On the knowledge of marine Heteroptera in the Philippines: two new subgenera and four new species of *Haloveloides* ANDERSEN 1992 (Veliidae, Haloveliinae)[1]

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Abstract: The marine veliid genus *Haloveloides* ANDERSEN 1992 is divided to three subgenera. *Anderseniveloides* nov.subgen. (type species: *H. fluvialis* ZETTEL 2003) is erected to hold the species formerly placed in the *Haloveloides cornutus* group sensu ZETTEL (2003), and *Heissius* nov.subgen. (type species: *H. femoralis* ANDERSEN 1992) for those of the *Haloveloides femoralis* group sensu ZETTEL (2003). Four species from the Philippines are described as new: *Haloveloides* (*Anderseniveloides*) *pangantihoni* nov.sp. from northeastern Mindanao, *H.* (*Anderseniveloides*) *tuberculatus* nov.sp. from Polillo, *H.* (*Heissius*) *aradophili* nov.sp. from Siquijor, and *Haloveloides* (*Heissius*) *crassifemur* nov.sp. from Samar. New records are published for *H.* (s.str.) *christyae* ZETTEL 1998, and *H.* (*Heissius*) *femoralis* ANDERSEN 1992.

Key words: Haloveliinae, *Haloveloides*, Heteroptera, new species, new subgenus, Philippines, Veliidae.

Introduction

Haloveloides ANDERSEN 1992 is one of the three marine water strider genera belonging to the subfamily Haloveliinae. With some experience, species of *Haloveloides* can be distinguished from *Halovelia* BERGROTH 1893 and *Xenobates* ESAKI 1927 already in the field by their slender bodies and relatively long antennae and legs. *Haloveloides* is well defined by several apomorphic characteristics (see ANDERSEN 1992, 2000) and distributed mainly in the West Pacific Realm from southern Thailand to the Solomon Islands (see CHEN et al. 2005: fig. 583). The genus *Haloveloides* was erected for two species previously described in *Halovelia* and five newly described species (ANDERSEN 1992). ZETTEL (1998, 2003) added six species and this paper another four, all collected in the Philippine Islands. With 14 of the 17 known species present in the country and with two endemic subgenera (this paper), the Philippines are the centre of radiation of *Haloveloides*. ANDERSEN (1992) and ZETTEL (2003) discussed the relationships of species with similar results: a clear division into three monophyletic species groups. New species described in this paper are persistent in this morphological separation. As a consequence, this study introduces subgeneric names, i.e. *Anderseniveloides* nov.subgen. for the *H. cornutus* group and *Heissius* nov.subgen. for the *H. femoralis* group (both sensu ZETTEL 2003). In addition, ecological differences can be found between *Haloveloides* s.str. and the new subgenera. Species of *Haloveloides* s.str. inhabit rocky sea coasts, but species of *Anderseniveloides* and *Heissius* are typically found in the lowest, brackish sections of streams and rivers and only rarely found at sea shores and then close to river mouths. As an exception, one species, *H.* (*Heissius*) *hirsutus*, was discovered in a cave with water connection to the sea (ZETTEL 2003). Subsequently, species of *Haloveloides*

[1] This paper is dedicated to Ernst Heiss. Ernst, I congratulate on your seventieth birthday, although I hardly can believe that you are really seventy as you look and are active as if you were fifty! I wish you – and also us, the scientific community – a prolific and happy life for another twenty years, at least. You are a most positive example of an amateur, who not only loves, but also lives science in a most professional way. May many young entomologists walk in your large and deep foot prints!

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Fig. 1: Habitus of male of *Haloveloides* (*Heissius*) *aradophili* nov.sp. (Matthias Buch pxt.)

s.str. are widely distributed, but species of the other two subgenera usually have small distribution areas. The subgenera *Anderseniveloides* and *Heissius* are only known from the Philippines.

Material and methods

Material studied consists mostly of dry mounted, but also of alcohol preserved specimens. They are deposited in the following institutions or private collections:

Acronyms of repositories:

CHI . . . . . Coll. E. Heiss, Innsbruck, Austria

CVPG . . . . . Coll. V.P. Gapud, University of the Philippines, Los Baños, Philippines

CZW . . . . . Coll. H. & S.V. Zettel, Vienna, Austria

MNHN . . . . . Muséum National d'Histoire Naturelle, Paris, France

MTMB . . . . . Hungarian Natural History Museum (Magyar Természettudományi Múzeum), Budapest, Hungary

NHMW . . . . . Naturhistorisches Museum Wien, Vienna, Austria

OÖLM . . . . . Oberösterreichisches Landesmuseum/Biologiezentrum, Linz, Austria

UPLB . . . . . Museum of Natural History, University of the Philippines, Los Baños, Philippines

USC . . . . . University of San Carlos (Biological Collections), Cebu City, Philippines

ZMUC . . . . . Zoological Museum, University of Copenhagen, Denmark

ZRCS . . . . . Zoological Reference Collection, National University of Singapore

The specimens have been studied with a Leica Wild M10 binocular microscope (max. 128x); studies on male genitalia have been done with an Olympus BX40 microscope (max. 400x). Drawings have been prepared with the help of a camera lucida fixed to these microscopes. Measurements (either in millimetres or as the ratio of two lengths) refer to the male holotype or to a randomly selected female paratype, respectively. Range of body length (measured from apex of head to apex of abdomen) refers either to all specimens available or to a minimum of ten randomly selected specimens of each sex. The following abbreviations of leg segments are used: FL – foreleg, ML – middle leg, HL – hind leg; Fe – femur, Ti – tibia, Ta – tarsus. Measurements of lengths of antennomeres and leg segments are given relative to the length of antennomere 2 or to the length of metatibia respectively (the length of which is stated in millimetres). The term "connexivum" is used for the edge (or "connection") of sternites and laterotergites, and not for the combination of the laterotergites. Descriptions of male genitalia are based on a few specimens only.

