

RESEARCH PAPER

Two New Records of the Genus *Idioscopus* Baker (Hemiptera: Idiocerinae) from Bangladesh

Md. Saiful Alam, Mohammad Atikur Rahman*, S. M. Hemayet Jahan

Department of Entomology, Patuakhali Science and Technology University, Dumki, Patuakhali-8602, Bangladesh

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*Corresponding author
atikentom@pstu.ac.bd

ABSTRACT

The mango leafhopper genus *Idioscopus* (Hemiptera: Idiocerinae) was revised critically from Bangladesh during the period from March, 2017 to February, 2018. The following three species of this genus were recognized taxonomically where two species were newly recorded in Bangladesh: *Idioscopus clypealis* (Lethierry 1889), *Idioscopus nagpurensis* (Pruthi, 1930) **rec. nov.**, *Idioscopus nitidulus* (Walker, 1870) **rec. nov.** Taxonomic key to species, redescrptions and proper illustrations were presented here for easy identification of *Idioscopus* at species level.

Key words: Bangladesh, cicadomorpha, mango leafhopper, first recorded species

Introduction

Mango production in Bangladesh is enormously hindered by the ravages of insect pests from seedling to their maturity owing to humid and subtropical weather that favoring luxuriant growth of various insect species with rich diversity. More than 300 insect pests have been recorded to attack mango crop in different regions of the world (Adnan *et al.* 2014).

Among the various insect pests attacking mango, the mango leafhoppers occur widely and cause serious damage. Both the nymphs and adults of the hoppers puncture and suck the sap from tender shoots, inflorescences, and leaves of mango crop, which cause nonsetting of flowers and dropping of immature fruits, thereby reducing the yield. These leafhoppers also encourage the development of fungi like *Meliola mangiferae* by excreting honey dew in moist environment, resulting in growth of sooty mould on dorsal surface of leaves, branches, and fruits. This black coating interferes with the normal photosynthetic activity of the plant, ultimately resulting in nonsetting of flowers and dropping of immature fruits. In case of severe infestation, it may cause up to 50 per cent crop loss and 20 to 100 per cent loss of inflorescence (Borad & Rathod 2013).

Considering the importance of this pest, researchers of Bangladesh are working for its management treating as Mango hopper, *Idioscopus clypealis* (Lethierry). But the question still exist either single species or species

complex are involved together for infesting mango plant. To find out the answer of this question, insect taxonomist should work systematically. But a very few taxonomic work at species level had been done in Bangladesh. As a result, many species are treated with misidentification that is a core problem for further advanced research work in Bangladesh. Besides, some rare species are going to be extinct due to ecological changes without any record.

The genus *Idioscopus* was erected by Baker (1915). It is oriental genus comprising nearly 30 species, out of which 23 species were reported from Indian subcontinent (Viraktamath 1979). But this insect fauna are very poorly known in Bangladesh. Previously, a very few taxonomic works on Idiocerinae have been done in Bangladesh may be due to lack of professional taxonomist. Jilani *et al.* (1992) worked on external morphology of Mango hopper, *Amritodus atkinsoni* (Leth.) (Homoptera: Cicadellidae) in Bangladesh. Later, Adnan *et al.* (2014) worked on management of mango hopper, *Idioscopus clypealis* (Lethierry) in mango tree mentioning a single species in Bangladesh. Very recently, a preliminary checklist of Auchenorrhyncha from Bangladesh had been published by Rahman *et al.* (2016) where *Idioscopus clypealis* (Lethierry) was listed under Idiocerini tribe and then no further works were done. Therefore, the aim of this study is to provide two newly recorded species of the genus *Idioscopus* with redescription, taxonomic identification key and proper illustrations.

Materials and Methods

Taxonomic study on mango leafhoppers, *Idioscopus* was done to identify, describe and illustrate the species in the Department of Entomology at Patuakhali Science and Technology University, Dumki, Patuakhali during the period from March 2017 to February 2018.

Collection

Leafhoppers were collected by a sweeping net (30 cm diameter), from the mango trees of different localities of Bangladesh gently. The leafhoppers of 10 sweeps from each plant were collected separately in a plastic bag.

