



DESCRIPTION OF *ETROCOREMA BELUMENSIS* SP.N. FROM ROYAL BELUM STATE PARK, PERAK, MALAYSIA

Wan Nur Asiah, W.M.A.¹, M.R. Che Salmah², & Ignac Sivec³

^{1,2}School of Biological Sciences, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia

¹E-mail: asiahwan@ymail.com

²E-mail: csalmah@usm.my

³Slovenian Museum of Natural History, Prešernova 20, P.O. Box 290, SLO-1001 Ljubljana, Slovenia

E-mail: isivec@pms-lj.si

ABSTRACT

Only one variable *Etrocorema* species, *E. nigrogeniculatum* (Enderlein), is currently recognized from Peninsular Malaysia. During limnological study in Royal Belum State Park, Malaysia, specimens of a new species of *Etrocorema*, *E. belumensis* n. sp., were discovered. Illustrations of male and female genitalia, eggs, and larvae of this new taxon are provided.

Keywords: *Etrocorema*, Plecoptera, Royal Belum State Park, Malaysia, New species

INTRODUCTION

Etrocorema nigrogeniculatum was described as *Ochtopetina nigrogeniculata* by Enderlein, 1909 from Malaccan specimens. Zwick (1973) designated a lectotype male of *E. nigrogeniculatum*, and in other papers (Zwick 1982a, 1982b, 1984) he clarified the systematics of the genus by placing several species and genera in synonymy, leaving only *E. nigrogeniculatum* and *E. hochii* (Wu) as valid. The latter species was originally named in genus *Tetropina* by Wu (1938) but was excluded from that genus by Zwick (1984) and tentatively placed in *Etrocorema*. The only known specimen from Hainan was presumably destroyed and no recent collections from the type locality are available to evaluate the status of *E. hochii*. Zwick (1982a) mentioned that Bishop (1973) had recorded "...three or four species of *Etrocorema* from the Gombak River...". These forms had been recognized by Kawai but never formally described, consequently the names published by Bishop (1973) are regarded as *nomen nudum*. Zwick (1982a) also indicated "...All specimens from the Gombak R. before me are clearly the same species."

Zwick & Sivec (1985) presented the egg description of *E. nigrogeniculatum* from Sumatran specimens, and Sivec et al. (1988) presented illustrations of the terminalia of the male, female, larval habitus and the first SEM images for eggs of *E. nigrogeniculatum*. Insufficient material did not permit clarification of the status of additional taxa, hence Sivec et al. (1988) treated *E. nigrogeniculatum* as a single, variable species. These authors suggested this hypothesis should be "...tested by SEM examination of eggs from several populations...". Subsequently, Uchida and Yamasaki (1989) presented an illustration of a "drop-shaped" egg dissected from the bodies of a pair of female specimens collected at Bukit Fraser, Malaya. Although these eggs were quite different from those of *E. nigrogeniculatum*, and were thought to belong to a probable new *Etrocorema* species, without male specimens these authors chose not to propose a new species at that time.

The limnological study of Royal Belum State Park was undertaken from December 2008 to May 2009. *Etrocorema* larvae and adults from Mes, Anak Perak and Kejar rivers in the restricted area of the forest were sampled monthly using an aquatic net and a

light trap, respectively. Both larval and adult specimens were sorted and preserved in 75% alcohol. Male genitalia were studied by cold maceration technique following Zwick (1983). Illustrations were done with the aid of an Olympus SZ61 image analyzer. Eggs were placed in 80% ethanol, hand cleaned and agitated in ultrasonic cleaner for several minutes. Afterwards they were transferred into acetone, air dried and fixed in specimen stub with a carbon tape. The egg specimens were gold coated in a Hummer II sputter coater prior to examination with an SEM electron microscope. The holotype and part of the paratype series of the new species is deposited in the Entomology collection of the School of Biological Sciences, Universiti Sains Malaysia (SBC, USM). Some paratypes are deposited in the Slovenian Museum of Natural History (PMSL), Ljubljana.

