga'an\ Bomod-ok Wf., 22.2.1999\ 1500 m, leg.H.Zettel (185)" (CZW, UPLB, NHMW); 1 ♀ (macropterous), 1 ♀ "PHILIPPINES\ Namatec, 1530m\ Bontoc Prov. [Mountain Prov.], Luzon\ June, 1, 1977\ M. Sato leg." (JTPC); 1 ♂, 3 ♀♀, 2 ♂♂ (macropterous) "Philippinen: LZ, Benguet\ Asin Hot Springs\ W Baguio, 17.2.1999\ leg. H. Zettel (180)" (NHMW, UPLB), 1 ♀, same label data, except "leg. F. Seyfert (4)" (CSW); 8 ♀♀ "PHILIPPINES, Luzon [Benguet, Baguio env.]\ John Hay Hydro,\ CL 1968, VII-8-85\ J.T. & D.A. Polhemus" (JTPC, NHMW); 3 ♂♂, 4 ♀♀, and 1 ♂, 2 ♀♀ (macropterous) "PHILIPPINES, Luzon [Benguet, Baguio env.]\ km 230, Kennon Rd.,\ CL 1966, VII-8-85\ J.T. & D.A. Polhemus" (JTPC, USNM, NHMW).

Description:

Brachypterous male: body size: length 7.80 - 8.40 mm; maximum width (at embolar margin or base of abdominal segment 4): 4.30 - 4.50 mm; pronotal width: 3.90 - 4.25 mm; colour: head and pronotum brownish yellow, head with blackish longitudinal stripe reaching posterior margin, posteriorly diffusely darkened; pronotum at most with weakly darkened disc; mesoscutellum blackish; hemelytron dark brown to blackish, with embolium usually dark, rarely yellowish brown, apex of clavus with distinct yellow patch, and corium

distally usually with large triangular yellowish mark; abdomen dorsally yellowish or brown; connexiva yellowish, in some specimens brown in posterior part; ventral surface blackish brown, on head and lateral margins of prothorax yellow; labrum, rostrum, antenna, and legs yellowish.

Head postero-dorsally with fine reticulation, shiny, antero-dorsally finely rugulose, matt, width across eyes 1.45 times head length, synthlipsis 0.65 times head width across eyes; labrum much wider than long (ca. 3 times); inner extension of maxillary plate slightly larger than length of labrum; rostral cavity semi-circular, anteriorly weakly convex; rostral segment 3 weakly (1.15 times) longer than segment 4 at anterior margin, segment 4 postero-apically with some hairs, segment 3 antero-apically with one pair of bristles.

Pronotum evenly, but weakly convex, with strongly curved lateral margins, which are much more convergent anteriad; 2.9 - 3.1 times wider than median length, maximum width at posterior third to fourth of lateral margin; with more distinct reticulation than on head, on disc each mesh with a small central fovea, shining, anteromedially with some transverse wrinkles, at hind and lateral margins surface more rugulose, matt; mesoscutellum 2.0 times wider than long, rugulose, matt; hemelytron variable in length, reaching basal fifth to middle of tergite 5; embolar and claval sutures at least very weakly indicated; clavus, corium, and embolium rugulose, matt, membrane coriaceous, matt; posterior corners of connexiva 3 - 5 right-angled; tergite 5 broadly convex posteriorly, medially not or very weakly truncate.

Profemur largely expanded, maximum width 0.75 times maximum length; protibia evenly curved, protarsus weakly separated from protibia, claw reduced, tooth-like, sometimes inconspicuous; mesotibia ventro-mesally with double row of numerous short, stout spines, dorso-mesally with single row of longer spines; metatibia mesally in distal three fourths with row of about 12 - 14 suberect long spines; claws of hind leg 0.50 - 0.55 times as long as segment 3 of metatarsus.

Mesosternum with anteriorly notched, obtuse and low median carina over entire length; pregenital abdomen asymmetrical; genital capsule posteriorly angularly rounded; aedeagus long and relatively stout (Fig. 120); left paramere distally with one elongate, more or less curved and relatively broad distal process, separated from the main piece by a deep subapical excavation (Figs. 121, 124, 126); right paramere with stout middle part, with acuminate, weakly recurved apex (Figs. 122, 123, 125).

Brachypterous female: body size: length 7.80 - 8.95 mm; maximum width (at base of abdominal segment 4): 4.30 - 4.80 mm; pronotal width: 3.95 - 4.45 mm; most characters as in male; hemelytra slightly variable in length, reaching to basal fourth of tergite 5 to basal fourth of tergite 6; tergite 7 with hind margin broadly emarginated, with weakly produced hind corners (Figs. 80 - 82); subgenital plate relatively long, tapered posteriad, with a small incision in the middle of the relatively narrow, convex posterior margin, and with a dense subapical pubescence often covering this incision (comp. Fig. 73); gonapophyses 2 postero-medially with a slender parallel-sided process bearing short lanceolate setae (Figs. 95 - 97).

Macropterous male: body size: length 7.70 - 9.00 mm; maximum width (at embolar margin): 4.10 - 4.75 mm; pronotal width: 4.10 - 4.50 mm; most characters as in brachypterous male except following: Pronotum slightly longer, convex along posterior mar-

gin, very weakly incised at hind corners, disc more infuscated; mesoscutellum larger; hemelytra (nearly) reaching hind margin of tergite 5, with well developed claval and embolar suture, clavus bipartite longitudinally.

Macropterous female: body size: length 8.00 - 9.20 mm; maximum width (at embolar margin): 4.50 - 4.80 mm; pronotal width: 4.10 - 4.50 mm; hemelytra nearly reaching end of abdomen; most characters as in brachypterous female or macropterous male, respectively.

Comparative notes: *Asthenocoris montanus* sp.n. has male genitalia not easily distinguishable from *A. luzonensis*. Females can be best distinguished by the process of the gonapophyses 2, which shows only little variability (Figs. 95 - 97). The laterosternites 6 are usually slightly bent ventrad in the brachypterous, but not in the macropterous female. Males and females differ from *A. luzonensis* in larger size, and from *A. luzonensis luzonensis* usually in darker colour of the head, although the size ranges of both species are nearly continuous, and specimens of *A. luzonensis luzonensis* with darker head rarely occur, as well as specimens of *A. montanus* sp.n. with light embolium.

