

Notes on the Helotrephini (Insecta: Heteroptera: Helotrephidae) from Thailand and Vietnam, with descriptions of three new species

H. Zettel*

Abstract

Three new species of Helotrephini are described: *Helotrephes trani* sp.n. from Vietnam belonging to the *H. sausai* species group; *Helotrephes vietnamensis* sp.n. from Vietnam belonging to the *H. australis* species group; and *Hydrotrephes sitesi* sp.n. from Thailand belonging to the *H. bouvieri* species group. New records of the following species of *Helotrephes* from Thailand are presented: *H. affinis* ZETTEL & POLHEMUS, 1998, *H. flaviceps* ZETTEL & POLHEMUS, 1998, *H. rompinensis* KOVAC & PAPÁČEK, 2000 stat.n. (described as subspecies of *H. flaviceps*; first record from Thailand), *H. senckenbergi* PAPÁČEK & KOVAC, 2001, *H. shepardi* ZETTEL & POLHEMUS, 1998, *H. tuberculatus* ZETTEL & POLHEMUS, 1998. The female of *H. affinis* is described for the first time. *Hydrotrephes schillhammeri* ZETTEL, 1998 is recorded from Vietnam for the first time; the previously unknown female is described.

Key words: Heteroptera, Helotrephidae, *Helotrephes*, *Hydrotrephes*, new species, new status, taxonomy, new record, Thailand, Vietnam.

Zusammenfassung

Drei neue Arten der Tribus Helotrephini werden beschrieben: *Helotrephes trani* sp.n. aus Vietnam aus der *H. sausai*-Artengruppe, *Helotrephes vietnamensis* sp.n. aus Vietnam aus der *H. australis*-Artengruppe und *Hydrotrephes sitesi* sp.n. aus Thailand aus der *H. bouvieri*-Artengruppe. Neue Nachweise aus Thailand werden zu folgenden *Helotrephes*-Arten geliefert: *H. affinis* ZETTEL & POLHEMUS, 1998, *H. flaviceps* ZETTEL & POLHEMUS, 1998, *H. rompinensis* KOVAC & PAPÁČEK, 2000 stat.n. (als Unterart des *H. flaviceps* beschrieben; Erstnachweis für Thailand), *H. senckenbergi* PAPÁČEK & KOVAC, 2001, *H. shepardi* ZETTEL & POLHEMUS, 1998 und *H. tuberculatus* ZETTEL & POLHEMUS, 1998. Das Weibchen von *H. affinis* wird erstmals beschrieben. *Hydrotrephes schillhammeri* ZETTEL, 1998 wird neu für Vietnam nachgewiesen; das bisher unbekannte Weibchen wird beschrieben.

Introduction

This paper presents taxonomic and faunistic information on the Helotrephini of Thailand and Vietnam. The present knowledge on the Helotrephidae of these two countries is very different. The fauna of Thailand is quite well known from several studies published during the last ten years; thirty-one species are so far recorded, seventeen of which are Helotrephini. Most of the records have been summarized by SITES & POLHEMUS (2002). In contrast, the Vietnamese fauna is still nearly unknown: Among five recorded species, only *Helotrephes shepardi* ZETTEL & POLHEMUS, 1998 belongs to Helotrephini.

A small collection of Helotrephidae from Vietnam, which has been given to me by Mr. Tran Anh Duc (presently in the National University of Singapore) contains four species of Helo-

* Dr. Herbert Zettel, Natural History Museum Vienna, International Research Institute of Entomology, Burgring 7, A-1014 Vienna, Austria; e-mail: herbert.zettel@nhm-wien.ac.at

trephini: two new species each of *Helotrephes* STÅL, 1860, *Hydrotrepes schillhammeri* ZETTEL, 1998, and one unidentified female of the *Hydrotrepes bouvieri* species group.

Recently, Prof. Dr. Robert W. Sites from the Enns Entomology Museum (University of Missouri) has sent me a very large collection of Helotrephidae from Thailand for identification. This valuable material, which has been collected by a large team of Thai and US American scientists, is a great contribution to the knowledge on the Thai fauna. It suggests that the majority of the Helotrephini species, which occur in Thailand, are already described, although one widely distributed new species of *Hydrotrepes* can be published in this paper. The new material was collected from many provinces and thus contributes much to the zoogeography of the group. Some morphological observations and taxonomic implications are noted below. The majority of records will be treated in a forthcoming publication.

Material and methods

Acronyms of repositories:

- CUL Coll. W.G. Ullrich, Lübeck (now in U.S. National Museum, Washington, U.S.A.)
 UMC Wilbur R. Enns Entomology Museum, University of Missouri, Columbia, U.S.A.
 NHMW Natural History Museum, Vienna, Austria
 NSMT National Science Museum, Pathum Thani, Thailand
 ZRCS Zoological Reference Collection, Raffles Museum for Biodiversity Research, National University of Singapore, Singapore

An L-number is given for some localities in the material examined sections of most species from Thailand, for which corresponding photographs can be accessed via a locality image database link from the Enns Entomology Museum internet site.

The term "eye index" refers to the ratio of minimum eye distance and maximum eye width.

