

# *Amemboa*

News and Results on Heteroptera of Thailand

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## Editorial preface

The edition of a newsletter depends upon many persons; from the authors who write the articles, to the assistants who make the copies. Especially I want to thank Prof. Carl W. Schaefer (Storrs) who is absolutely essential for AMEMBOA; not only does he make the linguistic proofs, he also enables the distribution together with The Heteropterists' Newsletter.

After the first issue of AMEMBOA, I received several responses, fortunately mostly positive. Nils M. Andersen (Copenhagen) informed me, that the name "Amemboa" is the Japanese word for "bug"; unintentionally, the title of this newsletter has a broader meaning. A few corrections were made by John T. Polhemus, of which an overlooked record of the marine family Hermatobatidae for Thailand (Gerromorpha) is most important. Prof. Jerzy Lis (Opole) is willing to work on the Cydnidae of Thailand (see below).

Generally the establishment of the monographs "Heteroptera of Thailand" (HoT) makes good progress, and Pingping Chen can present the scope and contributors for the first two volumes, which mainly deal with the "aquatics". The work of finding contributors for the "terrestrials" is steadily continued by Pingping Chen.

The most stupid mistake in AMEMBOA 1 is some wrong references to figures in the Gerromorpha key by Chen & Zettel: Because of a "last minute" change of two figures for layout reasons, the text references to figures 9 and 10 have to be changed!

Another, more organizational, mistake in the first issue was, that we did not explain carefully enough the separation between 1) the newsletter "AMEMBOA", 2) the monographs "Heteroptera of Thailand" (HoT), edited by Ping-ping Chen, and 3) faunistical projects involved in both: The "list of collaborators" (Amemboa 1: 3) contains the authors of the monographs "Heteroptera of Thailand" only, but not the many other people involved in the projects, nor the many local scientists who enable it.

It turned out that the illustrated keys to families published in issue 1 are also useful for scientists from other Oriental countries (e.g. from Nepal and Malaysia). For this reason I plan to focus the content of the newsletter more in this direction.

Herbert Zettel

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**Imprint:** "Amemboa" is a newsletter for taxonomical, systematical, and faunistical co-operative works on Thai Heteroptera. Editor: Dr. Herbert Zettel, Naturhistorisches Museum Wien, 2. Zoologische Abteilung, Burgring 7, A-1014 Vienna, Austria. Proof reading: Prof. Dr. C. W. Schaefer, Storrs, USA. Published by Naturhistorisches Museum Wien. © Naturhistorisches Museum Wien, 1998. Authors are fully responsible for the content of their papers.

## Plan and process of the monographs "Heteroptera of Thailand" (HoT)

The process of the "terrestrial parts" is still slow, mainly because of lack of material, but the "wet part" looks quite promising. In the following a list of chapters with contributors is presented for Vol. 1 (Nepomorpha and Leptopodomorpha) and Vol. 2 (Gerromorpha) (if there are more than one name mentioned, the first author may not be fixed yet), which is followed by a new list of contributors for terrestrial Heteroptera.

### Volumn 1:

#### NEPOMORPHA

General Introduction *by N. Nieser*  
 Belostomatidae *by N. Nieser*  
 Nepidae *by J.T. Polhemus & N. Nieser*  
 Gelastocoridae *by N. Nieser & P.P. Chen*  
 Ochteridae *by N. Nieser & P.P. Chen*  
 Corixidae *by N. Nieser*  
 Micronectidae *by N. Nieser*  
 Naucoridae *by R.W. Sites & D.A. Polhemus*  
 Aphelocheiridae *by D.A. Polhemus*  
 Notonectidae *by N. Nieser*  
 Pleidae *by N. Nieser*  
 Helotrephidae *by H. Zettel*

#### LEPTOPODOMORPHA

General Introduction *by J.T. Polhemus*  
 Leptopodidae *by J.T. Polhemus*  
 Saldidae *by J.T. Polhemus*

### Other volumns:

Brailovsky, H.: Coreidae partim (Hydarini & Colpurini)  
 Bu, W.J.: Anthocoridae  
 Cherot, F.: Miridae (partim)  
 Heiss, E.: Aradidae  
 Kerzhner, I.M.: Nabidae  
 Lis, J.A.: Dinodoridae, Cydnidae  
 Lis, B.: Tingidae partim (Cantacaderinae)  
 Schaefer, C.W.: Pyrrhocoridae, Largidae, Alydidae  
 Zheng, L.Y.: Acanthosomatidae, Lygaeidae, Malcidae, Pentatomidae, Plataspidae, Urostylidae, Miridae (partim)

### Volumn 2:

#### GERROMORPHA

General Introduction *by N.M. Andersen*  
 Mesoveliidae *by P.P. Chen*  
 Hebridae *by H. Zettel*  
 Hydrometridae *by P.P. Chen & H. Zettel*  
 Veliidae:  
 General Introduction *by H. Zettel*  
 Microveliinae *by Ch. Hecher & H. Zettel*  
 Haloveliinae *by N.M. Andersen*  
 Perittopinae *by H. Zettel & Ch. Hecher*  
 Rhagoveliinae *by J.T. Polhemus & H. Zettel*  
 Veliinae *by P.P. Chen*  
 Gerridae:  
 General Introduction *by P.P. Chen*  
 Rhagadotarsinae *by P.P. Chen*  
 Trepobatinae *by P.P. Chen*  
 Gerrinae *by P.P. Chen*  
 Eotrechinae *by P.P. Chen & H. Zettel*  
 Cylindrostethinae *by P.P. Chen*  
 Ptilomerinae *by N.M. Andersen*  
 Halobatinae *by N.M. Andersen & P.P. Chen*  
 Hermatobatidae *by N.M. Andersen*

Pingping Chen, chief editor of HoT

# Key to the genera of Veliidae (Gerromorpha) of Thailand and adjacent countries, with a check-list of genera and species known from Thailand

by Christine Hecher

**Abstract:** An illustrated key for the sixteen genera of Veliidae occurring in Thailand and adjacent countries is provided. A check-list of the thirteen genera and eighteen described and several undescribed species known from Thailand is added.

The Veliidae is a large and diverse family of the Gerromorpha. Species of the Veliidae are characterized by the claws inserting before the apex of the last tarsal segment (also in Gerridae), by the impressed line on the vertex, by the grasping comb on the fore tibia of males, and by the row of setae on the middle tibia (ANDERSEN 1982). CHEN & ZETTEL (1996, Amemboa 1) provide a key to the families of Gerromorpha occurring in Thailand, which is useful to separate Veliidae from other water striders.

In Thailand five of the six subfamilies of Veliidae are represented: Perittopinae and Rhagoveliinae each with only one genus, Haloveliinae and Veliinae each with three genera, and Microveliinae with five genera (see check-list). The occurrence of further three genera (known from West Malaysia or Myanmar) is probable.

As the Veliidae is rather diverse, species of this family are found in very different habitats: Most species inhabit the surface of running and stagnant freshwater, brackish or sea water. A few are terrestrial (hygropetric). Detailed descriptions of the habitat preferences of the subfamilies are given by ANDERSEN (1982).

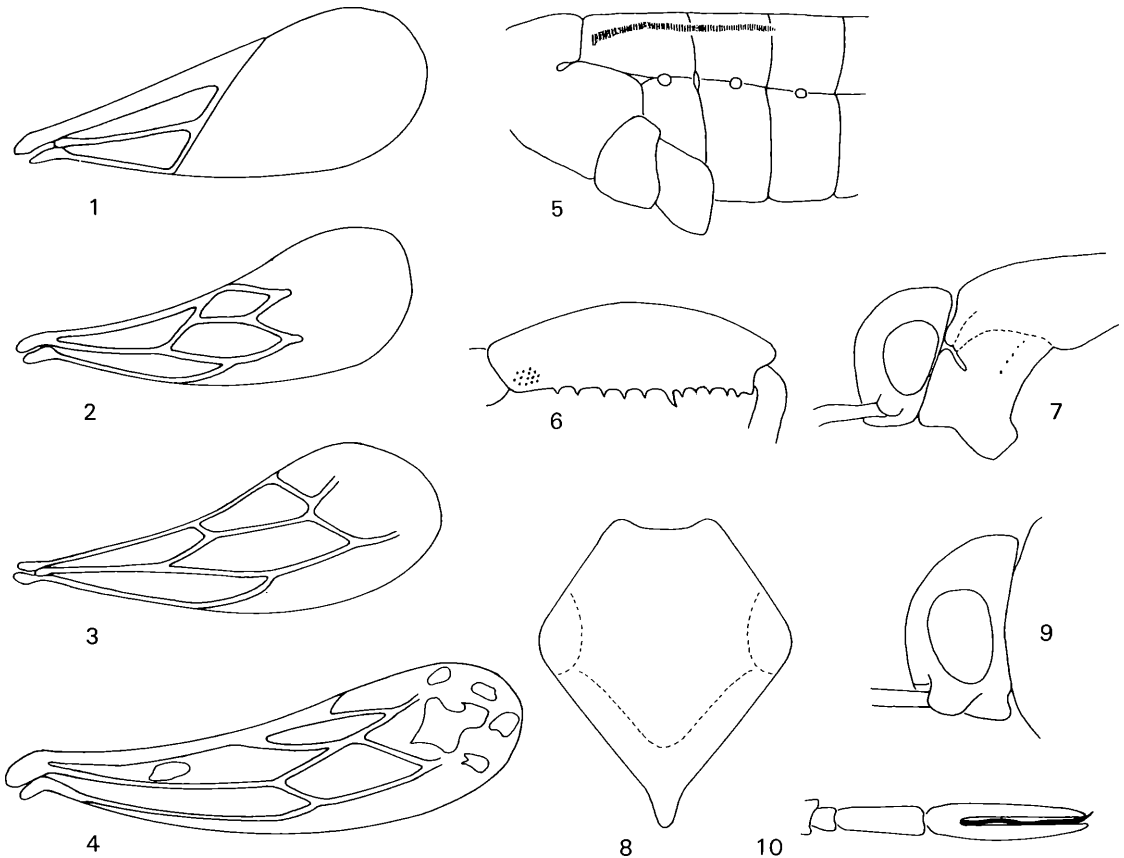
Up to now eighteen described species of Veliidae are known from Thailand (see check-list). Several undescribed species of *Pseudovelgia*, *Xiphovelgia*, *Microvelgia*, *Strongylovelgia*, *Perittopus*, *Rhagovelia*, and *Tetraripis* are deposited in the collection of the Natural History Museum Vienna and the Nieser Collection (Tiel, The Netherlands).

*Microvelgia* is one of the world's largest genera within the Veliidae (about 170 described species; ANDERSEN 1983). LUNDBLAD (1933) already reported on seventeen species of this genus (including species now belonging to *Pseudovelgia*) occurring in the Oriental and Australian Realms. *Microvelgia* is thought to be a polyphyletic taxon (ANDERSEN 1982, POLHEMUS & POLHEMUS 1994). Some African and North and Central American species groups are already established (LINNAVOURI 1977, POLHEMUS 1974). The specimens of "*Microvelgia*" from Thailand and adjacent countries are so diverse, that they are thought to belong to even several undescribed genera, which will have to be erected, as was done previously for *Pseudovelgia* by HOBERLANDT (1950). A revision of this difficult genus is badly needed.

## Key to the genera of Veliidae

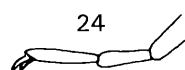
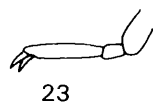
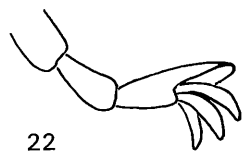
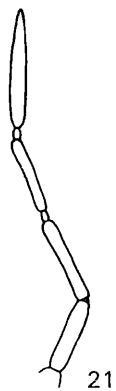
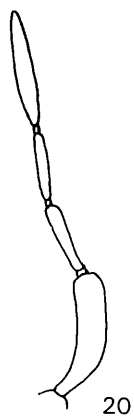
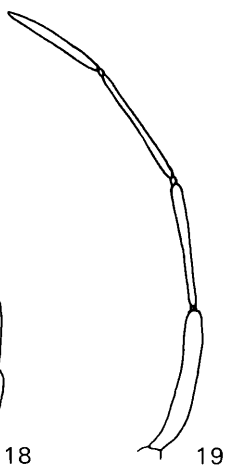
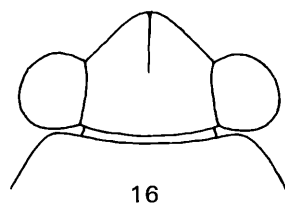
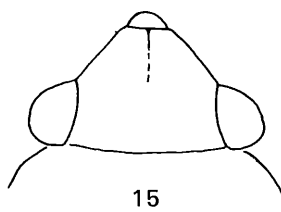
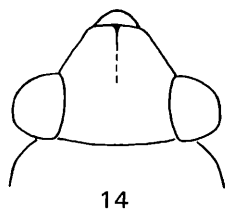
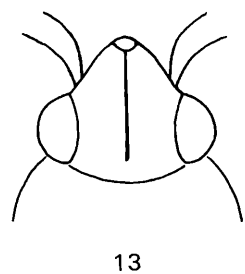
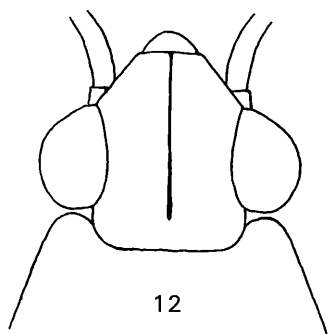
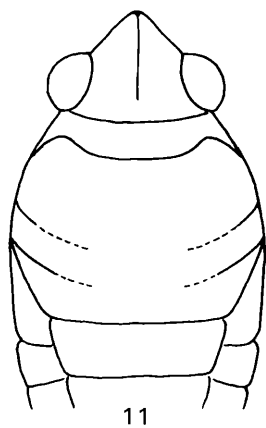
- 1 Middle tarsi with three segments (basal segment sometimes very short)..... 2
- Middle tarsi with two segments..... 7

- 2 Fore tarsi with two segments, basal segment very short; first segment of middle tarsi subequal to the two apical segments; fore wings divided into proximal coriaceous part with two closed cells, and distal membranous part without veins (Fig. 1); bright orange or reddish coloured species. (Perittopinae)..... **Perittopus**
- All tarsi three-segmented, basal segments of fore and hind tarsi sometimes very short; fore wings not divided as above, with three or four closed cells (Fig. 2); blackish or yellowish brown coloured species..... 3
- 3 Middle tarsi deeply cleft, with leaflike claws and plumose or hairy swimming fans arising from base of the cleft, which are fold up at rest (Fig. 10). 4
- Middle tarsi not deeply cleft and without plumose or hairy swimming fans. (Veliinae, partim)..... 6
- 4 Hind tarsi not cleft and without swimming fan; in Thai species pronotum short. (Rhagoveliinae) ..... **Rhagovelia**
- Hind tarsi cleft, with swimming fan; pronotum long (Veliinae, partim)..... 5
- 5 Stridulatory devices present on connexival margin of sternites 2 and 3 (Fig. 5) and on hind femur (Fig. 6); anterior margin of pronotum laterally with a narrow and deep incision (Fig. 7) ..... **Chenevelia**
- Stridulatory devices absent; anterior margin of pronotum with indistinct or without an incision. .... **Tetraripis**
- 6 Stridulatory devices absent; macropterous morph with apex of pronotum drawn out into a finger-like projection (Fig. 8); apical part of fore wing with one large, irregular white spot surrounded by 2 4 smaller spots (Fig. 4); head strongly deflected in front of eyes (Fig. 9); grasping comb on fore tibia long in both sexes. .... **Angilia**
- Stridulatory devices present on connexival margin of sternites 2 and 3 and on hind femur (as in Figs. 5 6); macropterous morph with apex of pronotum without finger-like projection; colour of fore wing not as above; head moderately deflected in front of eyes; grasping comb on fore tibia short in males and absent in females. .... **Angilovelina**
- 7 All tarsi two-segmented (basal segment of fore tarsi very short); middle leg obviously longer than hind leg; middle tarsi three or more times as long as hind tarsi. (Haloveliinae) ..... 8
- Fore tarsi one-segmented, middle and hind tarsi two-segmented; middle leg subequal to hind leg; middle tarsi rarely more than twice as long as hind tarsi. (Microveliinae) ..... 11
- 8 Eyes small, not broader than half width of interocular space (Figs. 14, 15); head moderately deflected in front of eyes; living in brackish or sea water 9
- Eyes very large, broader than half width of interocular space (Fig. 16); head strongly deflected in front of eyes; living in freshwater..... 10



Figs. 1–10: (1–4): Fore wing of (1) *Perittopus* sp., (2) *Pseudovelvia* sp., (3) *Microvelia* sp., and (4) *Angilia orientalis*; (5–7) *Chenevelia stridulans*: (5) sternites 2–4, lateral view, (6) hind femur, and (7) head and pronotum, lateral view; (8–9) *Angilia orientalis*: (8) pronotum, dorsal view and (9) head, lateral view; (10) middle tarsus of *Tetraripis* sp.