Curating and specimen preparation

Collected specimens were killed by placing them directly into 70% ethyl alcohol. Preserved specimen was dipped in 99% ethyl alcohol for 2-3 seconds to wet the specimen, the placed in distilled water for 3-5 minutes.

Genital segment was separated by inserting a minute pin and kept in a test tube filled with 5-6 ml water, 1-2 pellets of 10% KOH, and 1-2 drops of filtered, saturated solution of Chlorazol black E powder in a hot water (80-90°C) bath for 3-5 minutes for clear observation. Then the segments were observed in glycerine jelly using a stereoscopic microscope (Zoom Stereo Microscope, BTB-3A).

Image and line drawing

Photographs of the specimen were made by using SXY-150 digital camera, and multifocusing system using software (Helicon Focus 5.1). The line drawings of the genital segment and labeling were prepared by using HP scanner and adobe photoshop CS₃.

Results and Discussion

The mango leafhoppers, *Idioscopus* (Hemiptera: Idiocerinae: Cicadellidae) associated with mango trees of different localities of Bangladesh were collected and studied taxonomically at species level. In survey the following mango leafhoppers from Bangladesh were identified: *Idioscopus clypealis* (Lethierry), *Idioscopus nagpurensis* (Pruthi) **rec. nov.**, *Idioscopus nitidulus* (Walker) **rec. nov.** These species were comprehensively studied, and taxonomic description with proper illustrations were provided here under.

Genus *Idioscopus* Baker, 1915

Idioscopus Baker, 1915: 338.

Chunrocera Zachvatkin, 1946:154.

Synonymised by Maldonado Capriles, 1971: 184

Diagnosis

Pronotum without a pair of distinct black spot anteriorly; aedeagus without preatrium, shaft elongated.

Key to species of *Idioscopus* from Bangladesh

1. Clypellus entirely black.....*I. clypealis*
- Clypellus partially black.....2
2. Forewing with transverse white bands at base and apex of clavus; many irregular black and without spot present on pronotum; black oval shaped marking present on frons.....*I. nitidulus*
- Forewing without transverse white bands at base and apex of clavus; no such markings on pronotum and frons.....*I. nagpurensis*

Idioscopus clypealis (Lethierry, 1889)

Figure (1, 2)

Idiocerus clypealis Lethierry, 1889: 252

Idiocerus nigroclypeatus Melichar, 1903: 148;
Synonymised by Distant, 1908:187

Idioscopus clypealis (Lethierry) Baker, 1915: 339

Coloration: General color yellowish. The colors have in familiar with *I. nagpurensis* but paler. Face yellow in color. In case of male insects pronotum lemon yellow in color without a spots but female insects have two black spots on anterior margin of the head. Scutellum with two basal dark triangles with two small dark spots in between them and with deep yellow at the apex. Females possess two small round black spots between the ocelli, males usually lack this spots. Clypellus identical in color and completely dark black.

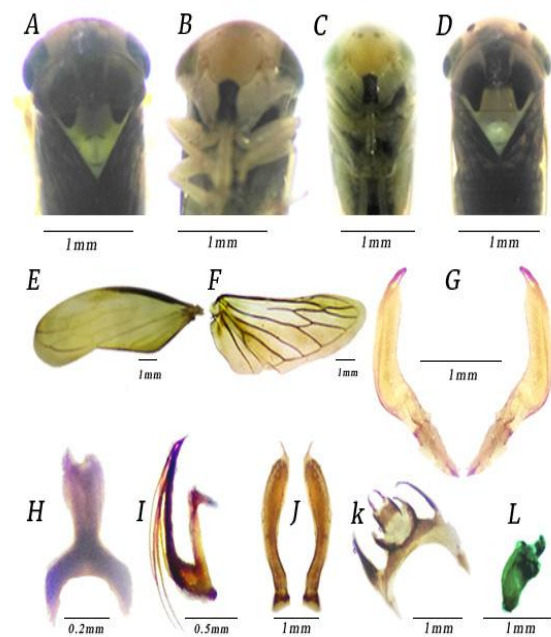


Figure 1. *Idioscopus clypealis* (Lethierry); A. Head and thorax of male (dorsal view), B. Face of male (ventral view), C. Face of female (ventral view), D. Head and thorax female (dorsal view), E. Forewing, F. Hind wing, G. Styles, H. Connective, I. Aedeagus (lateral view), J. Genital plates, K. Anal segment, L. Pygofer.

