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SYSTEMATICS AND PHYLOGENY

A new genus *Mesophlaeoba* (Orthoptera: Acrididae: Acridinae) from India

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Abstract

A new genus of Acridinae, *Mesophlaeoba* Kumar and Usmani gen. n. based on type species *Mesophlaeoba usmanii* Kumar and Usmani sp. n., is described and illustrated from India. The description was based on both conventional morphological and genital characters. The new genus is closely related to *Phlaeoba* Stal, 1861 but differs from it in presence of filiform antennae, absence of median carinula of fastigium of vertex and rounded posterior margin of pronotum.

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Key words: *Mesophlaeoba*; Acridinae; new genus; new species; India.

Contributions: HK has collected and identified the material under study, description, photography, illustration and manuscript were prepared for new taxa; MKU has critically gone through the manuscript and made necessary corrections/modifications and also confirm the identification.

Conflict of interest: the authors declare no potential conflict of interest.

Acknowledgments: we wish to extend our gratitude to Department of Science and Technology, New Delhi for providing financial assistance during the tenure of a major research project (Ref. No. SR/SO/AS 32/2008) being carried out on Biosystematics and Biodiversity of Acridoidea (Orthoptera) in North India. Thanks are also due to Prof. Iqbal Parwez, Chairman, Department of Zoology, Aligarh Muslim University for providing facilities.

To meet the requirements by the International Code of Zoological Nomenclature (ICZN), this article was registered at ZooBank (20 March 2015) under the ZooBank Life Science Identifier (LSID): 941EBBFE-61A2-4A87-82BD-3414B0D53671.

Received for publication: 17 February 2015.
Revision received: 14 March 2015.
Accepted for publication: 20 March 2015.
Published: 15 April 2015.

Entomologia 2015; 3:269
doi:10.4081/entomologia.2015.269

Introduction

Krauss (1890) was the first who used the family name Acrididae, but priority for family-group names based on *Acrida* dates from Acridina MacLeay, 1821 (Eades *et al.,* 2014). Acrididae is divided into 25 subfamilies (Eades *et al.,* 2014). However tribe Eucopiocerini with four genera and 12 other genera are remaining free from all subfamilies of Acrididae (Eades *et al.,* 2014). The subfamily Acridinae is divided into 5 tribes, but within the subfamily 106 genera are not assigned to any tribe (Eades *et al.,* 2014). Acridinae is represented by 138 genera worldwide (Eades *et al.,* 2014); while in India, 36 species belonging to 15 genera were reported under Acridinae (Shishodia *et al.,* 2010). The characteristic features of Acridinae are: absence of prosternal process, apical and basal valves of aedeagus flexured, bridge-shaped epiphallus; ancorae and lophi mostly present (Dirsh, 1961); posterior margin of female subgenital plate entirely setose, spermatheca with apical divertidulum short or rudimentary, preapical diverticulum sac-like (Usmani & Kumar, 2011). The present paper deals with the description and illustration of a new genus *Mesophlaeoba* Kumar and Usmani gen. n. and a new species *Mesophlaeoba usmanii* Kumar and Usmani sp. n. from India. The terminology used for external morphology is similar to that of Uvarov (1966) and for describing the female genitalia was used that of Slifer (1939) and Agarwala (1952). Holotype and paratypes of a new species are deposited in the Zoology museum, Aligarh Muslim University, India.

Materials and Methods

The authors collected new materials from grassland areas of Mandi and Solan districts of Himachal Pradesh, India. Dry mounts were prepared for morphological characters like size, color, texture *etc*. Images of Figure 1 were obtained using an Olympus SLR digital camera (Olympus, Center Valley, PA, USA) and camera mounted to a Nikon stereozoom microscope (Nikon Inc., Tokyo, Japan).

For a detailed study of the various components of genitalia, the permanent slides were prepared and examined under the microscope in order to make a detailed study of its structures. Drawings were initially made with the help of a camera lucida. Details were filled in by conventional microscope examination.