RESULTS AND DISCUSSION

Etrocorema nigrogeniculatum (Enderlein) (Figs. 11-13)

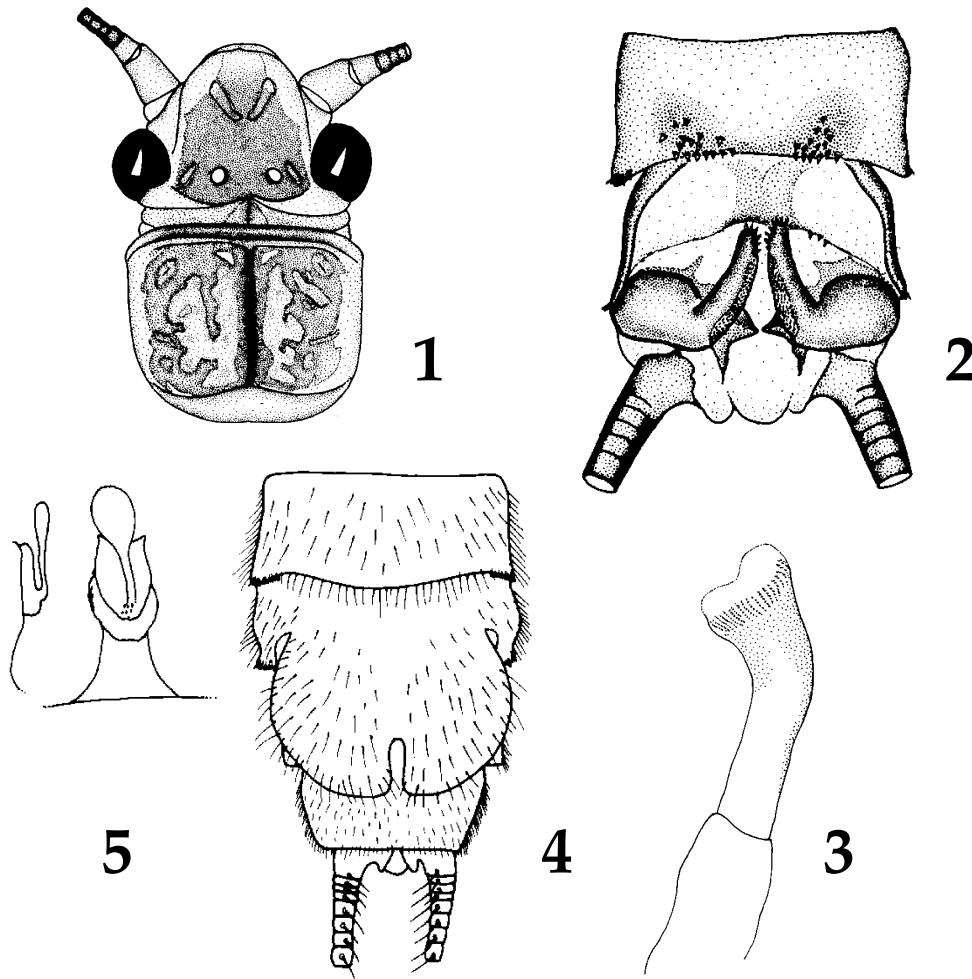
Ochtopetina nigrogeniculata Enderlein, 1909:400. Lectotype ♂, (Institute of Zoology, Polish Academy of Sciences) Malaka.

Etrocorema nigrogeniculatum: Zwick, 1973:494.