Head and thorax: Vertex and face dorsad of ocelli transversely striate, rest of face shagreen. Clypellus wide apex with lateral margins concave. Pronotum shagreen, twice as wide as long, posterior margin slightly concave. Scutellum shagreen, longer than pronotum. Male eighth sternite with convex hind margin.

Male genitalia: Pygofer elongate, longer than extensive with anterior basal fracture, collar spine well developed. Subgenital plate elongate, flattened, pointed at base, widest at about basal third of the length, achieving apex of pygofer lobe; bearing long hair-like setae in dorsal marginal raw extending from the basal region towards the apex. Styles sickle shape, apical apophysis longer

than anterior part away from articulation with connective, an increasing number of narrowed to pointed apex, with few spine shape at apex. Connective short, Y-shaped with basal stem trilobed and laterally prolonged at apex, basal lateral area pigmented. Aedeagus with slender basal apodeme attaining 1/3 size of shaft, with two pairs of disparate elongates two processes, outer pair longer accomplishing base of aedeagus, inner two pair short which extending greater than 1/2 as long as longer pair, the ratio of the length of two pair is 1:1.6.

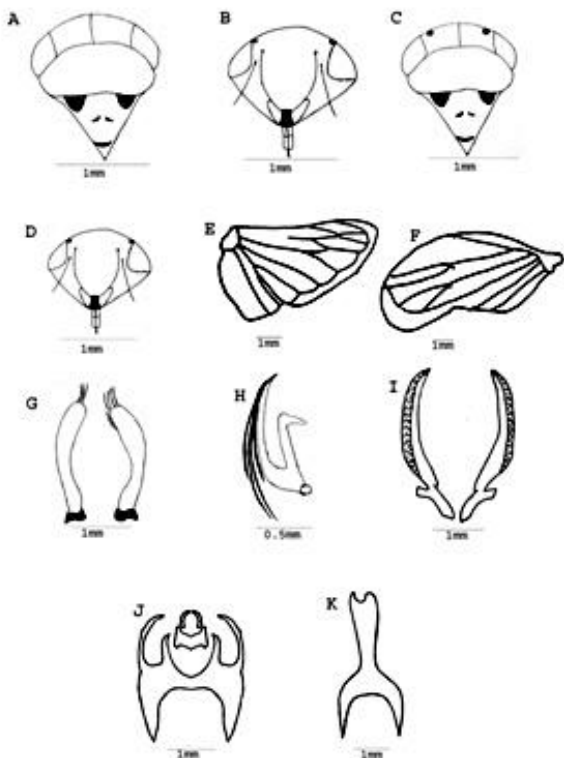


Figure 2. *Idioscopus clypealis* (Lethierry); A. Head and thorax of male (dorsal view), B. Face of male, (ventral view), C. Head and thorax of female (dorsal view), D. Face of female (ventral view), E. Hind wing, F. forewing, G. Genital plates, H. Aedeagus (lateral view), I. Styles, J. Anal segment, K. Connective.

Measurements: Male 3.5-4.1 mm long; Female 3.6-4.3mm long; both male and female 1.3-1.5 mm wide across eyes.

Materials examined: 186 females, 131 males, Patuakhali, BD, 1 Sept, 2017 to 15 Apr, 2018; 11 females, 7 male, Baisal, BD, 5 Sept, 2017; 24 females, 28 males, Bhola, BD 26 Sept, 2017; 39 females, 21 males, Jalokati, BD, 8 Oct, 2017; 23 females, 11 males, Barguna, BD, 13 Nov, 2017; 7males, 5 females, Gopalganj, BD, 5 Dec, 2017; 14 females, 4 males, Khulna, BD, 6 Dec, 2017; 6 females, 3 males, Shatkhira, BD, 6 Dec, 2017; 24 females, 18 males, Jessore, BD, 7 Dec 2017; 34 femals, 24 males, Manikgonj, BD, 12 Jan, 2018; 44 males, 54 females, Gazipur BD, 26 Feb, 2018; 3males, 8 females, Bandarban, BD, 11 Mar, 2018; 8 males, 7 females, Cox's bazaar, BD, 13 Mar, 2018; S. Alam (PSTU).