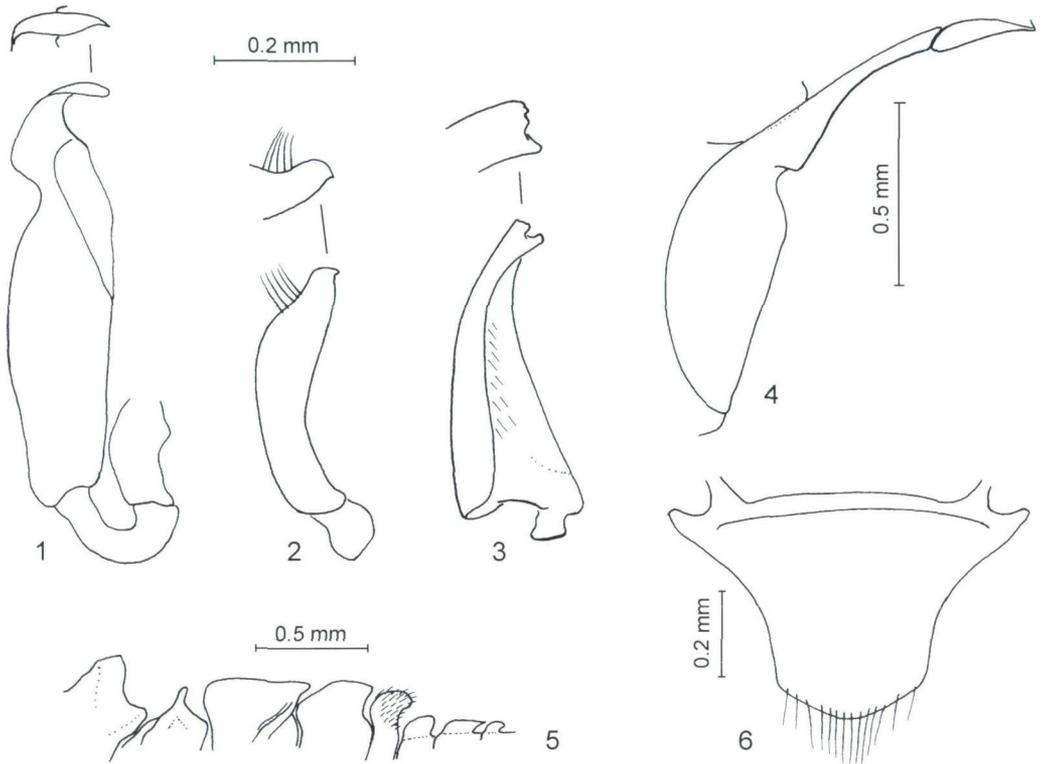
Helotrephes trani sp.n. (Figs. 1 - 6)

Holotype (hindwing-micropterous male): "Vietnam: Lao Cai Prov.\ Sa Pa, Thac Bac waterfall\ (12 km from Sa Pa town)\ 2.VI.2003\ Coll. Tran A.D. (TAD0341)" (NHMW); **paratypes**: 2 ♀♀ (hindwing-micropterous), same label data as holotype (NHMW, ZRCS).

Type locality and habitat: north-western Vietnam, Lao Cai Province, Sa Pa, Thac Bac Water Fall, GPS 22°21.697'N 103°46.877'E, 1865 m; collected at the foot of a high water fall with rocky bottom and very strong water current (Tran, pers. comm.).

Description of hindwing-micropterous male: body size: length 3.1 mm, width 2.34 mm.

Colour: cephalonotum mainly brown; on head around eye margins and in front of eyes yellow; pronotum with lateral and posterior margins and a spot in middle of anterior margin yellow, on disk only a few small, faint, yellowish marks; mesoscutellum and hemelytra predominantly yellow, but base of mesoscutellum, a patch at lateral margin of hemelytron, and pseudomembrane dark brown, with few indistinct, light brown patches on other parts; venter yellow to dark brown; legs and antennae yellowish; rostrum brown.



Figs. 1 - 6: *Helotrephes trani* sp.n., male holotype and female paratype: (1 - 3) genitalia of male, right aspect, with apical view of structures added: (1) aedeagus, (2) right paramere, (3) left paramere; (4) pronotal and genal plate, ventrolateral aspect; (5) ventromedian carinae of female, right aspect, venter turned upward; (6) subgenital plate of female, ventral aspect, pilosity partly omitted.

Cephalonotum shining; head with fine punctures, their distances mostly larger than their diameter, on interspaces with very fine micropunctures, especially on anterior half of head; pronotum with punctures of similar size as on head, but on disk with larger distances (ca. 2 - 3 times diameter of punctures), more densely set posteriorly and laterally; genal plate very narrow; pronotal plate anteriorly very narrow, in middle with relatively small, approximately semi-circular incision (Fig. 4); inner corner of propleural plate truncate; eye index: 3.5; fourth rostral segment 2.4 times as long as segment 3; mesoscutellum 0.9 times as long as wide; mesoscutellum and hemelytron with punctures larger than on cephalonotum, with interspaces approximately as large as diameters of punctures, between punctures smooth, shining.

Ventral carinae: prosternal carina with blunt posterior corner, posterior edge concave; mesosternal carina and metasternal carina as typical for genus; mesosternal carina anteriorly acute; metasternal carina posteriorly with small tip; carina of sternite 3 small, with dense, short pilosity; carina of sternite 6 much smaller than those of sternites 4 and 5.

Genitalia: aedeagus (Fig. 1) stout, with posterior margin undulate, with apex forming a hook-shaped lamella, without apical plate (in apical view); left paramere (Fig. 3) with-

out distinct basal lobe, evenly tapered toward apex, with apex truncate and irregularly dentate; right paramere (Fig. 2) slightly shorter than left paramere, relatively stout, undulate, distally with short row of setae, apically with rectangular corner.

Description of hindwing-micropterous female: larger and darker than male; body size: length 3.7 mm, width 2.54 - 2.66 mm; cephalonotum mainly blackish brown, head around eye margins yellow, with small yellow dot in centre and with pair of yellow marks anteriorly; pronotum mainly blackish brown, with small yellow dot in middle of anterior margin and with irregular transverse fascia along hind margin; mesoscutellum and anterior two thirds of hemelytron mainly dark brown, with small, irregular yellow marks; distal third of hemelytron nearly completely yellow, with few brown marks and pseudomembrane blackish; puncturation of cephalonotum slightly finer, and appearing less dense than in male; micropunctures on head more distinct; ventral median carinae (Fig. 6) similar as in male, well developed on abdominal sternites 4 - 6; abdomen symmetrical; sternite 6 with straight hind margin; subgenital plate with broad medial lobe with distally slightly converging sides and convex hind margin.

Comparative notes: *Helotrephes trani* sp.n. belongs to the *H. sausiai* species group sensu ZETTEL & POLHEMUS (1998), which contains five other described species: *H. major* ZETTEL & POLHEMUS, 1998, *H. steiningeri* KOVAC & PAPÁČEK, 2000, and *H. monticola* ZETTEL, 2000 from northern Thailand; *H. sausiai* ZETTEL, 1995 and *H. komareki* ZETTEL, 2004 from China (ZETTEL & POLHEMUS 1998, KOVAC & PAPÁČEK 2000, ZETTEL 2000a, 2004). All species are mountainous and locally endemic. Within this group, *H. trani* sp.n. is closely related to *H. sausiai*, with which it shares the strongly recurved apex of the aedeagus (Fig. 1), the relatively short and apically abruptly narrowed right paramere (Fig. 2), the broad distal lobe of the subgenital plate of the female (Fig. 6), and the fine puncturation of the hemelytra. However, *H. sausiai* has the posterior margin of the prosternal carina very deeply incised, the left paramere long and acuminate, and the head anteriorly yellow. The short, truncate left paramere of *H. trani* sp.n. (Fig. 3) is diagnostic and distinguishes it from all other species of the *H. sausiai* group.

