

Notes on *Heterocleptes spinosus* Andersen, 1982 in Peninsular Malaysia (Heteroptera: Hydrometridae: Heterocleptinae)

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Abstract. *Heterocleptes spinosus* Andersen, 1982 is reported for the first time from the Peninsular Malaysia, and the male is described and figured. Observations relating to the sampling methods suggest a semi-terrestrial behaviour for this species.

Key words. Gerromorpha, Hydrometridae, *Heterocleptes*, Peninsular Malaysia

INTRODUCTION

Heterocleptes spinosus Andersen, 1982 is the only species of the subfamily Heterocleptinae reported in the Oriental region (the other three are African), and to date it was only known from a single female specimen collected in 1927 in Borneo–Malaysia, Sabah (cf. Andersen, 1982; Yang & Zettel, 2005). This species is very distinctive among hydrometrids because of its primitive characters such as the presence of ocelli. Probably due to this feature, the first species of *Heterocleptes* Villiers, 1948 was originally placed in the family Reduviidae within the Cimicomorpha, instead of in the Hydrometridae within the Gerromorpha (Villiers, 1948).

After the discovery in the north of Myanmar of the fossil heterocleptine *Carinametra burmensis* in mid-Cretaceous amber, Andersen & Grimaldi (2001) suggested that this subfamily had previously been more widely distributed.

Three specimens of *H. spinosus* were collected during two recent entomological expeditions (2007, 2008) to Peninsular Malaysia organised by the Natural History Museum of the University of Florence. The male of this species is described and figured here for the first time.

MATERIAL AND METHODS

The terms used in the description accurately follow Andersen (1982) in order to allow for a better comparison between the two descriptions. Measurements are given in millimeters and units of measurements (1 unit = 25 µm).

Abbreviations: CFC = F. Cianferoni collection, Florence, Italy; MZUF = Natural History Museum of the University of

Florence, Zoological Section “La Specola”, Florence, Italy.

The male and female specimens were photographed with a Leica M205 C stereomicroscope. The photo of the male terminal abdomen was taken before the extraction of genital segments.

All of the specimens were collected by sieving forest litter near a stream.

RESULTS

Heterocleptes spinosus Andersen, 1982

(Figs. 1–4)

Material examined. 1 male (Figs. 1–4), 1 female (Figs. 1–3) macropterous (MZUF; collection numbers: 840, 841), Malaysia: Perak, Hulu Perak, forest near the Anak Sungai Halong (stream), Bungan Camp, c/o Kampung Semelor (E shore Lake Tasek Temengor), 101°26'16"E 5°30'18"N (WGS84), 230 m a.s.l., coll. L. Bartolozzi, 10–19 July 2007; 1 female macropterous (CFC), idem, coll. L. Bartolozzi, F. Cianferoni, G. Mazza & F. Fabiano, 29 June–4 July 2008.

Comparative examination of female specimens. The two collected females have been compared with the holotype (female) of *H. spinosus* Andersen, 1982. Some selected measurements are given in the following table.

The holotype seems to be only slightly smaller than the female collected in 2008, but it provides a good match with Andersen's original description (1982). The first description of a male specimen of *H. spinosus* is provided below.

Description of the male

Diagnosis. The male of *H. spinosus* is extremely similar to the female (holotype and two specimens examined). From above (Fig. 1) it appears more slender than the female (ratio between broadest part and narrowest part of abdomen: 1.16 in the male vs. 1.46 in the female). From a lateral view the abdominal end is more tapered than in the female (Fig. 3).

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Size. Total length: 3.25 mm; head width across eyes 0.34 mm; body width across pronotum 0.81 mm.