Results

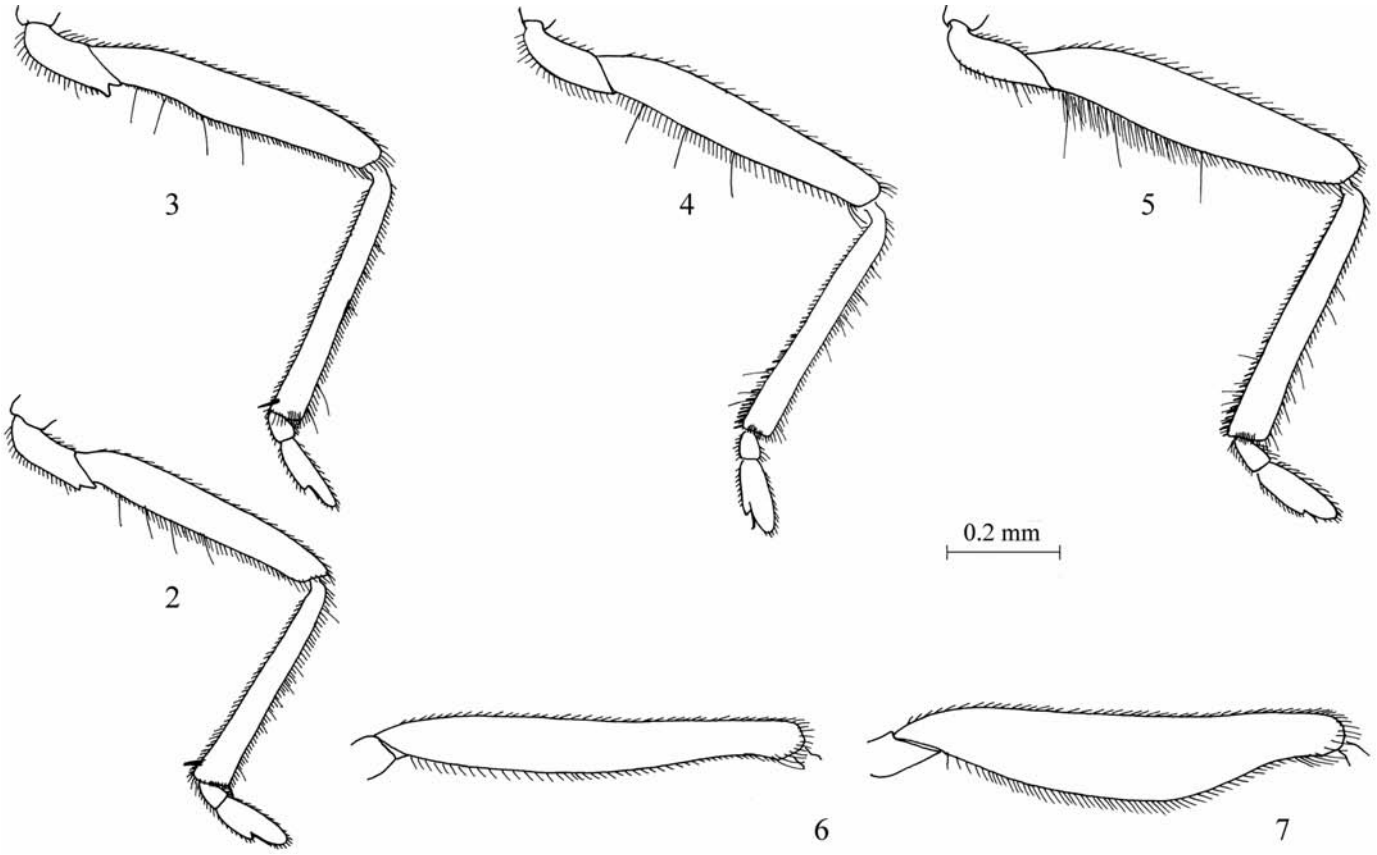
I. Subgeneric classification

Haloveloides Andersen 1992 (s.str.)

(= *Haloveloides papuensis* group sensu Zettel 2003)

Type species: *Halovelia papuensis* Esaki 1926 (by original designation)

Diagnosis: Eyes small, smallest eye distance clearly more than half of head width;



Figs 2-7: Leg structures of *Haloveloides*, males (2-5: foreleg; 6, 7: metafemur; all in ventral aspect, pilosity partly omitted): (**2**) *H. pangantihoni* nov.sp.; (**3**) *H. tuberculatus* nov.sp.; (**4**, **6**) *H. aradophili* nov.sp.; (**5**, **7**) *H. crassifemur* nov.sp.

length of antennomere 3 less than 1.5 times length of antennomere 2; protrochanter of male with apical spine or tubercle; profemur of male evenly and weakly thickened; protibia of male subapically with group of 4-8 spinous hairs; metafemur of male not or moderately incrassate, with maximum width close to base; venter of male with median carina posteriorly reaching sternite 6; proctiger distolaterally widened; paramere long, curved, with acute apex; tergite 8 of female with more or less evenly distributed long pilosity.

Included species (5): *Haloveloides* (s.str.) *brevicornis* ANDERSEN 1992, *H.* (s.str.) *browni* (LANSBURY 1989), *H.* (s.str.) *chrystiae* ZETTEL 1998, *H.* (s.str.) *papuensis* (ESAKI 1926), *H.* (s.str.) *sundaensis* ANDERSEN 1992.

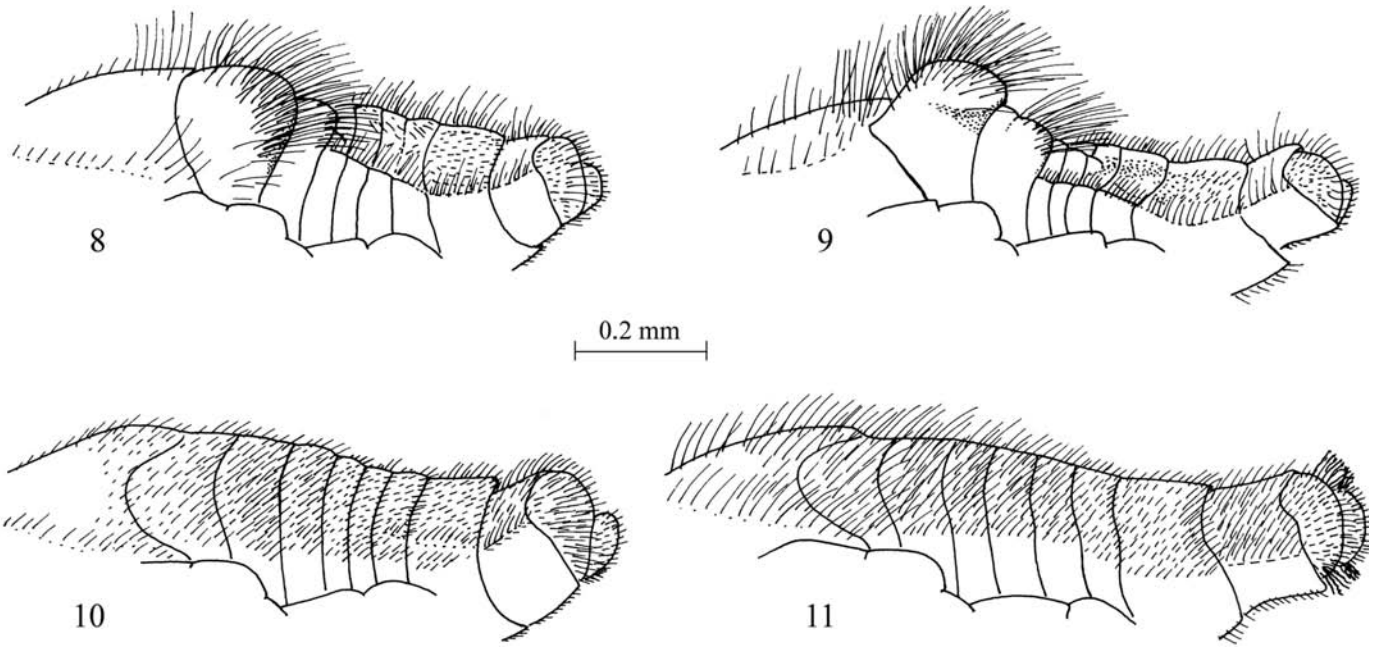
Distribution: From Thailand to the Solomon Islands.