Distribution: Vietnam: Lao Cai Prov.

Etymology: This species is dedicated to Mr. Tran Anh Duc, National University of Singapore, to honour and encourage his enthusiastic research on the water bugs of his country.

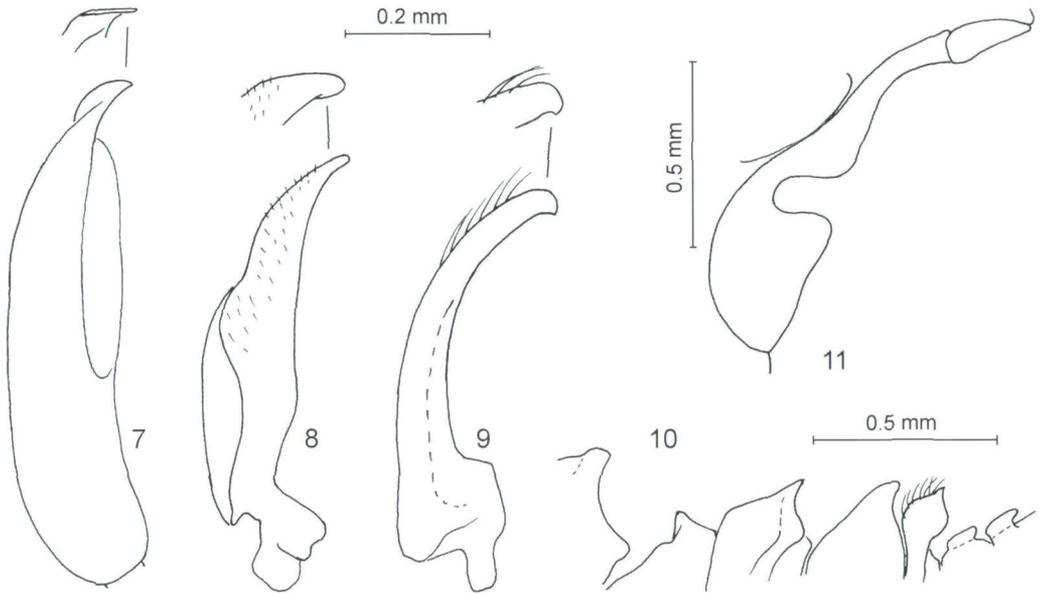
Helotrephes vietnamensis sp.n. (Figs. 7 - 11)

Holotype (hindwing-macropterous male): "Vietnam: Quang Binh Prov.\ Phong Nha NP, stream\ near Hang So Dua\ 11.VIII.2001\ Coll. Tran A.D. VNQB0101" (NHMW).

Type locality and habitat: central Vietnam, Quang Binh Province, Phong Nha National Park, near Hang So Dua; collected from a forested stream with moderate water current and bottom mainly with stones and sand (Tran, pers. comm.).

Description of hindwing-macropterous male: body size: length 2.7 mm, width 2.01 mm.

Colour dorsally yellowish with dark brown marks; head with continuous brown stripe on midline, which is wide posteriorly, very wide between eyes and narrow in front of eyes, and with pair of small, brown marks anterolaterally; pronotum with irregular brown marks, forming transverse row of patches along hind margin; mesoscutellum



Figs. 7 - 11: *Helotrephes vietnamensis* sp.n., male holotype: (7 - 9) genitalia of male, right aspect, with apical view of structures added: (7) aedeagus, (8) left paramere, (9) right paramere; (10) ventromedian carinae, right aspect, venter turned upward; (11) pronotal and genal plate, ventrolateral aspect.

with blackish base, other parts yellow with small, irregular, brown marks; hemelytron yellowish with irregular, partly confluent brown patches, clavus darker than corium; venter mainly light brown; legs and antennae yellowish; rostrum brown.

Head densely punctured, nearly without interspaces, dull; puncturation of pronotum anteriorly and laterally similar as on head, on disk and posteriorly with larger distances, these areas slightly shining; cephalonotal suture deeply sinuate, distinct; genal plate narrow; pronotal plate with very large, roundish incision, which is not constricted marginally (Fig. 11); inner corner of propleural plate rounded; eye index: 2.4; fourth rostral segment 3.0 times as long as segment 3; mesoscutellum 0.9 times as long as wide; mesoscutellum and hemelytron with punctures larger than those on cephalonotum, between punctures chagreened, dull.

Ventral carinae (Fig. 10): prosternal carina with distinctly, but shallowly concave posterior margin; mesosternal carina and metasternal carina as typical for genus, the former slightly sloping dorsocaudad, the latter sloping ventrocaudad and with spine-like posterior apex; carina of sternite 3 squared, with posterior corner slightly pointed, with distinct pilosity; carinae of sternites 4 and 5 small; carina of sternite 6 lacking.

Genitalia: aedeagus (Fig. 7) stout, slightly curved, with apex consisting of vertical, relatively narrow lamella, without apical plate (in apical view); left paramere (Fig. 8) abruptly narrowed distal of prominent basal lobe, with distal part evenly tapered to narrowly rounded apex; right paramere (Fig. 9) approximately as long as left paramere, relatively stout, evenly curved, distally with long setae, apically rounded, except with minute corner.

Comparative notes: *Helotrephes vietnamensis* sp.n. belongs to the *H. australis* group sensu ZETTEL & POLHEMUS (1998). This species group contains six other species, five from southeast Asia and one from Borneo (ZETTEL & POLHEMUS 1998, ZETTEL 2000, ZETTEL 2004). The new species agrees well with *H. incisus* ZETTEL & POLHEMUS, 1998 from northern Thailand and Yunnan Province, China, in external characteristics like colour pattern, ventral carinae (Fig. 10), and typical shape of the incision of the pronotal plate (Fig. 11). Distinguishing characteristics are found in the genitalia of the male. In *H. vietnamensis* sp.n. the aedeagus has a small, slender apex (Fig. 7), the left paramere is strongly narrowed distal of the basal lobe and lacks an apical knob (Fig. 8).