Host: Mango (*Mangifera indica*)

Distribution: Bangladesh, India, China, Cambodia, Indonesia, Iran, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam, Australia, Papua New Guinea.

Remarks: *Idioscopus clypealis* occurs along with *I. nagpurensis*, but differ in clypeus coloration, apex of aedeagus shaft pointed. In case of male absence of two round black spots on anterior margin of the head.

***Idioscopus nagpurensis* (Pruthi, 1930) rec. nov.**

Figure(3, 4)

Idiocerus nagpurensis Pruthi, 1930:17

Idioscopus nagpurensis (Pruthi): Synonymised by Maldonado Capriles, 1965:246.

Coloration: Light brownish yellow to brown in color. Eye dark brown in color with lateral black markings. Two round conspicuous black spots visible on head both dorsally and ventrally; female have two smaller round spots between ocelli on face but males usually lack these spots. Clypellus possess black spot or black marking not occupying the whole area, basal half black, half yellow in color. Scutellum has two basal black triangle spot and two small brown dots in between them. Forewing bronzy brown in color and costal margin yellow having small raw of pits.

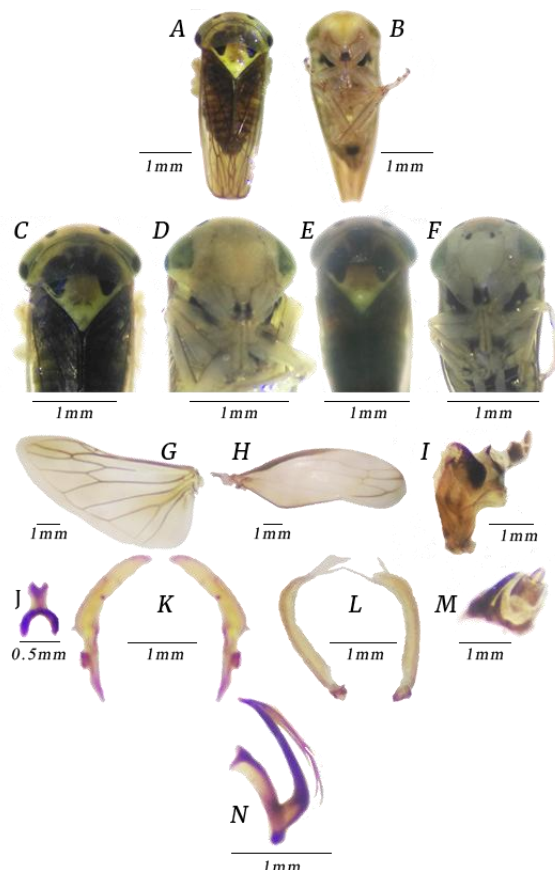


Figure 3. *Idioscopus nagpurensis* (Pruthi); A. Male (dorsal view), B. Male (ventral view), C. Head and thorax of male (dorsal view), D. Face of male, (ventral view), E. Head and thorax of female (dorsal view), F. Face of female (ventral view), G. Hind wing, H. forewing, I. Pygofer, J. Connective, K. styles, L. Genital plates, M. Anal segment, N. Aedeagus.

Head and thorax: Head as wide as pronotum. Ocelli located on the frons. Vertex and face dorsad of ocelli transversely striate, rest of face shagreen. Clypellus wide apex with lateral margins concave. Pronotum shagreen, twice as wide as long, posterior margin slightly concave. Scutellum shagreen, longer than pronotum. Male eighth sternite with convex hind margin.