Anderseniveloides nov.subgen.

(= *Haloveloides cornutus* group sensu ZETTEL 2003)

Type species: *Haloveloides fluvialis* ZETTEL 2003 (by present designation)

Diagnosis: Eyes large, smallest eye distance less than half of head width (Figs 24, 25); length of antennomere 3 at least 1.5 times length of antennomere 2; protrochanter of male with subapical tubercle or edge (Figs 2, 3); profemur of male with proximal concavity (Fig. 3) and distinctly thickened beyond middle (except indistinct in *H. anderseni* and *H. pangantihoni* nov.sp., Fig. 2); protibia of male either with short row of 5-10 spinous hairs (in *H. cornutus* and *H. gapudi*) or with spine-like group of hairs subapically (in *H. anderseni*, *H. danpolhemi*, *H. fluvialis*, *H. pangantihoni* nov.sp., and *H. tuberculatus* nov.sp.; Figs 2, 3); metafemur of male not or weakly incrassate, with maximum width close to base (except in *H. anderseni* and *H. pangantihoni* nov.sp.); venter of male with medial hump, carina or tubercle posteriorly at most reaching sternite 5, sternite 6-7 with medial impression lined by erect hairs (Figs 8, 9); paramere curved, either short and with rounded apex (in *H. anderseni*, *H. danpolhemi*, *H. fluvialis*, *H. pangantihoni* nov.sp., and *H. tuberculatus* nov.sp.; Figs 14, 17) or medium sized and with acute apex (in *H. cornutus* and *H. gapudi*); tergite 8 of female without long, erect pilosity (Figs 28, 29).



Figs 8-11: Venter of males of *Haloveloides* (ventrolateral aspect, pilosity partly omitted): (**8**) *H. pangantihoni* nov.sp.; (**9**) *H. tuberculatus* nov.sp.; (**10**) *H. aradophili* nov.sp.; (**11**) *H. crassifemur* nov.sp.

Included species (7): *Haloveloides* (*Anderseniveloides*) *anderseni* ZETTEL 2003, *H.* (*Anderseniveloides*) *cornutus* ANDERSEN 1992, *H.* (*Anderseniveloides*) *danpolhemi* ANDERSEN 1992, *H.* (*Anderseniveloides*) *fluvialis* ZETTEL 2003, *H.* (*Anderseniveloides*) *gapudi* ZETTEL 2003, *H.* (*Anderseniveloides*) *pangantihoni* nov.sp., *H.* (*Anderseniveloides*) *tuberculatus* nov.sp.

Notes: Within this subgenus two distinct monophyletic groups are recognizable by the armature of protibia and the shape of the paramere: *Haloveloides cornutus* and *H. gapudi* belong to one, the other five species to another clade.

Distribution: Endemic to the Philippines.

Etymology: Named in respectful memento for the late Dr. Nils Møller Andersen who contributed most to the knowledge of marine Haloveliinae.

Heissius nov.subgen.

(= *Haloveloides femoralis* group sensu ZETTEL 2003)

Type species: *Haloveloides femoralis* ANDERSEN 1992 (by present designation)

Diagnosis: Eyes large, smallest eye distance slightly less than half of head width (Figs 26, 27); length of antennomere 3 more than 1.4 times length of antennomere 2; protrochanter of male without spine or tubercle (Figs 4, 5); profemur without proximal concavity, more or less thickened beyond middle, protibia of male with row of ca. 10-15 scattered spinous hairs (Figs 4, 5); metafemur of male moderately to strongly incrassate, with maximum width close to middle of length (Figs 6, 7); venter of male with medial swelling at most reaching sternite 4 (or posteriorly ill-defined) (Figs 10, 11); proctiger laterally with small lobes (e.g., Figs 19, 22); paramere short, straight, bar- or club-shaped (Figs 20, 23); tergite 8 of female with long erect pilosity anteromedially (Figs 30, 31).

Included species (5): *Haloveloides* (*Heissius*) *aradophili* nov.sp., *H.* (*Heissius*) *crassifemur* nov.sp., *H.* (*Heissius*) *femoralis* ANDERSEN 1992, *H.* (*Heissius*) *hirsutus* ZETTEL 2003, *H.* (*Heissius*) *lansburyi* ZETTEL 1998.

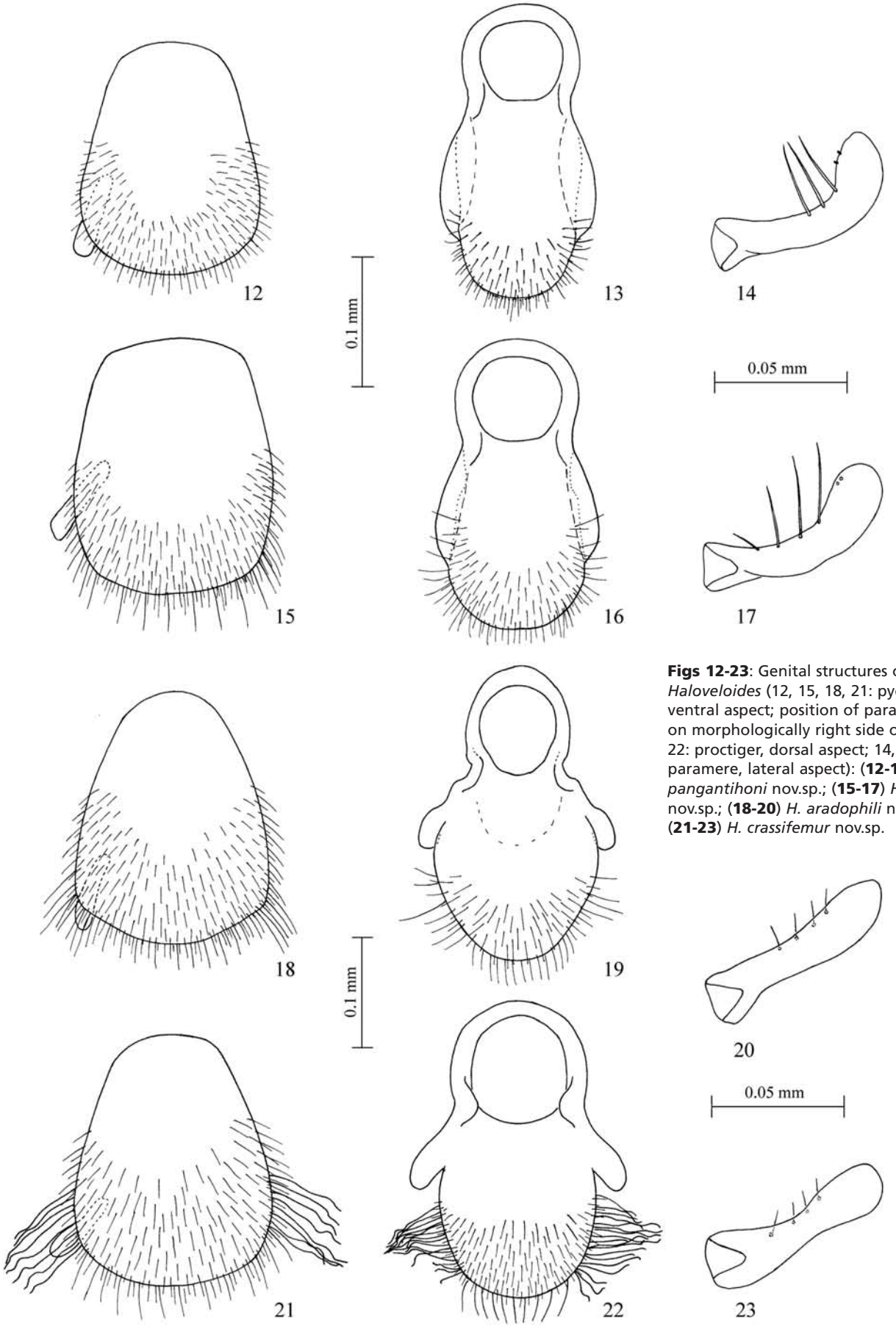
Distribution: Endemic to the Philippines.

