



A new genus and a new species of Tropidopolinae (Orthoptera: Acrididae) from India

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ABSTRACT: A new genus *Neoxyrrhepes* gen. n. with a new species *Neoxyrrhepes meghalayensis* sp. n. from Meghalaya, a state of the North Eastern region of India. Description and illustrations of the new genus and species are given. A key to the genera of subfamily Tropidopolinae from North Eastern states of India is also provided. Additionally the characters of male and female genitalia at generic and species level are also given. © 2019 Association for Advancement of Entomology

KEY WORDS: New species, *Neoxyrrhepes*, Tropidopolinae, Acrididae, Meghalaya, India

INTRODUCTION

All the economically important species belonging to the family Acrididae, are commonly known as grasshoppers and locusts. Sometimes they are called short-horned grasshoppers (Caelifera) in contrast to Ensifera (long-horned grasshoppers). Acrididae possess short antennae, usually shorter than the body, a short ovipositor and three-segmented tarsi. Locusts and grasshoppers constitute an economically important group of Orthopterous pests that infest a number of cultivated and non-cultivated crops. They cause considerable damage to agricultural crops, pastures and forests and are well reputed for their destructiveness all over the world (Joshi *et al.*, 1999). Orthoptera comprising 27,200 valid species worldwide (Eades *et al.*, 2016) and 8000 species by Acrididae and out of that 136 species under 28 genera of family Acrididae are endemic (Chandra and Gupta, 2013) showing maximum diversity. Stal (1860) was probably the first to initiate the study of

Indian Acrididae and a notable taxonomical work on Acrididae was made by Kirby (1914) in the series 'Fauna of British India' followed by series of work by Uvarov (1921, 1927, 1966).

Two species *Oxyrrhepes obtuse* and *Tristria* sp. have been reported by Chandra *et al.* (2007) from Madhya Pradesh and Chattisgarh. *Tropidopola* and *Tristria* have been mentioned from India by Shishodia *et al.* (2010), *Oxyrrhepes obtuse* and *Tristria pulvinata* have been reported from North Eastern India by Usmani and Khan (2010), and only species description given by various authors from different parts of India like Usmani and Nayeem (2012) from Bihar, Nayeem and Usmani from Jharkhand (2012), Kumar and Usmani (2013) from Rajasthan, Nayeem *et al.* (2013) from Bihar and Kumar and Usmani (2013) from Punjab respectively. Only *Tropidopola longicornis* have been reported by Usmani *et al.* (2010) from Western Uttar Pradesh but very recently *Tropidopola longicornis* and *Tristria pulvinata* have been

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reported by Akhtar *et al.* (2016) from Uttar Pradesh, largest state of India.

Bei-Beinko and Mishchenko (1951), Dirsh (1961), Uvarov (1966) studied the Subfamily. This is represented by two genus *viz.* *Tristria* and *Tropidopola* from India. Genus *Tristria* was originally erected by Stal (1873a) to include a new species *lacerta* described from China. Genus *Tropidopola* was erected by Stal (1873b) to include *cylindrica* as a type species. Subfamily Tropidopolinae was erected by Jacobson in 1905 include *Tropidopola* as its type genus. Currently Tropidoplinae is represented by two tribes *viz.* Tristriini, Mishchenko, 1945 and Tropidopolini, Jacobson, 1905 with genus *Tristria* and *Tristriella* under the former tribe and genera *Afroxyrrhepes*, *Chloroxyrrhepes*, *Dabba*, *Homoxyrrhepes*, *Mesopsilla*, *Musimoja*, *Oxyrrhepes*, *Petamella*, *Pseudotristria*, *Tropidopola* grouped under the later one. A survey of the North Eastern states of India revealed a new genus and a new species from Meghalaya state.

MATERIALS AND METHODS

I) Collection and killing

Various agricultural and forest areas of Meghalaya states were surveyed during 2008-2011 to collect the grasshoppers and locusts. Insects were caught by ordinary aerial insect net by sweeping on grasses and crops. Sometimes also captured through hands and forceps when these are under reach. The collected specimens were killed by putting these in the killing jar having ethyl acetate soaked in cotton. Once killed removed for stretching.

II) Morphological studies

Left wings of the grasshoppers were stretched putting a piece of paper on it, and pinned right of the thorax on stretching board and left for 72 hours to dry. Then with the help of stereoscopic microscope and available literature Grasshoppers were identified up to species level. Permanent collections of pinned specimens were kept in store boxes and cabinets for further studies on their morphological structures.