Asthenocoris montanus sp.n. was first regarded as a subspecies or an ecotype ("mountainous form") of *A. luzonensis*. Presently, the syntopic occurrence of *A. montanus* and *A. luzonensis luzonensis* in Benguet (sites # 180, CL 1966) is regarded as an evidence for their specific divergence, although in these populations the differences in the gonapophyses 2 are not as strong as usual (but always congruent with external characteristics; see Figs. 92, 97, both from loc. # CL 1966). Therefore, the specific status of *A. montanus* sp.n. should remain under discussion.

Distribution: North Luzon (Mountain Province, Benguet) (Fig. 151).

Habitats: *Asthenocoris montanus* sp.n. inhabits lotic parts of middle sized mountain streams and rivers. In rivers it can be found by lifting larger stones in the current, in streams it is also found at their edge, if there is a high water velocity, or between rough gravel of the stream beds.

Etymology: *montanus* (Latin, adjective) meaning "mountainous"; named after the occurence of the species in mountainous areas.

Asthenocoris sp. (from North Luzon) (Fig. 151)

Material examined: 1 ♀ (brachypterous) "PHILIPPINES, Luzon [Benguet, Baguio env.]\ John Hay Hydro,\ CL 1968, VII-8-85\ J.T. & D.A. Polhemus" (JTPC).

Diagnosis: body size: length 7.80 mm; maximum width (at embolar margin): 4.65 mm; pronotal width: 4.10 mm; head and pronotum predominately light coloured; head relatively short; disc of pronotum slightly convex; hemelytra short, reaching basal third of tergite 4; tergite 7 and sternite 7 as in *A. luzonensis luzonensis*; gonapophyses 2 with very broad process only weakly delimited from the main piece (nearly as in Fig. 99).

Notes: The single female was collected with eight paratype females of *A. montanus* sp.n. It differs from this species and from *A. luzonensis* in the relatively broad appearence and the shape of the gonapophyses 2. Based on this single specimen, it cannot be decided whether the female represents an undescribed species or is only an aberrative specimen of *A. luzonensis luzonensis*.

The *Asthenocoris australis* species group

Diagnosis: relatively broad-ovate species without forewing-brachyptery; male: aedeagus subapically widened (Figs. 127, 137); left paramere without subapical excavation (e.g., Fig. 128); right paramere relatively slender in middle, with apex blunt triangular to rounded (e.g., Figs. 130, 138); female: subgenital plate with hind margin straight and medially not incised (Fig. 74); tergite 8 narrow, with deep concavity of hind margin (Figs. 83 - 89); process of gonapophyses 2 stout or elongate, with long stout bristles (Fig. 98 - 104).

Asthenocoris medius medius sp.n. (Figs. 83, 84, 98, 127 - 133, 151)

Holotype (brachypterous ♂): "PHILIPPINES, Leyte\ Lusig River at Aboyo\ VII-15-85, CL 1979\ J.T. & D.A.Polhemus" (USNM); **paratypes** (brachypterous, if not otherwise stated): 9 ♂♂, 16 ♀♀, and 1 ♂ (macropterous), same label data as holotype (USNM, JTPC, NHMW, CNT, UPLB); 4 ♂♂, 6 ♀♀ "PHILIPPINES, Leyte\ Leyte Prov.\ Lusig River at Hilusig\ VII-15-85 CL 1979\ J.T. & D.A.Polhemus" (JTPC).

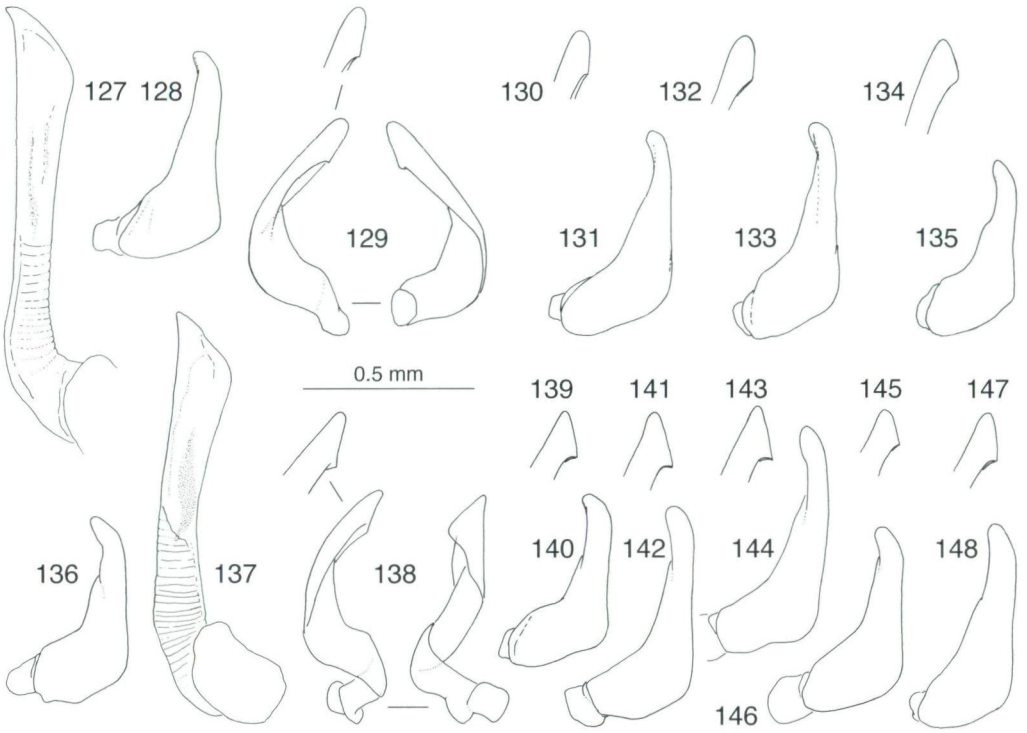
Description:

Brachypterous male: body size: length 6.80 - 7.30 mm; maximum width (at embolar margin or base of abdominal segment 4): 4.30- 4.70 mm; pronotal width: 3.90 - 4.25 mm; colour: head and pronotum brownish yellow, head at most with small dark spots, pronotum without distinct dark marks except two narrow dark longitudinal stripes behind eye; mesoscutellum blackish; hemelytron blackish, with yellow patch on anterior three fourths of embolium and more or less yellowish along claval margin, especially at apex, corium distally with very indistinct yellowish mark; abdomen dorsally yellowish; ventral surface blackish brown, on head and lateral margins of prothorax yellow, mesosternum yellowish brown; labrum, rostrum, antenna, and legs yellowish.