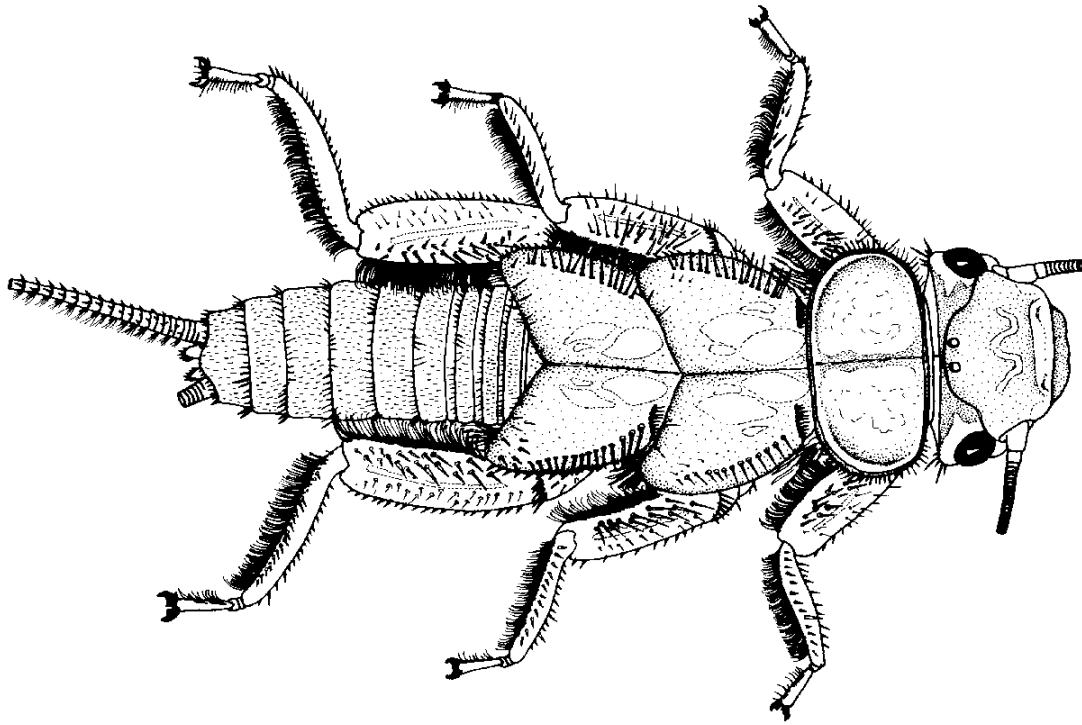
Etrocorema nigrogeniculatum: Zwick, 1982:104.

Etrocorema nigrogeniculatum: Sivec et al., 1988:35.

Remarks. This species is widespread (Zwick, 1982a, b) and has already been reported from Thailand, Sumatra and Borneo. Egg figures are from the same locality as the new species.



Figs. 1-5. *Etrocorema belumensis*. 1. Head and pronotum, 2. Male terminalia, dorsal, 3. Aedeagus lateral, 4. Female terminalia, 5. Vagina lateral and ventral view.



Figs. 6. *Etrocorema belumensis*. Larva, habitus.

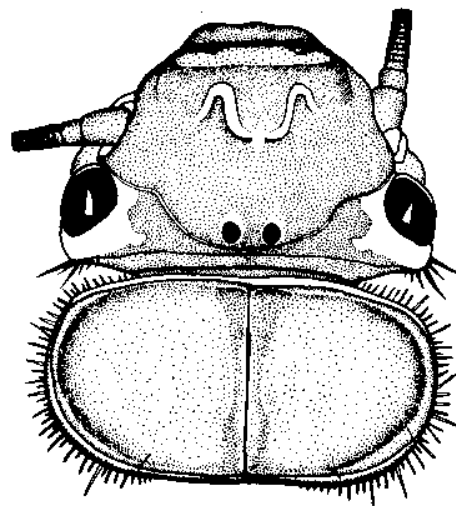
Etrocorema belumensis Wan Nur Asiah & Che Salmah sp. n.
(Figs. 1-10)

Etrocorema sp.: Uchida and Yamasaki, 1989:136. Fig. 2.