- 9 Eyes more than 0.4 times as wide as interocular distance (Fig. 14); male fore tibia without grasping comb; male genital segments distinctly protruding from pregenital abdomen; pronotum usually with pale stripe or spots..... **Haloveloides**  
 Eyes less than 0.3 times as wide as interocular distance (Fig. 15); fore tibia of male with grasping comb; male genital segments withdrawn into pregenital abdomen and only slightly protruding; pronotum usually totally dark..... **Halovelvia**
- 10 Second segment of antenna longer than or subequal to first (Fig. 17); first hind tarsal segment subequal to second segment (Fig. 24); body with yellow markings, but without dense pilosity **Strongylovelia**



Second segment of antenna shorter than first (Fig. 18); first hind tarsal segment about half as long as second segment (Fig. 23); body with dense pilosity, but without yellow markings **Entomovelina**

- 11 Head posteriorly produced, extending well behind margin of eyes, anterior margin of pronotum deeply emarginated (Fig. 12); body usually elongate and relatively slender..... 12  
 Head not produced as above, anterior margin of pronotum straight or only slightly convex (Fig. 13); body usually shorter and stouter 14
- 12 Eyes distinctly removed from anterior margin of prothorax; pronotal collar distinct..... **Lathriovelina**  
 Eyes not removed from anterior margin of prothorax; pronotal collar absent..... 13
- 13 Antennal segments 3 and 4 very slender, much longer than basal two segments; femora modified (with hair tufts, tubercles, etc.) on posterior surface (at least in males) **Baptista**  
 Antennal segments 3 and 4 slender, but shorter than segment 1 and subequal to segment 2 (Fig. 19); femora not modified on posterior surface..... **Neolardus**
- 14 First antennal segment incrassate (Fig. 20), extending more than two thirds of its length beyond apex of head; in macropterous morph apical cells of fore wings reduced (Fig. 2); in apterous morph pronotal lobe long..... **Pseudovelina**  
 First antennal segment more slender and usually much shorter (Fig. 21); if not, then in macropterous morph with normal fore wing venation (Fig. 3) or in apterous morph with shortened pronotal lobe..... 15
- 15 Middle tarsi with claws and ventral arolium developed as three leaf-like structures (Fig. 22); pronotum always thin, tergite 1, meso- and metanotum always fused (Fig. 11)..... **Xiphovelina**  
 Middle tarsi not modified as above; tergite 1, pro-, meso-, and metanotum of variable shape..... **Microvelina**

Figs. 11–24: (11) Head and thoracic nota of *Xiphovelina* sp.; (12–16) head, dorsal view, of (12) *Neolardus typicus*, (13) *Pseudovelina* sp., (14) *Haloveloides* sp., (15) *Halovelina* sp., and (16) *Strongylovelina* sp.; (17–21) antenna of (17) *Strongylovelina* sp., (18) *Entomovelina* sp., (19) *Neolardus typicus*, (20) *Pseudovelina* sp., and (21) *Xiphovelina* sp.; (22) middle tarsus of *Xiphovelina* sp.; (23–24) hind tarsus of (23) *Entomovelina* sp. and (24) *Strongylovelina* sp.

## Check-list of genera and species known from Thailand

References concern the first record from Thailand or collections where specimens from Thailand are deposited.

NHMW - Natural History Museum Vienna

NCTN - Nieser Collection, Tiel, The Netherlands

### Microveliinae:

#### **Baptista** DISTANT, 1903

*Baptista digitata* ANDERSEN, 1989 (ANDERSEN 1989a)

*Baptista femoralis* ANDERSEN, 1989 (ANDERSEN 1989a)

*Baptista gestroi* DISTANT, 1903 (ANDERSEN 1989a)

#### **Neolardus** DISTANT, 1912

*Neolardus typicus* (DISTANT, 1903) (NHMW)

#### **Pseudovelvia** HOBERLANDT, 1950

*Pseudovelvia buccula* ANDERSEN, 1983 (ANDERSEN 1983)

*Pseudovelvia feuerborni* (LUNDBLAD, 1933) (ANDERSEN 1983)

*Pseudovelvia sexualis* (PAIVA, 1917) (ANDERSEN 1983)

*Pseudovelvia* sp. (undescribed species, NHMW)

#### **Xiphovelvia** LUNDBLAD, 1933

*Xiphovelvia* spp. (undescribed species, NHMW, NCTN)

#### **Microvelia** WESTWOOD, 1834

*Microvelia albolineolata* TORRE-BUENO, 1927  
(ANDERSEN, unpublished list)

*Microvelia diluta* DISTANT, 1909 (ANDERSEN, unpublished list)

*Microvelia douglasi* SCOTT, 1874 (NHMW)

*Microvelia insignis* (DISTANT, 1903) (DISTANT 1903)

"*Microvelia*" spp. (undescribed species, NHMW)

### Haloveliinae:

#### **Halovelvia** BERGROTH, 1893

*Halovelvia malaya* ESAKI, 1930 (ANDERSEN 1989b)

#### **Haloveloides** ANDERSEN, 1992

*Haloveloides sundaensis* ANDERSEN, 1992 (ANDERSEN 1992)

#### **Strongylovelia** ESAKI, 1924

*Strongylovelia* spp. (undescribed species, NHMW)

### Perittopinae:

#### **Perittopus** FIEBER, 1861

*Perittopus* sp. (ANDERSEN 1982; undescribed species, NHMW, NCTN)

### Rhagoveliinae:

#### **Rhagovelvia** MAYR, 1865

*Rhagovelvia hutchinsoni* LUNDBLAD, 1933 (POLHEMUS 1990)

*Rhagovelvia sumatrensis* LUNDBLAD, 1933 (POLHEMUS 1990)

*Rhagovelvia* spp. (undescribed species, NHMW)

### Veliinae:

#### **Angilia** STÅL, 1865

*Angilia (Adriennella) bispinosa* ANDERSEN, 1981  
(ANDERSEN 1981)

*Angilia (Adriennella) orientalis* ANDERSEN, 1981  
(ANDERSEN 1981)

#### **Tetraripis** LUNDBLAD, 1936

*Tetraripis* sp. (undescribed species?, NCTN)

#### **Chenevelia** ZETTEL, 1996

*Chenevelia stridulans* ZETTEL, 1996 (ZETTEL 1996)

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- ANDERSEN, N.M. 1982: The Semiaquatic Bugs (Hemiptera, Gerromorpha). Phylogeny, Adaptations, Biogeography and Classification. - *Entomograph* 3: 1-455.
- ANDERSEN, N.M. 1983: The Old World Microveliinae (Hemiptera: Veliidae). I. The status of *Pseudovelvia* HOBERLANDT and *Perivelia* POISSON, with a review of Oriental species. *Entomologica scandinavica* 14: 253-268.
- ANDERSEN, N.M. 1989a: The Old World Microveliinae (Hemiptera: Veliidae). II. Three new species of *Baptista* DISTANT and a new genus from the Oriental region. - *Entomologica scandinavica* 19: 363-380.



- ANDERSEN, N.M. 1989b: The coral bugs, genus *Halovelia* BERGROTH (Hemiptera, Veliidae). II. Taxonomy of the *H. malaya*-group, cladistics, ecology, and biogeography. *Entomologica scandinavica* 20: 179-227.
- ANDERSEN, N.M. 1992: A new genus of marine water striders (Hemiptera, Veliidae) with five new species from Malesia. - *Entomologica scandinavica* 22: 389-404.
- CHEN, P.P. & ZETTEL, H. 1996: An illustrated key to the families of Gerromorpha in Thailand. *Amemboa* 1: 10 - 13.
- DISTANT, W.L. 1903: Report on the Rhynchota. Part I. Heteroptera. - *Fascicula malayenses*, Zoology 2: 221-271.
- HOBERLANDT, L. 1950: Semiaquatic Heteroptera collected in Lunda, North East Angola (Potruguese West Africa) by Dr. a. de Barros Machade in 1946-1949. - *Publcoes cult. Co. Diam. Angola*, 10: 7 - 50.
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- LUNDBLAD, O. 1933: Zur Kenntnis der aquatilen und semiaquatilen Hemipteren von Sumatra, Java und Bali. - *Archiv für Hydrobiologie, Supplement* 12: 1-195, 263-489, 21 Tafeln.
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- POLHEMUS, J.T. 1990: Miscellaneous studies on the genus *Rhagovelia* MAYR (Heteroptera: Veliidae) in Southeast Asia and the Seychelles Islands, with keys and descriptions of new species. *Raffles Bulletin of Zoology* 38(1): 65 - 75.
- POLHEMUS, J.T. & D.A.POLHEMUS 1994: Four new genera of Microveliinae (Heteroptera) from New Guinea. - *Tijdschrift voor Entomologie* 137: 57-74, figs 1-30.
- ZETTEL, H. 1996: *Chenevelia stridulans* gen.n. et sp.n. from North Thailand (Insecta: Heteroptera: Veliidae). - *Annalen des Naturhistorischen Museums in Wien* 98B: 353 - 359.
- Author's address:** Mag. Christine Hecher, Naturhistorisches Museum Wien, 2. Zoologische Abteilung, Burgring 7, A-1014 Vienna, Austria.

## Small communications:

## Literature with Heteroptera records:

The following mainly ecologically orientated books include data of aquatic and semiaquatic Heteroptera from Thailand which should be proved and included in the distribution data:

The material studied by C.W. Heckman is deposited in the Zoologische Staatssammlung, Munich, Germany (as stated in the book).

- HECKMAN, C.W. 1979: Rice Field Ecology in Northeast Thailand. The effect of wet and dry seasons on a cultivated aquatic ecosystem. *Monographiae Biologicae* 34, Dr. W. Junk, The Hague - Boston - London, 228 pp.
- YASUMATSU, K., WONGSIRI, T., TIRAWAT, C., WONGSIRI, N. & LEWVANICH, A. 1980: Contributions to the development of integrated rice pest control in Thailand. Department of Agriculture, Ministry of Agriculture & Cooperation, Government of Thailand and Japan International Coop. Agency, IV + 163 pp..

# Introduction to the Notonectidae (Nepomorpha) of Thailand

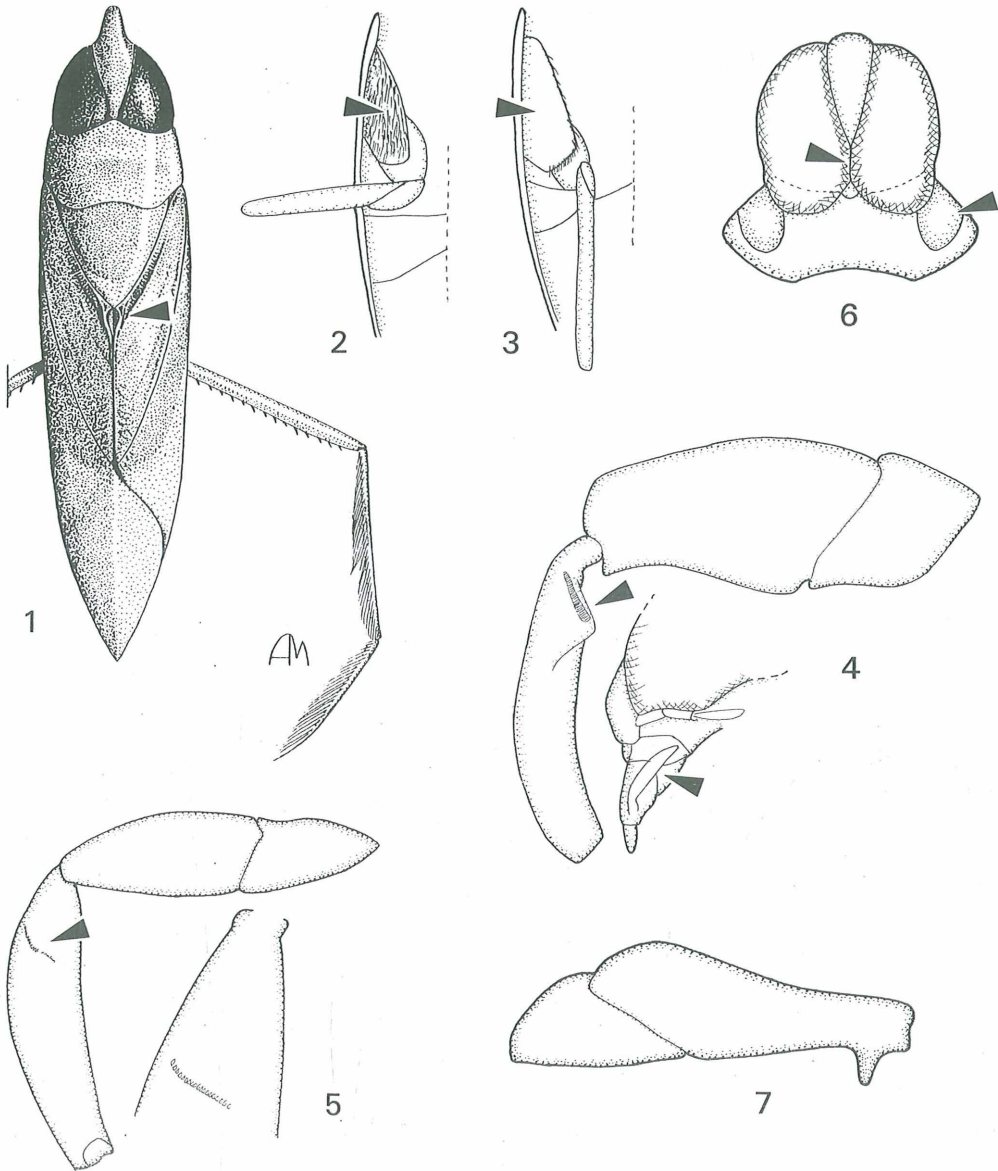
by Nico Nieser

**Abstract:** A key to the Old World genera of Notonectidae is given followed by a list of species of Notonectidae known from Thailand and adjacent regions and a few notes on habits and habitat preferences of the Thai genera. *Nychia sappho* KIRKALDY is newly recorded from Thailand.

The following key is meant to serve in sorting out genera of Notonectidae (Back Swimmers) in SE Asia and the Pacific. Whether a specimen of water bug belongs to this family can be checked by the key to families (NIESER 1996, Amemboa 1: 4-9). As can be seen from the key below, the remark on antennae in Notonectidae in couplet 10 of that paper is incorrect.

## Key to subfamilies and Old World genera of Notonectidae

- 1 Hemelytral commissure with a definite hair-lined pit at anterior end (Fig. 1)  
**(Anisopinae)** ..... 2  
Hemelytral commissure without a definite hair-lined pit at anterior end  
**(Notonectinae)** ..... 4
- 2 Coxal plates of hind legs bare (Fig. 3). Male fore tibia proximally with a row of stridulatory pegs which usually are placed on a protrusion ..... 3  
Coxal plates of hind legs covered with long black hairs (Fig. 2). Males without stridular teeth or pegs on fore tibia [Australian]..... **Paranisops**
- 3 Antennae three-segmented. Male rostrum with a prominent lateral prong, stridular teeth or pegs proximally on fore tibia packed closely together and situated on a protuberance (Fig. 4) [palaetropical and subtropical]..... **Anisops**  
Antennae two-segmented. Male rostrum without a lateral prong, stridular pegs proximally on fore tibia clearly separate and not situated on a protuberance (Fig. 5) [Australian]..... **Walambianisops**
- 4 Anterolateral margins of prothorax foveate (Fig. 6) ..... 5  
Anterolateral margins of prothorax not foveate..... 7
- 5 Mid femur with an anteapical pointed protuberance (Fig. 7) [Tropicopolitan]..  
**Enithares**  
Mid femur without an anteapical pointed protuberance ..... 6
- 6 Eyes basally contiguous, forming an ocular commissure (Fig. 6) [Palaeotropical]..... **Nychia**  
Eyes basally widely spaced [southeast and insular Asia] ..... **Aphelonecta**
- 7 Eyes posteriorly separated, mid femur with anteapical pointed protuberance [Cosmopolitan, predominantly temperate and subtropical zones] ..... **Notonecta**  
Eyes posteriorly contiguous, mid femur without anteapical pointed protuberance [Tropical Africa] ..... **Neonychia**



Figs. 1 - 7: (1) *Anisops sardeus*, ♂, habitus, illustrating the hair-lined pit (from NIESER 1982). 2 - 3: Right side of metathorax and base of abdomen in ventral view: (2) *Paranisops* with hairy coxal plate, (3) *Anisops* with surface of coxal plate bare. (4) Trochanter, femur and tibia of fore leg and rostrum in lateral view of *Anisops tahitiensis* illustrating tibial protuberance with closely packed pegs and rostral prong. (5) Trochanter, femur and tibia of fore leg of *Walambianisops wandjina* LANSBURY illustrating tibial pegs not on protuberance and not closely packed together (simplified from LANSBURY 1984). (6) Head of *Nychia sappho* in dorsal view, illustrating pronotal fovea's and ocular commissure. (7) Mid femur of *Enithares* illustrating ante-apical protuberance.