Head postero-dorsally with distinct reticulation, shiny, antero-dorsally finely rugose, matt, width across eyes 1.45 times head length, synthlipsis 0.65 times head width across eyes; labrum much wider than long; mesal extension of maxillary plate subequal to length of labrum; rostral cavity semi-circular, anteriorly weakly convex; rostral segment 3 weakly (1.1 times) longer than segment 4 at anterior margin, segment 4 postero-apically with some hairs, segment 3 antero-apically with one pair of bristles.

Pronotum evenly, but weakly convex, with strongly curved lateral margins, which are much more convergent anteriad; 3.1 - 3.2 times wider than median length, maximum width at posterior fourth to fifth of lateral margin; with more distinct reticulation than on head, on disc each mesh with large central fovea, weakly shiny antero-medially with a few weak transverse wrinkles, at hind and lateral margins surface more rugulose, matt; mesoscutellum 2.0 times wider than long, rugulose, matt; hemelytron surpassing hind margin of tergite 5, posteriorly narrowed; embolar and claval sutures weakly indicated; clavus, corium, and embolium rugulose, matt, membrane coriaceous, matt; posterior corners of connexiva 3 - 5 right-angled; tergite 5 broadly convex posteriorly.

Profemur largely expanded, maximum width 0.75 times maximum length; protibia evenly curved, protarsus weakly separated from protibia, claw reduced, tooth-like; mesotibia ventro-mesally with single row of about 10 relatively long spines, dorso-mesally with single row of longer spines; metatibia mesally in distal two thirds with row of about 8 - 9 suberect long spines; claws of hind leg 0.5 times as long as segment 3 of metatarsus.



Figs. 127 - 148: *Asthenocoris australis* group: male genitalia: (127 - 133) *A. medius medius* sp.n.; (134, 135) *A. medius samarensis* ssp.n.; (136 - 148) *A. australis* sp.n.: (136 - 138) from Agusan Norte (holotype), (139, 140) from Zamboanga del Sur, (141 - 144) from Bukidnon, (145, 146) from Camiguin, (147, 148) from Cotabato South; (127, 137) aedeagus; (128, 131, 133, 135, 136, 140, 142, 144, 146, 148) left paramere; (129, 138) right paramere, two different views, and apex in full face view; (130, 132, 134, 139, 141, 143, 145, 147) apex of right paramere in full face view (pilosity omitted).

Mesosternum with anteriorly notched, obtuse and low median carina over entire length; pregenital abdomen asymmetrical; genital capsule posteriorly angularly rounded; aedeagus long, preapically widened (Fig. 127); left paramere distally with one slender, elongate, apically curved process continuous with main part (Figs. 128, 131, 133); right paramere with relatively slender middle part, with rounded, not recurved apex (Figs. 129, 130, 132).

Brachypterous female: body size: length 7.00 - 7.80 mm; maximum width (at base of abdominal segment 4, rarely at embolar margin): 4.40 - 4.80 mm; pronotal width: 4.00 - 4.35 mm; most characters as in male; hemelytra not variable in length, nearly reaching end of abdomen; tergite 7 narrow, with emargination of hind margin deeper than in *A. luzonensis* and *A. montanus*, but more shallow than in *A. australis*, with relatively rounded posterior corners (Figs. 83, 84); subgenital plate with posterior margin truncate, without medial incision (comp. Fig. 73); gonapophyses 2 postero-medially without distinct process, broad-triangular, apically bearing long lanceolate setae (Figs. 98).

Macropterous male: body size: length 7.60 mm; maximum width (at embolar margin): 4.55 mm; pronotal width: 4.15 mm; most characters as in brachypterous male except

following: Pronotum slightly longer, convex along posterior margin, very weakly incised at postero-lateral corners; mesoscutellum larger; hemelytra reaching end of abdomen, with well developed claval and embolar suture, clavus distinctly bipartite.

Macropterous female: unknown.

Comparative notes: *Asthenocoris medius* sp.n. is a very distinctive species, which is closely related to *A. australis* sp.n. Females can be identified by the simply acuminate gonapophyses 2 (without pronounced process; Fig. 98) and by the intermediate (between *A. luzonensis* and *A. australis*) emargination of tergite 7 (Fig. 83, 84); sternite 7 is similar to that of *A. australis* sp.n. Males of the nominate subspecies have the right paramere with a very blunt apex (Figs. 129, 130, 132), a character not found in any other species or subspecies of *Asthenocoris*, and the left paramere similarly slender as in *A. australis* sp.n. Head and pronotum are at most weakly infuscated. For distinction of *A. medius samarensis* ssp.n. see below.

Distribution: Leyte (Leyte Prov.) (Fig. 151).

Habitats: syntopic with *A. luzonensis leyticus* ssp.n.; for information see habitat notes on this subspecies.

Etymology: *medius* (Latin, adjective) meaning "intermediate", named after the geographically medial position between *A. luzonensis* and *A. australis*.

Asthenocoris medius samarensis ZETTEL & NIESER ssp.n.
(Figs. 85, 99, 134, 135, 151)

Holotype (brachypterous ♂): "Philippinen: N. Samar\ Veriato, El Amigo\ Veriato Falls, 16.3.\ 1998, leg.Zettel (162)" (UPLB) (USNM); **paratypes:** 1 ♂♂, 2 ♀♀ (brachypterous), same label data as holotype (CZW, UPLB).

Description: as in the nominate subspecies except the following characteristics:

Brachypterous male: body size: length 6.30 - 6.70 mm; maximum width (at embolar margin): 3.85 - 4.05 mm; pronotal width: 3.45 - 3.75 mm; head posteriorly slightly infuscated, in average longer, width across eyes 1.50 - 1.55 times head length; maximum width of pronotum 83.1 times median length) at posterior third of lateral margin; hemelytron hardly reaching end of tergite 5, claval suture not or hardly traceable.

Aedeagus as in the nominate subspecies (comp. Fig. 127); left paramere relatively stout (Fig. 135); right paramere with blunt triangular apex (Fig. 134).

Brachypterous female: body size: length 6.75 - 7.00 mm; maximum width (at base of abdominal segment 4): 4.20 - 4.35 mm; pronotal width: 3.85 - 3.90 mm; most characters as in male; hemelytra reaching medio-posterior margin of tergite 7; tergite 7 more deeply excavate, with more acute posterior corners (Fig. 85); subgenital plate and gonapophyses 2 (Fig. 99) as in the nominate subspecies.

Macropterous morph unknown.

Comparative notes: *Asthenocoris medius samarensis* ssp.n. differs from the nominate subspecies mainly in the triangular apex of the right paramere of male (Fig. 134) and in a deeper emargination of the female tergite 7 (Fig. 85). In both these characters, it re-

sembles *A. australis* more closely. However, the simply acuminate gonapophyses 2 (without pronounced process; Fig. 99) clearly show its very close relation with *A. medius medius* sp.n. from Leyte. As in this form, the head and pronotum are at most weakly infuscated. External differences mentioned in the description may be related to the relatively small size of the four types and should be verified in larger series.