Results: taxonomic account

Genus: *Mesophlaeoba* Kumar and Usmani gen. n.
Type species: *Mesophlaeoba usmanii* Kumar and Usmani sp. n.
Description: Small to medium sized (Figure 1A); cylindrical, antennae

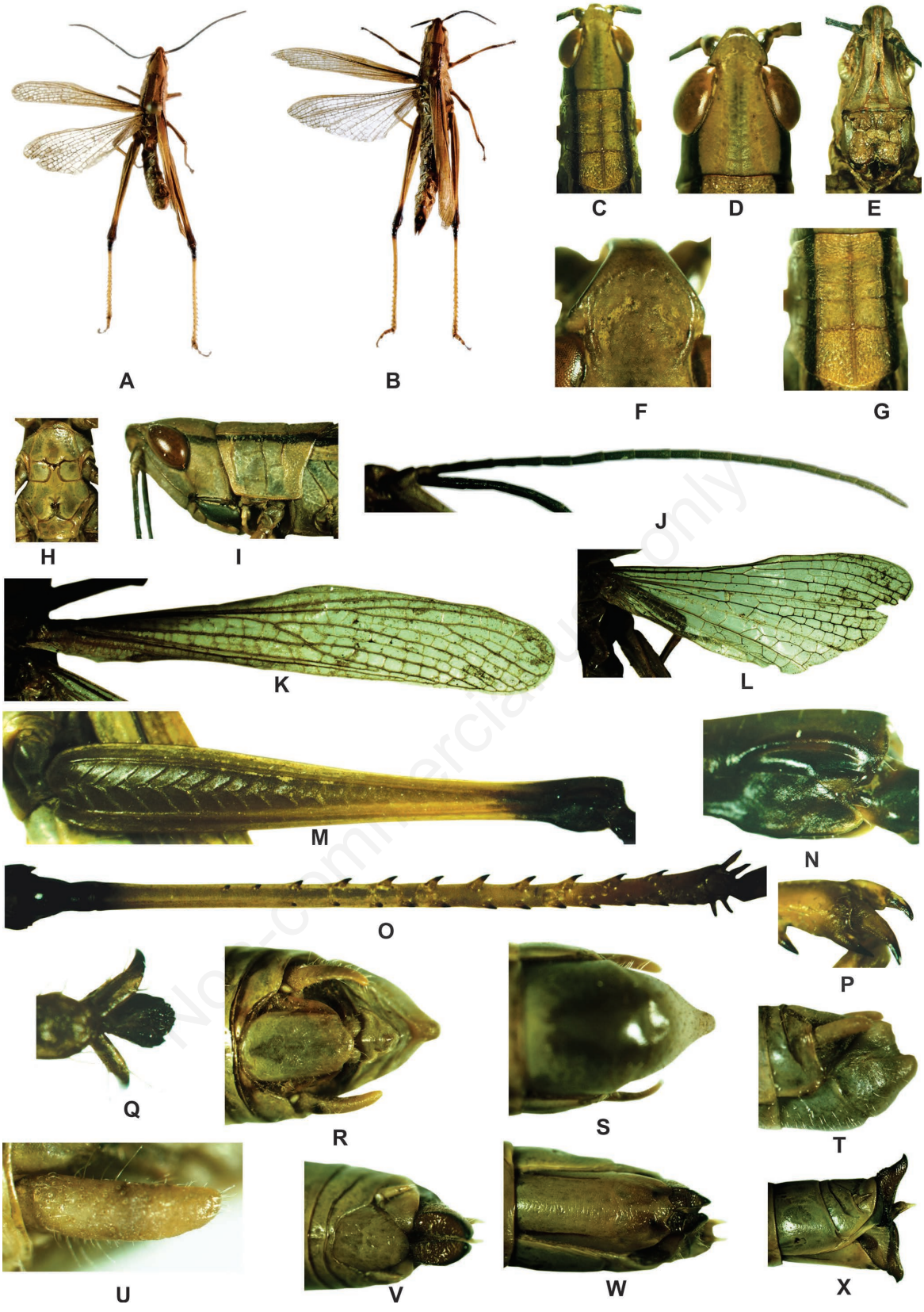

Figure 1. *Mesophlaeoba usmanii* Kumar and Usmani sp. n. (A-X). A) Dorsal view ♂; B) dorsal view ♀; C) dorsal view of head and pronotum ♂; D) dorsal view of head ♂; E) ventral view of head ♂; F) dorsal view of fastigium of vertex ♂;G) dorsal view of pronotum ♂; H) ventral view of sternum ♂; I) lateral view of head and pronotum ♂; J) dorsal view of antenna ♂; K) dorsal view of tegmina ♂; L) dorsal view of hind wing ♂; M) dorsal view of hind femur ♂; N) dorsal view of knee lobe ♂; O) dorsal view of hind tibiae ♂; P) dorsal view of tibial spurs ♂; Q) dorsal view of arolium ♂; R) dorsal view of abdominal apex ♂; S) ventral view of abdominal apex ♂; T) lateral view of abdominal apex ♂; U) lateral view of cercus ♂; V) dorsal view of abdominal apex ♀; W) ventral view of abdominal apex ♀; X) lateral view of abdominal apex ♀.

