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Taxonomic Study on Four Southeast Asian Species of the Genus *Xestocephalus* (Auchenorrhyncha, Cicadellidae)

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Abstract. Four new Southeast Asian species of the genus *Xestocephalus* are herein described. *Xestocephalus tetracerus* sp. nov. and *X. halimunensis* sp. nov. are found from West Java, Indonesia, and *X. takahashii* sp. nov. and *X. fuliginosus* sp. nov. are from West Malaysia.

Key words: taxonomy, Cicadellidae, *Xestocephalus*, new species, Indonesia, Malaysia.

The leafhopper genus *Xestocephalus* Van Duzee is a major genus of the subfamily Xestocephalinae. About 120 species are recognized from the world, but only five species are recorded from Southeast Asia. In Indonesia and Malaysia, three of the above five *Xestocephalus* species had been recorded: *X. guttulatus* (Motschulsky, 1859), *X. minimus* China, 1935 and *X. javanus* Melichar 1914. The first species of the three Southeast Asian species is recorded widely from Indonesia (Java), Malaysia, Philippines, Taiwan, Sri Lanka, Russia, Korea, Ethiopia, and Tanzania. The second one is recorded only from Indonesia (Sumatra). The last one has been recorded only from Indonesia (Java). Body length of all the species are small and ranged from 2 mm to 3 mm. A key to two of these Southeast Asian species is provided by Melichar (1914), and China (1935) showed morphological differences between *X. guttulatus* and *X. minimus*. As a series of our taxonomic studies on this taxon, we herein describe four new larger species of the genus *Xestocephalus* on the basis of the material collected mainly from the Gunung Halimun National Park, Java, Indonesia and the Cameron Highlands, Malaysia.

The following abbreviations are used for the repositories of the material examined in the text: [NHMB] Museum Zoologicum Bogoriense, Zoological Division,

Research Center for Biology, Indonesian Institute of Science, Cibinong, Indonesia; [UKM] School of Environmental & Natural Resource Sciences, Faculty of Science & Technology, National University of Malaysia, Bangi, Selangor, Malaysia; [ELKU] Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan.

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Xestocephalus tetracerus Kamitani, sp. nov. (Figs. 1, 5-8)

Body yellowish ocher. Vertex, frontoclypeus, clypellus,

gena, lorum, pronotum, and mesonotum (scutellum) ocher and immaculate; fore wing pale brownish semi-transparent, with small black spots near caudal margin and apical 1/4; ventral surface of thorax, and legs yellowish ocher; abdominal segments yellowish ocher.

Head 0.9 times narrower than pronotum; vertex roundly produced anteriorly; medial length of vertex 1.3 times as long as length next to eyes and 0.3 times as long as width of head; ocelli situated on boundary between vertex and frons, separated from eyes by 3 times of own diameter; coronal suture indistinct; pronotum 2.1 times as wide as long, longer than mesonotum mid-dorsally; hind femur with apical setal formula 2 + 1 + 1; female pygofer (9th tergum) with caudal margin triangularly concave.

Male genitalia. Pygofer furnished with approximately 7 macrosetae on posterior half, with caudal margin dentate and 2 small notches along ventral margin; inner process of pygofer absent; genital plate narrow at base but widened from apical half, with 2 rows of stout macrosetae; style robust, S-shaped, with apical dilation of apophysis rectangular; aedeagus U-shape in lateral view; dorsal apodeme slightly shorter than shaft; shaft almost straight but weakly bent obliquely apicad at apical 1/3,

providing with a pair of long apical processes directing posteriorly; gonopore apical and ventral.

Body length to tip of folded fore wing. ♂, 2.9 – 3.4 mm (mean 3.2 mm); ♀, 3.4 – 3.8 mm (mean 3.6 mm).