Distribution: Vietnam: Quang Binh Prov.

Etymology: This species is named after the country of origin, Vietnam.

Hydrotrepes sitesi sp.n. (Figs. 12 - 17)

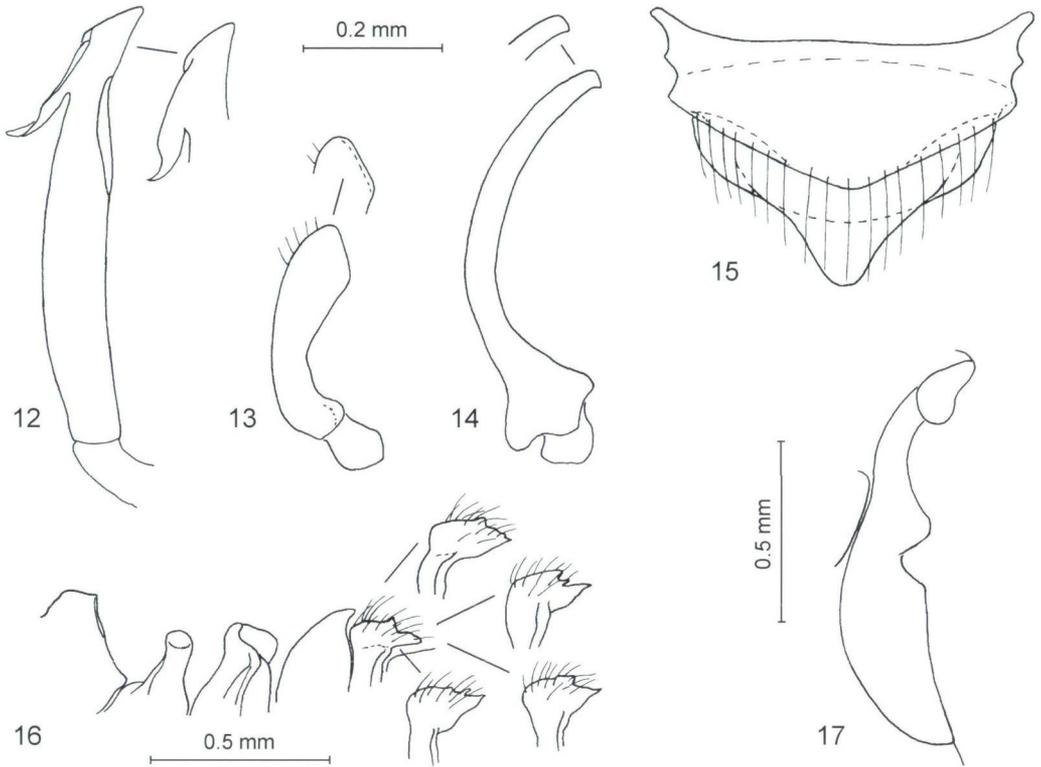
Holotype (hindwing-micropterous male): "THAILAND: Suratthani Prov.\ Amphur Phanom, Ban\ Chong Lom ; Klong Sok\ 08°52'N 98°40'E ; 43 m\ 23 May 2003 ; L-563\ Vitheepradit & Ferro" (UMC); **paratypes:** 2 ♂♂, 3 ♀♀ (hindwing-micropterous), 2 ♂♂ (hindwing-macropterous), same label data as holotype (UMC, NHMW); 1 ♀ (hindwing-macropterous) "THAILAND: Suratthani Prov.\ Amphur Phanom, 20 km N of\ Amphur Thap Put on Hwy 4118\ 08°40'N 98°42'E ; 49 m\ 27 April 2002 ; L-377\ Vitheepradit & Kirawanich" (UMC); 1 ♂, 3 ♀♀ (hindwing-macropterous) "THAILAND: Songkhla Prov.\ Ton Nga Chang Wildlf. Sanc.\ stream at Buddhist temple\ margin ; 06°56'N 100°15'E\ 44 m ; 3 June 2003 ; L-589\ colls: Sites & Vitheepradit" (UMC); 5 ♂♂, 8 ♀♀ (hindwing-macropterous) "THAILAND: Songkhla Province\ Amphur Hat Yai ; stream from\ Ton Nga Chang Waterfall at\ Buddhist Temple; 78 m ; L-388\ 06°56'N 100°15'E; 3 May 2002\ colls: AV. [= Akekawat Vitheepradit] Kirawanich, Suwonno" (UMC, NHMW, NSMT); 1 ♂ (hindwing-micropterous), 1 ♂ (hindwing-macropterous) "THAILAND: Kanchanaburi Prov.\ Amphur Muang Heuy\ Lam Ta Pern; 14°08'N 99°22'E\ stream ; 15 April 2002 ; 48 m\ Vitheepradit, Kirawanich; L-344" (UMC, NHMW); 1 ♂ (hindwing-micropterous) "THAILAND: Phitsanulok Prov.\ Thung Saleang Luang N.P. Huai Tub Dah Mi; L-274; 440 m\ 16°50'N 100°51'E; 8 III 2002\ Vitheepradit, Kirawanich, Sites" (UMC).

Type locality and habitat: southern Thailand, Suratthani Province, Amphur Phanom, Ban Chong Lom, Klong Sok, 08° 52' N 98° 40' E, 43 m; photo of habitat see at: <http://www.museum.insecta.missouri.edu/database/TH/563>

Description of hindwing-micropterous male: body size: length 2.4 - 2.6 mm, width 1.62 - 1.71 mm.

Colour: yellowish to light brown, strongly marked with dark brown, especially on head; colour pattern varying from clearly defined to very diffuse; head posteriorly darker than anteriorly, arrangement of indistinct yellowish marks similar as in light forms of *H. maculatus*, anteriorly dark areas confined to middle; pronotum with continuous dark anterior margin and with more or less distinct transverse fascia of irregular marks in posterior half; base of mesoscutellum dark brown; other parts of mesoscutellum and hemelytron with irregular, often confluent, brown marks; venter yellowish to dark brown; legs and antennae yellowish; rostrum brown.