(Figure 1J) filliform slightly flattened basally, longer than head and pronotum together (Figure 1C); head conical; fastigium of vertex (Figure 1F) angular, shorter than the longest diameter of eye without median carinula; fastigial foveolae absent; frons (Figure 1I) oblique; frontal ridge (Figure 1E) deeply sulcated; pronotum (Figure 1G) flat or slightly tectiform, smooth, median carina well developed, crossed by posterior transverse sulcus only, lateral carina straight, nearly parallel; metazona shorter than prozona, posterior margin rounded; prosternal process absent; mesosternal interspace (Figure 1H) open; tegmina (Figure 1K) and wings fully developed; hind femur (Figure 1M) thickened, inner side without stridulatory file; arolium (Figure 1Q) of medium size.

Male genitalia: Supra-anal plate (Figures 1R and 2A) elongate-angular, cercus (Figures 1U and 2A) narrow-conical, slightly incurved with obtuse apex; subgenital plate (Figure 1S and 2B) short with obtusely rounded apex; epiphallus (Figure 2C), bridge narrow and undivided, ancorae large, lophi lobiform; aedeagus (Figure 2D) apical valve narrower and shorter than basal valve with upcurved and obtuse apex.

Female genitalia: Supra-anal plate (Figures 1V and 2E) broadly angular, cercus conical with obtuse apex; subgenital plate (Figures 1W and 2F) broad, triangular with media process slightly longer than lateral lobes, posterior margin entirely setose; spermatheca (Figure 2G), apical divertidulum short, preapical diverticulum sac-like; ovipositor (Figures 1X and 2H), dorsal valve much shorter than lateral apodeme.

Discussion

Both genera *Acrida* Linnaeus, 1758 and *Truxalis* Fabricius, 1775 differ from the new genus in the presence of elongated head and very long and slender hind femur. The new genus differs from *Zygophlaeoba* Bolivar, 1902, *Phlaeobida* Boliar, 1902, *Paraphlaeoba* Bolivar, 1902, *Parodontomelus* Ramme, 1929, *Odontomelus* Bolivar, 1890 and *Carliola* Uvarov, 1939 in the presence of fully developed tegmina which is short or rudimentary in all the above genera. *Pasiphimus* Bolivar, 1914 differs from new genus by the presence of longitudinal ridges on head and pronotum together. The genera viz. *Sikkimiana* Uvarov, 1940, *Gymnobothrus* Bolivar, 1889, *Julea* Bolivar, 1914 and *Duroniopsis* Bolivar, 1914 are different from new genus by the presence of curved lateral carinae of pronotum in prozona. Lateral carina of pronotum diverging in metazona in genera viz. *Phlaeobacris* Willemse 1932, *Holopercna* Karsch, 1891 and *Orthochtha* Karsch, 1891 which make them different from new genus. *Pyrgophlaeoba* Miller, 1929 and *Bababuddinia* Bolivar, 1918 differing from new genus by the irregular lateral carinae of pronotum. *Neophlaeoba* Usmani & Shafee, 1983 differing from new genus by presence of fastigial foveolae.

The genus *Mesophlaeoba* is closely related to *Phlaeoba* Stal, 1861 in serrated upper carina of hind femur, parallel lateral carinae of pronotum in its whole length and antennae as long as or longer than head and pronotum together but differs from it for: i) the presence of almost filiform antennae which are slightly compressed basally but in *Phlaeoba* Stal, 1861 basal 1/3 segments of antennae are completely ensiform; ii) absence of median carinula of fastigium of vertex which is very prominent in *Phlaeoba* Stal, 1861 and clearly visible from tip to end of head dorsally; iii) presence of rounded depression in fastigium of vertex which is absent in *Phlaeoba* Stal, 1861; iv) rounded posterior margin of pronotum which is not completely rounded but slightly wavy in species of *Phlaeoba* Stal, 1861; v) epiphallus with short ancorae in *Phlaeoba* Stal, 1861 while they are comparatively large in new genus; vi) apical diverticulum of spermatheca is rudimentary in *Phlaeoba* Stal, 1861 while it is in short condition in new genus; vii) dorsal valve of ovipositor shorter than lateral apodeme in *Phlaeoba* Stal, 1861 while it is comparatively much shorter in new genus.

Due to the absence of prosternal process, flexure valves of aedeagus, bridge-shaped epiphallus, presence of ancorae and lophi, entirely setose posterior margin of female subgenital plate and spermatheca with apical divertidulum short, preapical diverticulum sac-like, *Mesophlaeoba* Kumar and Usmani gen. n. is arranged under the subfamily Acridinae.