Etymology: Named in honour of the famous Austrian heteropterologist Prof. Dr. Ernst Heiss on the occasion of his 70th birthday.

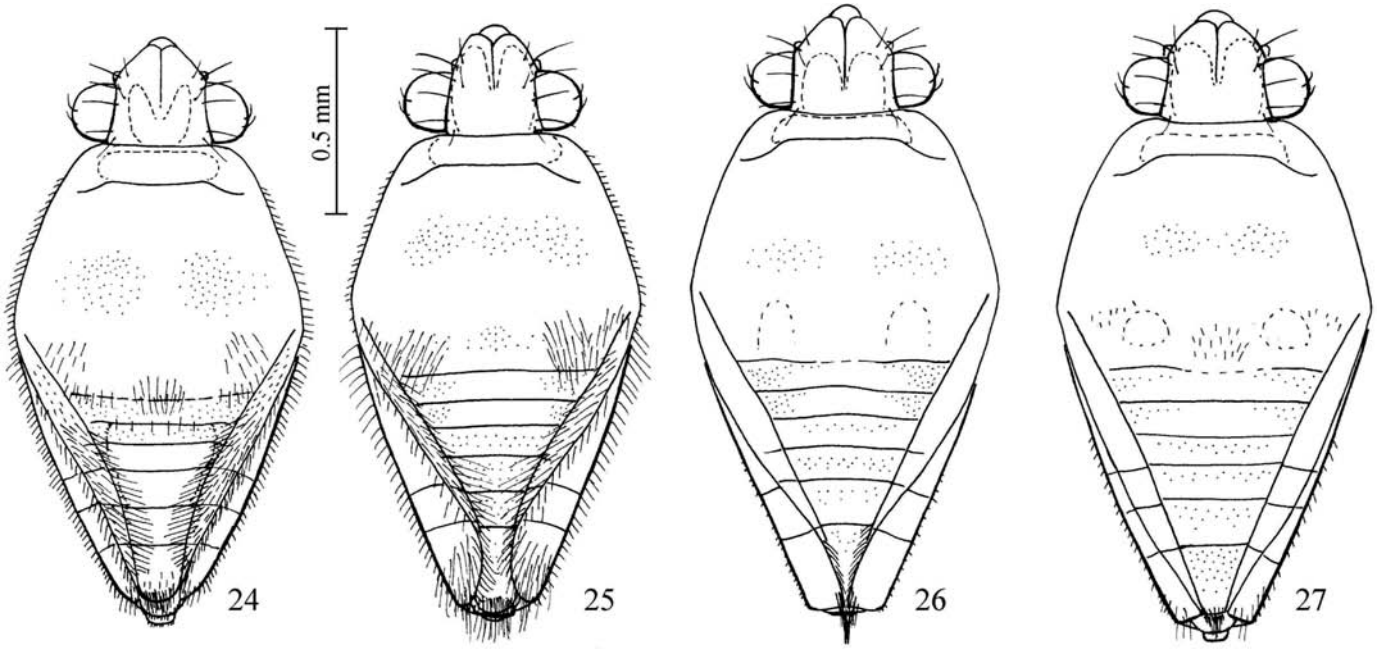
II. Description of new species

Haloveloides (*Anderseniveloides*) *pangantihoni* nov.sp. (Figs 2, 8, 12-14, 24, 28)

Holotype (♂): "Philippinen: Surigao d.S.\ Tago, Duot Suong\ 23.12.2004, leg. C.\ Pangantihon (P131)" (USC); paratypes: 3♂♂, 5♀♀, same label data as holotype (CZW, USC).



Figs 12-23: Genital structures of males of *Haloveloides* (12, 15, 18, 21: pygophore, ventral aspect; position of paramere indicated on morphologically right side only; 13, 16, 19, 22: proctiger, dorsal aspect; 14, 17, 20, 23: left paramere, lateral aspect): (**12-14**) *H. pangantihoni* nov.sp.; (**15-17**) *H. tuberculatus* nov.sp.; (**18-20**) *H. aradophili* nov.sp.; (**21-23**) *H. crassifemur* nov.sp.



Figs 24-27: Dorsal aspect of females of *Haloveloides* (all appendages removed, pilosity partly omitted): (**24**) *H. pangantihoni* nov.sp.; (**25**) *H. tuberculatus* nov.sp.; (**26**) *H. aradophili* nov.sp.; (**27**) *H. crassifemur* nov.sp.

Description of male: Size: Body length 1.48 (1.47-1.55) mm; body width 0.63 mm; length of mesotibia 0.99 mm; length of second antennomere 0.21 mm.