Male genitalia: Pygofer elongate with anterior basal fracture, ventrad distal end with small spine-like process. Subgenital plate elongate, flattened, narrowed half basal length and above broadened, inner lateral margin region bearing long hair-like setae extending from the basal region to the apex. Style, robust, with blunt apex, and bearing fine hair like setae on dorsal margin. Connective short, Y-shaped with pigmented bilobed arms. Aedeagus shaft with well-developed basal apodeme, aedeagus shaft tapering caudally from base to slightly knobbed apex, bearing two pairs of unequal elongate sub apical serrated processes whose conducted antero-ventrally alongside the shaft, one pair longer which extending up to 80% of the shaft length, another pair short which reaching less than half as long as longer pair, the ratio of the length of two pair is 1:2.39.

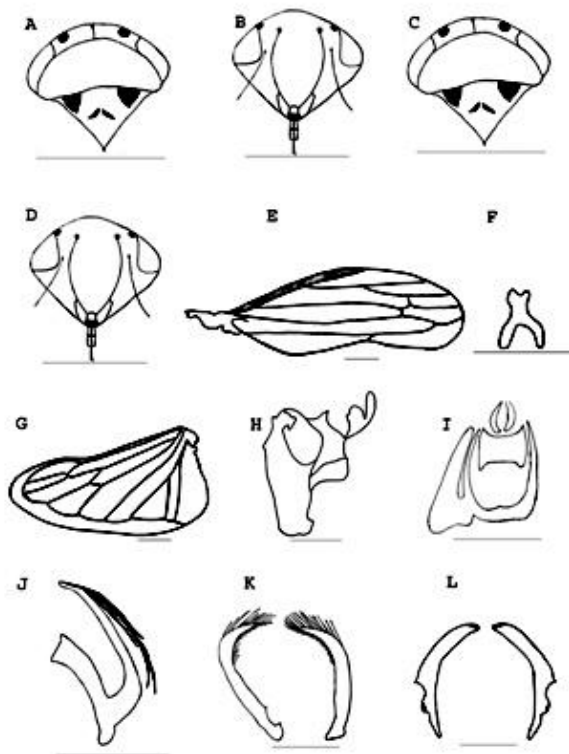


Figure 4. *Idioscopus nagpurensis* (Pruthi, 1930); A. Head and thorax of male (dorsal view), B. Face of male, (ventral view), C. Head and thorax of female (dorsal view), D. Face of female (ventral view), E. Forewing, F. connective, G. Hind wing, H. Pygofer with anal segment, I. Anal style, J. Aedeagus (lateral view), K. Genital plates, L. Styles. [Each scale measures 1mm]

Measurements: Male 3.68 to 3.69 mm long and 1.41-1.5 mm wide across eyes. Female 3.7-3.79 mm long and 1.46 - 1.5 mm wide across eyes.

Materials examined: 163 females, 118 males, Patuakhali, BD, 1 Sept, 2017 to 15 Apr, 2018; 14 females, 11 males, Baisal, BD, 5 Sept, 2017; 19 females, 13 males, Bhola, BD 26 Sept, 2017; 29 females, 11 males, Jalokati, BD, 8 Oct, 2017; 13 females, 8 males, Barguna, BD, 13 Nov, 2017; 9 males, 13 females, Gopalganj, BD, 5 Dec, 2017; 6 females, 4 males, Khulna, BD, 6 Dec, 2017; 7 females, 11 males, Shatkhira, BD, 6 Dec, 2017; 26 females, 13 males, Jessore, BD, 7 Dec 2017; 17 females, 7 mals, Manikgonj, BD, 12 Jan, 2018; 28 males, 36 females, Gazipur BD, 26 Feb, 2018; 1 male, 4 female, Bandarban, BD, 11 Mar, 2018; 3 male, 2 female, Cox's bazaar, BD, 13 Mar, 2018; S. Alam (PSTU).

Host: Mango (*Mangifera indica*)

Distribution: Bangladesh (new record), India, Nepal, Pakistan, Sri Lanka, Laos, Thailand, Burma.

Remarks: *Idioscopus nagpurensis* and *I. clypealis* closely resemble each other but differ in the coloration of the clypellus and relative size of the processes of aedeagus.