Distribution: Samar (Northern Samar) (Fig. 151).

Habitats: The small type series was collected together with *Asthenocoris luzonensis luzonensis* in the lotic parts of a small, in average 2 m wide, stream above a waterfall at an elevation of less than 50 m a.s.l. close to the sea shore.

Etymology: Named after the island of origin, Samar.

Asthenocoris australis sp.n. (Figs. 4, 74, 86 - 89, 100 - 102, 151)

Holotype (brachypterous ♂): "PHILIPPINEN: Mindanao\ Agusan N., stream at\ Kicharao, 27.III.1993\ leg. N. Nieser N9326" (CNT); **paratypes** (brachypterous, if not otherwise stated): 12 ♂♂, 18 ♀♀, same locality data (CNT, NHMW); 4 ♂♂, 3 ♀♀, and 2 ♂♂, 7 ♀♀ (macropterous) "PILIPINAS: Danau Sebu\ area, Cold River\ mount.stream, 8.XII.1993\ leg. N.Nieser N9375A" (CNT, NHMW); 10 ♂♂, 5 ♀♀, and 1 ♂, 3 ♀♀ (macropterous) "PILIPINAS: Danau Sebu\ area, nr. Lopo\ small stream, 9.XII.1993\ leg. N.Nieser N9377A" (CNT, NHMW); 1 ♂, 1 ♀, and 1 ♀ (macropterous) "PHILIPPINES, Mindanao [South Cotabato Prov.]\ Luhib River [13 km. SW Surallah], CL 1993\ VII-19-85 J.T. & D.A. Polhemus" (JTPC); 17 ♂♂, 4 ♀♀, and 1 ♂ (macropterous) "PHILIPPINES, Mindanao [South Cotabato]\ Cacob River [550 m, SE of Koronadal]\ CL 1995, VII-20-85\ J.T. & D.A.Polhemus" (USNM, JTPC, NHMW); 1 ♂ (macropterous) "DAVAO:MT.APO\ UGIS CRK.:3000FT.\ 17 MAY 1979\ F.A.MULIMBAYAN" (UPLB); 2 ♂♂, 2 ♀♀ "PHILIPPINEN: Mindanao\ Bukidnon Pr., Malaybalay\ Kaamulan Site, 650m,7.11.\ 1996, leg. H. Zettel (90b)" (NHMW); 3 ♂♂, 1 ♀ "Philippinen: Mindanao\ Bukidnon Prov., Malaybalay\ Kaamulan Site, 650 m\ 15-16.[3.]1997,lg.Zettel (130)" (CZW, UPLB); 1 ♂, 2 ♀♀ "PHILIPPINEN: Mindanao\ Bukidnon Pr., Tugasan\ Riv., 14.11.1994\ leg. Catalan" (CZW); 4 ♂♂, 9 ♀♀ "PHILIPPINEN: Mindanao\ Bukidnon, 4km NE Lantapan\ Kaatuan, Kulasihan Riv.,850m \9.11.1996, leg.H.Zettel (93)" (NHMW, UPLB); 19 ♂♂, 19 ♀♀, and 6 ♂♂, 6 ♀♀ (macropterous) "PHILIPPINES, Mindanao\ [Zamboanga del Sur Prov., 7 km. NW of Zamboanga City, 100m,] Bituti River, CL 1998\ VII-22-85, J.T. + D.A.Polhemus" (USNM, JTPC, NHMW); 13 ♂♂, 16 ♀♀ "PHILIPPINEN: Camiguin\ Mambajao, Agrarland [agricultural land]\ 16.11.1996\ leg. H. Zettel (97a)" (UPLB, NHMW, AMNH); 2 ♂♂, 3 ♀♀ "PHILIPPINEN: Camiguin\ Mambajao, Agrarland [agricultural land]\ 16.11.1996\ leg. H. Zettel (97d)" (NHMW, UPLB); 1 ♀ "PHILIPPINEN: Camiguin\ W Mambajao, Katibawasan\ Falls, 15.11.1996\ leg. H. Zettel (96)" (NHMW); 1 ♂, 1 ♀ "PHILIPPINEN: Camiguin\ Tupsan, Macao Cold\ Spring, 18.11.1996\ leg. H. Zettel (99)" (NHMW); 2 ♂♂, and 1 ♂ (macropterous) "PHILIPPINES\ Todaya [no more information on locality available]\ Is.Mindanao\ July 30,1970\ M. SATO leg." (USNM); **further material:** 1 ♀ "PHILIPPINEN: Camiguin\ Umg. Mambajao\ 4.2.1994\ leg. Seyfert & Graindl" (NHMW) [strongly shriveled]; 1 ♂ "Philippines\ Mindanao, Sibulan [= town in Negros]-\ Tudaya [= Todaya ?; no more informations on locality available]\ 26. VII.1970\ M. Sato leg." (JTPC) [doubtful locality]; 1 ♂ (macropterous) "PHILIPPINES\ Amulan [Amlan]\ Is. Neglos [Negros]\ July 16-18,1970\ M.SATO leg." (JTPC) [doubtful record; most probably mislabelled specimen; among specimens from Mindanao, Todaya, and not distinguishable from those; a series of *Rhagovelia phoretica* mixed-labelled with the same labels was discussed by POLHEMUS (1996)].

Description:

Brachypterous male: body size: length 6.30 - 7.80 mm; maximum width (at embolar margin or base of abdominal segment 4): 3.80 - 4.40 mm; pronotal width: 3.55 - 4.15 mm; colour: head and pronotum yellowish, head in posterior half with pair of dark longitudinal stripes which often confluent and sometimes extended on anterior half, disc of pronotum (except midline) with numerous brownish spots, appearing distinctly infuscated

in nearly all specimens; mesoscutellum blackish; hemelytron blackish, with yellow patch on anterior two thirds to three fourths of embolium and more or less yellowish along claval margin, especially at apex, corium distally with yellowish mark, which in most specimens conspicuous and large (in one aberrant specimen antero-distal margin broadly yellow); abdomen dorsally yellowish, connexiva narrowly infuscated; ventral surface blackish brown, on head and lateral margins of prothorax yellow, mesosternum yellowish brown; labrum, rostrum, antenna, and legs yellowish.