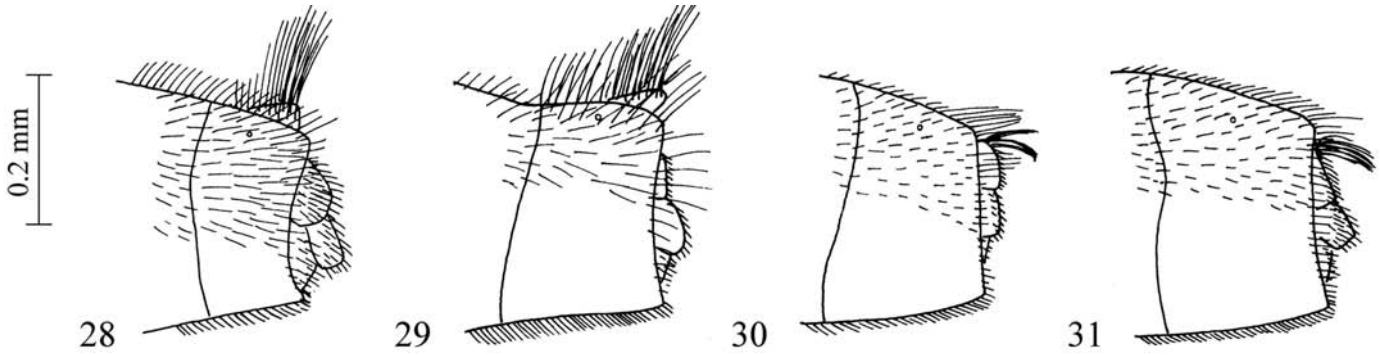
Colour: Blackish; head dorsally yellowish to brownish, anteriorly, along inner eye margins and midline infuscated; medial area (except anterior margin) of pronotum yellowish; sides of thorax, connexiva, and tergite 7 brown; ventral sides of head, prosternum, inverted v-shaped area on mesosternum, and medial parts of sternites 3-7 yellowish; antenna and legs dark brown to blackish, but base of antennomere 1, coxae, trochanters (except mesotrochanter apically), and bases of pro- and mesofemur yellowish; pubescence greyish, with distinct patches of dense silverish pubescence medially on mesonotum and laterally (more or less medially confluent) on tergites 2-3; indistinct scattered silverish pubescence on other dorsal sclerites of thorax and abdomen present.

Structural characteristics: Body fusiform; head length about 0.6 times head width across eyes; eye width 0.26 times head width; relative lengths of antennomeres (antennomere 2 = 1): 1.5 : 1 : 1.8 : 1.7; antennomere 1 slightly longer than head and approximately as wide as antennomere 4; relative lengths of leg segments (mesotibia = 100): FL: Fe 49, Ti 47, Ta 4+14; ML: Fe 131, Ti 100, Ta 45+32; HL: Fe 72, Ti 60, Ta 6+14; foreleg (Fig. 2): protrochanter subapically with small edge, but without distinct tubercle; profemur with proximal concavity indistinct, with maximum width in middle of length; protibia subapically with distinct spine-like structure consisting of spinous setae; metafemur slightly incrassate, with maximal width in basal third and hardly wider than mesofemur (ca. 1.1); venter (Fig. 8) with high and long hump medially on metasternum, with smaller convexity on sternite 2, and with median impression on sternites 4-8; mesosternum posteriorly, metasternum and sternite 2 medially with long, greyish yellow, posteroventrad directed pubescence; sternites 3-7 laterally with shorter, posteroventrad to ventrad directed pubescence; pygophore (Fig. 12) ovate, posterocaudally without modified pilosity; proctiger (Fig. 13) elongate, with narrow laminate sides (dotted line in Fig. 13); paramere (Fig. 14) short, relatively slender, curved, with blunt apex, cucumber-shaped, apically slightly widened, with long setae.

Description of female: Size: Body length 1.70 (1.67-1.74) mm; body width 0.84 mm; length of mesotibia 1.15 mm; length of second antennomere 0.19 mm.

Colour as in male, except profemur yellowish with infuscated apex and whole venter light; pubescence similar as in male, except mesonotum with pair of circular, silverish hair patches; long pilosity described below.

Structural characteristics: Body rhomboid, abdomen relatively broad (Fig. 24);



Figs 28-31: Terminalia of females of *Haloveloides* (lateral aspect, pilosity partly omitted, areas with silverish pilosity dotted): (**28**) *H. pangantihoni* nov.sp.; (**29**) *H. tuberculatus* nov.sp.; (**30**) *H. aradophili* nov.sp.; (**31**) *H. crassifemur* nov.sp.

third antennomere 1.6 times as long as antennomere 2; relative lengths of leg segments (mesotibia = 100): FL: Fe 45, Ti 42, Ta 4+13; ML: Fe 125, Ti 100, Ta 46+33; HL: Fe 64, Ti 54, Ta 5+14; legs without modifications; abdominal venter simple; connexiva evenly converging until segment 7, terminating in slightly rounded apex; laterotergites 2-4 sloping dorsolaterad, 5-7 subvertical, 4-7 with very long, black, mediad directed hairs; tergites 1-3 medially slightly convex, tergite 1 with some very long, posterocaudad directed setae; tergites 5-6 shallowly impressed; tergite 7 upcurved, with rounded hind margin set with numerous long, black, dorsad directed hairs (Fig. 28); metanotum laterally and sternites 2-5 dorsally with semierect pilosity (Fig. 24); tergite 8 and proctiger only with short pilosity, directed posteroventrad, covering major part of gonocoxae (Fig. 28).

Comparative notes: *Haloveloides pangantihoni* nov.sp. is closely related to *H. anderseni*. Males differ only in minor details of the abdominal venter, especially in the longer and more strongly swollen metasternum of *H. pangantihoni* nov.sp. (Fig. 8). Females of *H. pangantihoni* nov.sp. can be easily distinguished from those of *H. anderseni* by the presence of a hair tuft medially on tergite 1, relatively long pilosity on laterotergites 4-6, and the more upright directed hair tuft on tergite 7 (Figs 24, 28).

Distribution: Northeastern coast of Mindanao (Surigao del Sur Province).

Etymology: This species is named for Clister V. Pangantihon, BSc student of Biology in the University of San Carlos, Cebu City, who discovered this species and helped the author a lot during field work in the Philippines.

Haloveloides (*Anderseniveloides*) *tuberculatus* nov.sp. (Figs 3, 9, 15-17, 25, 29)

Holotype (♂): "Philippinen: Polillo Is.\ Panuculan, Ngalan\ mangrove, 16.2.2004, leg.\ Zettel & Pangantihon (370a)" (UPLB); paratypes: 13 ♂♂, 66 ♀♀, same label data as holotype (CZW, MTMB, MNHN, NHMW, OÖLM, UPLB, USC, ZMUC, ZRCS).

Description of male: Size: Body length 1.60 (1.54-1.61) mm; body width 0.65 mm; length of mesotibia 1.24 mm; length of second antennomere 0.26 mm.

Colour: Blackish; head dorsally yellowish to light brown, anteriorly, along inner eye margins and midline infuscated; medial area (except anterior margin) of pronotum yellowish; sides of thorax, connexiva, and tergite 7 orange brown; ventral sides mainly yellowish, but metasternum, sides of mesosternum and tergites 2-6 dark brown, mesosternum posteromedially variably yellow to brown; antenna and legs dark brown to blackish, but base of antennomere 1, coxae, trochanters (except mesotrochanter apically), and bases of pro- and mesofemur yellowish; pubescence greyish, with distinct patches of dense silverish pubescence medially on mesonotum and laterally (more or less medially confluent) on tergites 2-3; indistinct scattered silverish pubescence on other dorsal sclerites of thorax and abdomen present.