Cephalonotum with bluntly right angled posterior corners, with straight lateral margins; head with densely set punctures, with very narrow interspaces, dull; disk of pronotum with very unequally set fine punctures, their distance ca. 0.5 - 5 times their diameter, and with fine micropunctures, distinctly shining; puncturation along all margins of



Figs. 12 - 17: *Hydrotrephes sitesi* sp.n., male and female paratypes: (12 - 14) genitalia of male, right aspect, with view perpendicular to most apical part added: (12) aedeagus, (13) right paramere, (14) left paramere; (15) subgenital plate of female, ventral aspect, pilosity partly omitted; (16) ventromedian carinae, right aspect, venter turned upward, variations of carina of sternite 3 added; (11) pronotal and genal plate, ventrolateral aspect.

pronotum denser; genal plate stout; pronotal plate (Fig. 17) with relatively deep, approximately semi-circular incision, anteriorly wide; inner corner of propleural plate broadly truncate; eye index: 2.4 - 2.7; fourth rostral segment 2.4 times as long as segment 3; mesoscutellum 1.1 times as long as wide, with puncturation similar to that on pronotal disk; hemelytron with similar puncturation, but punctures slightly larger and micropunctures very dense, dull.

Ventral carinae (Fig. 16): prosternal carina with posterior edge weakly concave; apical parts of mesosternal carina and metasternal carina thin-laminate; carina of sternite 3 variable, with few denticles, the most proximal denticle more produced backward than the others; abdominal segments strongly asymmetrical.

Aedeagus (Fig. 12) slender, with laminate, short, triangular apex, and with laminate, long, twisted, spine-like postero-subapical process, whole "head" of aedeagus distinctly bent to right side, not continuous with axis of "body"; right paramere (Fig. 13) short, basally curved, with distally weakly diverging sides and apically truncate; left paramere (Fig. 14) very slender, with subparallel sides, curved, without basal lobe, with narrowly truncate apex.

Description of hindwing-micropterous female: body size: length 2.5 - 2.6 mm, width 1.64 - 1.76 mm; eye index: 2.5 - 2.9; most characteristics as in male; abdomen symmetrical; sternite 6 with convex hind margin; subgenital plate (Fig. 15) triangular, inner ridge slightly sinuate, ventral plate bluntly triangularly produced, medial part of distal lamella stout, triangular, with rounded apex.

Description of hindwing-macropterous male: body size: length 2.5 - 2.6 mm, width 1.69 - 1.77 mm; eye index: 2.2 - 2.5; lateral margin of pronotum with small angulation close to posterolateral corner; hemelytron with well developed embolar and claval sutures; other characteristics as in brachypterous male.

Description of hindwing-macropterous female: body size: length 2.5 - 2.6 mm, width 1.71 - 1.83 mm; eye index: 2.4 - 2.5; characteristics as in brachypterous female, except those mentioned for macropterous male.

Comparative notes: *Hydrotrepes sitesi* sp.n. belongs to the *H. bouvieri* group as defined by ZETTEL (1998, 2000b). This group contains so far three species from the southeast Asian mainland: *Hydrotrepes yupae* ZETTEL, 1998 from northern Thailand, *H. septentrionalis* ZETTEL, 1998 from northern Thailand and northern Laos, and *H. maculatus* PAPÁČEK & KOVAC, 2001 from southern Thailand. Males of *H. sitesi* sp.n. can be very easily distinguished from these three species by the short, triangular apex of the aedeagus (Fig. 12). The female of *H. sitesi* sp.n. has the subgenital plate with a relatively long and slender, triangular medial apex (Fig. 15), which resembles that of *H. maculatus*; however, in *H. maculatus* the shape of the apical triangle is larger and the inner ridge more concave than in *H. sitesi* sp.n.

Distribution: Thailand: Suratthani Prov., Songkhla Prov., Kanchanaburi Prov., Phitsanulok Prov.

Etymology: This species is dedicated to Prof. Dr. Robert W. Sites, University of Missouri, for his great contributions to the zoogeography of Thai water bugs.

Helotrephes shepardi ZETTEL & POLHEMUS, 1998 and *H. senckenbergi* PAPÁČEK & KOVAC, 2001 (Figs. 18 - 20)

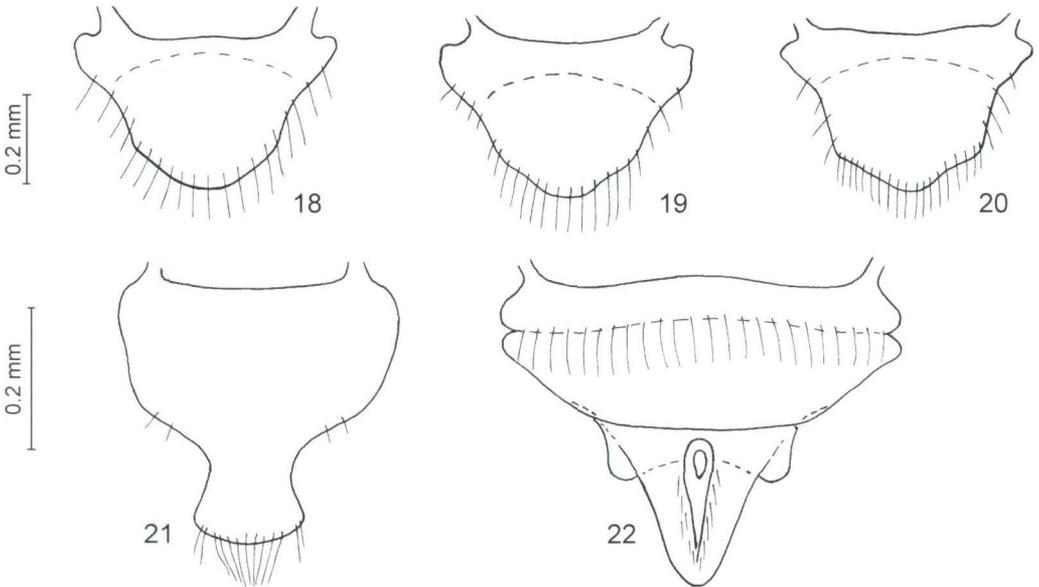
Material of *H. shepardi* re-examined: ♂ holotype and 1 ♀ paratype (hindwing-micropterous) from Thailand, Phetchabun, Phu Hin Rong Kla NP; 2 ♂♂ paratypes (hindwing-micropterous), 1 ♂ and 2 ♀♀ paratypes (hindwing-macropterous) from Vietnam, Vinh Phu, Tam Dao (see ZETTEL & POLHEMUS 1998); 1 ♂ from China, Yunnan (see ZETTEL 2001).