III) Genitalia studies

For a detailed study of the various components of genitalia, the apical part of the specimen were cut off and boiled in 10% potassium hydroxide to remove unsclerotized and non-chitinous tissues. Thoroughly washed in tap water and examined in 70% ethyl alcohol on a cavity slide and dissected under a binocular microscope with the help of fine needles to separate genetalic structures *viz.*, supra-anal plate, subgenital plate, epiphallus and aedeagus of male, supra-anal plate, subgenital plate, ovipositor and spermatheca of female. The normal process of dehydration was adopted and clearing was done in clove oil. The genital structures were mounted separately on cavity slides in Canada balsam. Drawings of genital structures were made with the help of a camera lucida of the concerned microscope.

IV) Study area

Meghalaya is a small state of North-Eastern India situated at 25.5700° N, 91.8800° E about 300 km long and 100 km wide, with a total area of about 8,660 sq mi (22,429 km²). The elevation of the plateau ranges between 150 m to 1961 m. The central part of the plateau comprising the Khasi Hills has the highest elevations, followed by the eastern section comprising the Jaintia Hills Region. Meghalaya is the wettest place on earth with average annual rainfall as high as 1200 cm. The maximum temperature not rises beyond 28°C, whereas sub-zero is common during winters. About 70% area of the state are covered with subtropical forests considered to be the richest botanical habitats of the Asia. Nearly 10% of the geographical area of Meghalaya is under cultivation and 80% of the population depends on this tiny area as agriculture. Rice is the dominant crop followed by maize and wheat.

RESULTS

A new genus *Neooxyrrhepes* gen. n. with a new species *Neooxyrrhepes meghalayensis* sp. n. from Meghalaya, a state of the North Eastern region of India. Twelve genus including this new one recoded from the world. *Tropidopola* (representing seven

species), *Tristia* (representing ten species), *oxyrrhepes* (representing three species), *Tristriella* (representing single species), *Afroxyrrhepes* (representing five species), *Chloroxyrrhepes* (representing single species), *Dabba* (representing single species), *Homoxyrrhepes* (representing two species), *Mesopsilla* (representing single species), *Musimoja* (representing single species), *Petamella* (representing two species), three species of *Pseudotristria* (Eades, 2016). Only four genus *Tropidopola*, *Tristia*, *oxyrrhepes* and *Neoxyrrhepes* including new one have been reported from India.

Taxonomic account:

Key to the genera from the North Eastern states of India of Tropidopolinae

- 1. Prosternal process long, nearly or strongly reaching anterior margin of mesosternum; hind femur with knee lobe short or long 2
- Prosternal process short not reaching anterior margin of mesosternum; hind femur with knee lobe short and blunt *Neoxyrrhepes* gen. n.