**Preliminary list of Notonectidae occurring in Thailand and adjacent areas  
(mainly based on literature)**

**Abbreviations used in the following table:** Countries: B = Myanmar; C = China (SW); I = India (especially Assam); L = Laos and Cambodia; M = West Malaysia and Singapore; S = Sumatera; T = Thailand; V = Viêt-Nam. + recorded, +! first record, ? uncertain record.

	I	B	T	L	V	M	S	C
<b><i>Anisops</i></b>								
<i>barbatus</i> BROOKS	+	+	+	+	+!	+	+	+
<i>bouvieri</i> KIRKALDY	+!	+	+	+	+!		+	+
<i>breddini</i> KIRKALDY	+	+	+		+	+		
<i>campbelli</i> BROOKS	+	+						
<i>exiguus</i> HORVATH	+				+			
<i>kempi</i> BROOKS	+	+	+		+			
<i>kuroiwae</i> MATSUMURA	+	+	+	+	+			
<i>nigrolineatus</i> LUNDBLAD	+	+	+				+	
<i>niveus</i> (FABRICIUS)	+				+	+	+	
<i>sardeus</i> (HERRICH-SCHÄFFER)	+	+						
<i>tahitiensis</i> LUNDBLAD					+			
<b><i>Aphelonecta</i></b>								
<i>gavini</i> LANSBURY			+	+	+			
<b><i>Enithares</i></b>								
<i>ciliata</i> (FABRICIUS)	+		+	+	+	+	+	+!
<i>intha</i> PAIVA		+						
<i>mandalayensis</i> DISTANT		+	+		+			
<i>metallica</i> BROOKS			+		+	+		
<i>sinica</i> (STÅL)				+	+			+
<i>stridulata</i> BROOKS			+	+	+			
<b><i>Nychia</i></b>								
<i>sappho</i> KIRKALDY		?	+!			+	+	?
	I	B	T	L	V	M	S	C

**Notes on habits and habitat preferences of the genera occurring in Thailand**

***Anisops* SPINOLA, 1837.** There are six species known from Thailand (see list). Species of *Anisops* and their New World counterpart *Buenoa* are remarkable for having haemoglobin cells at the base of their abdomen. Here they store the reserve oxygen during a dive. The amount of air they take with them under water can be regulated and in this way they can obtain neutral buoyancy which makes them belong to the few really planktonic insects.

They live usually in ponds or pools with little or no fish; an exception are fish ponds with fry on which they prey. Some species live in ponds in agricultural situations; several of these are widely distributed, e.g. *A. bouvieri*, *A. breddini*, and *A. kuroiwae*.

***Aphelonecta* LANSBURY, 1965.** A small genus, only six species known so far, with one species known in Thailand, *A. gavini* LANSBURY. Its ecology seems to be similar to that

of the species of *Enithares* associated with streams but, as representatives of this genus are rarely collected and usually only as single specimens, their ecology is poorly known.

***Enithares* SPINOLA, 1837.** There are four species known from Thailand (see list). They live in stagnant water including virtually stagnant potholes or side pools of streams. Based on experience with the Indonesian fauna (mainly in Sulawesi where this genus is richly represented, NIESER & CHEN 1996), there are two types of habitat preference. Some smaller species like *E. mandalayensis* live in various ponds including man-made ones. The larger species live in small ponds and pools associated with streams, usually only one or two at one place. It is not yet known if these habitat preferences are also shown by the Thai species of the genus. Like most Notonectinae, *Enithares* species usually float against the underside of the surface film when resting or awaiting prey. However, most species scare easily and hide under water when someone approaches the pond.

***Nychia* STÅL, 1859.** A small genus with some three species which tend to have wide distributions. Only one species in Thailand. If the species from South China is the same as *N. sappho* KIRKALDY, the correct name for this species is *N. limpida* STÅL. Specimens from Myanmar have been described as *N. infusata* PAIVA. The status of these is not certain as the description refers nearly only to colour pattern. However, as various Thai specimens of *N. sappho* (which have been compared with specimens from Sulawesi) agree exactly with the description of *N. infusata* the synonymy is very probable.

*Nychia sappho* lives in various stagnant waters, ponds, potholes with very little current in streams, etc. They rest against the underside of the surface film of the water (as do most *Enithares* and *Aphelonecta*) awaiting prey, which may be aquatic animals but also terrestrial species which fall in the water. Usually when present they are found in fair to large numbers.

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**Author's address:** Dr. Nico Nieser, Htg. Eduardstraat 16, NL-4001 Tiel, Netherlands (e-mail: [iftang@icns.nl](mailto:iftang@icns.nl))

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## Introduction to the Helotrephidae (Nepomorpha) in Thailand and adjacent countries

by Herbert Zettel

**Abstract:** An illustrated key is provided for the seven genera of Helotrephidae occurring in Thailand and adjacent countries. Notes on the habitat preferences are given.

Helotrephidae are small, semiglobular or depressed aquatic Heteroptera of the superfamily Notonectoidea. The main diagnostic character is the "cephalonotum" resulting from a fusion of head and prothorax (Figs. 1, 2, 9-11), which is unique in Heteroptera. For further differences between Helotrephidae and other families of Nepomorpha see the identification key by NIESER (1996). The phylogenetic system of genera was discussed by POLHEMUS (1990) and MAHNER (1993).

Helotrephidae are found in aquatic habitats, preferably in running waters or in small stagnant waters, which are associated with streams. Only a few species (in Thailand *Tiphotrephes indicus*) are found in larger stagnant waters. The most abundant genera (*Helotrephes*, *Hydrotrepes*) live in lentic parts of streams and smaller rivers, and rarely in lakes.

Brachypterous morphs usually predominate. Macropterous morphs are externally characterized by a separation of clavus and corium (Fig. 2).

The majority of species occurring in Thailand are still undescribed. This is mainly due to the fact that Helotrephidae are often not easy to find and were neglected by collectors in former times. Recently collected material deposited in different private and museum collections indicate that there are probably more than 20 species living in Thailand.

### Key to the subfamilies, tribes and genera of Helotrephidae in Thailand and adjacent countries

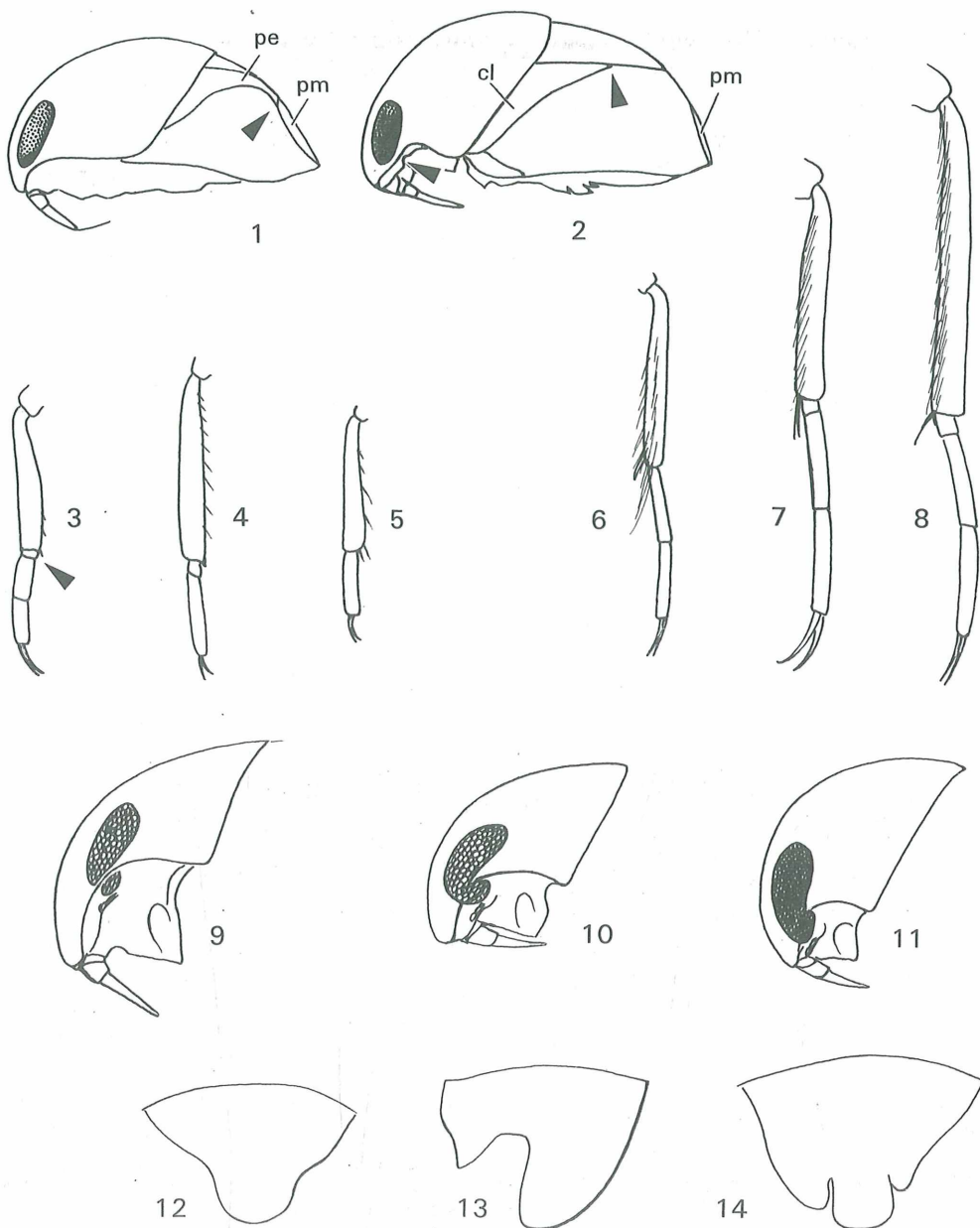
- 1 Tarsal formula (= number of tarsal segments of fore, middle and hind leg)  
3-3-3 (note: the first segment is very short and therefore difficult to see;  
Figs. 3, 7); very small species (up to 1.6 mm), body depressed (subfamily  
Fischerotrephinae) **[Fischerotrephes ZETTEL]**

Five species are known from Western Malaysia, Laos, Borneo, and India (ZETTEL 1994, in press, and unpublished); the genus is not recorded from Thailand. *Fischerotrephes depressus* lives in fine gravel sediments of brooks and streams in Sarawak. Because of their small size and their cryptic life *Fischerotrephes* is very rarely collected.

Tarsal formula 2-2-3 or 1-2-2, usually globular, rarely flat species (but then larger) ..... 2

- 2 Hemelytron with "pseudendocorium" reaching pseudomembrane (Fig. 1) in all morphs, and additionally with claval suture in macropterous specimens; tarsal formula 2-2-3 (note: the first segment is very short and therefore difficult to see; Figs. 4, 9), cephalonotum very large, much larger than hemelytra in dorsal and lateral view (Fig. 1). (subfamily Trephotomasinae).....  
**Trephotomas PAPACEK, STYS & TONNER**
- Three species are described from southeast Asia. *Trephotomas compactus* PAPACEK, STYS & TONNER is reported from Thailand, the larva of a second species was found in Chiang Mai Province (ZETTEL 1996). Inhabitants of brooks and streams.
- Hemelytron without "pseudendocorium", but macropterous morph with a claval suture not reaching pseudomembrane but crossing lateral side of meso-scutellum (Fig. 2); tarsal formula 1-1-2 (Figs. 5, 6), cephalonotum smaller (e.g., Fig. 2) (subfamily Helotrephinae s.l.)..... 3
- 3 Larger species, body length at least 2.5 mm, cephalonotum usually densely punctate and therefore rather dull; postero-lateral margin of cephalonotum continued ventrally of the eye, not dividing or indenting it (Fig. 2); female subgenital plate (sternite 7) symmetrical (tribe Helotrephini) ..... 4
- Smaller species, body length less than 2.0 mm; cephalonotum usually with small scarce punctures and therefore shining; postero-lateral margin of cephalonotum not continuous ventrally of the eye, either dividing or indenting it or pointed to the centre of the eye (Figs. 9–11); female subgenital plate usually more or less asymmetrical (tribe Limnotrephini)..... 5
- 4 Sternite 4 (or 4 and 5) with median keel..... **Helotrephes STÅL**
- Several species have been collected all over Thailand; most of them are undescribed. Species are usually found in quiet areas of streams, especially between leaf litter, sometimes in large numbers.
- Sternite 4 and 5 without median keel..... **Hydrotrephes CHINA**
- Two species, both undescribed, were collected in Thailand in similar habitats like *Helotrephes*. One species is common and widely distributed.
- 5 Eye divided by the lateral margin of cephalonotum, with a separated part ventrally (Fig. 9), or these parts are connected in the anterior fourth in the very rare alate morph; metasternal keel with two rami in posterior half; female subgenital plate (in species from the Asian mainland) with asymmetrical middle lobe (Fig. 12), which is reduced in one species..... **Distotrephes POLHEMUS**
- Three undescribed species are known from North Thailand, but several species (described from China, Viet Nam and Laos) may also occur. Cryptic species, typical inhabitants of brooks and smaller streams.
- Eye not divided by the lateral margin of cephalonotum, but sometimes deeply indented in posterior half (Figs. 10, 11); metasternal keel simple; female subgenital plate with one or two incisions (Figs. 13, 14)





Figs. 1 - 14: (1 - 2) Body in lateral view of (1) *Trephotomas compactus* (brachypterous) and (2) *Hydrotrepes* sp. (macropterous); (3 - 5) Fore tarsi and tibiae of (3) *Fischerotrepes jaechi* ZETTEL, (4) *Trephotomas compactus*, and (5) *Tiphotrephes indicus*; (6 - 8) Hind tarsi and tibiae of (6) *Tiphotrephes indicus*, (7) *Fischerotrepes jaechi*, and (8) *Trephotomas compactus*; (9 - 11) Cephalonotum, in lateral view, of (9) *Distotrepes stysi* POLHEMUS, (10) *Idiotrepes* sp., and (11) *Tiphotrephes indicus*; (12 - 14) Female subgenital plate of (12) *Distotrepes stysi*, (13) *Idiotrepes chinai*, and (14) *Tiphotrephes indicus*; cl - clavus, pe - pseudendocorium, pm - pseudomembrane (Fig. 1 modified from ZETTEL 1996; Fig. 12 from ZETTEL 1995).

- 6 Lateral margin of cephalonotum clearly extending onto eye surface, deeply indenting the eye (Fig. 10); sternite 5 with median keel; subgenital plate of female very asymmetrical, with one more (Fig. 13) or less deep incision in right half..... ***Idiotrephes* LUNDBLAD**

One species, *Idiotrephes chinai* LUNDBLAD, is reported from Thailand (ZETTEL 1995). Studies on the type series have shown, that these specimens are not conspecific with *I. chinai* (from Sumatra). Further two species are undescribed, and more species may be discovered or recorded (two species were recently described from Viet Nam by PAPACEK 1994, 1995). Inhabitant of stagnant waters, mainly small pools associated with streams.

Lateral margin of cephalonotum not extending onto eye surface, only indistinctly indenting the eye at posterior margin (Fig. 11); sternite 5 without median keel; subgenital plate of female nearly symmetrical, with two narrow incisions laterally of a middle lobe (Fig. 14)..... ***Tiphotrephes* DISTANT**

Only one species is known: *Tiphotrephes indicus* DISTANT has a wide range from India to Malaysia, and was reported from Thailand by ZETTEL (1995). Inhabitant of various types of stagnant waters.

**Acknowledgements:** Thanks are due to J.T. Polhemus (Englewood) and C. Schaefer (Storrs) for comments on the manuscript.