Additional new material of *H. shepardi* examined: 1 ♂, 2 ♀♀ (hindwing-micropterous) "THAILAND : Phitsanulok Prov.\ Phu Hin Rongkla N.P.; 1280m\ Waterwheel Falls and stream\ 16°59'N 101°00'E; 10 III 2002\ Sites, AV [= Akekawat Vitheepredit] Kirawanich ; L-285 " (UMC, NHMW); 1 ♂ (hindwing-micropterous) "THAILAND, Phitsanulok \ Prov., Phu Hin Rongkla NP\ Waterwheel Fall, 1280m\ 16°59'N 101°00'E 20.x.02\ collected by CMU team\ MARGIN" (UMC); 1 ♂ (hindwing-micropterous) "THAILAND: Phitsanulok Prov.\ Phu Hin Rongkla Natl. Pk.\ Waterwheels falls\ 16°59'N 101°00'E; 1280 m\ 22 May 2002 ; margin\ coll: CMU team" (UMC); 1 ♂ (hindwing-macropterous) "THAILAND : Phitsanulok Prov.\ Phu Hin Rongkla Natl. Park\ Namtok Romglao\ 16°59'N 101°00'E ; 1190m\ 17 - March - 2003\ coll: CMU team" (UMC); 3 ♂♂ (hindwing-micropterous), 1 ♀ (hindwing-macropterous) "THAILAND : Phitsanulok Prov.\ Phu Hin Rongkla Natl. Park\ Namtok Huai Khamuen Noi\ 16°59'N 101°60'E; 1220 m\ 17 - Jan - 2003\ coll: CMU team" (UMC, NHMW); 6 ♂♂, 3 ♀♀ (hindwing-micropterous) "THAILAND : Phitsanulok Prov.\ Phu Hin Rongkla N. P.; 1250 m\ Mhun Daeng Waterfall, tier 5\ 16°57'N 101°03'E ; 19 III 2002\ coll: G. W. Courtney\ root mats & leaves in pools" (UMC, NHMW); 11 ♂♂, 4 ♀♀ (hindwing-micropterous) "THAILAND, Loei Province\ Phu Hin Rongkla Nat. Park\ Namtok Man Daeng, tier 5\ 16°57'N 101°03'E 1250m\ 11.iii.2002 GW Courtney\ undercut bank" (UMC, NHMW, NSMT).

Material of *H. senckenbergi* re-examined: 1 ♂, 2 ♀♀ paratypes (hindwing-micropterous), 1 ♂ paratype (hindwing-macropterous) of *H. shepardi* from Thailand, Chiang Mai, Doi Suthep (see ZETTEL & POLHEMUS 1998).

Additional new material of *H. senckenbergi* examined (all hindwing-micropterous): 2 ♂♂ "THAILAND: Chiang Mai Prov.\ Doi Suthep N. P. ; Nam Tok\ Monthathan ; 18°49'N 98°55'E\ 700 m ; 8 April 2002 ; L-330\ colls: UMC and CMU teams (5)\ leaf pack" (UMC, NHMW); 1 ♀ "THAILAND: Chiang Mai Prov.\ Doi Suthep-Pui National Park\ Namtok Monthathan\ 18°49'N 98°55'E\ 700 m ; 29 April 2003 ; L-489\ AV. [= Akekawat Vitheepredit] Thamasenanupap, Ferro" (UMC); 2 ♂♂, 2 ♀♀ "THAILAND: Chiang Mai Prov.\ Doi Suthep National Park\ Huai Kaew above Nam Tok\ Monthathan; 18°49'N 98°55'E\ 800 m ; 5 March 2002 ; L-262\ Vitheepredit, Kirawanich, Sites" (UMC, NHMW); 2 ♂♂, 3 ♀♀ "THAILAND: Chiang Mai Prov.\ Doi Suthep Natl. Pk. ; 750 m\ Huai Kaew above lower falls\ at Nam Tok Monthathan\ 18°49'N 98°55'E; 5 III 2002\ Sites, Kirawanich; L-261" (UMC, NHMW, NSMT).

Notes: PAPAČEK & KOVAC (2001) pointed out that these two forms are "similar and probably also closely related". *Helotrephe shepardi* was described from the Phu Hin Rong Kla National Park (Phetchabun Province, Thailand; holotype and paratypes), with additional paratypes from Chiang Mai Province in Thailand (Doi Suthep) and Vinh Phu Province in northern Vietnam (ZETTEL & POLHEMUS 1998). Subsequently, this species was also recorded from Yunnan, China (ZETTEL 2001). PAPAČEK & KOVAC (2001) described *H. senckenbergi* from Doi Suthep and mentioned that this species occurs there syntopically ("in the same stream") with *H. shepardi* (referring to the paratype material); they compared the new taxon with specimens of *H. shepardi* from Vietnam. The statement on syntopy is not correct, because *senckenbergi*-like specimens were regarded as an intraspecific variation by ZETTEL & POLHEMUS (1998), and now the paratypes of *H. shepardi* from Doi Suthep can be identified as *H. senckenbergi*. After examination of more material, morphological differences of the two taxa are very small: ZETTEL & POLHEMUS (1998: fig. 33) depicted the variability of the notch of the pronotal plate, including material from Doi Suthep. As pointed out by PAPAČEK & KOVAC (2001), this notch is consistently wider in *H. senckenbergi* than in *H. shepardi*; but differences with some populations of *H. shepardi* are small. The statement by the same authors that the mid-sternal carinae of the metasternum and abdominal sternites 2 and 3 in *H. senckenbergi* are higher than in *H. shepardi* cannot be confirmed. However, the carina of sternite 2 bears a small notch in most specimens of *H. shepardi*, which is consistently lacking in *H. senckenbergi*. The colour of the venter is variable in *H. shepardi* and, thus, does not differ consistently from *H. senckenbergi* as stated by PAPAČEK & KOVAC (2001). Small differences in the male genitalia, as listed by PAPAČEK & KOVAC (2001), are stable in the new material; the most distinct difference is the shape of the apex of the left paramere (in full face view) which is truncate in *H. shepardi* (most distinct in males from the type locality), but rounded in *H. senckenbergi*. Also, small local differences exist in the subgenital plate of the female: the posterolateral corners are reduced in *H. shepardi* from the type locality (Figs. 18, 19), whereas in *H. shepardi* from Vietnam (illustrated by ZETTEL & POLHEMUS 1998: fig. 39), they strongly resemble those of *H. senckenbergi* (Fig. 20; also illustrated by PAPAČEK & KOVAC 2001: fig. 6). As the conclusion of this studies, *H. shepardi* and *H. senckenbergi* should be preliminarily regarded as two allopatric, separable taxa, of which the latter seems to be endemic to the Doi Suthep – Doi Pui area. Whether they are different species or subspecies cannot be decided from morphology. The *H. shepardi*-*senckenbergi* complex consists of isolated mountain populations with specimens mostly unable to fly. It seems advisable to check the status of several populations of *H. shepardi* (from Vietnam and China) for their taxonomic status based on larger series, eventually also by molecular studies.