Head postero-dorsally with distinct reticulation, shiny, antero-dorsally finely rugulose, matt, width across eyes 1.45 times head length, synthlipsis 0.65 times head width across eyes; labrum about 3 times as wide as long; mesal extension of maxillary plate slightly larger or subequal to length of labrum; rostral cavity semi-circular, anteriorly weakly convex; rostral segment 3 weakly (1.15 times) longer than segment 4 at anterior margin, segment 4 postero-apically with some hairs, segment 3 antero-apically with one pair of bristles.

Pronotum evenly, but weakly convex, with strongly curved lateral margins, which are much more convergent anteriad; 3.15 - 3.3 times wider than median length, maximum width at posterior third to fourth of lateral margin; with more distinct reticulation than on head, on disc each mesh with a large central fovea, weakly shining, anteromedially with a few weak transverse wrinkles, at hind and lateral margins surface more rugulose, matt; mesoscutellum 2.0 times wider than long, rugulose, matt; hemelytron reaching distal third to hind margin of tergite 5, posteriorly narrowed; embolar and claval sutures differently developed, at least weakly indicated, never complete; clavus, corium, and embolium rugulose, matt, membrane coriaceous, matt; posterior corners of connexiva 3 - 5 right-angled; tergite 5 broadly convex posteriorly, medially at most slightly truncate.

Profemur largely expanded, maximum width 0.75 times maximum length; protibia evenly curved, protarsus weakly separated from protibia, claw reduced, tooth-like; mesotibia ventro-mesally with two rows of short spines, dorso-mesally with single row of longer spines; metatibia mesally in distal two thirds with row of about 8 - 9 suberect long spines; claws of hind leg 0.5 times as long as segment 3 of metatarsus.

Mesosternum with anteriorly notched, obtuse and low median carina over entire length; pregenital abdomen asymmetrical; genital capsule posteriorly angularly rounded; aedeagus long, preapically widened (Fig. 137); left paramere distally with one slender, elongate, apically curved process (nearly) continuous with main part (Figs. 136, 140, 142, 144, 146, 148); right paramere with relatively slender middle part, with obtusely triangular, weakly recurved apex (Figs. 138, 139, 141, 143, 145, 147).

Brachypterous female: body size: length 6.50 - 7.70 mm; maximum width (at base of abdominal segment 4, rarely at embolar margin): 3.95 - 4.40 mm; pronotal width: 3.65 - 4.10 mm; most characters as in male; hemelytra nearly reaching end of abdomen (distal third of tergite 6 to medial posterior margin of tergite 7); tergite 7 narrow, with deep posterior emargination (Figs. 86 - 89); subgenital plate with posterior margin truncate, without medial incision (Fig. 74); gonapophyses 2 postero-medially with distinct process, which slightly variable in width, apically (usually) bearing long lanceolate setae (Figs. 100 - 104).

Macropterous male: body size: length 6.75 - 7.60 mm; maximum width (at embolar margin): 4.00 - 4.30 mm; pronotal width: 3.75 - 4.00 mm; most characters as in brachy-

pterous male except following: Pronotum slightly longer, convex along posterior margin, very weakly incised at postero-lateral corners; mesoscutellum larger; hemelytra (nearly) reaching end of abdomen, with well developed claval and embolar suture, clavus distinctly bipartite.

Macropterous female: body size: length 6.80 - 7.70 mm; maximum width (at embolar margin, rarely at abdominal segment 4): 4.00 - 4.30 mm; pronotal width: 3.85 - 4.10 mm; most characters as in brachypterous female or macropterous male, respectively.

Variability: Whereas females of *A. australis* sp.n. are uniform in all characters (except for some variability of the apices of the laterosternites 7 and the process of gonapophyses 2), male show quite a high variation in shape of the left paramere. Specimens from Camiguin have its distal part relatively short and the inner basal angle more rounded. However, some specimens from Mindanao show a similar shape of the paramere and which are partly intermixed with "Mindanao-typical" specimens. *Asthenocoris australis* sp.n. varies also in colour: the populations from northern Mindanao and Camiguin usually have more distinct yellowish marks on the hemelytra than do those from southern Mindanao.

Comparative notes and discussion: *Asthenocoris australis* sp.n. differs from the closely related species, *A. medius* sp.n., mainly in the shape of the female gonapophyses 2 (comp. Figs. 98 and 99 with Figs. 100 - 104), and in the more acute apex of the male right paramere (comp. e.g. Figs. 138 and 147 with Figs. 129 and 134). The two species are allopatric.

With the present knowledge, splitting *A. australis* sp.n. into two or more subspecific units is not practical. However, it is suspected that *A. australis* sp.n. consists of an unsolved complex of subspecies, similar to *A. luzonensis* in the northern parts of the Philippines.

Distribution: Mindanao (Zamboanga del Sur, Bukidnon, Agusan Norte, Davao, South Cotabato, Sarangani, "Todaya"); Camiguin (Fig. 151); the records from Negros are very doubtful.

Habitats: In general, *A. australis* sp.n. has demands similar to *A. luzonensis* and *A. montanus* sp.n., living in the lotic sections of streams. However, *A. australis* sp.n. was found also in small streams, sometimes less than two metres wide, with low water level, and flowing through agricultural land (e.g. site # 97a); in such habitats *A. luzonensis* and *A. montanus* sp.n. have not been found.

Etymology: *australis* (Latin, adjective) meaning "southern"; referring to the distribution of this species in comparison with the other species of the genus.

Species incertae sedis

Asthenocoris sp. (from Cebu) (Fig. 151)

Material examined: 1 immature "Philippinen: Cebu, S Badian\ Matutinao, Kawasan Falls\ 2-50 m, 23.-24.2.1997\ leg. H. Zettel (116)" (CZW).