***Idioscopus nitidulus* (Walker, 1870) rec. nov.**

Figure(5, 6)

Iassus nitidulus Walker, 1870:322

Idiocerus niveosparsus Lethierry, 1889:252

Synonymised by Maldonado Capriles, 1973:180

Idiocerus basalis Melichar, 1903: 147

Synonymised by Distant, 1908: 185

Idioscopus karachiensis Ahmed *et al.*, 1980:222

Idioscopus freytagi Ahmed *et al.*,1980: 224

Synonymised by Khatri and Webb, 2014: 282

Idioscopus nitidulus (Walker): Maldonado Capriles, 1973:181

Coloration: General color pattern yellowish brown to dark brown. Face, reddish brown, various black marking's with white spots in male but paler in female. Ocelli dark brown in color. Genae with white markings in the middle, area above ocelli with transverse stripes. Pronotum with mottled fuscous markings. Scutellum with a triangular black spot near each basal angle and also with two longer and two smaller black spots in the middle. Compound eye brown in color containing thin longitudinal line. Forewing pale ochraceous with distinct basal white band at base and the apex of clavus possess obscure transverse white band.

Head and thorax: Head slightly wider than pronotum. Vertex immaculate, narrow and round; ocelli located on the frons. Pronotum more than twice longer than the length of vertex; Labium shows sexual difference; Males have apically expanded labium compared to females which have labium of uniform width throughout. Upper part of head dorsad of ocelli striate. Lora slightly raised, clypellus strongly constricted in the middle and expanded apically. Forewing with a small closed third subapical cell.

Male genitalia: Pygofer elongate, with an anterior basal fracture. Sub genital plates elongate narrow barely

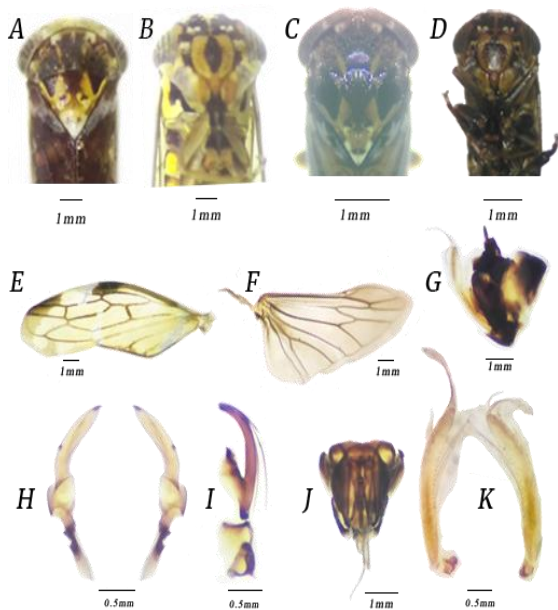


Figure 5. *Idioscopus nitidulus* (Walker, 1870); A. Head and thorax of male (dorsal view), B. Face of male, (ventral view), C. Head and thorax of female (dorsal view), D. Face of female (ventral view), E. Forewing, F. Hind wing, G. Pygofer with anal segment, H. Styles, I. Aedeagus (lateral view), J. Genital block, K. Genital plates.