Figs. 18 - 22: Subgenital plates of females, ventral aspects, pilosity partly omitted: (18, 19) *Helotrephes shepardi* (both females from the typical population in the Phu Hin Rong Kla National Park); (20) *Helotrephes senckenbergi* (from Doi Suthep); (21) *Helotrephes affinis*; (22) *Hydrotrephes schillhammeri*.

Helotrephes affinis ZETTEL & POLHEMUS, 1998 (Fig. 21)

Additional material examined (all hindwing-micropterous): 1 ♀ "THAILAND: Songkhla Prov.\ Ton Nga Chang Wildlf. Sanc.\ stream at Buddhist temple\ margin ; 06°56'N 100°15'E\ 44 m ; 3 June 2003 ; L-589\ colls: Sites & Vithepradit" (UMC); 2 ♂♂, 2 ♀♀ "THAILAND: Songkhla Province\ Amphur Hat Yai ; stream from\ Ton Nga Chang Waterfall at\ Buddhist Temple; 78 m ; L-388\ 06°56'N 100°15'E ; 3 May 2002\ colls: AV. [= Akekawat Vithepradit] Kirawanich, Suwonno" (UMC, NHMW).

Notes: *Helotrephes affinis* has been described by ZETTEL & POLHEMUS (1998) from a single male specimen from Songkhla Province in southern Thailand (in Coll. Nico Nieser, Tiel). Although topotypical material of both sexes has been recorded earlier (SITES & POLHEMUS 2002), the female remained undescribed. Here first description of the female is provided. The subgenital plate of the female is characteristic (Fig. 21). For correct identification of the female, characters of females in the key by ZETTEL & POLHEMUS (1998) should be changed as follows: point 14 – "female subgenital plate with stalked median lobe."; point 16: "female subgenital plate with long, narrow median process."; point 16 – "female subgenital plate with short, wide median process."

Description of hindwing-brachypterous female: body length 2.5 mm, body width 1.99 - 2.02 mm; most characteristics as in male; abdomen subsymmetrical; sternite 6 without median carina, with conspicuously convex hind margin, covering base of sternite 7; subgenital plate (Fig. 21) relatively small, with approximately semicircular base, with few inconspicuous bristles at basolateral margin, with median lobe relatively short and broad (in comparison with related species), and with convex hind margin.

***Helotrephes flaviceps* ZETTEL & POLHEMUS, 1998 and
H. rompinensis KOVAC & PAPÁČEK, 2000, stat.n.**

Additional new material of *H. flaviceps flaviceps* examined (all hindwing-micropterous): 7 ♂♂, 14 ♀♀ "9 VIII 1998 Thailand. ca. 12 km N of Mae Hong Son", "Tam Pla Resort at Tam Pla River Dr. W. Ullrich leg.", "N 019° 25' 34.2" E 097° 59' 16.7""; "Dr. Wolfgang G. ULLRICH collection" (CUL, NHMW); 1 ♂ "11 VIII 1998 Thailand. Mae Hong Son Mae Nam Cottage", "N 019° 19' 59.0" in Pai River E 097° 57' 13.0"", "among floating debris Dr. W. Ullrich leg.", "Dr. Wolfgang G. ULLRICH collection" (CUL).

Additional new material of *H. rompinensis* examined: 2 ♂♂ (hindwing-micropterous) "THAILAND: Phangnga Prov. Amphur Kapong; stream 5.4 km N of int. Hwy 4090 x Ban Kradai Ban Lum Roo Road; 08°39'N 98°26'E 69 m; 28 May 2002; L-575 colls: Vitthepradit, Ferro" (UMC, NHMW).

Notes: *Helotrephes flaviceps* has been described by ZETTEL & POLHEMUS (1998) from Mae Hong Son Province in northern Thailand (type locality), and Songkhla and Yala Provinces in southern Thailand. KOVAC & PAPÁČEK (2000) have described the subspecies *rompinensis* from Pahang, West Malaysia and added new distributional data to the nominate subspecies from Mae Hong Son Province, from Narathiwat Province in southern Thailand, and from Terengganu Province in West Malaysia. Thus, the two subspecies should be geographically separated in West Malaysia. Such a distribution pattern is unusual in the region, because the zoogeographical border of (sub-)species is usually at the Isthmus of Kra in southern Thailand. However, limited new material shows that *H. rompinensis* also occurs farther north, in Phang Nga Province in southern Thailand. Because the ranges of the two taxa overlap widely, they should not be treated as subspecies, but rather as distinct species based also on the characters of the genitalia of the males and the subgenital plate of the females (as described by KOVAC & PAPÁČEK 2000). Consequently, the following status change is proposed: *Helotrephes rompinensis* stat.n.