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**Authors address:** Dr. Herbert Zettel, Naturhistorisches Museum Wien, 2. Zoologische Abteilung, Burgring 7, A-1014 Vienna, Austria (e-mail: herbert.zettel@nhm-wien.ac.at)

## Introduction to the Nepidae of Thailand

by Nico Nieser & John T. Polhemus

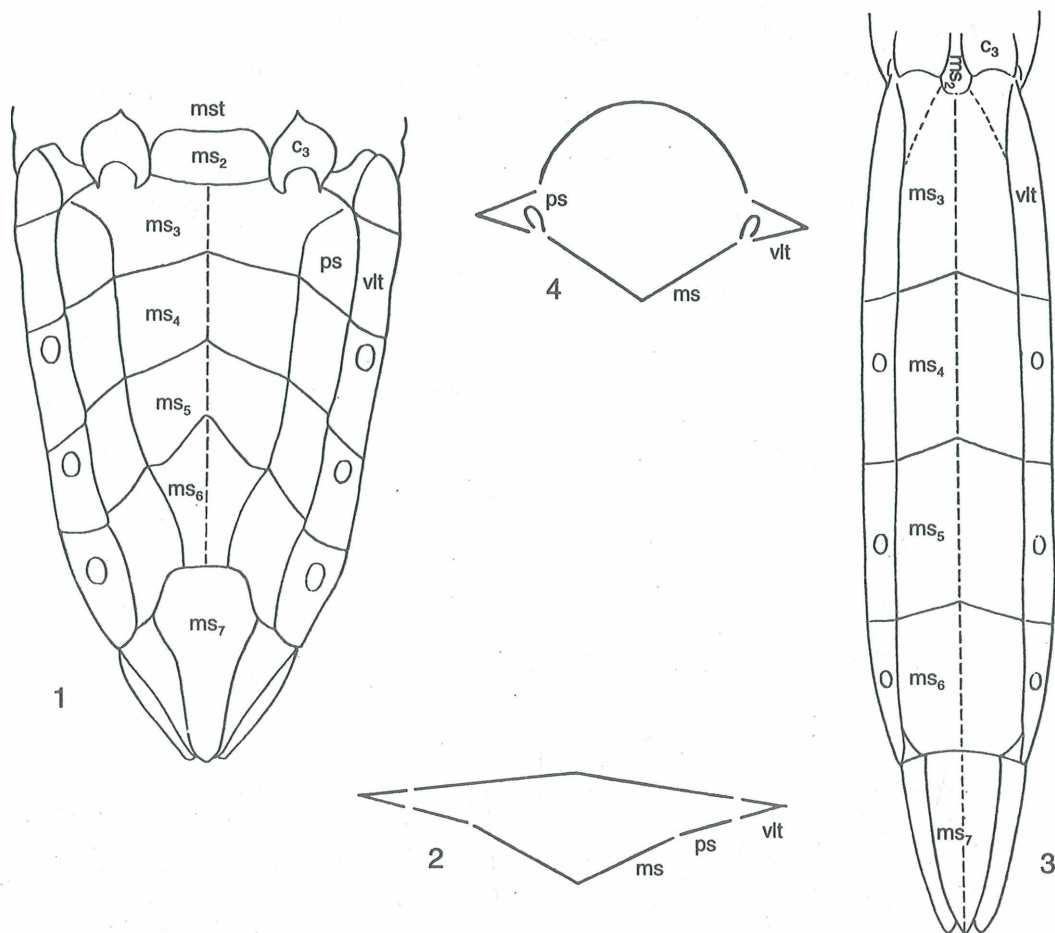
**Abstract:** A key to Australasian genera of Nepidae is given followed by a list of species of Nepidae known from Thailand and adjacent regions and a few notes on habits and habitat preferences of those genera.

The following key is meant to serve in identifying Australasian genera of Nepidae (water scorpions). Whether a specimen of water bug belongs to this family can be checked by the key to families by NIESER (1996b).

### Key to Australasian subfamilies and genera of Nepidae

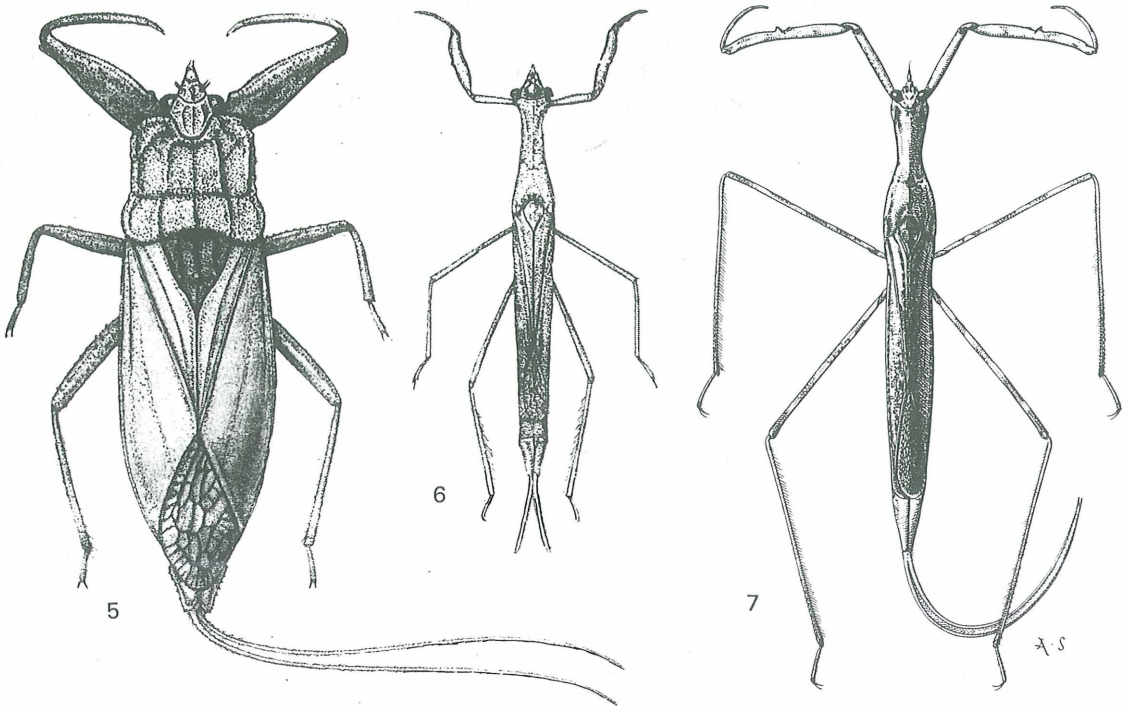
(adapted from LANSBURY 1972b, 1974)

- 1 Body broad and flat, parasternites visible, abdominal sterna divided into six more or less distinct longitudinal zones (Figs. 1, 2) (Nepinae)..... 2  
 Body usually cylindrical, parasternites concealed by the ventral laterotergites (Figs. 3, 4) (Ranatrinae)..... 5
- 2 Small species, body length excluding respiratory siphon not exceeding 14 mm, siphon short, less than half the length genital operculum..... **Montonepa**  
 Known from one species, *Montonepa erutus* (MONTANDON), from Assam (India), see LANSBURY (1973b).  
 Larger species, length over 16 mm, respiratory siphon longer than the genital operculum. 3
- 3 Ventral spiracular apertures (on pronotum caudally of fore coxae, not to be confused with the spiracular like structures on laterotergites) distinct (Fig. 8), siphon not more than half the length of the inner margin of hemielytra (measured from apex of scutellum to membrane) [South America, Southeast China and North Borneo]..... **Telmatometra**  
 Ventral spiracular apertures vestigial or absent, siphon more than two thirds the length of inner margin of hemielytra..... 4
- 4 Membrane of hemielytra with distinct venation and differentiated from corium, siphon longer (usually much longer) than inner margin of hemielytra (Fig. 5) [Palaeotropical]..... **Laccotrephes**  
 There are two species in Thailand (see list), but the genus needs revision, because many records are suspect. *Laccotrephes* are usually found in shallow somewhat muddy or sandy places, in virtually stagnant water, hiding in the substrate.  
 Membrane of hemielytra with indistinct venation and not differentiated from corium, siphon shorter than inner margin of hemielytra. **Borborophyes**  
 Known from one species, *B. mayri* STÅL, from North Luzon (Philippines), see LANSBURY (1973).



Figs. 1 - 4: Abdomen of (1, 2) Nepinae and (3, 4) Ranatrinae in ventral view (1, 3) and in schematic cross section; c3: metacoxa; ms2 - ms7: median sternites 2 - 7; mst: metasternum; ps: parasternites; vlt: ventral laterotergite (after LANSBURY 1972a).

- 5 Body subcylindrical (Figs. 6, 7), distance between middle and hind coxae narrower than the width of a coxa..... 6
- Body flattened, distance between middle and hind coxae broader than the width of a coxa. .... 7
- 6 In lateral view outer margin of eyes not reaching downward ventrally of ventral margin of head, fore femur longer than pronotum [cosmopolitan]. ..... **Ranatra**
- In Thailand eight species (see list), most species hide amongst vegetation at the edge of various types of water, some bury at least occasionally in mud.



Figs. 5 - 7: Habitus of (5) *Laccotrephes*, (6) *Cercotmetus*, and (7) *Ranatra* (figs. 5 & 6 from LUNDBLAD 1933, 7 from USINGER in MENKE 1979).

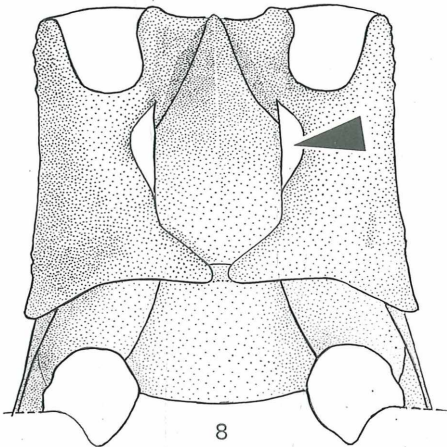


Fig. 8: Pro- and mesosternum of *Telmatotrepes*, arrow illustrating spiracular aperture (adapted from LANSBURY 1973b).

- In lateral view outer margin of eyes reaching downward ventrally of ventral margin of head, fore femur shorter than pronotum [tropical Asia] ***Cercotmetus***

In Thailand three species (see list), apparently in similar places as *Ranatra* species, however, compared to *Ranatra*, species of *Cercotmetus* are more often found

swimming, exploring the area ahead with their front legs or simply floating without moving between plant debris.

- 7 Humeral width of pronotum larger than its median length, groove in anterior femur extending about four fifth along inner margin. .... ***Goondnomdanepa***

Known from three species, *G. brittoni* LANSBURY, 1978, *G. prominens* LANSBURY, 1978, and *G. weiri* LANSBURY, 1974, from North Australia.

Humeral width of pronotum less than its median length, groove of fore femur short, extending about halfway along inner margin. .... ***Austronepa***

Known from one species, *Austronepa angusta* (HALE), from Australia.

**Preliminary list of Nepidae occurring in Thailand and adjacent areas,  
mainly based on literature**

**Abbreviations used in the following table:** countries: B = Myanmar; C = China (SW); I = India (especially Assam); L = Laos and Cambodia; M = West Malaysia and Singapore; S = Sumatera; T = Thailand; V = Viêt-Nam. + recorded, +! first record (material deposited in Natural History Museum Vienna [NHMW]), +\* endemic, ? uncertain record, a see MONTANDON (1903), b see POLHEMUS (1995), c first record (Material in John T. Polhemus Collection [JTPC]), d from LUNDBLAD (1933), e - from LANSBURY (1972).

	I	B	T	L	V	M	S	C
<b><i>Cercotmetus</i></b>								
<i>asiaticus</i> AMYOT & SERVILLE			+		+!	+	+	
<i>brevipes</i> MONTANDON	+		+		+	+ <sub>c</sub>	+	+
<i>compositus</i> MONTANDON			+	+	+	+ <sub>c</sub>	+	
<b><i>Ranatra</i></b>								
<i>chinensis</i> MAYR		+ <sub>a</sub>			+			+
<i>falloui</i> MONTANDON			+		+			+
<i>feana</i> MONTANDON	+	+						
<i>filiiformis</i> F.	+ <sub>c</sub>	+						
<i>gracilis</i> DALLAS		+	+ <sub>c</sub>	+			+	
<i>katsara</i> NIESER			+*					
<i>longipes longipes</i> STÅL							+	+ <sub>b</sub>
<i>longipes thai</i> LANSBURY	+ <sub>c</sub>		+	?	+ <sub>c</sub>	+ <sub>c</sub>		
<i>odontomeros</i> NIESER			+*					
<i>parmata</i> MAYR			+	+			+!	
<i>sulawesii</i> NIESER & CHEN			+!					
<i>varipes varipes</i> STÅL	+	+	+		+	+	+	
<i>varipes atrophæa</i> MONTANDON	+ <sub>e</sub>		+ <sub>e</sub>			+ <sub>e</sub>	+ <sub>c</sub>	
<b><i>Laccotrephes</i></b>								
<i>archipelagi</i> (FERRARI)							+ <sub>c</sub>	
<i>grossus</i> (FABRICIUS)			+ <sub>c</sub>		+ <sub>c</sub>	+ <sub>c</sub>	+ <sub>c</sub>	+
<i>japonensis</i> SCOTT						+	+	
<i>pfeifferæ</i> FERRARI			+ <sub>d</sub>			+ <sub>c</sub>	+ <sub>c</sub>	
<i>simulatus</i> MONTANDON					+ <sub>c</sub>	+ <sub>c</sub>	+ <sub>d</sub>	
<b><i>Montonepa</i></b>								
<i>erutus</i> (MONTANDON)	+*							
	I	B	T	L	V	M	S	C

**Remarks:**

*Ranatra falloui*: in Thailand only from Koh Chang.

*Ranatra katsara*: only from Ubon Ratchanthani; see NIESER (1997).

*Ranatra longipes thai*: Record from Laos based on a single female. Subspecific classification therefore uncertain.

*Ranatra parmata*: Record from "Sumatra" refers to one specimen from Nias Island [NHMW] and one female from Sumatera Utara [JTPC].

*Ranatra varipes atrophpha* should be treated as a distinct species, because it is distinctive, and occurs with the nominal subspecies.

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**Authors' addresses:**

Dr. Nico Nieser, Htg. Eduardstr. 16, 4001 RG Tiel, The Netherlands (e-mail: iftang@pop.icns.nl)

Dr. John T. Polhemus, Colorado Entomological Museum, 3115 South York St., Englewood, Colorado 80110, U.S.A. (e-mail: polhemus@stripe.colorado.edu)

# Key to the genera and subgenera of Gerridae (Gerromorpha) of Thailand and adjacent countries, with a check-list of species known from Thailand

by Pingping Chen & Herbert Zettel

**Abstract:** A key to the gerrid genera of Thailand and adjacent countries is presented. The check-list of Gerridae of Thailand contains 23 genera (one of them undescribed) and 55 species (undescribed species not included). *Cryptobates johorensis* POLHEMUS & POLHEMUS, 1995, and *Neogerris assimilis* ANDERSEN, 1975, are recorded for Thailand for the first time.

## Introduction

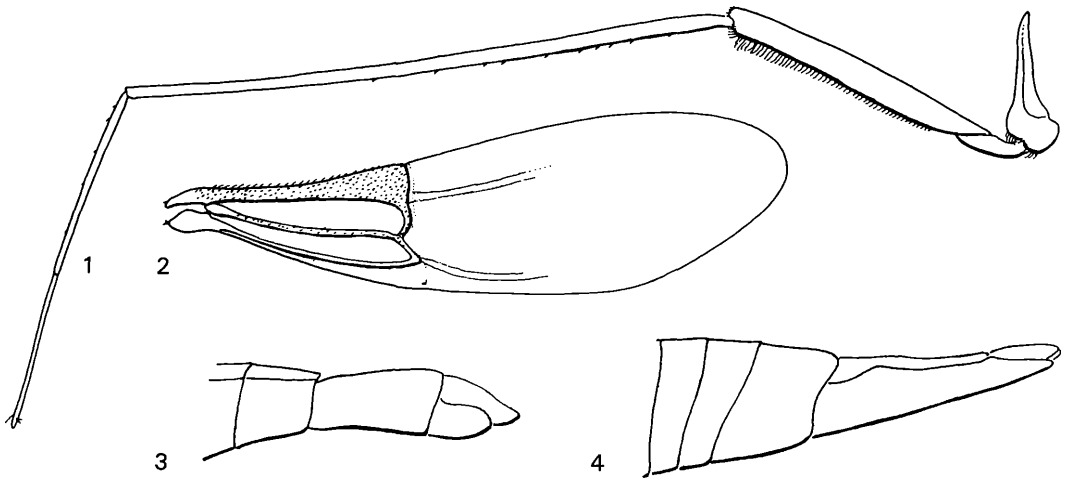
The present phylogenetic system of the True Water Striders (Gerridae) contains eight subfamilies, seven of which are represented in the Oriental and Thai faunas. Presently more than 60 gerrid genera are known; about half of them occur in Southeast Asia, and 23 are so far recorded from Thailand.