Type material. Holotype: ♂, [W. Java: Indonesia], NP Gate – Cikaniki (alt. 900 m), Gn. Halimun National Park, 17. III. 2003 [SW-3], Coll. S. Kamitani. Paratypes. 1♀, Cikaniki (alt. 900m), Gn. Halimun National Park, 9. VIII. 1997, S. Kamitani; 1♀, same data except 12. VIII. 1997; 1♂ 1♀, same locality, 16. III. 2003, A. Matsunaga; 3♂ 1♀, Cikaniki - Citalahab (alt. 950 m), Gn. Halimun National Park, 16. III. 2003, S. Kamitani; 1♀, same data except 17. III. 2003; 1♂ 1♀, same data except 18. III. 2003; 1♂, same data to holotype; 1♀, Citalahab (alt. 1,000 m), Gn. Halimun National Park, 18. III. 2003, S. Kamitani; 1♀, Gn. Kendeng (alt. 1,500 m), Gn. Halimun National Park, 11. VIII. 1997, S. Kamitani. The holotype is deposited in the Museum Zoologicum Bogoriense, Zoological Division, Research Center for Biology, Indonesian Institute of Science, Cibinong, Indonesia (NHMB).

Distribution. Indonesia (Java).

Remarks. This new species is slightly similar to *Xestocephalus japonicus* in habitus, but is easily distinguishable from it by the shape of the style and aedeagus.



Figs. 1-4. Southeast Asian *Xestocephalus*. 1, *X. tetracerus* sp. nov.; 2, *X. halimunensis* sp. nov.; 3, *X. takahashii* sp. nov. 4, *X. fuliginosus* sp. nov. Scale bar, 1 mm.

This new species is rather abundant inside the tropical forest of Java.

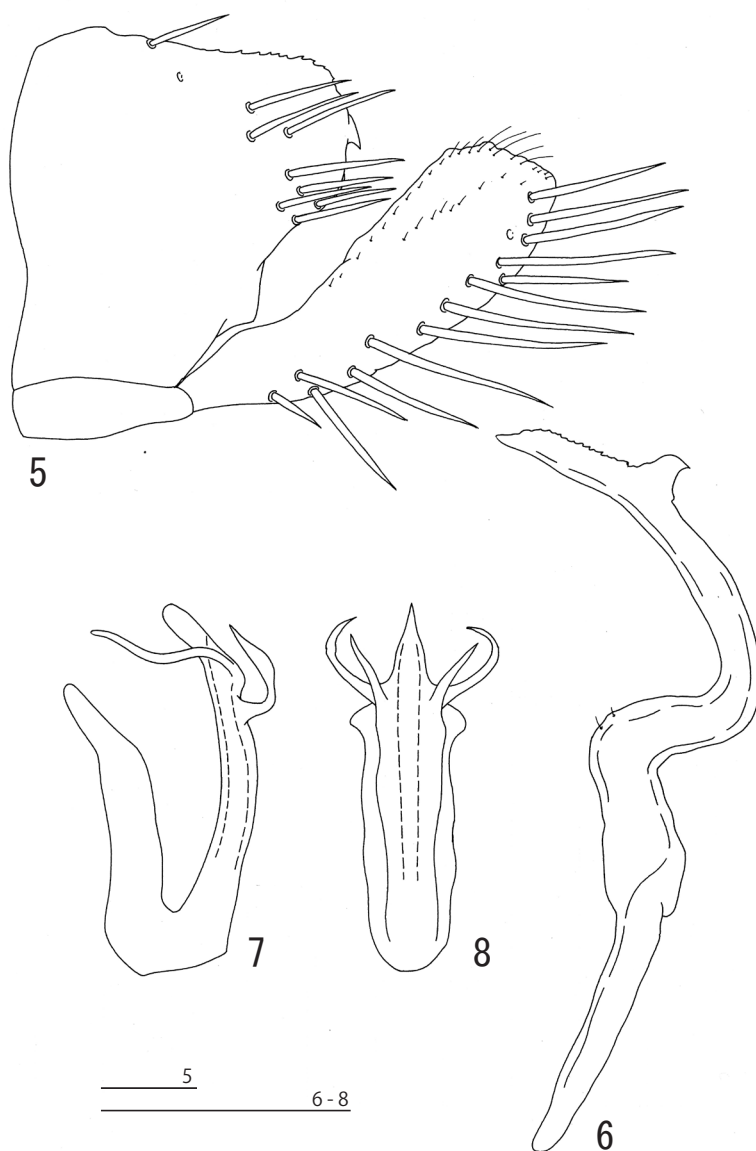
***Xestocephalus halimunensis* Kamitani, sp. nov.**
(Figs. 2, 9-12)

Body yellowish ocher. Vertex, frontoclypeus, clypellus, gena, lorum, pronotum, and mesonotum ocher and immaculate; fore wing black, with many pale brownish spots all over; ventral surface of thorax, and legs yellowish ocher; abdominal segments yellowish ocher.