Notes: A single immature is so far the only record of *Asthenocoris* from Cebu. Because of its isolated occurence, it might represent an undescribed species. Because of a distinct

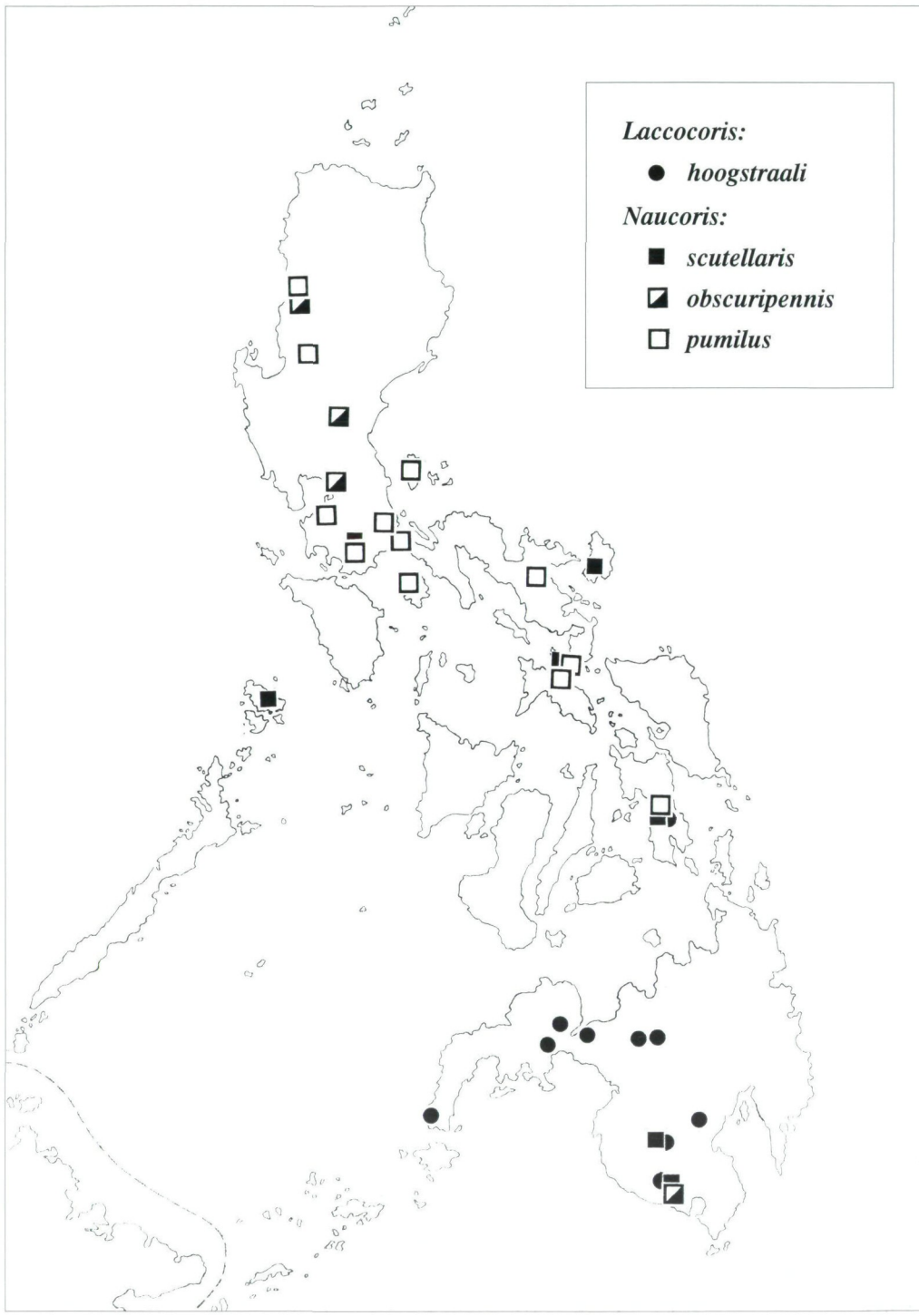


Fig. 149: Distribution of the genera *Laccocoris* and *Naucoris* in the Philippines.

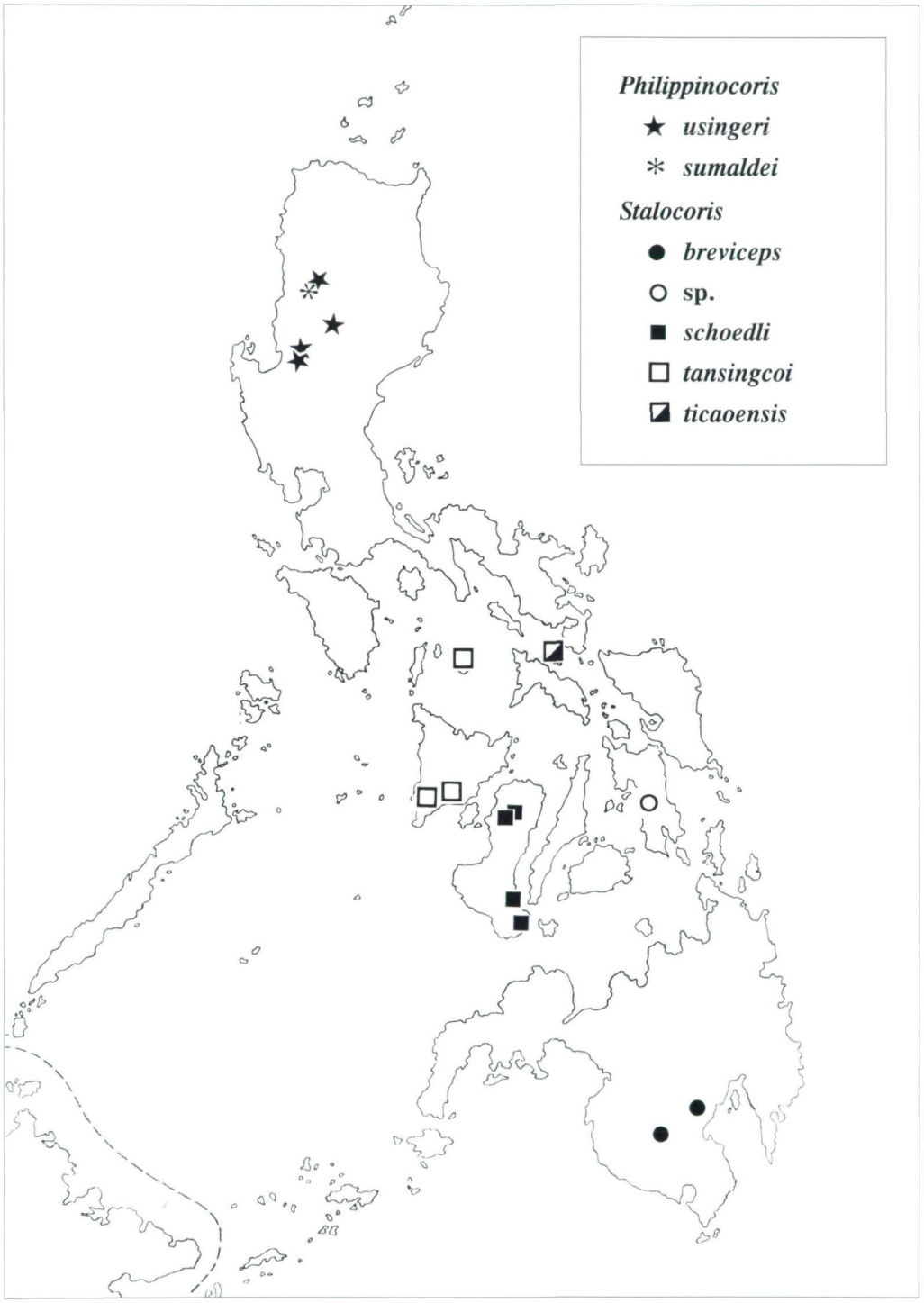


Fig. 150: Distribution of the genera *Philippinocoris* and *Stalocoris*.