After numerous revisions (see references) of Oriental Gerridae, the taxonomy of Thai species of this family are probably better known than most other Heteroptera of the area, and much better than the second large family of Gerromorpha, the Veliidae. Recent collections have brought a few additional species, mainly of the genera *Amemboa* and *Metrocoris*, which are (ZETTEL & CHEN 1997) or will be described by the authors in other papers. The key to families of Thai Gerromorpha (CHEN & ZETTEL 1996) will distinguish Gerridae from other families of the suborder.

Gerridae live in humid environment, in general in the presence of free water, either on the water surface or at the shore. The habitat preferences of Gerridae are diversified by the different groups. The known species of Rhagadotarsinae are usually found in still water, such as fish ponds, water reservoirs, lakes, and temporary pools; they usually assamblage in large schools. Most species of Trepobatinae and Gerrinae are found in stagnant and slowly flowing water, but some prefer streams. Eotrechinae live in stagnant water, but species of *Onychotrechus* and *Eotrechus* were found climbing and jumping upon seeping rock faces, sometimes upon rocks in streams, or rock walls splashed by waterfalls. Cylindrostethinae live in streams and stream pools, but avoid both, turbulent and still water. Ptilomerinae are exclusively found in flowing waters, preferably mountain streams, torrents with small waterfalls, or the most rapid courses of rivers. Species of most Halobatinae genera prefer flowing fresh water habitats. The genus *Halobates* comprises the well known sea scaters and the only truely ocean insects. Other *Halobates* and *Asclepios* species are confined to coastal habitats, as several Trepobatinae genera.

All Gerridae are predators and most of them are skating fastly on the water surface. The development of wings in adults is varying between groups. Wing dimorphism (macropterous/apterous, macropterous/brachypterous) and wing polymorphism (macropterous/brachypterous/micropterous) are common. As a rule, brachypterous specimens are more common in species living in running waters, but macropterous morphs dominate in species of stagnant waters. Marine species are obligatorily apterous.





Figs. 1 - 4: (1 - 2) *Trepobates* sp.: (1) middle leg, (2) forewing; (3 - 4) *Rhagadotarsus kraepelini*, tip of abdomen, lateral view, of (3) male, and (4) female (1, 2, 4: after ANDERSEN 1982a).

In general, using a light insect collecting net is suitable to catch gerrids from the water surface. Especially for collecting large species, the net should have a minimum diameter of 20 cm, and a minimum depth of 25–30 cm, because otherwise large specimens easily escape by jumping out of the net. Wide meshes (about 500  $\mu\text{m}$ ) allow it to pull the net fastly enough through water. For small species living near the edge of the water, a second, smaller net would be handy.

PC and HZ refers to personal observations of the authors.

### Key to the genera and subgenera of Gerridae from Thailand and adjacent countries

(partly adapted from keys in ANDERSEN 1982a, 1995, POLHEMUS & ANDERSEN 1984, POLHEMUS & POLHEMUS 1995, 1996; partly simplified according to the species known from the area)

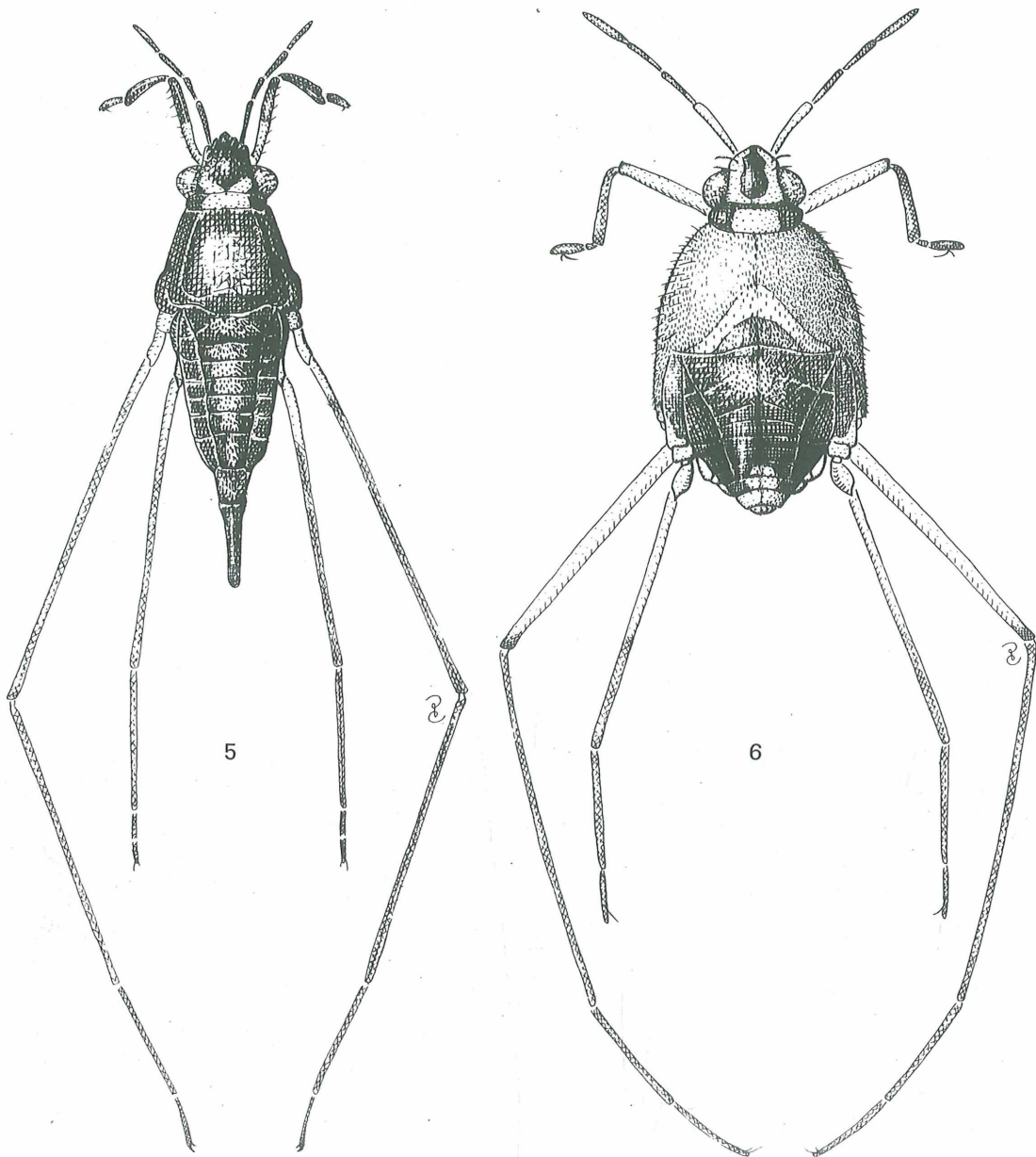
- 1 Female tergite 8 and gonocoxae 1 long (Fig. 4); ovipositor long and serrate; male abdominal segment 8 long, cylindrical (Fig. 3), habitus as in Figure 5 (**Rhagadotarsinae**) ..... **Rhagadotarsus**

With one species in the area; common at the edge of stagnant waters (lakes, artificial ponds, etc.) preferably in open areas; rarely also in lentic parts of larger streams and rivers (HZ, pers. observ.).

Female tergite 8 and gonocoxae 1 short; ovipositor short and nonserrate; male abdominal segment 8 much shorter.

2

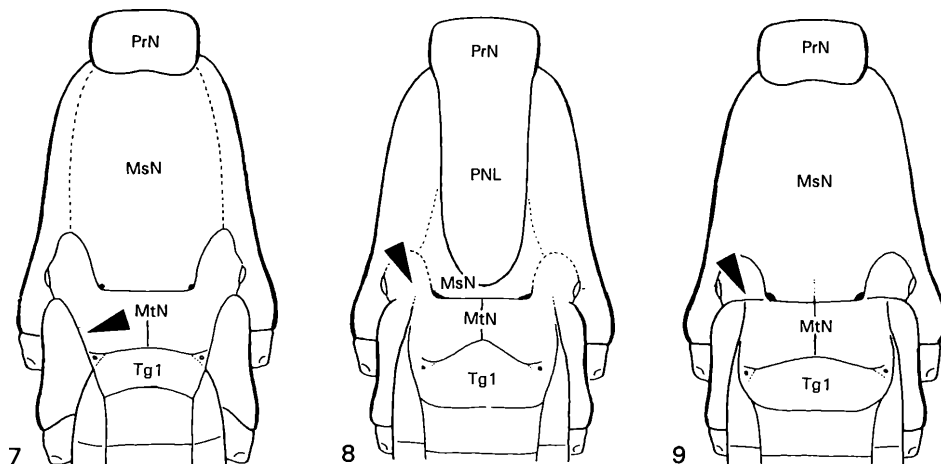
- 2 Middle femur distinctly stouter than hind femur, distinctly shorter than middle tibia (Fig. 1) and usually shorter (except in *Cryptobates*) than hind femur; forewings (if present) with coriaceous basal part and membranous apical part (Fig. 2) (**Trepobatinae**) ..... 3



Figs. 5 - 6: (5) *Rhagadotarsus kraepelini*, ♀ (body length 4 mm), (6) *Naboandelus signatus*, ♀ (3 mm).

- Middle femur about as slender as hind femur, usually longer than middle tibia and subequal or longer than hind femur; forewings (if present) not differentiated. .... 7

- 3 Third antennal segment twice as long as second or longer (freshwater species). 4
- Third antennal segment shorter or slightly longer than second segment (freshwater and mangrove inhabiting species)..... 5
- 4 Head predominantly yellowish; antenna almost as long as body. ***Cryptobates***
- One species known from Thailand, a second (*C. rufus* POLHEMUS & POLHEMUS, 1995) is described from West Malaysia, Singapore, and Indonesia (Batam Isl.) and may be found in Thailand, too. Species live in lentic areas at the edge of small, but deep rivers (POLHEMUS & POLHEMUS 1995) or in small pools (PC, pers. observ.).
- Head predominantly blackish with yellow median stripe; antenna distinctly shorter than body. ***Gnomobates***
- The genus includes one species only, which is rarely collected in India and Indochina. In India specimens have been collected in an artificial pond (POLHEMUS & POLHEMUS 1995).
- 5 Rostrum curved; foretibia distinctly widened apically (mangrove inhabiting species)..... 6
- Rostrum nearly straight (Fig. 10); foretibia not widened apically; habitus as in Figure 6 (freshwater species). ***Naboandelus***
- Naboandelus signatus* is widespread in India and the Southeast Asian mainland and was found in several areas of Thailand, where it inhabits the edge of stagnant waters (lakes, artificial ponds etc.) preferably in open areas; (PC and HZ, pers. observ.). A second species (*N. johorensis* POLHEMUS & POLHEMUS, 1995) is described from West Malaysia and may occur in South Thailand.
- 6 Mesonotum with two pairs of slender elongate yellowish stripes; male metasternum anteriorly produced, metasternal scent gland large. **[*Stenobates*]**
- One species (*S. biroi* ESAKI, 1926) is known from Singapore and may also occur in South Thailand. *Stenobates* species inhabit mangroves.
- Mesonotum with one pair of broad elongate yellowish stripes; male metasternum rarely produced anteriorly, metasternal scent gland small..... **[*Rheumatometroides*]**
- One mangrove inhabiting species, *R. insularis* (POLHEMUS & CHENG, 1982), is known from Singapore and West Malaysia and may also occur in South Thailand.
- 7 Body of elongate shape, rarely stout (Figs. 15–20); metasternum well developed, clearly reaching the metacetabula laterally (freshwater species)..... 8
- Body usually of short ovate or triangular shape (Figs. 25–27), rarely stoutly elongate (only in marine species); metasternum reduced to a short subtriangular plate, only in marine species reaching the metacetabula laterally (Halobatinae)..... 24



Figs. 7–9: Thorax and base of abdomen, dorsal view in (7) Ptilomerinae, (8) Gerrinae, and (9) Cylostethinae (all after ANDERSEN 1982a); arrows pointing at the metacetabular grooves; MsN - mesonotum, MtN - metanotum, PNL - pronotal lobe, PrN - pronotum, Tg1 - tergite 1.

- 8 Metacetabular groove dorsally reaching anterior end of abdominal tergite 1 (Fig. 7); length of foretarsus at least 0.5 times length of foretibia (Fig. 15) (**Ptilomerinae**). ..... 9

Metacetabular groove not reaching anterior end of abdominal tergite 1 (Figs. 8, 9); length of foretarsus shorter than 0.5 times length of foretibia. .... 14

- 9 Large species, body length more than 15 mm; hind coxa with a small apical spine; hind femur much longer than middle femur; middle femur of male with a fringe of long hairs. **Ptilomera**

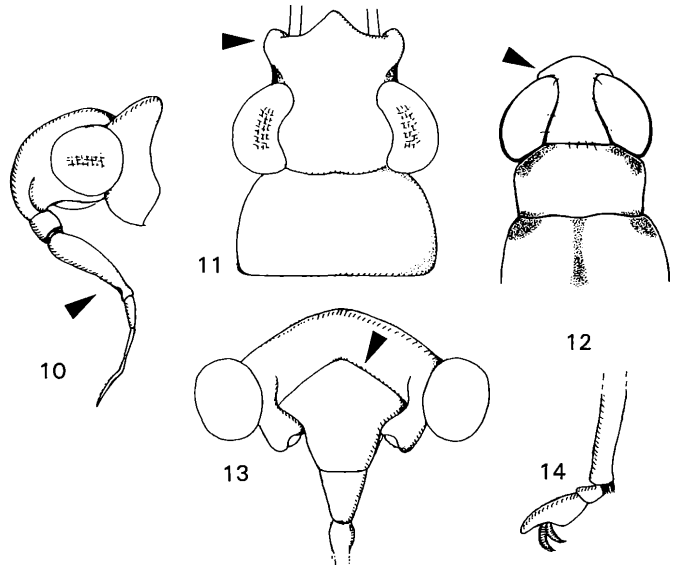
Three species are known from Thailand, a fourth, undescribed species known from Laos (NHMW) may occur in Thailand, too. These large water striders are typical inhabitants of lotic sections of smaller and middle sized streams in forested areas.

Smaller species, body length less than 10 mm; hind coxa without spine; hind femur subequal or shorter than middle femur; middle femur without fringe of long hairs. .... 10

- 10 Dorsal appearance predominantly yellowish; antennal segment 1 distinctly shorter than segments 2–4 together; in dorsal view head anteriorly more rounded (Fig. 12); male distinctly smaller than female; paramere crescent-shaped, not hirsute. **Rheumatogonus**

The taxonomy of the Southeast Asian species of this difficult genus is not well known. Probably most of the Thai specimens belong to *R. intermedius* HUNGERFORD, 1933, at least those from the south. But further undescribed species and *R. vietnamensis* ZETTEL & CHEN, 1996, may also occur. *Rheuma-*

Figs. 10 14: (10) *Naboandelus signatus*, head, lateral view; (11 12) head and pronotum of (11) *Rhyacobates* sp. and (12) *Rheumatogonus vietnamensis* (from ZETTEL & CHEN 1996); (13) *Halobates* sp., head, frontal view (arrow: base of clypeus); (14) *Onychotrechus esakii*, foretarsus with claws.



*togonus* species inhabit small and middle sized streams in forested areas, where they prefer areas with lower water velocity than *Ptilomera* species do. Some species tend to accumulate to large groups (HZ, pers. observ.).