Structural characteristics: Body fusiform; head length about 0.65 times head width across eyes; eye width 0.25 times head width; relative lengths of antennomeres (antennomere 2 = 1): 1.3 : 1 : 1.75 : 1.6; antennomere 1 slightly longer than head and slightly thinner than hardly thickened antennomere 4; relative lengths of leg segments (mesotibia = 100): FL: Fe 47, Ti 44, Ta 4+12; ML: Fe 128, Ti 100, Ta 42+29; HL:

Fe 69, Ti 58, Ta 6+13; foreleg (Fig. 3): protrochanter subapically with short, distinct process; profemur with proximal concavity, with maximum width beyond middle of length; protibia subapically with distinct spine-like structure consisting of spinous bristles; metafemur hardly incrassate, with maximal width in basal third and slightly smaller than maximum width of mesofemur (ca. 0.95); venter (Fig. 9) with huge, rounded hump medially on metasternum, median carina on sternites 2-4, and median impression on sternites 5-8, which very shallow on posterior half of sternite 7 and on segment 8; mesosternum posteriorly, metasternum and sternites 2 and 3 medially with long, greyish yellow, posteroventrad directed pubescence; sternites 2-8 laterally with shorter, sparse, ventrad directed pubescence; pygophore (Fig. 15) ovate, in posterocaudal corners without modified pilosity; proctiger (Fig. 16) elongate, with laminate sides (dotted line in Fig. 16); paramere (Fig. 17) short, relatively slender, strongly upcurved, with blunt apex, with long setae.

Description of female: Size: Body length 1.76 (1.75-1.86) mm; body width 0.84 mm; length of mesotibia 1.34 mm; length of second antennomere 0.21 mm.

Colour as in male, except profemur yellowish with infuscated apex, orange lateral stripe wider, and abdominal segment 7 usually darker and contrasting with segment 6; pubescence similar as in male, except mesonotum with pair of circular, silverish hair patches (in some specimens medially confluent); long pilosity described below.

Structural characteristics: Body rhomboid, abdomen relatively broad (Fig. 25); third antennomere 1.6 times as long as antennomere 2; relative lengths of leg segments (mesotibia = 100): FL: Fe 44, Ti 41, Ta 4+13; ML: Fe 123, Ti 100, Ta 42+29; HL: Fe 64, Ti 51, Ta 5+13; legs without modifications; abdominal venter simple; connexiva evenly converging until segments 5, strongly bent mesad on segment 6, and less convergent on segment 7, terminating in weakly rounded apex; laterotergites 2-5 sloping (latero-)dorsad, 6 and 7 mediodorsad, 6 and 7 with long, black, mediocaudad directed pilosity; metanotum and tergites 1-3 without median ridge, tergite 1 medially without long hairs; tergites 5-6 shallowly impressed; tergite 7 upcurved, with rounded hind margin set with numerous long, black, dorsad directed hairs (Fig. 29); metanotum laterally and sternites 2-5 dorsally with semierect pilosity (Fig. 25); sternite 7 lateroposteriorly with long, black, dorsad directed pilosity; tergite 8 and proctiger only with short pilosity, both directed posteroventrad, covering major part of gonocoxae (Fig. 29).

Comparative notes: From all species of the subgenus, *H. tuberculatus* nov.sp. can be distinguished by the huge hump on the metasternum of the male (Fig. 9). Species with a similar, but smaller hump, *H. anderseni* and *H. pangantihoni* nov.sp., can be distinguished by reduction of the process on the protrochanter, which is strongly developed in *H. tuberculatus* nov.sp., and by a hardly recognizable concavity at the base of the profemur (for both characteristics see Figs 2 and 3). Females of *H. tuberculatus* nov.sp. can be distinguished from those of *H. anderseni* and *H. pangantihoni* nov.sp. by long erect pilosity lateroposteriorly on sternite 7 (Fig. 29), from *H. pangantihoni* nov.sp. also by absence of long hairs on tergite 1 (Fig. 25). *Haloveloides tuberculatus* nov.sp. is larger than these two species.

Distribution: Polillo Island.

Habitat: Collected in a river mangrove area close to the mouth of the stream.

Etymology: This species is named for the prominent tubercle on the abdominal venter of the male.

Haloveloides (*Heissius*) *aradophili* nov.sp. (Figs 1, 4, 6, 10, 18-20, 26, 30)

Holotype (♂): "Philippines: Siquijor\ E of Lazi, Simacolong -\ Nangerong, coast,22.10.\ 2004, l.Pangantihon (P394)" (USC); Paratypes: 3♂♂, 15♀♀, same label data as holotype (CZW, USC); 10♀♀ "Philippines: Siquijor\ E of Lazi, Simacolong -\ Nangerong, coast,22.10.\ 2004, leg. Zettel (394)" (CHI, NHMW, UPLB, ZMUC).

Description of male: Size: Body length 1.59 (1.58-1.64) mm; body width 0.70 mm; length of mesotibia 1.22 mm; length of second antennomere 0.26 mm.

Colour: Blackish; head dorsally brownish, but blackish anteriorly and along inner

eye margins; medial area (except anterior margin) of pronotum yellowish; sides of thorax dark brownish; ventral sides of head, of prothorax, and of all acetabula yellowish; mesosternum, metasternum, and abdominal sternites brown; antenna and legs blackish brown, except base of antennomere 1, coxae, and trochanters (mesotrochanter apically infuscated) yellow; pubescence brownish, with distinct patches of dense silverish pubescence medially on mesonotum and laterally (more or less confluent) on tergites 2-3, and indistinct scattered silverish or golden pubescence on pronotum and tergites 4-7.

Structural characteristics: Body fusiform (Fig. 1); head length about 0.65 times head width across eyes; eye width 0.26 times head width; relative lengths of antennomeres (antennomere 2 = 1): 1.25 : 1 : 1.5 : 1.4; antennomere 1 as long as head length and as wide as antennomere 4; relative lengths of leg segments (mesotibia = 100): FL: Fe 48, Ti 41, Ta 3+12; ML: Fe 123, Ti 100, Ta 41+26; HL: Fe 67, Ti 54, Ta 6+14; all femora with inconspicuous, relatively short pilosity; foreleg (Fig. 4): protrochanter without modification; profemur without proximal concavity; protibia in distal half with (often interrupted) row of approximately 11-16 spinous bristles; mesofemur basally moderately incrassate; metafemur (Fig. 6) moderately incrassate, with maximal width close to middle and hardly larger than maximum width of mesofemur (ca. 1.05); venter (Fig. 10) with broad medial tumescence from mesosternum to sternite 4, bearing moderately long, golden, posteroventrad directed setae; sternites 5-7 with broad, shallow groove, sternite 8 with narrower, more distinct, shining impression; pygophore (Fig. 18) ovate, posterolaterally with simple, straight setae; proctiger (Fig. 19) slender, with small, curved processes laterally; paramere (Fig. 20) very small, short, club-shaped, distally slightly widened, apically rounded, with short setae.