Head 0.9 times narrower than pronotum; vertex triangularly produced anteriorly; medial length of vertex 1.3 times as long as length next to eyes and 0.3 times as long

as width of head; ocelli separated from eyes by 4 times of own diameter; pronotum 1.9 times as wide as long; hind femur with apical setal formula $2 + 1 + 1$; female pygofer with caudal margin triangularly concave.

Male genitalia. Pygofer furnished with approximately 10 macrosetae on posterior half, with caudal margin dentate and several distinct notches along ventral margin; inner process of pygofer small and triangular, directing ventrad; genital plate widened from apical half, with 2 rows of stout macrosetae; style slender, S-shaped, with apical dilation of apophysis very short and trapezoid; aedeagus U-shape in lateral view; dorsal apodeme slightly shorter than shaft; shaft rounded at apex in posterior view, directing dorsad, almost straight, providing with a



Figs. 5–8. *Xestocephalus tetracerus* sp. nov., 5, ♂ pygofer in lateral view; 6, right style; 7–8, aedeagus in lateral (7) and caudal (8) views. Scales; 0.2 mm.

pair of short subapical processes directing dorsad and a long ventral projection arising from base; gonopore apical and ventral.

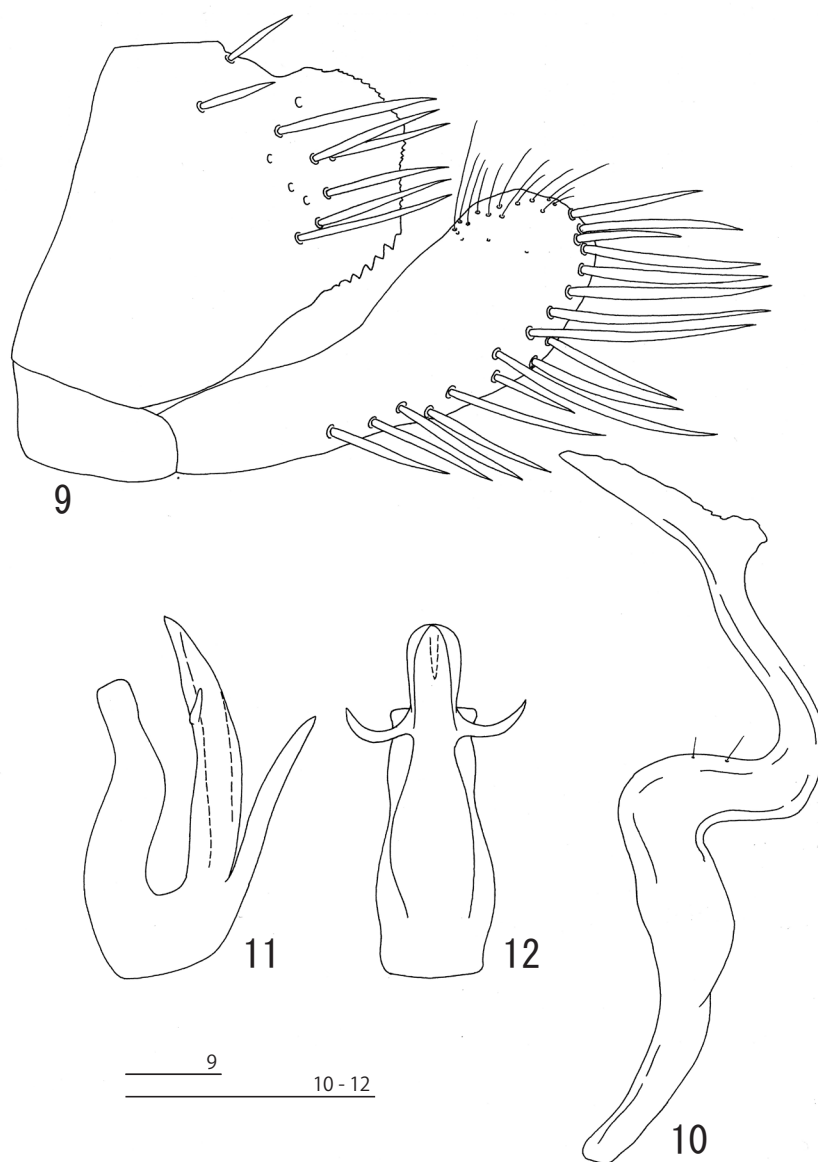
Body length to tip of folded fore wing. ♂, 3.3 – 3.4 mm (mean 3.4 mm); ♀, 3.6 mm.