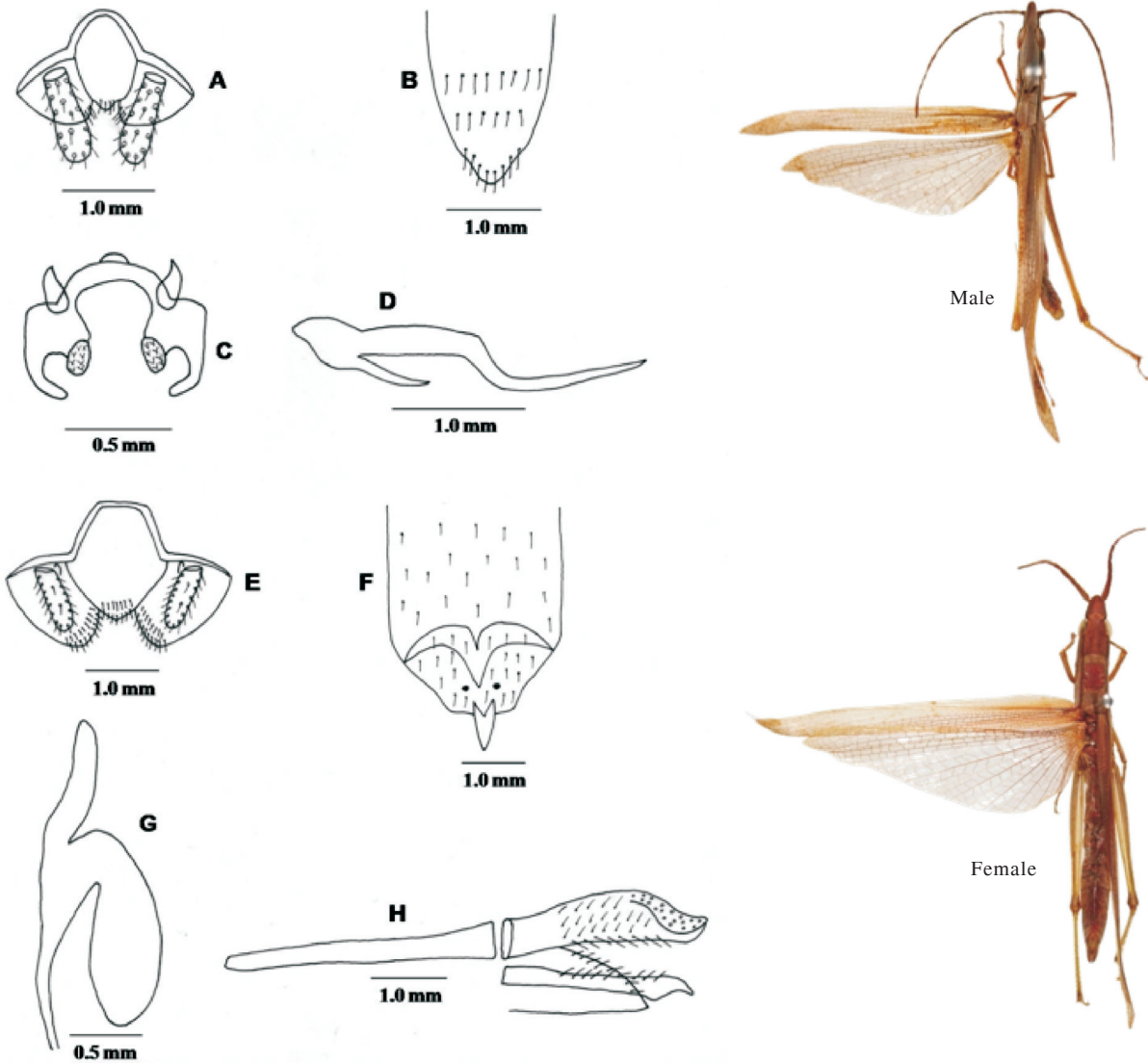


Fig. 1. *Neoxyrrhepes meghalayensis* gen. n. sp. n. A-D (male); E-H (female) A. Supra anal plate, B. Subgenital plate, C. Epiphallus, D. Aedeagus, E. Supra anal plate, F. Subgenital plate, G. Spermatheca, H. Ovipositor

2. Prosternal process compressed antero-posteriorly, apex rectangular, strongly reaching anterior margin of mesosternum; hind femur with knee lobe short and rounded *Tristria* Stål, 1873
- Prosternal process compressed laterally, apex conical, nearly reaching anterior margin of mesosternum; hind femur with knee lobe long and acute..... *Oxyrrhepes* Stål, 1873

Description

Genus *Neooxyrrhepes* gen. n. (Fig. 1)

Neooxyrrhepes Khan & Usmani, 2019

LSIDurn:lsid:zoobank.org:act:F02E7C0E-0081-4B2C-BF95-AED931A6382D

Type species: *Neooxyrrhepes meghalayensis* sp. n.

Diagnosis: Body smaller in size, elongate. Integument nearly smooth, not shiny. Antennae much longer than head and pronotum together, strongly compressed in basal half while filiform in apical half with elongated segments. Head elongate, longer than pronotum, frons strongly oblique. Frontal ridge narrow, deeply sulcate with lateral carinulae acute, merging anteriorly, slightly constricted below median ocellus, gradually diverging posteriorly. Fastigium of vertex elongate, twice as long as wide, fairly concave with sharp carinulae, fastigial furrow prominent, interocular distance constricted as compared to fastigium width, much narrower than with of frontal ridge and about slightly less than one-third of maximum diameter of eye. Eyes elongate oval with fair convexity. Pronotum of uniform width, metazona tectiform dorsally while slightly rugose laterally, anterior margin straight, posterior margin angular with obtuse apex, lateral margin angulated rather than round, median and lateral carinae sharp, dorsum crossed by two transverse sulci, posterior transverse sulcus crossing median carina, lateral carinae crossed by two sulci and bordered along by post-ocular bands on lateral sides of pronotum. Prosternal process small, prismatic, apex acute not pointed. Mesosternal interspace much constricted or absent, lobes rounded, square or longer than wide, mesosternal pits closely placed. Tegmina lanceolate, sub-hyaline with sparse venation, wings hyaline,

margin markedly wavy, wingspan narrow. Hind femur slender, elongate, upper and lower carina smooth, lower genicular lobe smaller and angular, not pointed. Hind tibia straight with two rows of black tipped spines, inner row with thirteen spines while outer row with fifteen spines, inner pair of spurs slightly longer, hind tarsus elongate, arolium small. Male supra-anal plate short, apex bluntly rounded. Cercus very long, broad. Male sub genital plate rounded, apex broadly rounded. Epiphallus bridge shaped, lophi developed and oval in shape. Aedeagus: with apical valve elongate narrow, basal valve moderately broad. Female supra-anal with bluntly rounded apex. Cercus uniformly broad, apex rounded. Female sub genital plate with lateral margin straight and diverging basally, apex blunt. Spermatheca, pre-apical diverticulum moderately broad, sac like. Ovipositor valves broad and robust, much shorter than lateral apodeme.