Colour. Head superiorly reddish brown, paler in the posterior part; inferiorly yellowish. Mainly “frosted” (cf. Andersen, 1982) on dorsal surface except for a shiny median stripe between eyes; shiny in the lower part. Eyes pink-red, ocelli black. Antennae and rostrum yellowish; first antennomere paler. Thorax brown, pronotum darker except for the frontal part; mainly shiny with the anterior part frosted and dull. Legs yellowish, blackened near the joints. Anterior wings pale brown, with whitish basal parts. One median and two distal whitish spots (wings at rest). Abdomen in lateral view yellowish and shiny, superiorly brown. The patterns and colours are identical to those of the female.

Structural characteristics. Head prolonged more than $\frac{1}{3}$ of total length of insect; head three times as long as wide across eyes (45:14 units, same values of the holotype); head width at the level of antenniferous tubercles (13 units), narrowest part behind eyes (8 units), broadest part at the base of head (11 units). Broad, shallow longitudinal sulcus between eyes. Eyes situated slightly behind the middle of the head; globular, one half as wide as interocular space and about twice as long as wide. Relative lengths of antecular and postocular parts (21:18.5 units). The curved ocular setae are comparable with those of the holotype. Ocelli present, slightly smaller than those of female. Three pairs of cephalic trichobothria

present, similar to those figured by Andersen (1982: 106; Figs. 1, 3). Ratio of antennal segments 1–4: 42:12:14:28 units; last segment subdivided by a membranous constriction on distal third (17.5:10.5 units). Rostrum long and slender as per the holotype.

Pronotum about $\frac{2}{3}$ [$\frac{1}{3}$ = error in the original description] of head length (30.5:46.5 units), nearly as long as wide (32.5 units). Humeral angles of pronotum raised and spinously produced, similar to the holotype (variability among specimens exists). Hind margin of pronotal lobe rounded as in the female. Relative lengths of leg segments (femur, including trochanter: tibia: tarsus): front leg: 41:42:20 units; middle leg: 41.5:40.5:21 units; hind leg: 49.5:50:30 units. Tarsal segments: front tarsus (12.5:5.5 units); middle tarsus (13.5:6.5 units); hind tarsus (21.5:7 units).

Fore wings reaching and slightly passing tip of abdomen (macropterous), covering the connexiva. Forewing venation exactly as in the holotype.

Length of male abdomen (measured from metacetabula) nearly $\frac{2}{3}$ of body length (excluding head), similar to holotype; greatest width of abdomen (28.5 units); greatest height (21 units). Abdomen distally tapered if compared to the female (holotype). Genital segments not protruding from abdominal end in lateral view (Fig. 3). Genital claspers very short, with expanded apices, rounded and flattened (Fig. 4b, f, g).



Fig. 1. *Heterocleptes spinosus* Andersen. Habitus, dorsal aspect. a, Male; b, Female. Scale bar = 1 mm.

DISCUSSION

The identification of our male specimen as *H. spinosus* has been made based on material from Peninsular Malaysia; a definitive confirmation of this determination awaits collection of a male from the type locality in Borneo (see Andersen, 1982).

The male parameres of *H. spinosus* are clearly different in size and shape when compared with those of the African species *H. schoutedeni* (China & Usinger, 1949) and *H. hoberlandti* China, Usinger & Villiers, 1950 (cf. China & Usinger, 1949; China et al., 1950); they cannot be compared to those of *H. tuberculatus* Villiers, 1948 because the male of that latter species is still unknown (cf. Villiers, 1948). In *H. spinosus* the parameres are smaller and more flattened (Fig. 4b, f, g) than in the African species noted above. In particular, their expanded apical portions are distinctive, and serve as useful diagnostic characters for identification and comparison. In addition, the shape of the abdominal segment VIII, pygophore, proctiger and endosomal sclerites (Fig. 4a–e) all appear to be useful comparative characters in

relation to further specimens with similar external features that have yet to be discovered.