Dorsal appearance predominantly blackish; antennal segment 1 distinctly longer or subequal to segments 2–4 together; in dorsal view, head anteriorly with distinct corners at base of antenna (Fig. 11); male slightly smaller than female; paramere distally elongate, in most genera distally hirsute. .... 11

- 11 Mesonotum with a yellow median line; forefemur ventrally with thin, hair-like bristles; paramere of male apically bare; habitus: Fig. 15. .... ***Rhyacobates***

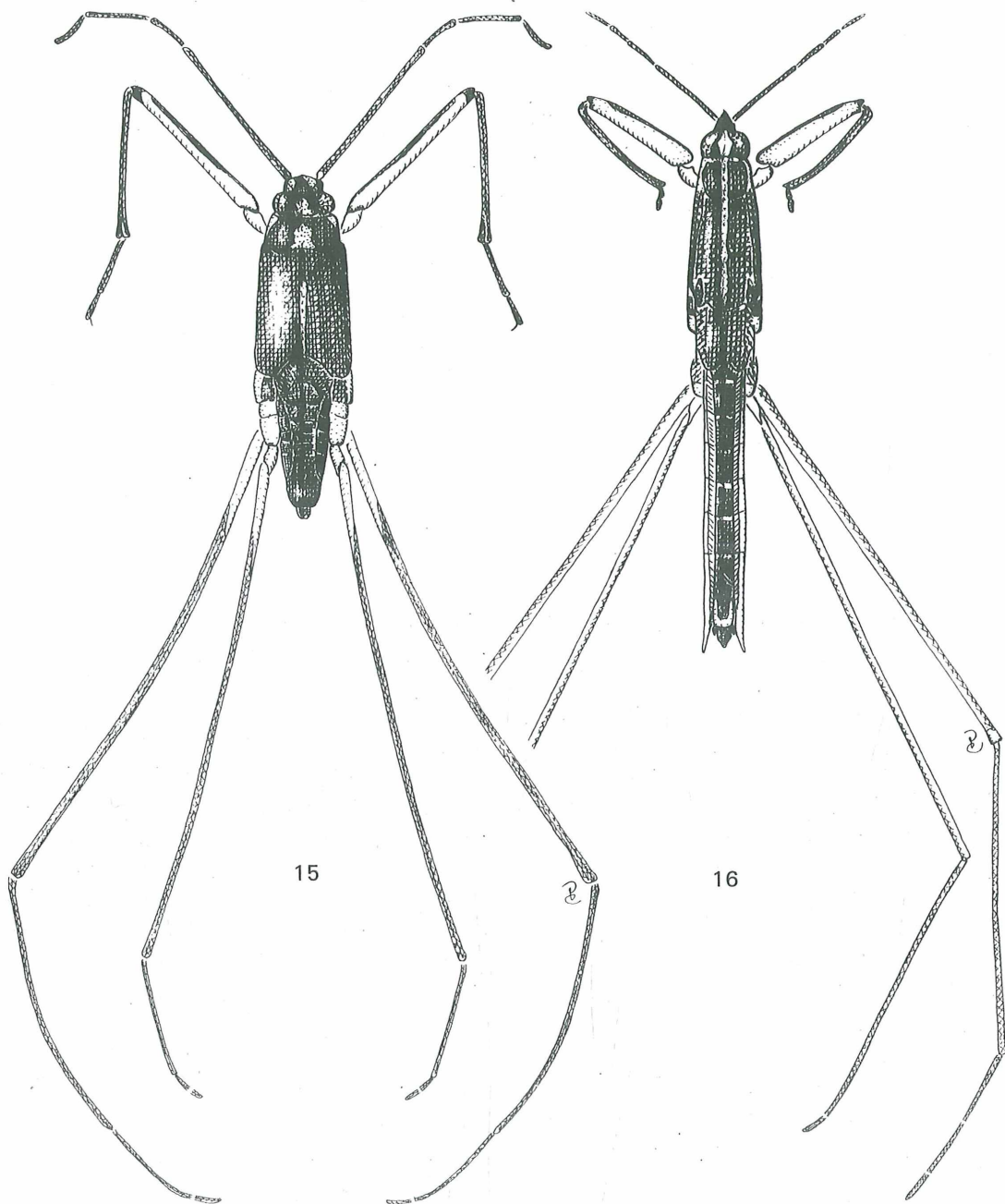
One species, *R. malaisei*, is known from Thailand. "*Rhyacobates*" *imadatei* was described after specimens from Brunei and Thailand, but the Thai record is probably wrong; *imadatei* belongs to an undescribed genus as pointed out by ANDERSEN & CHEN (1995). *Rhyacobates* species are specialized inhabitants of stream currents in forested areas (ANDERSEN & CHEN 1995).

Mesonotum medianly black; forefemur ventrally with thick bristles; paramere of male apically densely hirsute. .... 12

- 12 Mesopleura orange coloured; length of antennal segment 1 subequal to segments 2–4 together; connexivum of segment 6 of female produced into a long, slender process. .... **Genus 1**

An undescribed genus related with *Pleciobates*. Specimens have been found in a middle sized stream in a forested area (HZ, pers. observ.).

Mesopleura blackish; length of antennal segment 1 distinctly longer than segments 2–4 together; connexivum of segment 6 of female with or without process. .... 13



Figs. 15 - 16: (15) *Rhyacobates malaisei*, ♂ (body length 6 mm); (16) *Cylindrostethus costalis*, ♂ (16 mm).

- 13 Abdominal tergites 1 and 2 completely fused; female with long hind coxa (at least 3.5 times as long as wide) and without processes on connexivum of segment 6. .... [Andersenius]

Two species (*A. dentifer* ZETTEL & CHEN, 1996, *A. longicoxa* ZETTEL & CHEN, 1996) are described from Vietnam and may also occur in Thailand. The habitat preference is unknown, but probably similar as in the related *Pleciobates*.

Suture between abdominal tergites 1 and 2 at least partly visible; female with normal short hind coxa (slightly longer than wide) and with long processes on connexivum of segment 6. .... ***Pleciobates***

One species is recorded from Thailand, two further species are described from West Malaysia (*P. tuberculatus* ESAKI, 1930) and Vietnam (*P. vietnamensis* ZETTEL & CHEN, 1996) and may also occur in Thailand. Inhabitants of streams (PC, pers. observ.).

- 14 Metacetabular groove dorsally connected with hind margin of the mesonotum (Fig. 9); antennal segment 4 short and curved; rostrum short, not surpassing the posterior margin of prosternum; segment 2 of foretarsus more than twice as long as segment 1. Body very slender and cylindrical (Fig. 16) (**Cylindrostethinae**)..... ***Cylindrostethus***

Three species are recorded from Thailand; no further species are expected. *Cylindrostethus costalis* and *C. malayensis* are allopatric species which inhabit smoothly flowing streams in lowland swamp forests (POLHEMUS 1994), but have been also found in wide pools of streams in higher altitudes (HZ, pers. observ.). *Cylindrostethus scrutator* typically inhabits rocky upland streams (POLHEMUS 1994).

Metacetabular groove dorsally indistinct (Fig. 8); antennal segment 4 straight; rostrum longer, always surpassing the posterior margin of prosternum; segment two of foretarsus usually less than twice as long as segment 1; body of different shape usually stouter and not cylindrical..... 15

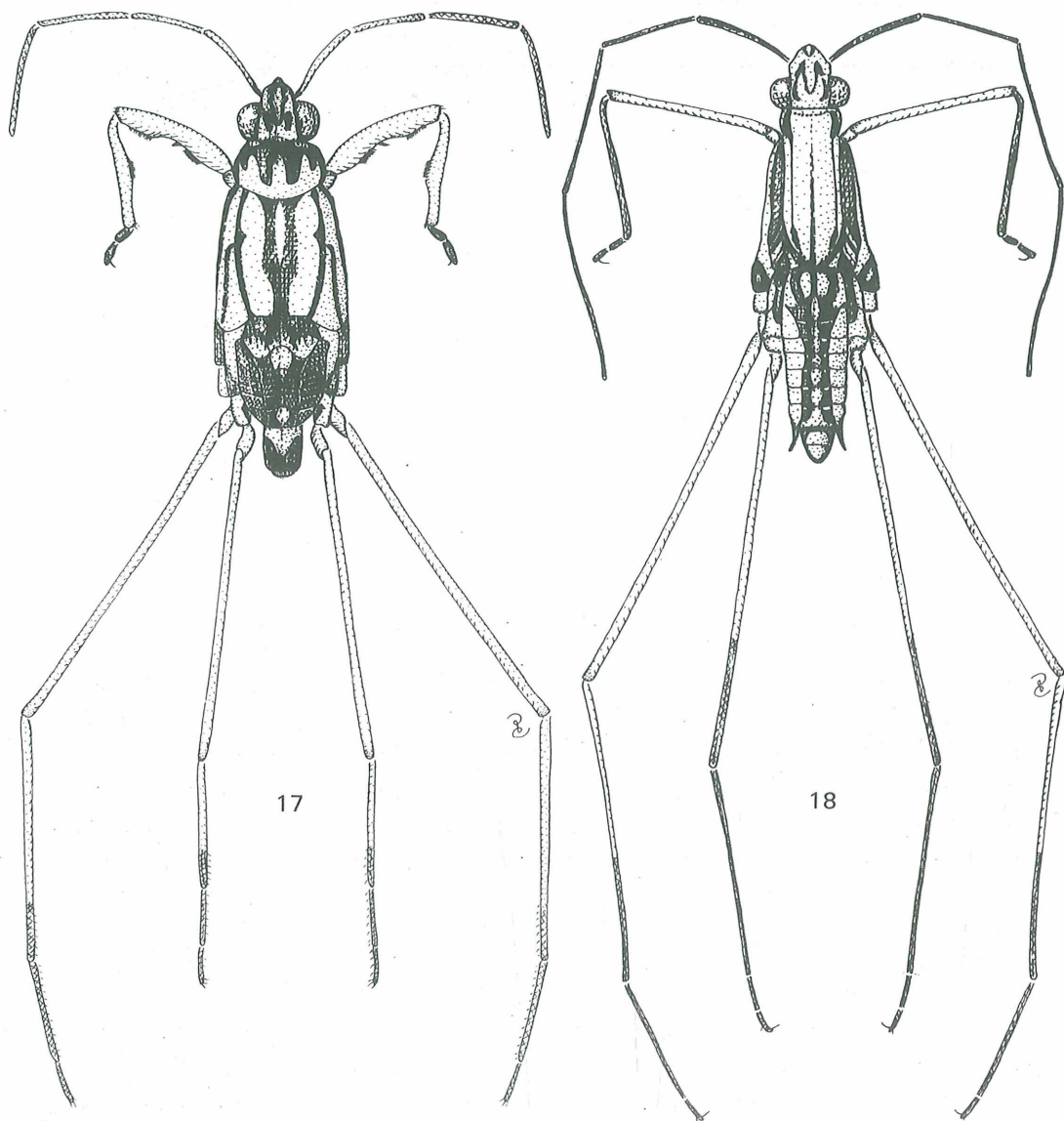
- 15 Meso- and metacetabula with distinct patches of dense, silvery reflecting hairs; pronotum of apterous morph short, without pronotal lobe (comp. Fig. 9) (**Eotrechinae**)..... 16

Meso- and metacetabula without distinct silvery reflecting hair patches, but with more or less uniform hair layer (not to mistake with frequently present yellowish coloured spots of the integument); pronotum of apterous morph usually long, with well developed pronotal lobe (Fig. 8) (Gerrinae). 18

- 16 Hind leg distinctly shorter than middle leg (habitus: Fig. 17). ***Amemboa***

a Segment 1 of middle tarsus about twice as long as segment 2. Male forefemur modified, with tubercles and/ or tufts or patches of dark hairs. .... sg. ***Amemboa***

Segment 1 of middle tarsus distinctly less than twice as long as segment 2. Male forefemur not modified..... sg. ***Amemboides***



Figs. 17 - 18: (17) *Amemboa* (s.str.) *speciosa*, ♂ (body length 3 mm); (18) *Limnometra matsudai*, ♂ (8 mm).

Thirteen species of the genus *Amemboa* are recorded from Thailand, but several species more may occur. *Amemboa* species inhabit pot holes and pools associated with streams in forested areas and are only rarely found at less quiet edges of streams (PC and HZ, pers. observ.). Frequently a few species are found in the same habitat.



Lengths of hind leg and middle leg subequal..... 17

- 17 Claws inserted in apex of tarsus; hind femur shorter than hind tibia and hind tarsus together..... **Eotrechus**

Two species are known from Thailand, but, because of the specialized habitats, further undescribed species may be discovered. As far as known, *Eotrechus* species live in high altitudes of mountains, where they inhabit wet rock surfaces (ANDERSEN 1982b).

Claws inserted before apex of tarsus (Fig. 14); hind femur longer than hind tibia and hind tarsus together. **Onychotrechus**

*Onychotrechus esakii* is widespread in North and Northeast Thailand. A second species (*O. pallidus* ANDERSEN, 1980, from West Malaysia) may occur in South Thailand. *Onychotrechus* species live hygropetric on wet rocks along streams and water falls in forested areas (ANDERSEN 1980).

(Gerrinae:)

- 18 Very large, body length 30 mm and more..... [*Gigantometra*]

The single species of the genus, *G. gigas* CHINA, 1925, is known from South China and North Vietnam. Probably it does not occur in Thailand. Its habitats are wide, slowly flowing small streams in primary forests (after various observations).

Smaller species up to 20 mm body..... 19

- 19 Pronotum inclusively pronotal lobe predominantly yellowish or brownish with blackish colour patterns, especially with blackish midline (Fig. 18); antenna very long and slender (Fig. 18). 20

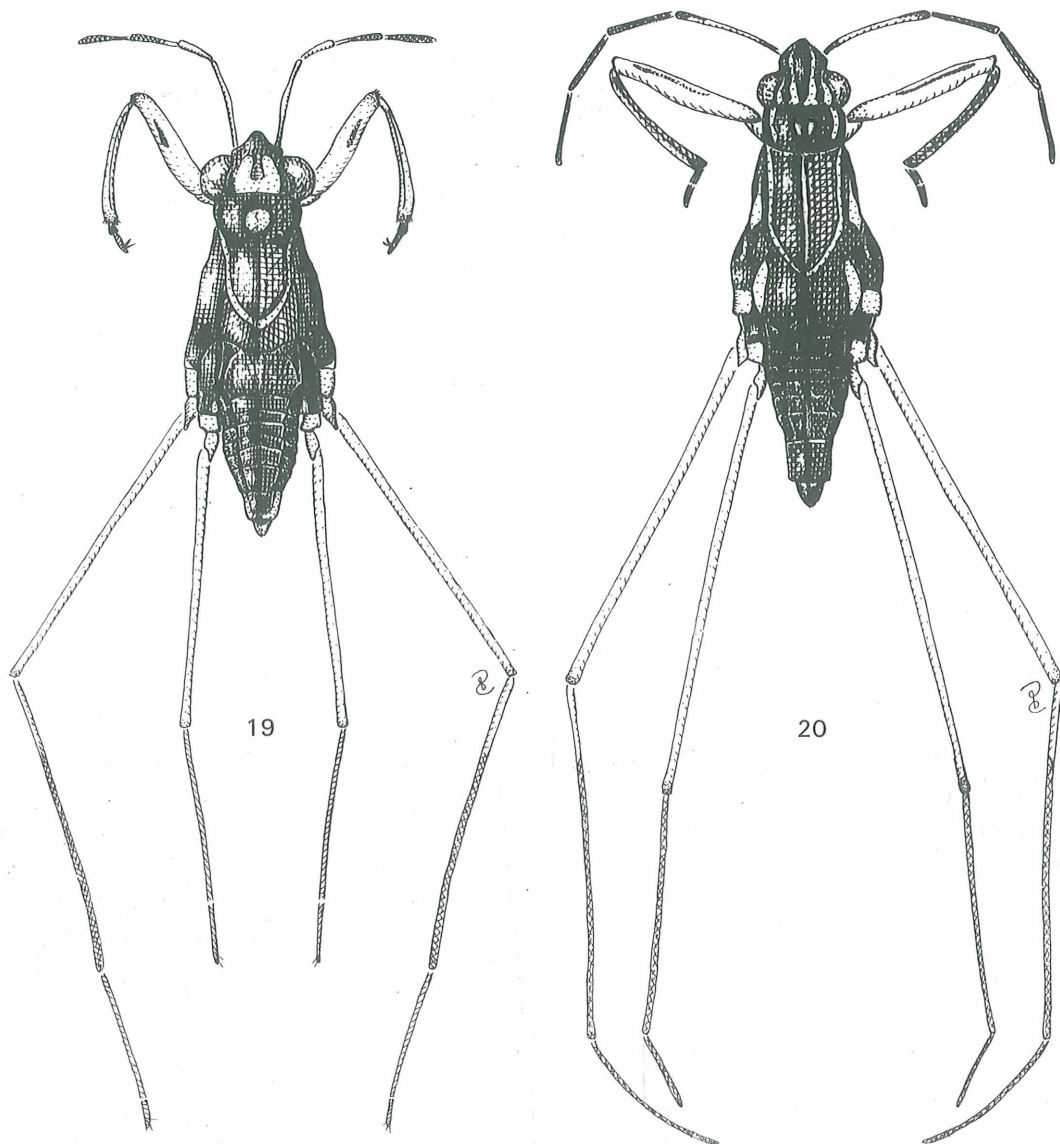
Pronotum inclusively pronotal lobe (if present) predominantly blackish, but frequently with distinct yellow or orange marks (middle line, spots, hind margin etc.) (Figs. 19, 20); antenna stouter. 21

- 20 Abdominal connexiva posteriorly without distinct spines. Abdomen relatively short..... **Tenagobonus**

One species is so far recorded, but the presence of two further species, *T. kuiterti* HUNGERFORD & MATSUDA, 1958 (described from Myanmar) and *T. maai* HUNGERFORD & MATSUDA, 1958 (described from West Malaysia), are likely. *Tenagobonus* species are typically found in larger, quiet, lentic parts of running waters, but also in stagnant waters, especially if they are associated with streams.