Etymology: The name of the new genus *Mesophlaeoba* is given because it is close to the genus *Phlaeoba* Stal, 1861 and it is based on a new species.

Description of *Mesophlaeoba usmanii* Kumar and Usmani sp. n.

Male

Small to medium size (Figure 1A); body cylindrical; antennae (Figure 1J) slightly flattened basally, 22 segmented, longer than head and pronotum together (Figure 1C); head (Figure 1D) conical, shorter than pronotum; eyes oval in shape, near the apex, maximum diameter of eye slightly longer than the interocular distance; frons (Figure 1I) oblique; fastigium of vertex (Figure 1F) angular, wider than long and slightly produced in front of eyes, shorter than eye length, sulcated with lateral carinulae, without median carinula, apex obtusely rounded; vertex with fine median carina, width of vertex between the eyes wider than the frontal ridge between the antennal sockets; fastigial foveolae absent; frontal ridge (Figure 1E) very narrow and deeply sulcated with high lateral carina reaching up to the clypeus, margins diverging below median ocellus; pronotum (Figure 1G) flat or slightly tectiform, longer than its width, almost smooth with well developed media and lateral carinae, all the three transverse sulcus seen on dorsum of pronotum but only posterior one cross median carina, lateral carina parallel in its whole length, crossed by all the three transverse sulci, prozona longer than metazona, posterovantral angle (Figure 1I) rounded, posterior margin of pronotum rounded; prosternal process absent; mesosternal lobes (Figure 1H) rounded and mesosternal interspace longer than wide, margins rounded; tegmina (Figure 1K) fully developed with rounded apex; hind wing (Figure 1L) slightly shorter than the tegmina; hind femora (Figure 1M) short and compressed laterally, upper carina weakly serrated while lower carina smooth, surpassing the tip of abdomen, upper apical lobe longer than lower (Figure 1N), inner margin of inner side without a row of stridulatory pegs; hind tibiae (Figure 1O) cylindrical, shorter than hind femur with 14 outer and 12 inner spines, inner spur on inner side of hind tibia slightly longer than external one (Figure 1Q); arolium large.

Genitalia: Supra-anal plate (Figures 1R and 2A) elongate-angular, slightly longer than wide, lateral margins curved, apex obtusely rounded; cercus (Figures 1T,U and 2A) narrow-conical, shorter than supra-anal plate, slightly less than three times as long as wide, slightly incurved with obtuse apex. Subgenital plate (Figures 1S and 2B) short, broadly angular, wider than long, apex obtusely rounded. Epiphallus (Figure 2C), bridge narrow and undivided, ancorae large, acute and incurved; lophi large and lobiform. Aedeagus (Figure 2D) flexured, apical valve narrow and upcurved, apex obtuse, narrower and shorter than basal valve, connected with basal valve with flexure; basal valve much broad with obtuse apex; gonopore process broad with acute apex.

Female

Same as male (Figure 1B), but larger in size.

Genitalia: Supra-anal plate (Figures 1V and 2E) broadly angular, wider than long with rounded apex; cercus conical, shorter than supra-anal plate, less than two times as long as wide, with obtuse apex. Subgenital plate (Figures 1W and 2F) broad, triangular with median process slightly longer than lateral lobes, posterior margin entirely setose; egg-guide