No observations on the ecology of *H. spinosus* exist (cf. Andersen, 1982), and those related to the African members of the subfamily Heterocleptinae are also scarce (cf. Villiers, 1948; China & Usinger, 1949). China et al. (1950) reported “detritus on soil” in a “forest gallery” as label data associated with *H. hoberlandti*, and Andersen (1977), on the basis of this scant data, suggested a “terrestrial life” for the species of *Heterocleptes*. Subsequently, Polhemus & Polhemus (1995), referring to the general habitat of the genus, indicate it as “damp earth at the edge of still water or somewhat removed from it”, while Schuh & Slater (1995) classify the genus as “semi-terrestrial”. The specimens studied in this contribution were collected by sieving forest litter adjacent to a stream near where it flowed into a large artificial lake (approx. 50–100 m away, depending by minimum/maximum basin-fill level), but not so close to running water (some meters); no individuals were found using the usual tools for aquatic insects (strainers, water nets, etc.) employed directly in the water or on the shores. This further data seems to confirm, as initially suggested by Andersen (1977), that this Oriental species is terrestrial or semi-terrestrial, although probably still water-dependent, and probably for this reason the members of this subfamily could have been overlooked during research on aquatic insects. If this hypothesis is confirmed by further data, it is possible that the species belonging to this subfamily could be more numerous than previously thought, and more species could be discovered if collections are made in suitable microhabitats and using the appropriate tools.

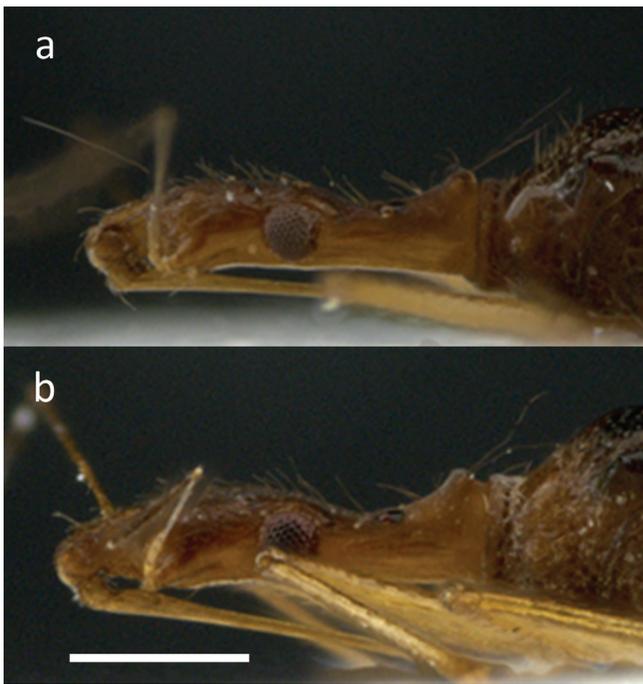


Fig. 2. *Heterocleptes spinosus* Andersen. Head, lateral aspect. a, Male; b, Female. Scale bar = 0.5 mm.

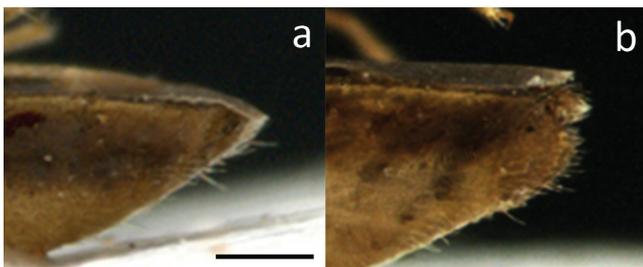


Fig. 3. *Heterocleptes spinosus* Andersen. Abdomen end, lateral aspect. a, Male; b, Female. Scale bar = 0.5 mm.