***Helotrephes tuberculatus* ZETTEL & POLHEMUS, 1998**

Additional material examined (all hindwing-micropterous): 1 ♀ "THAILAND: Phitsanulok Prov. Amphur Chatrakan Klong Namkub @ Ban Coke Huan 17°17'N 100°39'E 23.x.2002 coll. CMU team" (UMC); 1 ♂, 2 ♀♀ "THAILAND: Phitsanulok Prov. Thung Saleang Luang N.P. Huai Tub Dah Mi, L-274; 440 m 16°50'N 100°51'E; 8 III 2002 Vitthepradit, Kirawanich, Sites" (UMC, NHMW).

Notes: *Helotrephes tuberculatus* is a very rare species, which originally has been known only in three specimens from Phetchabun Province in Thailand and Hainan Island in southern China (ZETTEL & POLHEMUS 1998). SITES & POLHEMUS (2002) have reported this species from Loei and Phitsanulok Provinces in Thailand.

***Hydrotrephes schillhammeri* ZETTEL, 1998 (Fig. 22)**

Additional material examined: 2 ♂♂ (hindwing-macropterous) "Vietnam, Quang Binh Prov. Phong Nha NP, Suoi Cha Ang, 9.VIII.2002, Coll. Hoang QK & Dinh VK VNQB0204" (NHMW, ZRCS); 2 ♀♀ (hindwing-micropterous) "Vietnam, Quang Binh Prov. Phong Nha NP, Km 19 Natl. Rd 20, Suoi Cha Ang 12.VIII.2001, Coll. HTran A.D. VNQB0102" (NHMW, ZRCS).

Notes: *Hydrotrephes schillhammeri* has been described as a species of the *H. mirus* group by a single male specimen from Laos (ZETTEL 1998). The newly studied material represents the first records of this species from Vietnam and facilitates the description of the female. The subgenital plate of the female of *H. schillhammeri* is very character-

istic by its narrow triangular shape and by the distomedian carina (Fig. 22). Its complex structures resemble those of the *H. bouvieri* group (e.g., Fig. 15), and it differs strongly from the lobe-shaped, even or tuberculate subgenital plates of the other species of the *H. mirus* group. A distinct tooth at the apical fifth of the lateral margins of the elytra is present in both sexes of *H. schillhammeri*, *H. mirus* ZETTEL, 1998 (from northern Thailand), and *H. admorsus* ESAKI & MIYAMOTO, 1959 (from Amami Island, Japan) and separates these three species from the Bornean and Philippine species of the group; the character is not described for *H. mixtus* PAPÁČEK & KOVAC, 2001 from southern Thailand.

Description of the brachypterous female: body size: length 2.9 - 3.0 mm, width 2.05 - 2.07 mm; most characteristics as in male; eye index 2.2 - 2.3; abdominal segments symmetrical; posterior margin of sternite 6 nearly straight, slightly produced caudad over most of its length (except laterally), and with median small tuft of hairs; subgenital plate (Fig. 22) distally with large, triangular ventral lamina bearing median carina which is higher anteriorly than posteriorly, and with posteriorly slightly concave dorsal lamina, with basal part short bearing transverse row of hairs close to base.

Habitat in Vietnam: Collected in the area of a 20 m wide river, bottom with gravel, sand and mud, on both banks with big trees, with water level and water current strongly changing between dry and raining season; eventually collected in a small tributary with bottom consisting of gravels and small stones (Tran, pers. comm.).

Acknowledgements

The author is grateful to the following persons: Tran Ahn Duc (National University of Singapore) for the gift of specimens (including two holotypes) to NHMW; Robert W. Sites and Akekawat Vitheepradit (University of Missouri) and Wolfgang G. Ullrich (Lübeck) for making available material from their collections for this study and for gift of reference specimens to NHMW; G.W. Courtney, M. Ferro, K. Kirawanich, R.W. Sites, V. Suwonno, P. Thamasenanupap, A. Vitheepradit, and the Chiang Mai University team for their collecting efforts in Thailand; R.W. Sites for linguistic corrections and scientific advice for an earlier version of the manuscript; Prof. M. Papáček (Česke Budejovice) for valuable discussions on systematics of Helotrephini. Collections by R.W. Sites were in part associated with a project funded by the National Science Foundation.

References

- KOVAC D. & PAPÁČEK M., 2000: *Helotrephes steingeri* sp. n., and notes on two further Helotrephini spp. (Heteroptera: Helotrephidae) from Thailand and West Malaysia. – Linzer biologische Beiträge 32(1): 265-271.
- PAPÁČEK M. & KOVAC D., 2001: Three new species of the genera *Helotrephes* and *Hydrotrepes* (Heteroptera: Nepomorpha Helotrephidae: Helotrephini) from Thailand. – Linzer biologische Beiträge 33(1): 315-324.
- SITES R.W. & POLHEMUS J.T., 2002: Distribution of Helotrephidae (Heteroptera) in Thailand. – Journal of the New York Entomological Society 109(3-4) (2001): 372-391.
- ZETTEL H., 1998: Four new species of *Hydrotrepes* (Heteroptera: Helotrephidae) from Thailand and Laos. – Entomological Problems 29(2): 129-137.
- ZETTEL H., 2000a: Erster Nachtrag zur Bearbeitung der Helotrephini Thailands (Heteroptera: Helotrephidae). – Linzer biologische Beiträge 32(1): 145-148.
- ZETTEL H., 2000b: The Helotrephidae (Heteroptera) of Borneo. – Entomological Problems 31(1): 1-22.

- ZETTEL H., 2001: *Helotrephes papaceki* sp. n. und Erstnachweise von vier weiteren *Helotrephes* Arten aus Yünnan, China (Heteroptera: Helotrephidae). – Linzer biologische Beiträge 32(1): 97-102.
- ZETTEL H., 2004: Helotrephidae (Insecta: Heteroptera) aus den chinesischen Provinzen Guangdong, Yünnan und Guizhou, mit Beschreibungen neuer Arten der Gattungen *Helotrephes* und *Distotrephes*. – Annalen des Naturhistorischen Museums in Wien 105B: 397-409.
- ZETTEL H. & POLHEMUS J.T., 1998: A revision of the genus *Helotrephes* STÅL, 1860 (Insecta: Heteroptera: Helotrephidae) with descriptions of twelve new taxa from the Oriental Realm. – Annalen des Naturhistorischen Museums in Wien 100B: 99-136.