Description of female: Size: Body length 1.86 (1.78-1.92) mm; body width 0.90 mm; length of mesotibia 1.42 mm; length of second antennomere 0.25 mm.

Colour as in male, except profemur yellowish brown and orange brown lateral stripe more distinct and extended onto connexiva until segment 7; pubescence similar as in male, except scattered silverish pubescence on mesonotum restricted to pair of patches and on tergites 4-7 reduced; long pilosity described below.

Structural characteristics: body rhomboid, relatively slender (Fig. 26); third antennomere 1.4 times as long as antennomere 2; relative lengths of leg segments (mesotibia = 100): FL: Fe 43, Ti 39, Ta 3+12; ML: Fe 117, Ti 100, Ta 45+28; HL: Fe 60, Ti 51, Ta 6+14; legs without modifications; abdominal venter simple; connexiva strongly converging, slightly more on segments 6 and 7 (Fig. 26); laterotergites 2-5 sloping laterad, 6-7 vertical, all without obvious erect pilosity; sternite 7 along lateroposterior margin with some long hairs, especially on slightly rounded corner; tergite 7 posteromedially with distinct tuft of long, black, posterodorsad directed setae; tergite 8 with relatively short, black, erect pilosity anteromedially (Fig. 30); abdomen otherwise without any long pilosity; in resting position tergite 8 and proctiger directed ventrad, covering major part of gonocoxae (Fig. 30).

Comparative notes: The female of *H. aradophili* nov.sp. is extremely similar with *H. femoralis*, but the structures of the male, especially the weakly incrassate metafemur (Fig. 6), are most similar with those of *H. lansburyi*. The ratio of lengths of antennomeres 3 : 2 is slightly smaller than in other species of the subgenus *Heissius*. *Haloveloides aradophili* nov.sp. is similar in size with *H. lansburyi* and slightly smaller than the other species of *Heissius*.

Distribution: Siquijor.

Habitat: Collected in the lowest section of a small stream lined with mangroves and nipa palms (*Nypa fruticans* WURMB.).

Etymology: The species epithet is a dedication to Prof. Dr. Ernst Heiss (Innsbruck), expert for and lover of flat bugs (Aradidae).

Haloveloides (*Heissius*) *crassifemur* nov.sp. (Figs 5, 7, 11, 21-23, 27, 31)

Holotype (♂): Samar: "Philippinen: N. Samar\ San Joaquin, stream\ near sea, 4.3.2003\ leg. H. Zettel (345a)" (UPLB); Paratypes: 25 ♂♂, 40 ♀♀, same label data as holotype (CZW, UPLB, NHMW, ZMUC,

Fig. 32: The lowest section of a stream (at low tide) at Poblacion, Boljoon, Cebu Island, a characteristic habitat of *H. femoralis*. Specimens were collected in huge numbers in shaded places like in the small channel indicated by an arrow.

USC); 17 ♂♂, 8 ♀♀ "Philippinen: N. Samar\ San Joaquin, stream\ near sea, 1.3.2004\ leg. H. Zettel (377a)" (CZW, UPLB, NHMW).

Description of male: Size: Body length 1.82 (1.77-1.88) mm; body width 0.78 mm; length of mesotibia 1.29 mm; length of second antennomere 0.30 mm.

Colour: Blackish; head posterodorsally brown; medial area of pronotum (except anterior margin) yellowish; sides of thorax more or less brownish; ventral sides of head, of prothorax, and of all acetabula yellowish; mesosternum, metasternum, and abdominal sternites brownish, medial area of mesosternum lighter than other parts; antenna and legs blackish brown, except base of antennomere 1, coxae, and trochanters (apically infuscated) yellow; pubescence brownish, with distinct patches of dense silverish pubescence medially on mesonotum and on tergites 2-3, and some scattered silverish or golden pubescence on pronotum, tergites 4-7, and laterotergites.

Structural characteristics: Body fusiform; head length about 0.65 times head width across eyes; eye width 0.24 times head width; relative lengths of antennomeres (antennomere 2 = 1): 1.3 : 1 : 1.5 : 1.5; antennomere 1 slightly longer than head and as wide as antennomere 4; relative lengths of leg segments (mesotibia = 100): FL: Fe 51, Ti 42, Ta 4+12; ML: Fe 121, Ti 100, Ta 40+27; HL: Fe 66, Ti 54, Ta 8+15; foreleg (Fig. 5): protrochanter without modification; profemur incrassate, without proximal concavity, ventrally with obvious, relatively long (maximum 0.3 times femur width), erect pilosity; protibia in distal third with (often interrupted) row of approximately 10-13 spinous setae; mesofemur basally incrassate, close to base with moderately long (maximum 0.25 times femur width) erect pilosity continuously becoming shorter towards apex; metafemur (Fig. 7) very strongly incrassate, with maximal width close to middle and larger than maximum width of mesofemur (ca. 1.3), with relatively short, suberect pilosity; venter (Fig. 11) with broad medial tumescence from mesosternum to sternite 5 bearing long, golden, posteroventrad directed pilosity; sternites 6-7 hardly impressed, sternite 8 with shallow, shining impression; pygophore (Fig. 21) ovate, in posterolateral corners with distally undulate setae; proctiger (Fig. 22) slender, at sides with small, curved processes, distolaterally with long, laterad directed, distally slightly undulate setae; paramere (Fig. 23) small, short, club-shaped, distally slightly widened, apically rounded, with short setae.

Description of female: Size: Body length 1.90 (1.84-1.94) mm; body width 0.91 mm; length of mesotibia 1.40 mm; length of second antennomere 0.24 mm.

Colour as in male, except profemur yellowish brown and orange brown lateral stripe more distinct and extended onto connexiva until segment 7; pubescence similar as in male; long pilosity described below.

Structural characteristics: body rhomboid, relatively slender (Fig. 27); third antennomere 1.45 times as long as antennomere 2; relative lengths of leg segments (mesotibia = 100): FL: Fe 44, Ti 39, Ta 4+12; ML: Fe 114, Ti 100, Ta 43+25; HL: Fe 60, Ti 49, Ta 6+14; legs without modifications; abdominal venter simple; connexiva strongly, but evenly converging until right-angled apex (Fig. 27); laterotergites 2-5 often slightly sloping laterad, more rarely vertical, 6-7 usually vertical or rarely sloping mediodorsad, all without obvious erect pilosity; sternite 7 along lateroposterior margin with some long hairs; tergite 7 posteromedially with indistinct tuft of short, black, posterodorsad directed hairs; tergite 8 with relatively short, black, erect pilosity anteromedially (Fig. 31);

abdomen otherwise without any long pilosity; tergite 8 and proctiger directed ventrad, covering major part of gonocoxae (Fig. 31).