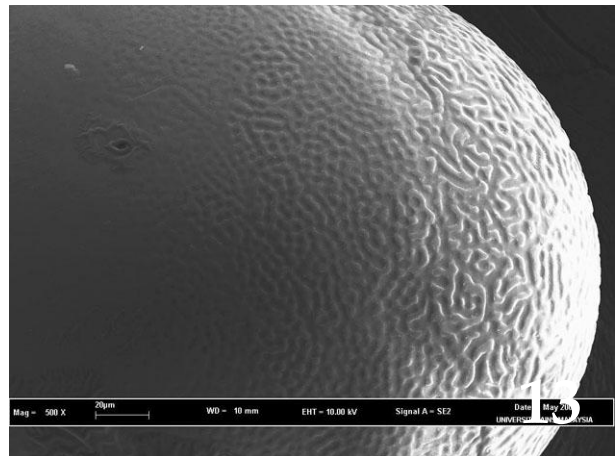
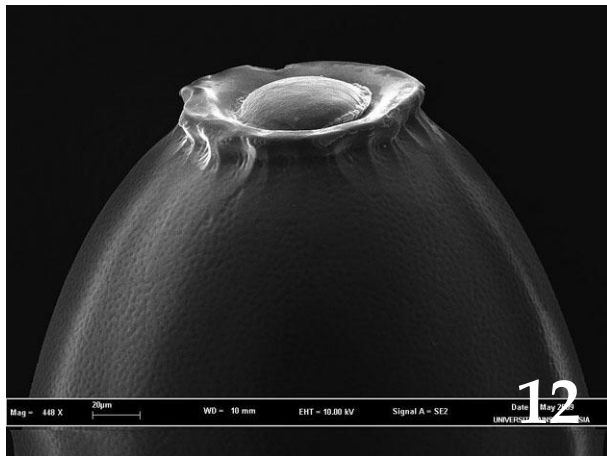
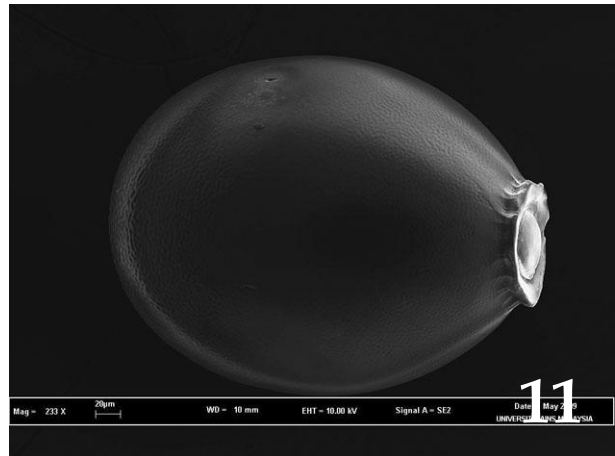
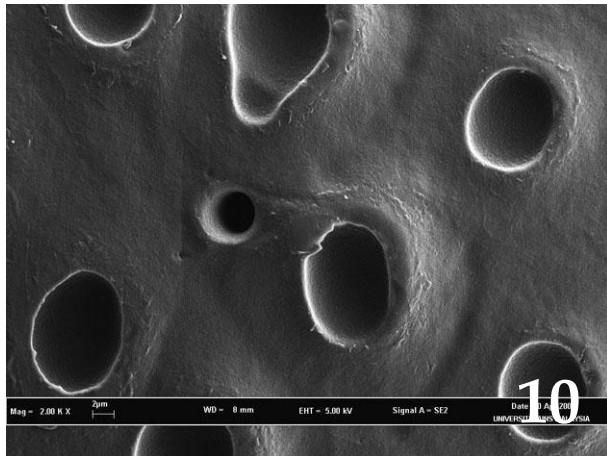
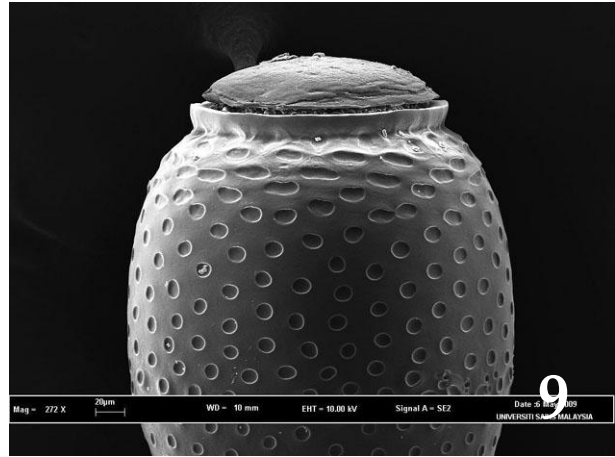
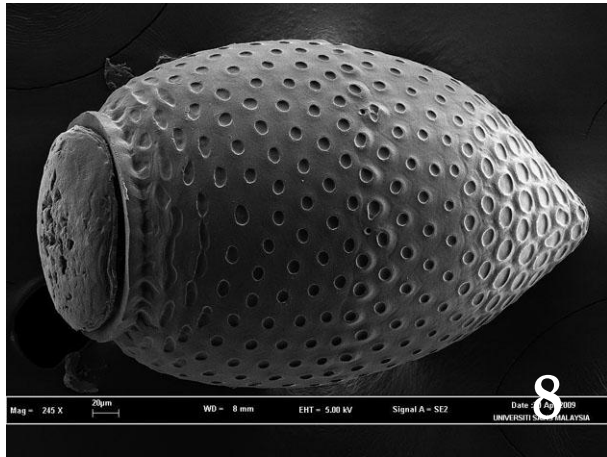
Material examined. Holotype ♂, 3♀ paratypes: Malaysia: Perak, Belum State Park. 20-25 April 2009, light trap. (Deposited at School of Biological Sciences, Universiti Sains Malaysia – SBC, USM). Additional paratypes: 2♂, 2♀, Perak, Belum expedition base camp. 5°30'07"N, 101°26'21"E, III-VII. 1994. Light trap. (Deposited at Slovenian Museum of Natural History, Ljubljana).