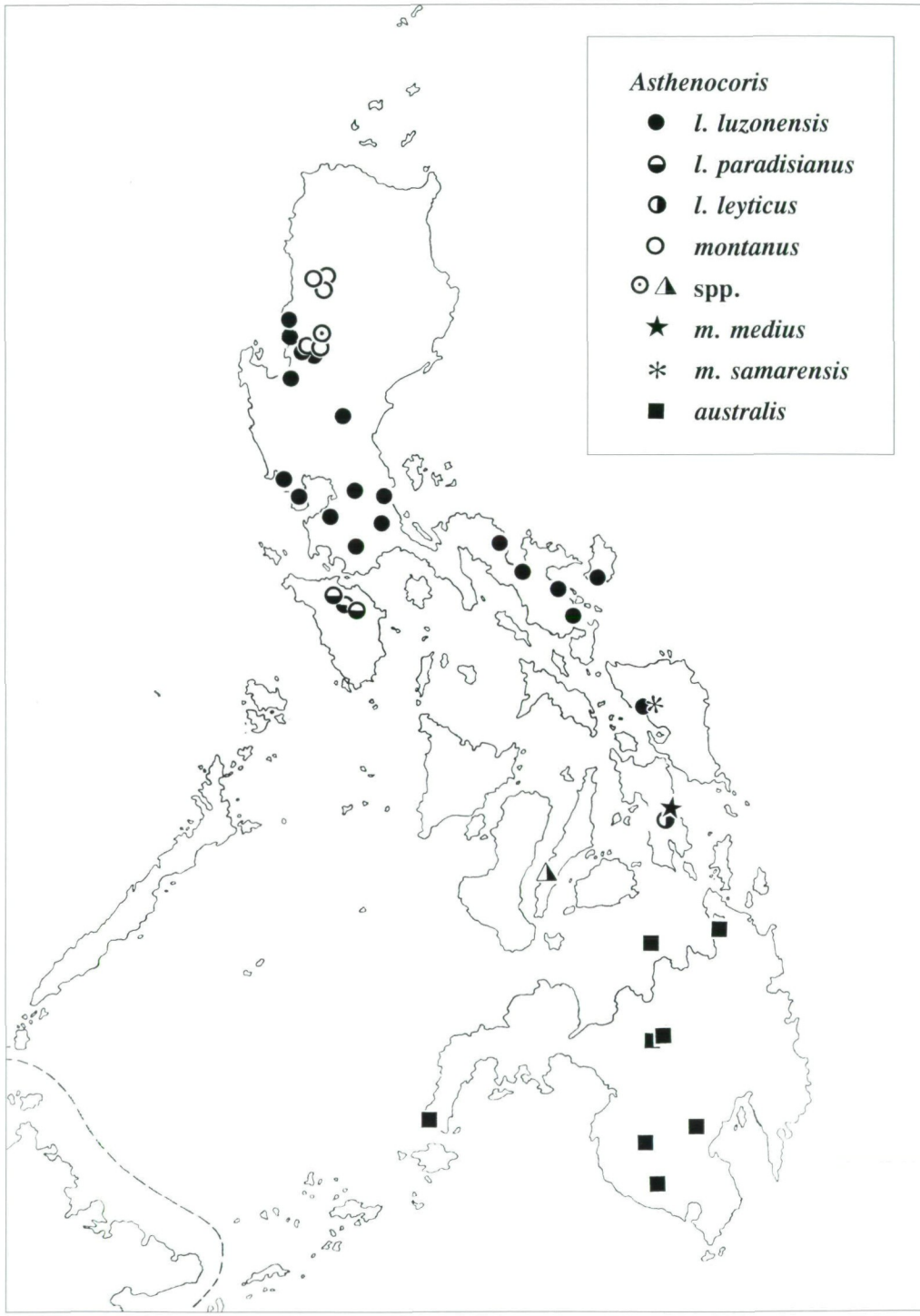


Fig. 151: Distribution of the genus *Asthenocoris*.