Remarks: The genus is closely related to *Tristria* Stål, 1873 and *Oxyrrhepes* Stål, 1873 but differs from former in much elongated antennae, basally ensiform while apical half filiform, elongated and concave fastigium of vertex, acutely sulcate and much narrow frontal ridge, two transverse sulci crossing dorsum, posterior margin angular, conical prism-shaped prosternal process with acute apex, medially contiguous mesosternal lobes, angulated lower genicular lobe. The genus differs from *Oxyrrhepes* in much elongated antennae, anteriorly produced fastigium, acutely sulcate and narrow frontal ridge, strongly oblique frons, presence of post-ocular bands, two transverse sulci crossing dorsum, medially contiguous mesosternal lobes having straight anterior and posterior margins rather than diagonal, lower genicular lobe acute angular and shorter than upper.

Etymology: The new genus *Neooxyrrhepes* is given because it is close to genus *Oxyrrhepes*.

***Neooxyrrhepes meghalayensis* gen. n., sp. n.** (Fig. 1)

Neooxyrrhepes meghalayensis Khan & Usmani, 2019

LSIDurn:lsid:zoobank.org:act:674B1E76-5E6A-41FE-AD6A-E97AE0A61C29

Male genitalia: Supra-anal plate short, uniformly broad, longer than wide, apex bluntly rounded.

Cercus very long, broad, three times as long as wide, apex broadly rounded. Sub genital plate rounded, broad basally, narrowing apically, apex broadly rounded. Epiphallus bridge shaped, bridge narrow, uniformly broad, ancorae developed, tip pointed, lophi developed and oval in shape. Aedeagus, apical valve elongate narrow, shorter than basal valve, tip pointed, basal valve moderately broad.

Female genitalia: Supra-anal plate longer than wide, apex bluntly rounded. Cercus uniformly broad, two and half time as long as wide, apex rounded. Sub genital plate with lateral margin straight and diverging basally, straight in the middle, egg-guide short, broad basally, narrowing apically, almost two times as long as wide, apex blunt. Spermatheca, pre-apical diverticulum moderately broad, sac like. Apical diverticulum long, slender, shorter than pre-apical diverticulum. Ovipositor valves broad and robust, dorsal valve broad uniformly, apical tip blunt and much shorter than lateral apodeme, ventral valve elongate, narrow, apical tip bluntly pointed, basal sclerite triangular, pointed apically.

Measurements: (length in mm)

Male: Body 20.1, Tegmina 7.6, Pronotum 4.3, Hind femur 8.5

Female: Body 36.2, Tegmina 20.0, Pronotum 6.3, Hind femur 17.0

Type Material: HOLOTYPE ♂, Meghalaya, Jowai, Thaldskin, 22-X-2008, on grasses. Paratypes 25♀, 19♂♂ (same data as holotype).

Depository: Zoological Museum, Department of Zoology, Aligarh Muslim University Aligarh, India (ZDAMU).

Etymology: The name of the new species is given on the name of the state of Meghalaya in India.

Distribution: Meghalaya (India)

DISCUSSION

Earlier studies on the systematics of Indian Acrididae are exclusively based on the external characters like colour, size, texture, number of

antennal segments etc. Beside conventional characters, in the present study attempt has also been made to make a comprehensive study on the genitalic structures, viz., supra-anal plate, subgenital plate, epiphallus and aedeagus of male; sub genital plate, supra-anal plate, ovipositor and spermatheca of female. Presence or absence of fastigial furrow; presence or absence of prosternal process; length of lower basal lobe in relation to upper basal lobe of hind femur. shield or bridge-shaped condition of epiphallus; presence or absence of dorso-lateral appendices, oval sclerites and lophi on epiphallus; divided, undivided or flexured condition of aedeagus; presence or absence of gonopore process on aedeagus; condition of apical and pre-apical diverticula of spermatheca; presence or absence of glandular pouches on female subgenital plate; rudimentary or well developed condition of egg-guide are taken as distinct family characters. A comparative study of the genitalic structures particularly epiphallus, aedeagus and spermatheca makes it possible to put forward some suggestions regarding interrelations of families and subfamilies of Acrididae more clearly than the external characters.

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