Adult habitus. Biocellate, general color dark brown. Mid size to large species, forewing length 12.5 mm in male and 18.0 mm in female. Head with large quadrangular dark brown pattern reaching the front of M-line. M-line and tentorial calluses conspicuous (Fig. 1). First two segments of antennae pale, remaining segments dark brown. Palpi brown. Mesal occipital knob present. Distance between ocelli about two diameters to the eye margin. Pronotum brown, nearly as wide as head, with slightly paler rougosities. Distal part of femora dark brown.

Forelegs uniformly dark brown, mid and hindlegs darker only at distal end. Ventral side of cerci with a row comprised of a single strong and long spine on each segment.



Figs. 7. *Etrocorema belumensis*. Head and pronotum of larva.



Figs. 8-13. *Etrocorema belumensis*. 8. Egg, 9. Egg collar, 10. Micropyle and chorionic detail. *Etrocorema nigrogeniculatum*. 11. Egg, 12. Egg collar, 13. Micropyle and polar chorionic detail.

Male. Terminalia generally similar to *E. nigrogeniculatum* (Fig. 2). Metasternum and sternum 6 with strong hair brushes. Penis generally similar to *E. nigrogeniculatum*, differing in a longer triangular field of fine spicules on ventral side of penis sac, reaching nearly to base of sac (Fig. 3). Apex of extended penis sac with 4 rounded lobes.

Female. The large, expanded subgenital plate is similar to *E. nigrogeniculatum*, but differs in a deeper median notch, nearly one third the length of subgenital plate (Fig. 4). Vagina generally similar to the structure of *E. nigrogeniculatum* (Fig. 5).

Egg. The "drop-shape" of eggs (Fig. 2 of Uchida and Yamasaki, 1989) is different from the oval eggs of *E. nigrogeniculatum* (compare Fig. 8 and Fig. 11). Length of egg ca 0.41 mm and slightly larger than *E. nigrogeniculatum* eggs collected from the same locality. Short ring like collar (Fig. 9) wider than the collar of *E. nigrogeniculatum* egg. Chorion with rounded shallow pits that are bigger and oval near the collar (Figs. 8-10). A few micropyles located in the middle of egg (Fig. 8). Anchor pedicel short (Fig. 9).