Abdominal connexiva posteriorly with long distinct spines; abdomen slender elongate (habitus: Fig. 18). **Limnometra**

*Limnometra matsudai* is a common species and frequently found in potholes or pools along streams in shaded places. *Limnometra ciliata* inhabits larger stagnant waters or wide lentic sections of larger streams. An undescribed species collected in Mae Hong Son Province keys out with *Limnometra*, but

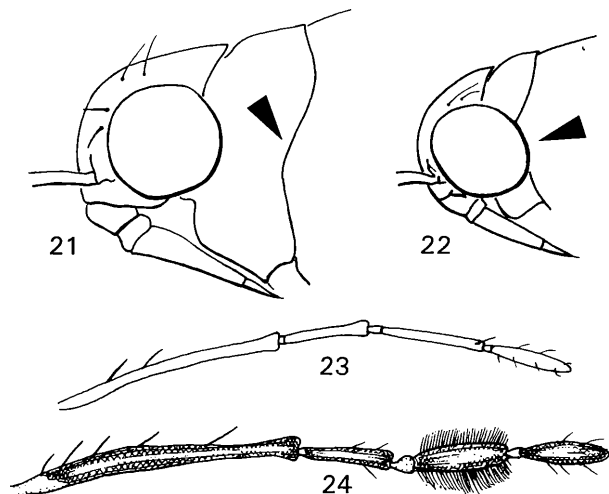


Figs. 19 - 20: (19) *Neogerris parvulus*, ♂ (body length 4 mm); (20) *Limnogonus fossarum fossarum*, ♂ (8 mm).

shows a combinations of characters of *Tenagogonus* and *Limnometra*. No further species is so far expected.

21 Dorsal surface of head almost uniformly dark; venter mainly dark. .... 22

- Dorsal surface of head with distinct longitudinal yellowish or transverse orange marks. .... 23
- 22 Antennal segment 1 longer than segments 2 and 3 together; larger species (11 mm or more). .... **Aquarius**
- Two widely distributed species occur also in Thailand, no further species are expected. Both inhabit large lentic habitats.
- Antennal segment 1 shorter than segments 2 and 3 together; smaller species (9 mm or less). .... **Gerris**
- a Pronotal lobe black. .... **sg. Gerris**
- Pronotal lobe reddish brown. .... [sg. *Macrogerris*]
- A mainly holarctic genus. So far only *Gerris* (s.str.) *nepalensis* is known from Thailand. The habitats of this species are unknown. Further species may occur in the mountains of North Thailand, e.g., *Gerris* (s.str.) *lobatus* ANDERSEN & CHEN, 1993, and *Gerris* (*Macrogerris*) *gracilicoris* (HORVATH, 1879), which are both known from Yunnan.
- 23 Pronotum with a central orange coloured mark (habitus: Fig. 19)..... **Neogerris**
- Neogerris parvulus* is a widespread and common species of small and middle sized stagnant waters including paddy fields, ponds etc., whereas *N. assimilis* is so far only known from one collection in Thailand. No further species is expected.
- Pronotum with a yellow midline, a pair of yellow spots, or both (habitus: Fig. 20). .... **Limnogonus**
- a Pronotum with a pair of yellowish spots. .... **sg. Limnogonus**
- Pronotum without a pair of yellowish spots, but with a continuous yellow midline... **sg. Limnogonoides**
- From Thailand, *L. (Limnogonoides) pectoralis* is so far only known from a single specimen (HECHER & ZETTEL 1996). The two recorded species of *Limnogonus* (s.str.) are common and widespread. *Limnogonus hungerfordi* ANDERSEN, 1975, is recorded from Singapore and may be found in South Thailand. *Limnogonus* species are typical inhabitants of all kinds of stagnant waters, but are also found in lentic parts of slow flowing streams (especially *L. nitidus*).
- (Halobatinae)**
- 24 Basal margin of clypeus well defined (Fig. 13), anterior margin of head not smoothly rounded (coastal marine species). .... 25
- Basal margin of clypeus not present, anterior margin of head broadly and evenly rounded (freshwater species, rarely reaching river mangroves). .... 26
- 25 Middle tibia and segment 1 of middle tarsus with hair fringe. .... **Halobates**



Figs. 21 - 24: Head and prothorax, lateral view, of (21) *Metrocoris armatus* and (22) *Ventidius modulatus*; antennae of (23) female and (24) male of *Esakia ventidioides*.

Both species known from Thailand belong to the subgenus *Halobates* s.str. Further species may be recorded in future. The majority of *Halobates* species are known from marine coastal habitats; only a few species inhabit the open ocean.

Middle tibia with, segment 1 of middle tarsus without hair fringe..... ***Asclepios***

*Asclepios annandalei* is the only species so far recorded from Thailand; *A. apicalis* (ESAKI, 1924), which was recently recorded from Vietnam (ZETTEL & CHEN 1996), may also occur. Both species live in coastal marine habitats.

- 26 Eyes not overlapping the anterolateral angles of mesonotum (Fig. 21); body yellowish with black colour pattern as in Fig. 27 or similar..... ***Metrocoris***

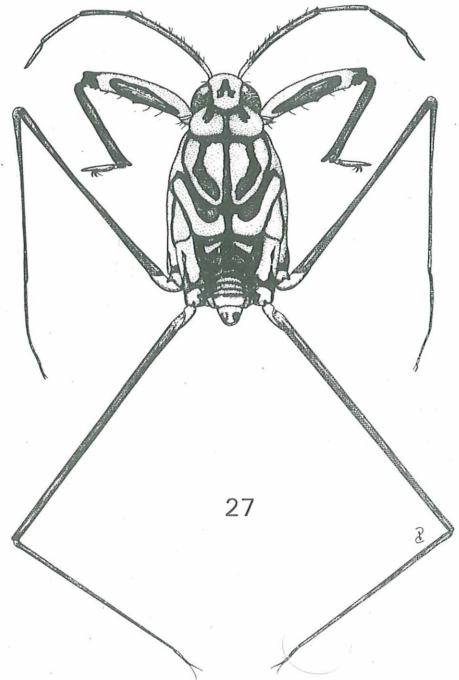
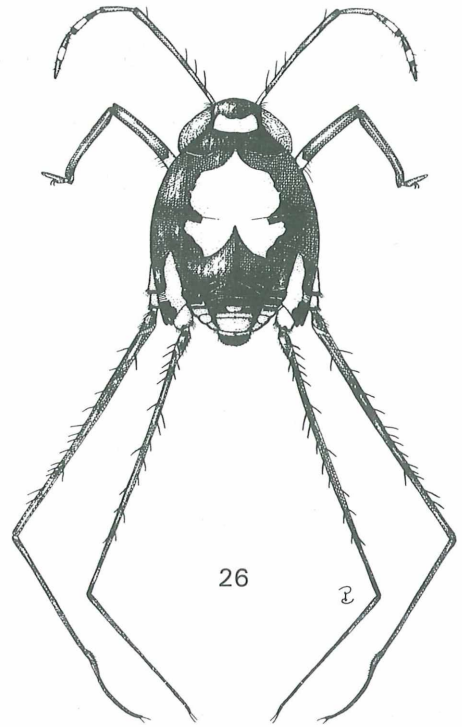
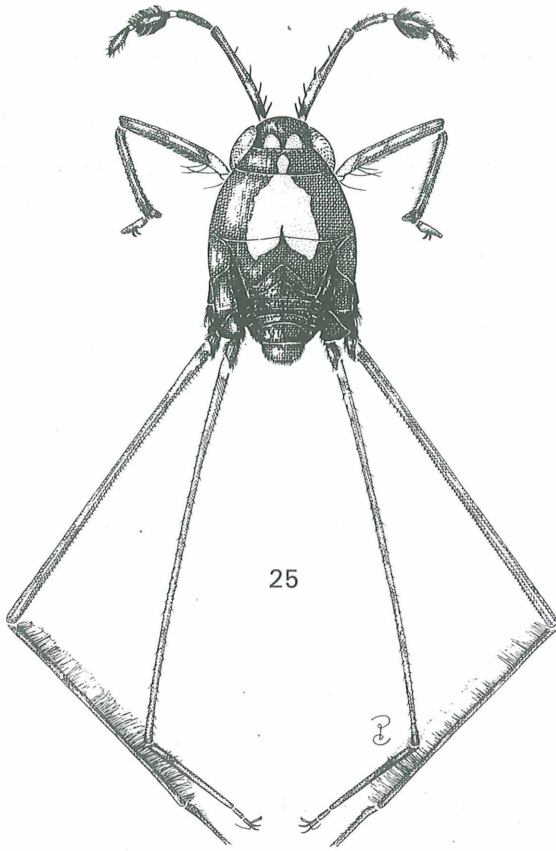
With ten described and several undescribed species, probably the most diverse gerrid genus in Thailand. Several species described from surrounding countries may be also recorded in future. *Metrocoris* species typically inhabit lentic parts of mountainous streams in forested areas (CHEN & NIESER 1993). Only a few lowland species (e.g., *M. tenuicornis*) are less demanding.

Eyes overlapping the anterolateral angles of mesonotum (Fig. 22); body greenish (after death yellowish) with black colour patterns as in Figs. 25 26 or similar.

27

- 27 Body strongly flattened, in anterior portion of thorax less narrowed (habitus: Fig. 25); antennal segment 3 of male enlarged and with a fringe of stiff hairs along margin (Fig. 24). ***[Esakia]***

*Esakia fernandoi* CHENG, 1966, and an undescribed species known from Vietnam, may also occur in Thailand. *Esakia* species prefer smoothly flowing smaller streams in forested areas. *Esakia fernandoi* lives in the lentic areas, but some other species inhabit lotic sections, where they are aggregating to small or even large groups (HZ, pers. observ.).



Figs. 25 - 27: freshwater Halobatinae:  
 (25) *Esakia ventidioides* LUNDBLAD, 1933,  
 ♂ (2 mm), (26) *Ventidius* (*Ventidioides*)  
*karen*, ♂ (3 mm) (from CHEN & ZETTEL  
 1996), (27) *Metrocoris lituratus* (STÅL,  
 1854, ♂ (6 mm).

Body usually not distinctly flattened (except females of *V. hungerfordi*), in anterior portion of thorax distinctly narrowed (habitus: Fig. 26); antennal segment 3 of male slender.

***Ventidius***

a Pronotal lobe black; metacetabula bilobate.

sg. ***Ventidioides***

Pronotal lobe partly yellowish; metacetabula triangular. .... sg. ***Ventidius***

So far six species are known from Thailand, two further species may occur: *V. (s.str.) harrisoni* CHENG, 1965 (known from Malaysia) and *V. (Ventidioides) kuiterti* HUNGERFORD & MATSUDA, 1960 (from Myanmar). Usually, *Ventidius* species are found in small and middle sized streams and at the edge of large mountainous lakes, where they inhabit open, quiet areas (PC, pers. observ.).

### Check-list of genera and species of Gerridae known from Thailand

This list includes all species presently known from Thailand based on literature and material deposited in the Natural History Museum Vienna (= NHMW). References in brackets refer to the first record for Thailand.

#### Subfamily Rhagadotarsinae

***Rhagadotarsus* BREDDIN, 1905**

*Rhagadotarsus kraepelini* BREDDIN, 1905 (POLHEMUS & KARUNARATNE 1993)

#### Subfamily Trepobatinae

***Naboandelus* DISTANT, 1910**

*Naboandelus signatus* DISTANT, 1910 (POLHEMUS & POLHEMUS 1994)

***Cryptobates* ESAKI, 1929**

*Cryptobates johorensis* POLHEMUS & POLHEMUS, 1995 (NHMW)

***Gnomobates* POLHEMUS & POLHEMUS, 1995**

*Gnomobates kuiterti* (HUNGERFORD & MATSUDA, 1958) (POLHEMUS & POLHEMUS 1995)

#### Subfamily Gerrinae

***Aquarius* SCHELLENBERG, 1800**

*Aquarius adalaidis* (DOHRN, 1860) (ANDERSEN 1990)

*Aquarius paludum* (FABRICIUS, 1794) (ANDERSEN 1990)

***Gerris* FABRICIUS, 1794**

*Gerris (Gerris) nepalensis* DISTANT, 1910 (HANBOONSONG & al. 1996)

***Limnogonus* STÅL, 1868**

*Limnogonus (s.str.) fossarum fossarum* (FABRICIUS, 1775) (ANDERSEN 1975)

*Limnogonus (s.str.) nitidus* (MAYR, 1865) (ANDERSEN 1975)

*Limnogonus (Limnogonoides) pectoralis* (MAYR, 1865) (HECKER & ZETTEL 1996)

***Neogerris* MATSUMURA, 1913**

*Neogerris assimilis* ANDERSEN, 1975 (NHMW)

*Neogerris parvulus* (STÅL, 1859) (ANDERSEN 1975)

***Limnometra* MAYR, 1865**

*Limnometra ciliata* MAYR, 1865 (ANDERSEN 1995)

*Limnometra matsudai* (MIYAMOTO, 1967) (ANDERSEN 1995)

***Tenagogonus* STÅL, 1853***Tenagogonus nicobarensis* ANDERSEN, 1964 (ANDERSEN 1995)*Tenagogonus/Limnometra* sp. (undescribed species, generic position unclear, NHMW)**Subfamily Eotrechinae*****Amemboa* ESAKI, 1925***Amemboa* (s.str.) *armata* POLHEMUS & ANDERSEN, 1984 (POLHEMUS & ANDERSEN 1984)*Amemboa* (s.str.) *brevifasciata* MIYAMOTO, 1967 (MIYAMOTO 1967)*Amemboa* (s.str.) *cristata* POLHEMUS & ANDERSEN, 1984 (POLHEMUS & ANDERSEN 1984)*Amemboa* (s.str.) *javanica* LUNDBLAD, 1933 (POLHEMUS & ANDERSEN 1984)*Amemboa* (s.str.) *lyra* (PAIVA, 1918) (POLHEMUS & ANDERSEN 1984, as *A. riparia* POLHEMUS & ANDERSEN, 1984)*Amemboa* (s.str.) *prostata* POLHEMUS & ANDERSEN, 1984 (POLHEMUS & ANDERSEN 1984)*Amemboa* (s.str.) *speciosa* POLHEMUS & ANDERSEN, 1984 (POLHEMUS & ANDERSEN 1984)*Amemboa* (s.str.) *aquafrigida* ZETTEL & CHEN, 1997 (ZETTEL & CHEN 1997)*Amemboa* (s.str.) *schwendingeri* ZETTEL & CHEN, 1997 (ZETTEL & CHEN 1997)*Amemboa* (*Amemboides*) *nodosa* POLHEMUS & ANDERSEN, 1984 (POLHEMUS & ANDERSEN 1984)*Amemboa* (*Amemboides*) *perlata* POLHEMUS & ANDERSEN, 1984 (POLHEMUS & ANDERSEN 1984)*Amemboa* (*Amemboides*) *velaris* POLHEMUS & ANDERSEN, 1984 (POLHEMUS & ANDERSEN 1984)***Onychotrechus* KIRKALDY, 1903***Onychotrechus esakii* ANDERSEN, 1980 (ANDERSEN 1980)***Eotrechus* KIRKALDY, 1902***Eotrechus hygropetricus* ANDERSEN, 1982 (ANDERSEN 1982b)*Eotrechus petraeus* ANDERSEN, 1982 (ANDERSEN 1982b)**Subfamily Cylindrostethinae*****Cylindrostethus* MAYR, 1865***Cylindrostethus costalis* SCHMIDT, 1915 (POLHEMUS 1994)*Cylindrostethus scrutator* (KIRKALDY, 1899) (POLHEMUS 1994)*Cylindrostethus malayensis* POLHEMUS, 1994 (POLHEMUS 1994)**Subfamily Ptilomerinae*****Ptilomera* AMYOT & SERVILE, 1843***Ptilomera hemmingseni* ANDERSEN, 1967 (ANDERSEN 1967)*Ptilomera hylactor* BREDDIN, 1903 (HANBOONSONG & al. 1996)*Ptilomera tigrina* UHLER, 1860 (HUNGERFORD & MATSUDA 1965, under *P. harpyia harpyia*)***Pleciobates* ESAKI, 1930***Pleciobates pacholatko* ZETTEL & CHEN, 1996 (ZETTEL & CHEN 1996)***Rhyacobates* ESAKI, 1923***Rhyacobates malaisei* ANDERSEN & CHEN, 1995 (ANDERSEN & CHEN 1995)? "*Rhyacobates*" *imadatei* MIYAMOTO, 1967 (MIYAMOTO 1967) (Generic position unclear. Record from Thailand doubtful.)***Rheumatogonus* KIRKALDY, 1909***Rheumatogonus* sp. (NHMW)**Genus 1 sp. (NHMW)**

## Subfamily Halobatinae

### ***Halobates* ESCHSCHOLTZ, 1822**

*Halobates germanus* WHITE, 1883 (HERRING 1961: map)

*Halobates flaviventris* ESCHSCHOLTZ, 1822 (HERRING 1961: map)

### ***Asclepios* DISTANT, 1915**

*Asclepios annandalei* DISTANT, 1915 (ANDERSEN & FOSTER 1992)

### ***Metrocoris* MAYR, 1865**

*Metrocoris acutus* CHEN & NIESER, 1993 (CHEN & NIESER 1993)

*Metrocoris armatus* CHEN & NIESER, 1993 (CHEN & NIESER 1993)

*Metrocoris ciliatus* DEN BOER, 1965 (CHEN & NIESER 1993)

*Metrocoris inthanon* CHEN & NIESER, 1993 (CHEN & NIESER 1993)

*Metrocoris* sp. aff. *malayensis* (nec *malayensis* CHEN & NIESER, 1993, as recorded by CHEN & NIESER 1993)

*Metrocoris nigrofasciatus* DISTANT, 1903 (CHEN & NIESER 1993)

*Metrocoris nigrofascioides* CHEN & NIESER, 1993 (CHEN & NIESER 1993)

*Metrocoris squamifer* LUNDBLAD, 1933 (CHEN & NIESER 1993)

*Metrocoris strictus* CHEN & NIESER, 1993 (CHEN & NIESER 1993)

*Metrocoris tenuicornis* ESAKI, 1926 (CHEN & NIESER 1993)

*Metrocoris* spp. (several undescribed species)

### ***Ventidius* DISTANT, 1910**

*Ventidius* (s.str.) *hungerfordi* CHENG, 1965 (CHEN & ZETTEL, in prep.)