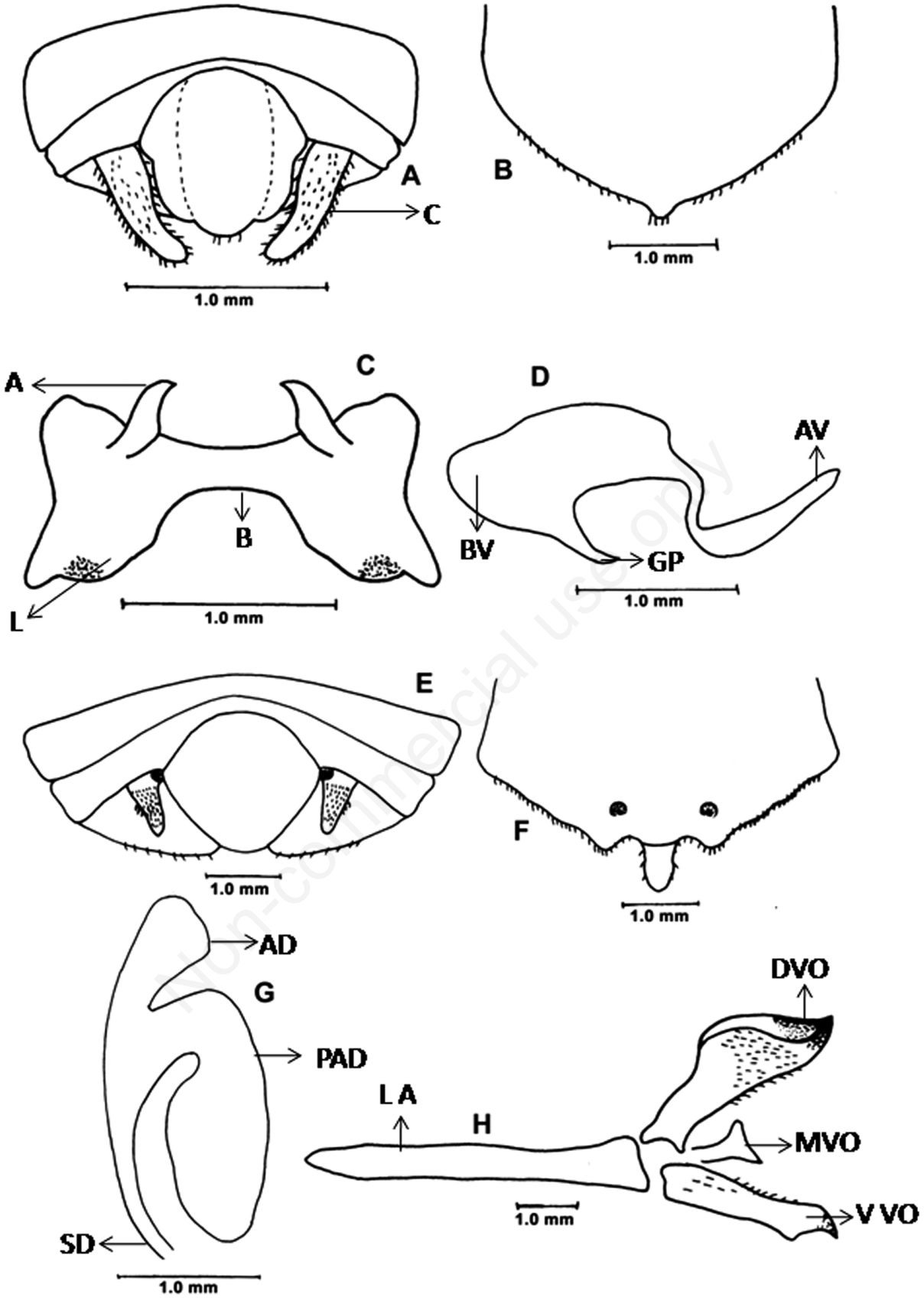

Figure 2. *Mesophlaeoba usmanii* Kumar and Usmani sp. n. (A-H). A) Supra anal plate ♂; B) subgenital plate ♂; C) epiphallus ♂; D) aedeagus ♂; E) supra anal plate ♀; F) subgenital plate ♀; G) spermatheca ♀; H) ovipositor ♀.
Abbreviations: A, ancorae; B, bridge; C, cercus; L, lophus; BV, basal valve; AV, apical valve; GP, gonopore process; AD, apical diverticulum; PAD, pre-apical diverticulum; SD, spermathecal duct; LA, lateral apodeme; DVO, dorsal valve of ovipositor, MVO, mesial valve of ovipositor; VVO, ventral valve of ovipositor.

short and broad, less than twice as long as wide, with rounded apex. Spermatheca (Figure 2G), apical diverticulum short with bulging and truncated apex, narrower and shorter than pre-apical diverticulum; pre-apical diverticulum long, broad, sac like. Ovipositor (Figures 1X and 2H), dorsal valve much broader and curved, much shorter than lateral apodeme, more than two times longer than wide, apical tip small, curved and acute; ventral valve broad, curved with apical tip small, curved and acute; mesial valve dilated apically with obtuse apex.

Type material

Holotype: ♂, India, Himachal Pradesh, Mandi, 26-X-2010, on grasses (Hirdesh Kumar).

Paratypes: 2♂♂, 1♀, (same data as holotype); Solan, 17♂♂, 3♀♀, 03-XI-2010, on grasses.

Measurements (length in mm)

Male: Body: 23.45; Pronotum: 4.40; Antenna: 13.61; Tegmina: 16.46; Hind Femur: 14.77.

Female: Body: 41.10; Pronotum: 6.71; Antenna: 9.29; Tegmina: 26.25; Hind Femur: 21.17.

Distribution

Himachal Pradesh, India.

Etymology

Patronymic name is given in honor of Prof. M. K. Usmani who contributed significantly in the taxonomy of this group.

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