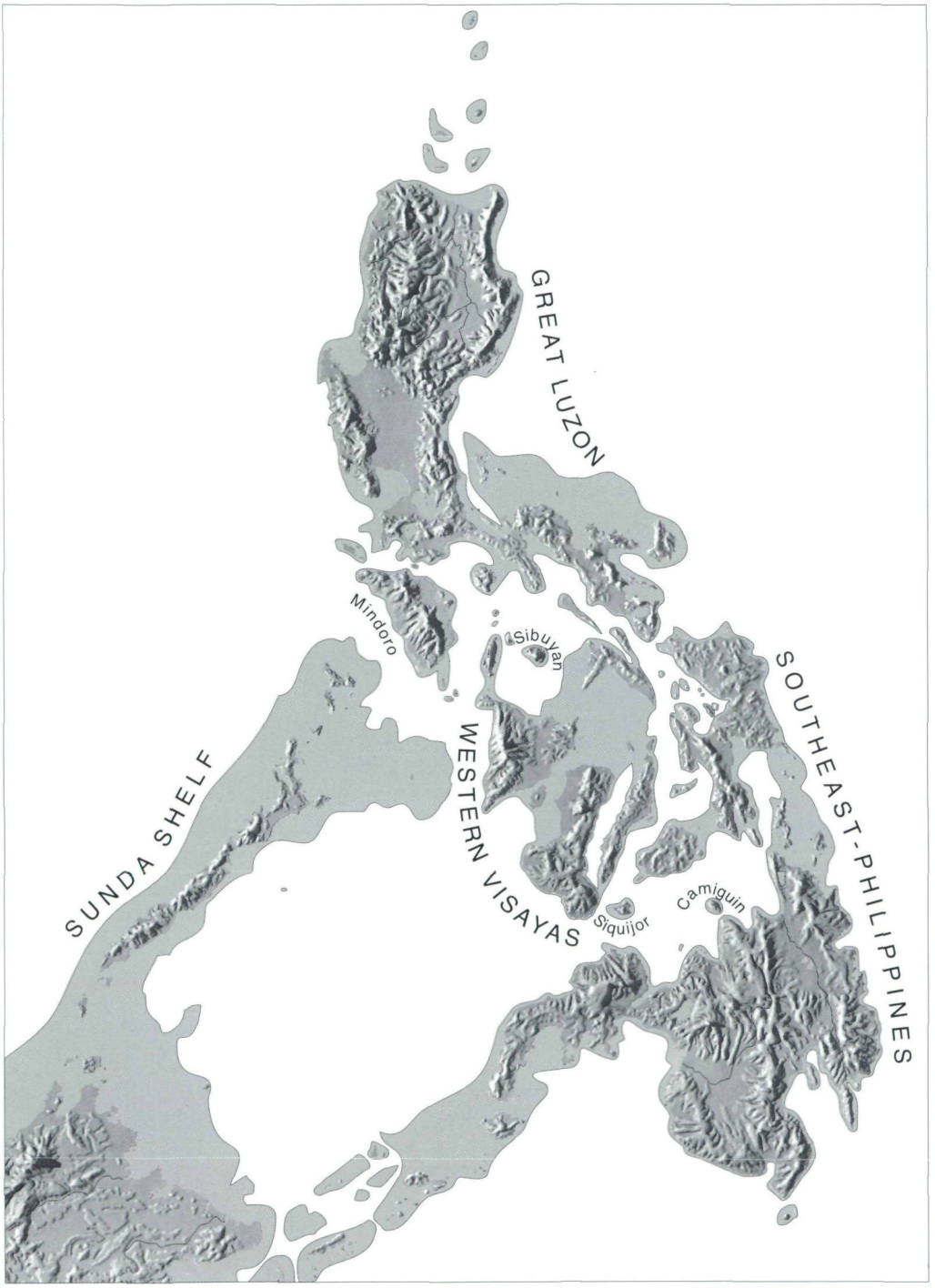


Fig. 152: Approximate situation of the Philippine archipelago during the Pleistocene (reconstructed by lowering the sea level by approximately 100 metres from present conditions).

dark line on head and a relatively narrow body, the species probably belongs to the *A. luzonensis* group. The specimen was collected in a fast rushing area of a middle sized stream in southern Cebu.

Distribution: Cebu (Fig. 151).

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References

GAPUD, V.P. 1986: Philippine Water Bugs. – Guide to Philippine Flora and Fauna 8: 1-47.

LA RIVERS, I. 1969: Entomological miscellanei. I. A new genus and species of naucorid from the Philippines (Hemiptera). – Occasional Papers of the Biological Society Nevada 18: 1-4.

LA RIVERS, I. 1970a: A new Philippine *Sagocoris* (Hemiptera: Naucoroidea). – Pan-Pacific Entomologist 46: 167-169.

LA RIVERS, I. 1970b: A new species of *Laccocoris* from the Philippines (Hemiptera: Naucoridae). – The Wasmann Journal of Biology 28: 269-273.

LARSÉN, O. 1938: Untersuchungen über den Geschlechtsapparat der aquatilen Wanzen. – Opuscula entomologica, Suppl. 1: 388 pp.

LETHIERRY, M. 1877: without title. In: Séance du 13 Juin 1877. – Bulletin des Séances de la Société Entomologique de France 1877: 100-102.

LUNDBLAD, O. 1933: Zur Kenntnis der aquatilen und semiaquatilen Hemipteren von Sumatra, Java und Bali. – Archiv für Hydrobiologie, Suppl. 12: 1-195, 263-489, 21 tab.

MAHNER, M. 1993: Systema Cryptoceratorum Phylogeneticum (Insecta, Heteroptera). – Zoologica 143, E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, 302 pp.

NIESER, N. & CHEN, P.P. 1991: Naucoridae, Nepidae and Notonectidae, mainly from Sulawesi and Pulau Buton (Indonesia). – Tijdschrift voor Entomologie 134: 47-67.

POLHEMUS D.A. 1996: Two new species of *Rhagovelia* from the Philippines, with a discussion of zoogeographic relationships between the Philippines and New Guinea (Heteroptera: Veliidae). – Journal of the New York Entomological Society 103(1): 55-68.

POLHEMUS, D.A. & POLHEMUS, J.T. 1987: A New Genus of Naucoridae (Hemiptera) from the Philippines, with Comments on Zoogeography. – Pan-Pacific Entomologist 63(3): 265-269.

POLHEMUS, D.A. & POLHEMUS, J.T. 1988: The Aphelocheirinae of Tropical Asia (Heteroptera: Naucoridae). – The Raffles Bulletin of Zoology, Singapore 36(2): 167-300.

POLHEMUS, J.T. & POLHEMUS, D.A. 1990: Zoogeography of the aquatic Heteroptera of Celebes: regional relationships versus insular endemism, pp. 73-86. In: KNIGHT, W.J. & J.D. HOLLOWAY (Edit.): Insects and the rain forests of South East Asia (Wallacea). – Royal Entomological Society London, IV + 343 pp.

STÅL, C. 1854: Nya Hemiptera. – Öfversigt af Kungliga Vetenskapsakademiens Förhandlingar 11(8): 231-255.

STÅL, C. 1860: Hemiptera, In: Kungliga Svenska Fregattens Eugenies resa omkring Jorden under befäl af C.A. Virgin aren 1851 – 1853. 2 (Zoologi 1. Insekter). Norstedt & Söner, Stockholm, pp. 219-298.

ŠTYS, P. & JANSSEN, A. 1988: Check-list of recent family-group and genus-group names of Nepomorpha (Heteroptera) of the world. – Acta Entomologica Fennica 50: 1-44.

USINGER, R.L. 1938: The Naucoridae of the Philippine Islands (Hemiptera). – The Philippine Journal of Science 64: 299-311.

TUXEN, S.L. (ed.) 1970: Taxonomist's glossary of Genitalia in Insects. 2nd. edit., Munksgaard, Copenhagen, 359 pp.

ZETTEL, H. 1998: Neue Taxa der Gattung *Aphelocheirus* WESTWOOD, 1833 (Insecta: Heteroptera: Aphelocheiridae) aus der Orientalischen Region sowie Bemerkungen zu einigen beschriebenen Arten und zu den Raubbeinen der Naucoroidea. – Annalen des Naturhistorischen Museums in Wien 100B: 77-97.

ZETTEL, H. 1999: Two new Philippine *Aphelocheirus* WESTWOOD, 1833 (Insecta: Heteroptera: Aphelocheiridae) and a key to the Philippine species. – Annalen des Naturhistorischen Museums in Wien 101B: 107-121.