Larva. General habitus (Fig. 7) corresponds to *E. nigrogeniculatum* larva. The only apparent difference is the presence of a pale area behind the compound eyes on the occipital part of the head (Figs. 6-7). This difference was observed only in mature larvae. Among smaller size larvae we could not recognize this color pattern. As we have no larval material from throughout the year, we do not know if smaller larvae were present during the December-May study period, or if it is possible to separate early instars of the two species.

Etymology. Species is named for the royal Belum State Park, Perak, Malaysia.

Remarks. Our investigation in the Belum area showed the presence of closely related but distinct species of this genus which we describe herein. The previous concept of single variable *Etrocorema* species throughout South East Asia should be reevaluated by more detailed study of species in current synonymy and in study of material from throughout Southeast Asia. Collections are also needed from Hainan Island in order to evaluate the status of *E. hochii*.

ACKNOWLEDGMENTS

We thank Prof. Dr. Bill Stark for linguistic help. We are indebted to Prof. Dr. Abu Hassan Ahmad,

dean of the School of Biological Sciences for his continuing support in the study of Plecoptera. Special appreciation is extended to Mr. Syahrudin Abdul Hamid, the General Manager of the Perak State Park and his staff for facilitating our study in the field. We are indebted to our Aquatic Entomology team especially Siti Mariam Zhafarina, Wan Mohd Hafeezul and other colleagues for helping us in collecting and sorting the specimens. Finally we would like to thank Electron Microscopy Unit of the School of Biological Sciences for providing the images of the eggs. This study was funded by Escience Research Grant of Ministry of Science, Technology and Innovation Malaysia no. 613603.

REFERENCES

- Bishop, J.E. 1973. Limnology of small Malayan river Sungai Gombak. *Monographiae biologicae*, Junk (The Hague), 22, 493pp.
- DeWalt, R.E., U. Neu-Becker & G. Steuber. 2009. Plecoptera species file online. Version 1.1/3/5 [13 August 2009]. <http://Plecoptera.SpeciesFile.org>.
- Enderlein, G. 1909. Klassifikation der Plecopteren sowie Diagnosen neuer Gattungen und Arten. *Zoologische Anzeiger (Leipzig)*, 34 (13/14):385-419.
- Kawai, T. 1969. Stoneflies (Plecoptera) from Thailand and India with descriptions of one new Genus and two new species. *Oriental Insects (Delhi)*, 2(1968) (2):107-139.
- Sivec, I., B.P. Stark & S. Uchida. 1988. Synopsis of the world genera of Perlinae (Plecoptera: Perlidae). *Scopolia*, 16:1-66.
- Stark, B.P. & I. Sivec. 2007. Studies on Indonesian Perlidae (Plecoptera) with description of three new species. *Illiesia*, 3 (7):53-74.
- Uchida, S. & T. Yamasaki (1989): Some Perlinae (Plecoptera: Perlidae) from the Malay Peninsula and Thailand with the redescription of *Neoperla hamata* from Assam [India]. *Bulletin of the Biogeographical Society of Japan* 44: 135-144.
- Zwick, P. 1973. Die Plecopteren-Arten ENDERLEINS (Insecta); Revision der Typen. *Annales Zoologici (Warszawa)*, 30:471-507.
- Zwick, P. 1982a. Notes on Plecoptera. (6). *Etrocorema nigrogeniculatum* (Enderlein). *Aquatic Insects (Lisse)*, 4 (2):104.

- Zwick, P. 1982b. Notes on Plecoptera. (7). *Neoeuryplax*: a junior synonym of *Etrocorema*. *Aquatic Insects (Lisse)*, 4 (4):236.
- Zwick, P. 1983. The *Neoperla* of Sumatra and Java (Indonesia) (Plecoptera: Perlidae). *Spixiana*, 6:167-204.
- Zwick, P. 1984. The genera *Tetropina* and *Neoperlops* (Plecoptera: Perlidae). *Aquatic Insects*, 6 (3):169-176.
- Zwick, P. & I. Sivec (1985): Supplements to the Perlidae (Plecoptera) of Sumatra. *Spixiana*, 8 (2):123-133.

Received 22 October 2009, Accepted 5 November 2009, Published 16 November 2009