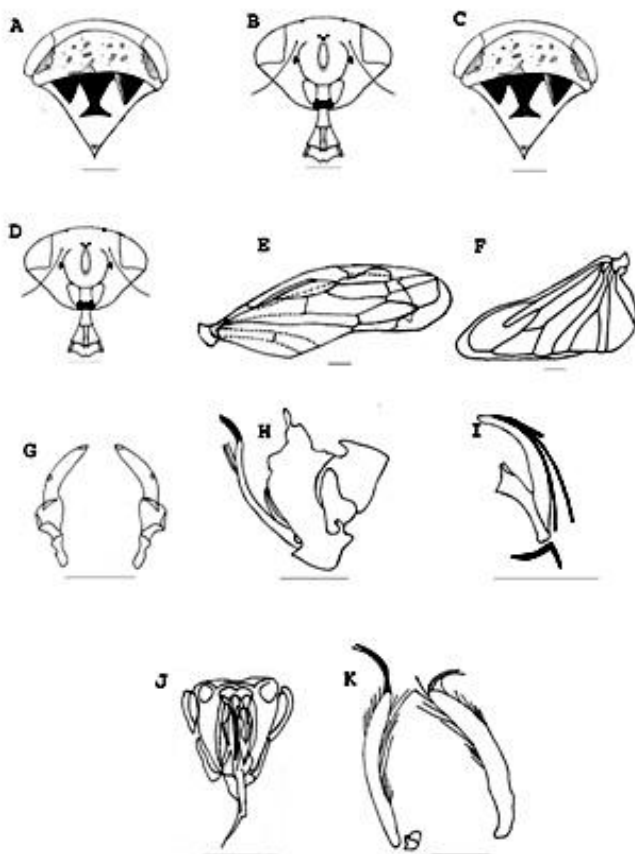


Figure 6. *Idioscopus nitidulus* (Walker, 1870) A. Head and thorax of male (dorsal view), B. Face of male, (ventral view), C. Head and thorax of female (dorsal view), D. Face of female (ventral view), E. Forewing, F. Hind wing, G. Pygofer with anal segment, H. Styles, I. Aedeagus (lateral view), J. Genital block, K. Genital plates. [Each scale measures 1mm]

wider basally than the rest bearing long hair-like setae in dorsal marginal extending from basal 1/3 in the direction of however not achieving the apex, a tuft of lengthy hair-like setae round apex and extending on to ventral margin and a small group of short hair like setae on ventral margin near apex. Style sickle shaped, wide at the base and narrowed apically leads to spine like apex. Connective T- shape in dorsal with dorsal extended hyaline or skinny sheet like structure. Aedeagus with basal apodeme attaining almost half length of shaft, aedeagus shaft evenly curved dorsally from base with gonopore on posterior surface close to broadly rounded apex, with two pairs of unequal, smooth, filamentous processes, small pair attaining up to 1/3 length of aedeagus, another pair extended up to base of the aedeagus.

Measurements: Males 4.42 to 4.7mm long and 1.74 to 1.94 wide across eyes; females 4.5 to 4.8 long and 1.94 to 2.01 wide across eyes.

Materials examined: 49 females, 24 males, Patuakhali, BD, 1 Sept, 2017 to 15 Apr, 2018; 6 females, 3 males, Barishal, BD, 5 Sept, 2017; 8 females, 9 males, Bhola, BD 26 Sept, 2017; 13 females, 5 males, Jalokati, BD, 8 Oct, 2017; 14 females, 7 males, Barguna, BD, 13 Nov, 2017; 2 males, 5 females, Gopalganj, BD, 5 Dec, 2017; 1 females, 2 males, Satkhira, BD, 6 Dec, 2017; 1 females, 3 males, Jessore, BD, 7 Dec 2017; 9 females, 4 males, Manikgonj, BD, 12 Jan, 2018; 1 males, 10 females, Gazipur, BD, 26 Feb, 2018; S. Alam (PSTU).

Host: Mango (*Mangifera indica*)

Distribution: Bangladesh (new record), Pakistan, India, Cambodia, china, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam, Australia.

Remarks: *Idioscopus nitidulus* can be distinguished from both *I. clypealis* and *I. nagpurensis* with the shape of the clypellus with face irregularly marked with brown or black patches without well-defined black spot, raised lora and with the transverse white band at base of forewing. It can differentiate from *Amritodus sp* by the absence of black spots on pronotum apart from the differently shaped structure of male genitalia.

In Bangladesh, *Idioscopus clypealis* (Viraktamath, 1989) was recorded previously (Rahman *et al.* 2016). Adnan *et al.* (2014) discussed with management of mango hopper *Idioscopus clypealis* in Bangladesh. But no workers discussed with *Idioscopus nitidulus* and *Idioscopus nagpurensis* previously from Bangladesh. Therefore, these two species are the new record for Bangladesh. *Idioscopus nitidulus* possess forewing with transverse white bands at base and apex of clavus; many irregular black and without spot present on pronotum; black oval shaped marking present on frons; inner pair process attaining up to 1/3 length of aedeagus. *Idioscopus nagpurensis* possess partially black clypellus and one pair process reaching base aedeagus and another pair extended up to half aedeagus.