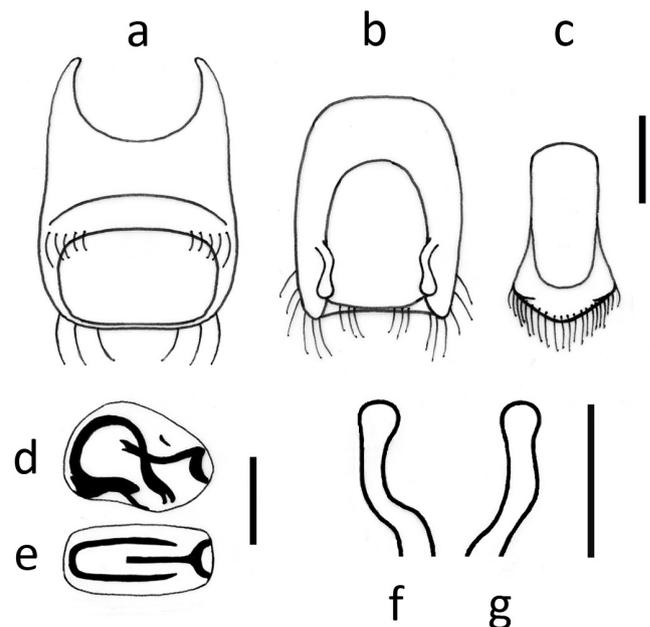


Fig. 4. *Heterocleptes spinosus* Andersen, structural details of male genitalia. a, Eighth abdominal segment (ventral view); b, Pygophore (dorsal view); c, Proctiger (ventral view); d, e, Vesica from two different views (vesical sclerites in black); f, g, Clasper from the two sides. Scale bars = 0.1 mm.

Table 1. Comparative measurements of the female specimens

	Female #1 (2007)	Female #2 (2008)	Holotype of <i>H. spinosus</i> Andersen
Total length (mm)	3.59	3.01	3.0
Head width across eyes (mm)	0.37	0.36	0.35
Body width across pronotum (mm)	0.92	0.83	0.78
Ratio between head length/head width across eyes (units)	49:13	43:12	45:14
Head width to the level of the antenniferous tubercles (units)	13.6	13.2	13.5
Head width behind the eyes (units)	8.4	8.0	7.5
Head width at the base of head (units)	12.0	11.6	11
Relative lengths of ante- and postocular parts of head (units)	22:18.8	19.2:18	21:17.5
Ratio between pronotum/head length (units)	35.2:49.2	30.8:42.8	29.5:45
Pronotum width (units)	36.8	32.8	31

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LITERATURE CITED

- Andersen NM (1977) A new and primitive genus and species of Hydrometridae (Hemiptera, Gerromorpha) with a cladistic analysis of relationship within the family. *Entomologica scandinavica*, 8: 301–316.
- Andersen NM & Grimaldi D (2001) A fossil water measurer from the mid-Cretaceous Burmese amber (Hemiptera: Gerromorpha: Hydrometridae). *Insect Systematic and Evolution*, 32(4): 381–392.
- Yang CM & Zettel H (2005) Guide to the aquatic Heteroptera of Singapore and Peninsular Malaysia. V. Hydrometridae. *The Raffles Bulletin of Zoology*, 53(1): 79–97.
- China WE & Usinger RL (1949) A new genus of Hydrometridae from the Belgian Congo, with a new subfamily and a key to the genera. *Revue de Zoologie et Botanique africaine*, 41: 314–319.
- China WE, Usinger RL & Villiers A (1950) On the Identity of *Heterocleptes* Villiers 1948 and *Hydrobatodes* China & Usinger 1949 (Hemiptera-Heteroptera Families Reduviidae and Hydrometridae). *Revue de Zoologie et Botanique africaine*, 43: 336–344.
- Polhemus JT & Polhemus DA (1995) A primitive new species of *Hydrometra* from Tahiti (Heteroptera: Hydrometridae). *Bishop Museum Occasional Papers*, 43: 1–3.
- Schuh RT & Slater JA (1995) *True Bugs of the World (Hemiptera: Heteroptera). Classification and Natural History*. Cornell University Press, Ithaca, New York, 12 + 336 pp.
- Villiers A (1948) Hémiptères Réduviidés de l'Afrique noire. *Faune de l'Empire français*, 9: 1–488.