Type material. Holotype: ♂, [W. Java: Indonesia], Cikaniki - Citalahab (alt. 950 m), Gn. Halimun National Park, 16. III. 2003 [SW-2], Coll. S. Kamitani. Paratypes. 1♂, same data to holotype; 1♂, Cikaniki (alt. 900 m), Gn. Halimun National Park, 14. VIII. 1997, S. Kamitani; 1♂, same locality, 16. III. 2003, A. Matsunaga; 2♂, NP Gate – Cikaniki (alt. 900 m), Gn. Halimun National Park, 17. III. 2003, S. Kamitani; 1♀, Citalahab, Gn. Halimun

National Park, 15. III. 2003, A. Matsunaga. The holotype is deposited in the Museum Zoologicum Bogoriense, Zoological Division, Research Center for Biology, Indonesian Institute of Science, Cibinong, Indonesia (NHMB).

Distribution. Indonesia (Java).

Remarks. This new darkened species is peculiar in the presence of ventral projection of aedeagal shaft, although it is slightly similar to the previous species in having a pair of aedeagal processes. In the national park, this species is sympatric with *X. tetracerus* sp. nov.



Figs. 9–12. *Xestocephalus halimunensis* sp. nov., 9, ♂ pygofer in lateral view; 10, right style; 11–12, aedeagus in lateral (11) and caudal (12) views. Scales; 0.2 mm.

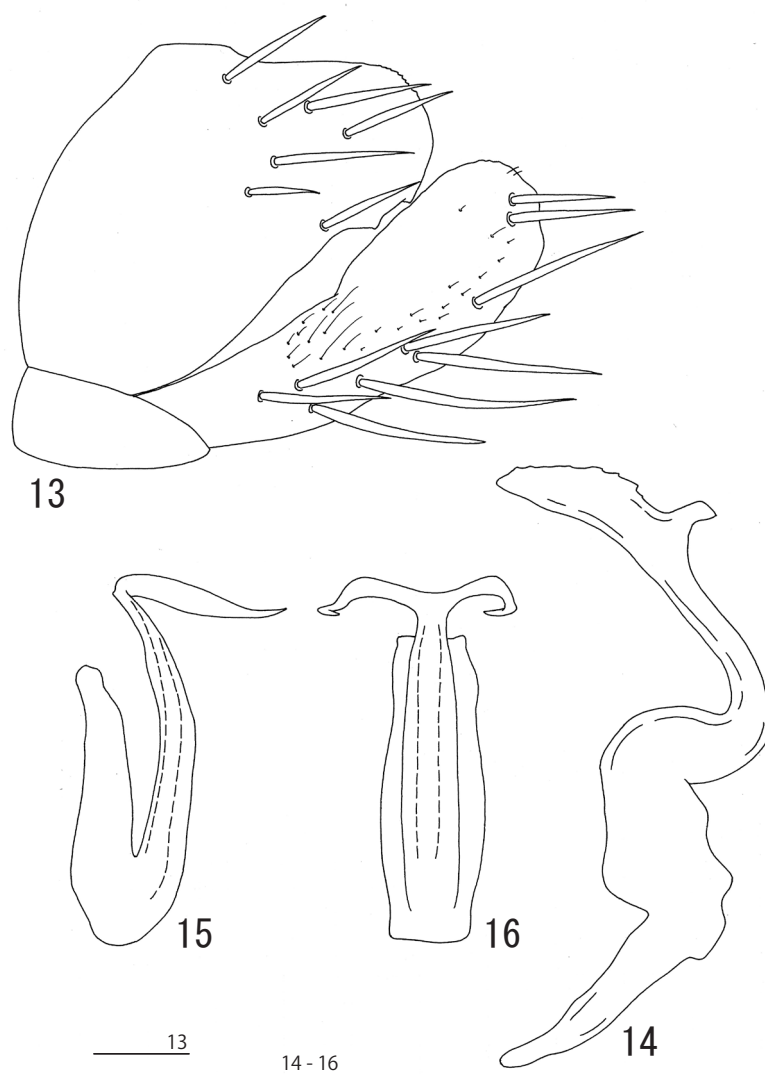
***Xestocephalus takahashii* Kamitani, sp. nov.**
(Figs. 3, 13-16)