Conclusion

Species of the genus *Idioscopus* are very poorly known in Bangladesh whereas nearly 30 species were recorded from the world. In the present research work two species, *Idioscopus nitidulus* and *Idioscopus nagpurensis* were recognized firstly in Bangladesh after critical taxonomic revision. Key to species, redescriptions and illustrations of all available species of this genus were provided for easy identification. Further collection and observation of this group are necessary to find out the record of more members at species level in Bangladesh.

References

- Adnan SM, Uddin MM, Alam MJ, Islam MS, Kashem MA, Rafii MY, Latif MA (2014) Management of mango hopper, *I. clypealis*, using chemical insecticides and Neem oil. *The Scientific World Journal* **709614**: 1-5.
- Ahmed SS, Naheed R, Ahmed M (1980) Three new species of Idiocerine Leafhoppers. *Proceedings of Pakistan Congress of Zoology* 1:221-225.
- Baker CP (1915) Studies in Philippine Jassoidea, IV: The Idiocerini of the Philippines. *The Philippine Journal of Science* **10 (6)**: 317 - 342.
- Borad PK, Rathod SV (2013) The hopper causes a loss of 20 to 100 per cent of inflorescence. *Entomon* **32 (1)**: 25-27.
- Distant WL (1908) Rhynchota- Homoptera. In: Bingham CT ed. The Fauna of British India including Ceylon and Burma Vol.4, 501 p.
- Jilani MSNK, Ahmad M, Hoque MR (1992) External morphology of mango hopper, *Amritodus atkinsoni* (Leth.) (Homoptera: Cicadellidae). *Bangladesh Journal of Zoology* **20 (1)**: 9-15.
- Khatri I, Webb MD (2014) Review of the Idiocerine Leafhopper of Pakistan (Homoptera, Cicadellidae) with a description of a new species. *Zootaxa* **3860(3)**: 280-290.
- Lethierry ML (1889) Definitions of three new Homoptera. *Journal of Asiatic Society* **58**: 252-253
- Maldonado Capriles J (1965) Studies of Idiocerine leafhoppers III on Singh-Pruthi's Indian species of *Idiocerus* (Homoptera: Cicadellidae). *Proceedings of the Entomological Society of Washington* **67(4)**: 244-246.
- Maldonado Capriles J (1971) Studies on Idiocerine leafhoppers, VII. Concerning the Ethiopian genus *Rotifunkia* China 1926 (Homoptera: Cicadellidae). *Annals Entomologica Fennica* **37(4)**: 202-204
- Maldonado Capriles J (1964) Studies on Idiocerine leafhoppers II the Indian and Philippine species of *Idiocerus* and the genus *Idioscopus*. *Proceedings of the Entomological Society of Washington* **66**: 89 - 100.
- Maldonado Capriles J (1973) Studies on Idiocerine leafhoppers X *Idioscopus nitidulus* (Walker). New combination (Homoptera: Cicadellidae). *Proceedings of the Entomological Society of Washington* **75 (2)**: 179 - 181.
- Melicher L (1903) Homopteran Fauna von Ceylon. Verlag von Felix I., Damer Berlin. Pp. 248
- Pruthi HS (1930) Studies on Indian Jassidae (Homoptera). Part I. Introduction and description of some new genera and species. *Indian Museum Memories* **11(1)**: 1-68.
- Rahman MA, Jhan PK, Khan MMH, Jahan SMH, Alam R (2016) A preliminary checklist of Auchenorrhyncha (Homoptera) from Bangladesh. *International Journal of Innovative Research* **1(2)**: 9-16.
- Viraktamath CA (1979) Four new species of *Idioscopus* (Homoptera: Cicadellidae) from Southern India. *Entomon* **4(2)**: 173-181.
- Viraktamath CA (1989) Auchenorrhyncha (Homoptera) associated with mango *Mangifera indica* L. *Tropical Pest Management* **35**: 431-434.
- Walker F (1870) Catalogue of the Homopterous insects collected in the Indian Archipelago by Mr. A.R. Wallace, with descriptions of new species. *Zoological Journal of the Linnaean Society* **10**: 276-330.
- Zachvatkin AA (1946) Studies on the Homoptera of Turkey. I-VII. *Transactions of the Entomological Society of London* **97**:149-176.