Comparative notes: *Haloveloides crassifemur* nov.sp. differs from other species of the subgenus *Heissius* in the extremely enlarged metafemur of the male (Fig. 7), in the relatively short setae on the apex of the abdomen of the female (Fig. 27), and in the less developed metallic (golden or silverish) pilosity of the dorsum. The posterolateral pilosity of the pygophore is undulate (Fig. 21); this distinct characteristic sets the new species close with *H. hirsutus*. The long pilosity of the male of *H. crassifemur* nov.sp. is intermediate between *H. femoralis* and *H. hirsutus*: The long pilosity of the femora is shorter than in *H. hirsutus*, but longer than in the other species; the pilosity of the venter is much longer than in *H. femoralis*, but shorter than in *H. hirsutus*, especially on the anterior part of the mesosternum. In size, *H. crassifemur* nov.sp. is similar with *H. lansburyi* and *H. femoralis*, but smaller than *H. hirsutus* and (in males) larger than *H. aradophili* nov.sp.

Distribution: Northern Samar.

Habitat: Found in large numbers in several quiet bays in the lowest section of a stream flowing through agricultural land; the sites were influenced by the tide.

Etymology: The epithet, used as a noun in apposition, refers to the incrassate metafemur of the male.

III. Additional records of described species

Haloveloides (s.str.) *christyae* Zettel 1998

Additional material examined: 3♂♂, 7♀♀ "Philippinen: [Luzon] Ilocos Norte\ Currimao, sea coast, tidal\ pools betw. high rocks\ 30.10.2002, lg.Zettel (321b)" (NHMW, UPLB); 5♀♀ same data except "321d" (NHMW); Mindoro: 2♂♂, 2♀♀ "OR.MINDORO: Puerto-Galera\ Sabang Area: seashore\ 15.6.2001/VP-Gapud" (CVPG); Bantayan: 8♂♂, 4♀♀ "Philippines: Bantayan Is.\ coast W of Sta. Fe\ 16.10.2004\ leg. H. Zettel (383)" (NHMW, UPLB); 4♂♂, 2♀♀ "Philippines: Bantayan Is.\ coast W of Sta. Fe\ 16.10.2004, leg. C.\ Pangantihon (P383)" (CZW); 1♂, 1♀ "Philippines: Bantayan Is.\ coast at Biasdos, ca. 5km W Sta. Fe, 17.10.2004\ leg. H. Zettel (384)" (NHMW); 2♂♂, 2♀♀ "Philippines: Bantayan Is.\ coast at Sulangan\ 17.10.2004\ leg. H. Zettel (385)" (NHMW); 1♀ "Philippines: Bantayan Is.\ coast at Sulangan\ 17.10.2004, leg.\ C. Pangantihon (P385)" (CZW).

Habitat notes: Specimens from Currimao in Ilocos Norte have been collected in shaded areas between high rocks, those from Bantayan at the shaded edge of coral rocks.

Distribution: Mindoro, Coron, Burias (Zettel 1998, 2003). The record from Burias has been doubted by Zettel (2003), but seems possible after first findings of the species from the Central Visayas. First records from Luzon and Bantayan!

Haloveloides (*Heissius*) *femoralis* Andersen 1992 (Fig. 32)

Additional material examined: numerous ♂♂ and ♀♀ "Philippinen: Cebu,S Badian\ Matutinao, Kawasan,\ mangrove, 11.11.2003\ leg. H. Zettel (352b)" (MNHN, NHMW, OÖLM, USC, UPLB); 1♂, 1♀ "Philippinen: Cebu\ Malapuyug, Monteneza\ 0-10 m, 13.11.2003\ leg. H. Zettel (353)" (NHMW); 4♂♂, 1♀ "Philippinen: Cebu\ Alegria, stream\ 0-3 m, 13.11.2003\ leg. H. Zettel (354)" (NHMW, UPLB); 2♂♂, 3♀♀ "Philippinen: Cebu\ Alegria, stream\ 0-3 m, 13.11.2003\ leg. Pangantihon (P354)" (CZW); 64♂♂, 56♀♀ "Philippines: Cebu, Argao\ Simala, first large river\ N of town, 6.12.2005\ leg. H. Zettel (439)" (NHMW, UPLB, USC, OÖLM); 72♂♂, 104♀♀ "Philippines: Cebu, Boljoon\ (Pobl.), river at Lusapon\ Bridge, intertidal zone, 5.12.\ 2005, leg. H. Zettel (437a)" (NHMW, UPLB, USC).

Habitat notes: On Cebu specimens have been collected in the intertidal zone of several streams (e.g., Fig. 32).

Distribution: Endemic to the Philippines; so far recorded from Palawan and Cebu (Andersen 1992; Zettel 1998, and this study).

Discussion

Results of the Philippine Water Bug Inventory Project (Gapud & Zettel 1999) yielded a surprisingly high number of undescribed species of *Haloveloides*. Since Andersen's (1992) study, only in the Philippines species have been discovered (Zettel 1998, 2003, and this study). This may re-

flect the intensive and systematic field work in this country, or – more likely – possible origin and radiation of the genus within the Philippine Archipelago. The latter hypothesis is supported by the fact, that only coastal and relatively widely distributed species of the subgenus *Haloveloides* s.str. have ever been reported from other countries. However, it would be interesting to survey habitats in nearby regions like northern Borneo or Sulawesi, which are similar to those where species of *Anderseniveloides* and *Heissius* have been collected in the Philippines. Supplementary field work is also required in the Philippines. *Haloveloides* (*Heissius*) *femoralis* is so far the only species of the subgenera *Heissius* and *Anderseniveloides*, which has been recorded from two islands and six localities; all the other eleven species are only known from their type locality. More distribution data could provide information on aberrant distribution patterns in these two subgenera, which have totally different habitat preferences than other Veliidae.

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Zusammenfassung

Die marine Veliiden-Gattung *Haloveloides* ANDERSEN 1992 wird in drei Subgenera aufgespaltet. *Anderseniveloides* nov.subgen. (Typusart: *H. fluvialis* ZETTEL 2003) wird für jene Arten errichtet, welche nach ZETTEL (2003) in der *Haloveloides cornutus*-Gruppe gestanden sind, und *Heissius* nov.subgen. (Typusart: *H. femoralis* ANDERSEN 1992) für solche, die bisher zur *Haloveloides femoralis*-Gruppe (sensu ZETTEL 2003) gehört haben. Vier Arten von den Philippinen werden neu beschrieben: *Haloveloides* (*Anderseniveloides*) *pangantihoni* nov.sp. aus dem nordöstlichen Mindanao, *H.* (*Anderseniveloides*) *tuberculatus* nov.sp. von Polillo, *H.* (*Heissius*) *aradophili* nov.sp. von Siquijor und *Haloveloides* (*Heissius*) *crassifemur* nov.sp. von Samar. Neue Nachweise von *H.* (s.str.) *christyae* ZETTEL 1998 und *H.* (*Heissius*) *femoralis* ANDERSEN 1992 werden erbracht.

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