Body yellowish ocher. Vertex, frontoclypeus, clypellus, gena, lorum, and mesonotum ocher and immaculate; pronotum with a pair of dark brownish longitudinal lines and a brownish transverse narrow band between lines; fore wing yellowish ocher semitransparent, with many small dark brownish spots all over; ventral surface of thorax, and legs yellowish ocher; abdominal segments dark brown.

Head 0.8 times narrower than pronotum; vertex triangularly produced anteriorly; medial length of vertex 2.2 times as long as length next to eyes and 0.3 times as long as width of head; ocelli separated from eyes by 3 times of

own diameter; pronotum 1.9 times as wide as long; hind femur with apical setal formula 2 + 1 + 1; female pygofer with caudal margin slightly concave at middle.

Male genitalia. Pygofer furnished with approximately 10 macrosetae on posterior half, with dorsal margin dentate and without notches along ventral margin; inner process of pygofer absent; genital plate widened from basal 1/3, with 2 rows of stout macrosetae; style slender, S-shaped, with apical dilation of apophysis trapezoid; aedeagus U-shape in lateral view; dorsal apodeme slightly shorter than shaft; shaft almost straight but bent obliquely apicad at apical 1/5, providing with 2 pairs of subapical processes; dorsal pair of subapical processes long, slightly sinuate, directing anteriorly; ventral pair of subapical processes short, widened at apical 1/3, directing dorsad;



Figs. 13–16. *Xestocephalus takahashii* sp. nov., 13, ♂ pygofer in lateral view; 14, right style; 15–16, aedeagus in lateral (15) and caudal (16) views. Scales; 0.2 mm.

gonopore subapical and ventral.

Body length to tip of folded fore wing. ♂, 3.0 – 3.3 mm (mean 3.2 mm); ♀, 3.5 – 3.9 mm (mean 3.6 mm).

Type material. Holotype: ♂, [W. Malaysia], trail 4-5, Bukit Fraser, 6. III. 2003, Coll. N. Takahashi. Paratypes. 1♂ 1♀, same data to holotype; 1♀, Gn. Berembun, Cameron Highland, 11. III. 2003, N. Takahashi; 1♂ 3♀, Gn. Berembun, Cameron Highland, 12. III. 2003, N. Takahashi; 4♂ 3♀, Gn. Mentigi, Cameron Highland, 13. III. 2003, N. Takahashi; 1♀, Gn. Pendah – Gn. Jasar, 14. III. 2003, N. Takahashi. The holotype is deposited in School of Environmental & Natural Resource Sciences,

Faculty of Science & Technology, Nasionak University of Malaysia, Bangi, Selnagor, Malaysia (UKM).