*Ventidius* (s.str.) *malayensis* HUNGERFORD & MATSUDA, 1960 (CHEN & ZETTEL, in prep.)

*Ventidius* (s.str.) *modulatus* LUNDBLAD, 1933 (CHEN & ZETTEL, in prep.)

*Ventidius* (*Ventidioides*) *karen* LANSBURY, 1990 (LANSBURY 1990)

*Ventidius* (*Ventidioides*) *lundbladi* MIYAMOTO, 1967 (MIYAMOTO 1967)

*Ventidius* (*Ventidioides*) *pulai* CHENG, 1965 (CHEN & ZETTEL, in prep.)

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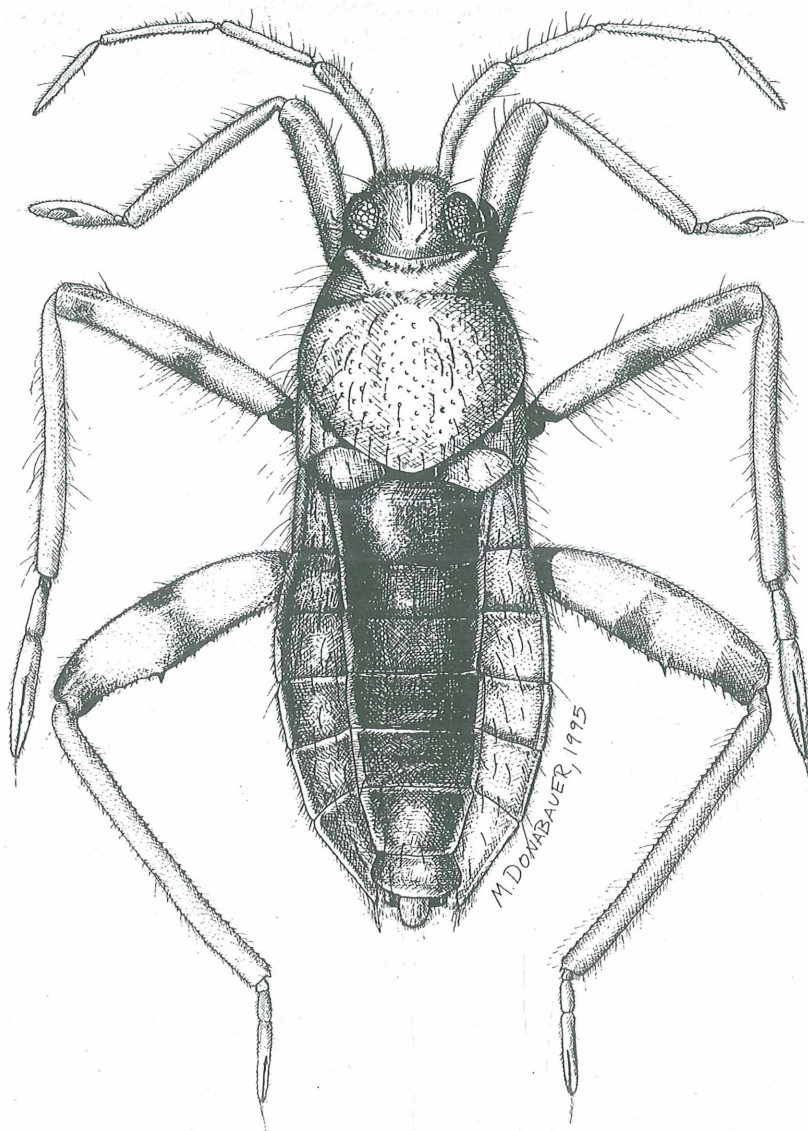
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**Authors' address:** Dr. Pingping Chen & Dr. Herbert Zettel, Naturhistorisches Museum Wien, 2. Zoologische Abteilung, Burgring 7, A-1014 Vienna, Austria (e-mail: herbert.zettel@nhm-wien.ac.at)

## Thai Heteroptera Gallery (1)



*Chenevelia stridulans* ZETTEL, 1996, apterous female

This monotypic Veliidae genus is so far known only from two localities in North Thailand (Mae Hong Son, Phrae). It was named in honour of Dr. Ping-ping Chen.

Reprint from ZETTEL 1996, Annalen des Naturhistorischen Museums in Wien 98B: 356; graph: Dipl.Ing. Martin Donabauer, Vienna.

# An annotated checklist of burrower bugs (Cydnidae) of Thailand

by Jerzy A. Lis

**Abstract:** A checklist of 24 species of Cydnidae from Thailand is presented. New records for nine species are provided. Two species, *Chilocoris assmuthi* (BREDDIN, 1904) and *Chilocoris barbarae* LIS, 1991, are recorded for the first time from Thailand.

Most representatives of Cydnidae are black or brown in colour, live in the soil, and feed on roots and stems of different plants; therefore the family is known under the popular name of burrower bugs (or burrowing bugs). Some of them have been reported as nuisances to plants, and several even as serious pests in tropical countries (LIS & BECKER, in print).

Only 22 species of Cydnidae were recorded from the territory of Thailand, so far (HASEGAWA 1962, CARVALHO 1969, LIS 1990, 1991, 1992, 1993, 1994, 1996a). It made about 12 % of the whole Oriental fauna of the family (LIS 1994), and suggested that many other species known from the neighbouring countries (Myanmar, Laos, Vietnam, Cambodia, Malaya) should be found also in Thailand.

The paper presents an annotated checklist of Cydnidae known from Thailand with localities as they were given in original papers, as well as new records for nine species (two recorded for the first time from the country) based on the authors collection (JAL) and the material borrowed from the following institutions: Zoologische Staatssammlung München, Germany (ZSM), Staatliches Museum für Naturkunde, Stuttgart, Germany (SMNS), Naturhistorisches Museum Wien, Austria (NhMW), and the National Science Museum, Tokyo, Japan (NSMT).

Species new to Thailand are marked with the asterisk. Data on the general distribution of species follow LIS (1994, 1996b).

## List of species

### Subfamily *Scaptocorinae* FROESCHNER, 1960

#### 1. *Stibaropus callidus* (SCHIÖDTE, 1847)

Khon Kaen City (CARVALHO 1969); Thailand (LIS 1991); Central Thailand, Kwae Noi Riv. (LIS 1994).

Species known from India, Sri Lanka, Pakistan, Nepal, Bangladesh, Myanmar, Laos, Vietnam, and Thailand.

#### 2. *Stibaropus molginus* (SCHIÖDTE, 1847)

Bangkok (LIS 1994); 1 ♂, Nong Khai Province, Nong Khai, Maekhong at Holiday, 28.11.1995, leg. H. Zettel (NhMW).

A rather common species recorded from Pakistan, India, Bangladesh, Myanmar, Laos, Vietnam, Cambodia, Thailand, and Malaya.

#### 3. *Stibaropus pseudominor* LIS, 1991

Pachim District (LIS 1994); Central Thailand, Kwae Noi River (LIS 1994).

Known from India, Burma, South China, Laos, Vietnam, Thailand, Malaya, and Philippines.

**Subfamily Cydninae BILLBERG, 1820**

**\*4. *Chilocoris assmuthi* (BREDDIN, 1904)**

1 ♂, Doi Inthanon, 15-20.V.1990, leg. Malicky (ZSM). First record for Thailand!

Till now known only from Pakistan, India, Nepal, and Sri Lanka.

**\*5. *Chilocoris barbarae* Lis, 1991**

2 ♂♂, 2 ♀♀, South Thailand, Betong, Gunung Cang dun vill., Yala distr., 26.3.-22.5.1993, leg. Horak & Strnad (NhMW, JAL).

So far recorded from Malaysia, Indonesia, Papua New Guinea, and Australia. First record for Thailand!

**6. *Chilocoris thaicus* Lis, 1994**

Chiang Mai, Doj Suthap (Lis 1994).

Described and known only from Thailand, so far.

**7. *Cydnus incisus* (DISTANT, 1901)**

Chiang Mai Province, Doi Inthanon National Park, Mae Ya (Lis 1994); Thailand (Lis 1996a).

Recorded from Myanmar, Thailand, Vietnam, and Indonesia (Sumatra).

**8. *Adrisa birmana* Lis, 1992**

Tak Province, Umphang District, Thung Yai Wildlife Sanctuary (Lis 1992, 1994); Muok-Lek (Lis 1994).

Known only from Myanmar, Laos, Thailand, and Malaya.

**9. *Adrisa magna* (UHLER, 1861)**

Tak Province, Umphang District, Thung Yai Wildlife Sanctuary, Mae Chan/Mae Klong confluence (Lis 1992, 1994).

Recorded from Japan, Korea, China, Hong Kong, Myanmar, Thailand, Laos, and Vietnam.

**10. *Aethus indicus* (WESTWOOD, 1837)**

Sai Yok (Lis 1993, 1994); NW Lan-Sak (Lis 1994); W Han Kha (Lis 1994); W Ben Rei (Lis 1994); 1 ♀, Central Thailand, Lan Sak, 20km W Uthai-Thani, ca. 80m, Juli 1986, leg. W. Thielen (SMNS); 1 ♀, Pak Chong, 1-10.4.93, at light, leg. T. Bziuk (JAL).

A species very common in the western part of the Oriental Region.

**11. *Aethus pseudindicus* Lis, 1993**

Bangsaen (Lis 1994).

A species common in the eastern part of the Oriental Region.

**12. *Aethus tanna* (DISTANT, 1908)**

Pon Makampon (HASEGAWA 1962); Thailand (Lis 1994).

Known only from India, Nepal, Myanmar, Laos, and Thailand.

**13. *Alonips acrostictus* (DISTANT, 1918)**

Phuket, Patong Beach (Lis 1994); Sarabri Province, Botanical Garden (Lis 1994).

Recorded from Pakistan, India, Sri Lanka, Myanmar, South China, Laos, Thailand, and Vietnam.

**14. *Alonips apicalis* (DALLAS, 1851)**

Bangkok (Lis 1994); Klon Ran (Lis 1994).

Known from Pakistan, India, Sri Lanka, Burma, Cambodia, Thailand, and Singapore.

**15. *Byrsinus varians* (FABRICIUS, 1803)**

Bangsaen (Lis 1994).

Common and widely distributed in the Oriental Region.

**16. *Fromundus biimpressus* (HORVATH, 1919)**

Bangkok (Lis 1994).

Recorded only from South China, Vietnam, Laos, Thailand, Malaya, and Sumatra.

**17. *Fromundus pygmaeus* (DALLAS, 1851)**

Chiang Dao (HASEGAWA 1962); Chiang Mai (HASEGAWA 1962); Chainat (HASEGAWA 1962); Chiang Mai Province, Fang Horticultural Expedition Station (Lis 1994); Chiang Mai Province, Chiang Mai (Lis 1994); Sam Ngao, at Bhumipol Dam (Lis 1994); Bangkok (Lis 1994); Vieng Vai (Lis 1994); Phuket, Patong Beach (Lis 1994); Nha-trang (Lis 1994); NW Lan Sak (Lis 1994); W Han Kha (Lis 1994); Bangsaen (Lis 1994); 1 ♀, Mae Taeng, Chiang Mai, 13.IX.1988, leg. Yimyam (NhMW); 1 ♂, Chiang Mai, Doi Inthanon National Park, 17.8.1995, leg. R. Grimm (JAL); 1 ♀, Pak Chong, 1.-10.4.93, at light, leg. T. Bziuk (JAL); 3 ♂♂, 8 ♀♀, Changwat Chiang Mai, Chiang Mai, 250 m, 12. 1988 & 1.1989, leg. Trautner & Geigenmüller (SMNS, JAL); 1 ♀, Central Thailand, Lan Sak, 20km W Uthai-Thani, ca. 80 m, Juli 1986, leg. W. Thielen (SMNS).

The most common species of Cydnidae, known from both Australian and Oriental Regions; recorded also from Korea, Japan, and even Saudi Arabia and Iraq.

**18. *Lactistes truncatoserratus* SIGNORET, 1880**

Pachim District (Lis 1994).

Known from India, Myanmar, South China, Thailand, and Vietnam.

**19. *Macroscytus aequalis* (WALKER, 1867)**

Chiang Mai Province, Doi Inthanon National Park (Lis 1994); Shan States, Manders (Lis 1994); 2 ♂♂, Doi Inthanon, 1.-3.V.1990, leg. Malicky (ZSM); 1 ♂, Chiang Mai, Zoo, 22.-29.VII.1990, leg. Malicky (ZSM).

Known from Nepal, Bhutan, India, Sri Lanka, South China, Hong Kong, Laos, Vietnam, Cambodia, and Thailand.

**20. *Macroscytus dominiqueae* Lis, 1991**

Loei Province, Phu Luang Wildlife Sanctuary (Lis 1994); NW Lan-Sak (Lis 1994); W Ban Rai (Lis 1994); 1 ♂, Central Thailand, Phu-Hin Rongkla, 1200 m, Nakhon Thai, C. Phitsanulok, 26 Aug. 1987, leg. Yamasaki (NSMT).

Recorded from India, South China, Hong Kong, Laos, Vietnam, Cambodia, Thailand, and Malaya.

**21. *Macroscytus subaeneus* (DALLAS, 1851)**

Thailand (Lis 1994).

A very rare species; known only from several specimens collected in Philippines, Indonesia (Flores) and Thailand. Almost all its previous records from other countries pertained to several different species of the genus.

**22. *Macroscytus sumatranus* Lis, 1994**

Thailand (Lis 1994); Nan (Lis 1994); 1 ♂, Khao Luang National Park, H.Q., 120 m, Nop Pi Tam, Nakhon Si Thammarat, 9.VIII.1987, leg. H. Ono (NSMT).

Known from India, Myanmar, South China, Laos, Vietnam, Thailand, Singapore, Malaysia, and Indonesia.

**23. *Macroscytus vietnamicus* Lis, 1994**

Thailand (Lis 1994); 1 ♂, Phu Rua National Park, 900 m alt., Loei Region, 20.VIII.1987, leg. H. Ono (NSMT).

A rarely collected species; recorded only from Myanmar, Laos, Vietnam, and Thailand.

**24. *Scoparipes rufipes* Lis, 1990**

Nakhon Si Thammarat, Khao Luang (Lis 1990, 1994).

Described and known only from Thailand, so far.

**Acknowledgements:** I would like to express my gratitude to Dr. M. Tomokuni (NSMT), Dr. H. Zettel (NhMW), Dr. W. Schawaller (SMNS), and Dr. K. Schönlitzer (ZSM) for the loan of material.

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**Author's address:** Prof. Dr. Jerzy A. Lis, Department of Zoology, University of Opole, Oleska 22, PL-45-052 Opole, Poland (e-mail: lis@chem.uni.opole.pl)

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