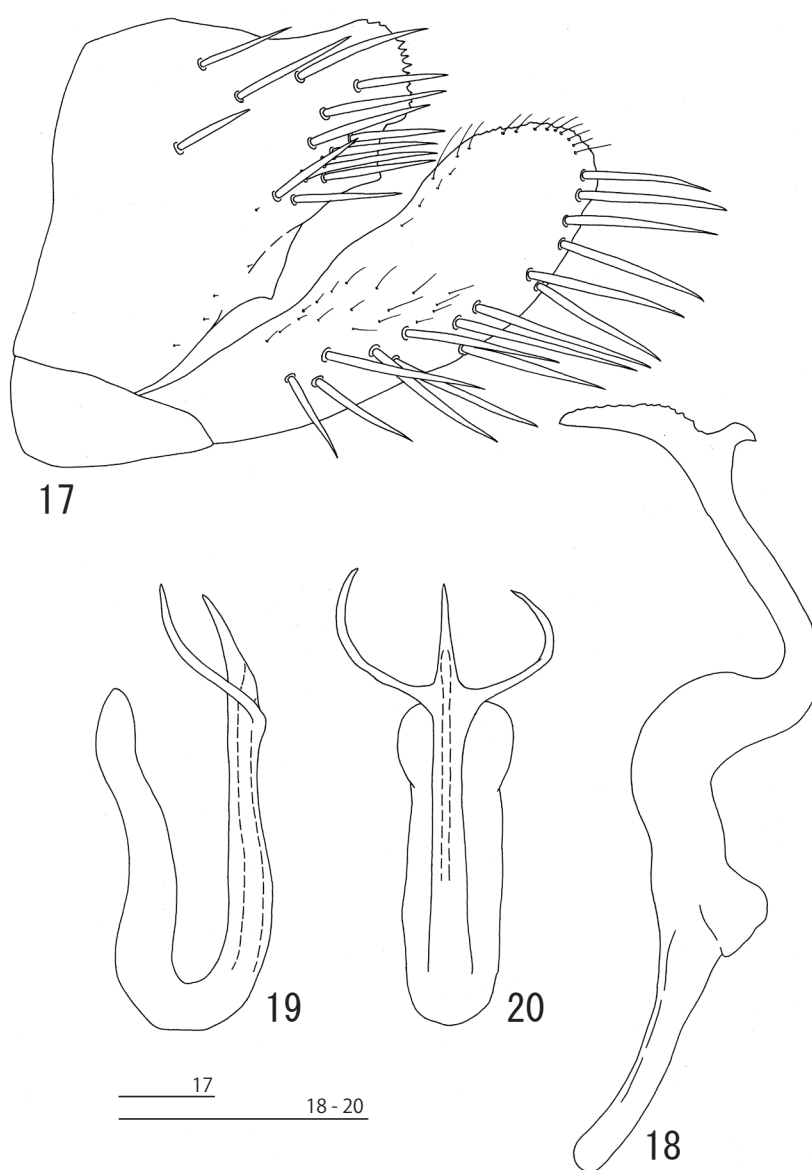
Distribution. Indonesia (Java).

Remarks. This new species is similar to *Xestocephalus tetracerus* sp. nov. in habitus, but is easily distinguishable from it by the shape of aedeagal processes.

***Xestocephalus fuliginosus* Kamitani, sp. nov.**

(Figs. 4, 17-20)

Body pale brown. Vertex, frontoclypeus, clypellus, and lorum pale brown and immaculate; gena chocolate



Figs. 17-20. *Xestocephalus halimunensis* sp. nov., 17, ♂ pygofer in lateral view; 18, right style; 19-20, aedeagus in lateral (19) and caudal (20) views. Scales; 0.2 mm.

brown; pronotum with brown anterior margin and a brownish transverse band at middle; mesonotum with a pair of brown large triangle markings near anterior margin; fore wing yellowish ocher semitransparent, with many dark brownish spots all over; ventral surface of thorax, and legs dark brown; abdominal segments dark brown.

Head 0.9 times narrower than pronotum; vertex triangularly produced anteriorly; medial length of vertex 1.4 times as long as length next to eyes and 0.3 times as long as width of head; ocelli separated from eyes by 3 times of own diameter; pronotum 2.2 times as wide as long; hind femur with apical setal formula 2 + 1 + 1.

Male genitalia. Pygofer furnished with approximately 15 macrosetae on posterior half, with caudal margin dentate and several distinct notches along ventral margin; inner process of pygofer absent; genital plate widened from basal 1/3, with 2 rows of stout macrosetae; style slender, S-shaped, with apical dilation of apophysis rectangular; aedeagus basically U-shape in lateral view; dorsal apodeme directing dorsad; shaft almost straight, narrow and pointed at apex in posterior view, providing with a pair of long subapical processes directing obliquely

dorsad; gonopore subapical and ventral.

Body length to tip of folded fore wing. ♂, 3.2 – 3.5 mm (mean 3.4 mm).

Type material. Holotype: ♂, [W. Malaysia], Genting Highland, 4. III. 2003, Coll. N. Takahashi. Paratypes. 2♂, same data to holotype. The holotype is deposited in School of Environmental & Natural Resource Sciences, Faculty of Science & Technology, Nationak University of Malaysia, Bangi, Selangor, Malaysia (UKM).

Distribution. Indonesia (Java).

Remarks. This blackish species should be closely related to *Xestocephalus halimunensis* sp. nov. in habitus, but is discriminated from the Indonesian species by the absence of the ventral projection of aedeagal shaft and the length of the aedeagal processes.

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