# Four species of a new genus, *Neoterpnosia* n. gen., including two new species (Hemiptera: Cicadidae: Cicadinae: Leptopsaltriini: Euterpnosiina)

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#### **ABSTRACT**

A new cicada genus, *Neoterpnosia* n. gen., is described for *Terpnosia oberthuri* Distant, 1912 as the type species, which is placed in the subtribe Euterpnosiina Lee, 2013 of the tribe Leptopsaltriini Moulton, 1923 in the subfamily Cicadinae Latreille, 1802. *Terpnosia oberthuri* Distant, 1912 becomes *Neoterpnosia oberthuri* (Distant, 1912) n. comb. *Terpnosia versicolor* Distant, 1912 is transferred from *Terpnosia* Distant, 1892 to *Neoterpnosia* n. gen. to become *Neoterpnosia versicolor* (Distant, 1912) n. comb. Two new species, *Neoterpnosia personalis* n. gen., n. sp. and *Neoterpnosia donghai* n. gen., n. sp., are described from Vietnam and India, respectively.

#### KEY WORDS Terpnosia, Vietnam, India, new genus, new species,

new combinations.

# RÉSUMÉ

Quatre espèces d'un genre nouveau, Neoterpnosia n. gen. dont deux espèces nouvelles (Hemiptera: Cicadidae: Cicadinae: Leptopsaltriini: Euterpnosiina).

Un nouveau genre de cigale, *Neoterpnosia* n. gen., est décrit, avec pour espèce type *Terpnosia oberthuri* Distant, 1912. *Neoterpnosia* n. gen. est placé dans la sous-tribu des Euterpnosiina Lee, 2013, de la tribu des Leptopsaltriini Moulton, 1923, de la sous-famille des Cicadinae Latreille, 1802. *Terpnosia oberthuri* Distant, 1912 devient *Neoterpnosia oberthuri* (Distant, 1912) n. comb. *Terpnosia versicolor* Distant, 1912 est transférée de *Terpnosia* Distant, 1892 à *Neoterpnosia* n. gen. pour devenir *Neoterpnosia versicolor* (Distant, 1912) n. comb. Deux nouvelles espèces, *Neoterpnosia personalis* n. gen., n. sp. et *Neoterpnosia donghai* n. gen., n. sp., sont décrites respectivement du Vietnam et d'Inde.

MOTS CLÉS
Terpnosia,
Vietnam,
Inde,
genre nouveau,
espèces nouvelles,
combinaisons nouvelles

#### INTRODUCTION

With the redefinition of the genus Terpnosia Distant, 1892 and the resurrection of Yezoterpnosia Matsumura, 1917 made by Lee (2012a), Terpnosia sensu stricto currently has seven species, and Yezoterpnosia includes six species which were transferred from Terpnosia. In spite of the new definition of Terpnosia by Lee (2012a), however, many species other than the seven real Terpnosia species still remained in Terpnosia, and some reclassification was required. Lee (2012b) transferred Terpnosia majuscula Distant, 1917 to Semia Matsumura, 1917. Lee (2013) erected Miniterpnosia Lee, 2013 to place *Terpnosia mega* Chou & Lei, 1997 and a new species (Miniterpnosia chorus Lee, 2013). Lee (in press) erected a new genus to place four species, namely Terpnosia andersoni Distant, 1892, Terpnosia abdullah Distant, 1904, Terpnosia clio (Walker, 1850), and Terpnosia nonusaprilis Boulard, 2003. However, many other species including Terpnosia oberthuri Distant, 1912 remained outstanding.

A new genus is described in the present paper with the type species of *Terpnosia oberthuri*. This new genus is placed in Euterphosiina Lee, 2013 of Leptopsaltriini Moulton, 1923 following Lee & Emery (2013). Another unplaced species, Terpnosia versicolor Distant, 1912, is also transferred from *Terpnosia* to the new genus. Two new species of this new genus are described from India and Vietnam, which were located in the private collection of the second author.

By the present study, two misplaced species are transferred to an appropriate genus. However, there are 22 species still remaining misplaced in Terpnosia. These 22 species are thought to belong to more than five different genera and are waiting for future studies which will address this problem.

# MATERIAL AND METHODS

The digital images of the male genitalia were captured using a Leica stereo-zoom microscope attached to a computer-assisted imaging system, Auto-Montage by Syncroscopy (Cambridge, UK), at the collection facility of the University of Connecticut. Morphological measurements were made with vernier calipers in mm. The holotypes of the new species are deposited in the Muséum national d'Histoire naturelle, Paris. The paratypes are deposited in the Australian Museum, Sydney.

#### ABBREVIATIONS

# Morphology Cubitus anterior vein;

CuA

М Median vein; Medial crossvein; m-cu Mediocubital crossvein; R Radius vein; Radial crossvein; RA Radius anterior vein; Radiomedial crossvein; r-m RP Radius posterior vein; Sc Subcostal vein; Ulnar cell.

# Institutions

AMS Australian Museum, Sydney; **BMNH** Natural History Museum, London; MNHN Muséum national d'Histoire naturelle, Paris.

#### SYSTEMATICS

Subfamily CICADINAE Latreille, 1802 Tribe LEPTOPSALTRIINI Moulton, 1923 Subtribe EUTERPNOSIINA Lee, 2013

# Neoterpnosia n. gen.

Type species. — Terpnosia oberthuri Distant, 1912, by present designation.

ETYMOLOGY. — The generic name means "new *Terpnosia*", having the prefix of neo-.

DIAGNOSIS. — This genus is distinguished from any other genera in Euterpnosiina by the following characters: fore wing basal portion of RA2 (or basal vein of apical cell 1) very short, about one third or less than one third as long as longitudinal portion of RA2 (or longitudinal vein of apical cell 1); fore wing basal portion of RA2 forming an angle of about 135 degrees to longitudinal portion of RA2; male abdominal tergites 2-5 or 2-6 with sublateral or lateral patches with a lighter color (which is almost same as the color of abdominal sternites); male abdominal segments 3, 4, and 5 each moderately inflated laterally; male abdominal sternites without tubercle-like projections. This genus appears to be closely related to

Calcagninus Distant, 1892 considering the similarity in RA2 vein of the fore wing, but Calcagninus is distinguished by the following characters: head and thorax more slender; male abdominal sternites III and IV with tubercle-like projections; male abdominal segments 3, 4, and 5 not inflated laterally.

#### DESCRIPTION

Body small (18.9-21.7 mm long in males). Head about as wide as or narrower than base of mesonotum, depending on species. Lateral pronotal collar not dentate. Wings hyaline with marginal areas extremely narrow. Fore wing basal portion of RA2 about one third or less than one third as long as longitudinal portion of RA2. Fore wing basal portion of RA2 forming an angle of about 135 degrees to longitudinal portion of RA2. Male opercula very small, scale-like, not extending beyond posterior margin of sternite II; widely separated from each other. Timbal with five ribs. Male abdomen distinctly longer than head and thorax together. Posterior margin of male abdominal tergite 3 distinctly

wider than anterior margin of mesonotum. Timbal cover minute, rudimentary, much wider than long. Fourth segment of male abdomen without molar-like projections laterally. Male abdominal sternites without tubercle-like projections. Male pygofer narrowly elliptical in ventral view, with posterolateral margins parallel-sided. Uncus not bifurcate, with incised apex. Basal lobe of pygofer well developed. Aedeagus thin. Ovipositor moderately protruding beyond abdominal segment 9.

SPECIES INCLUDED. — Besides the type species Neoterpnosia oberthuri (Distant, 1912) n. comb. and the two new species described below, this genus also includes Terpnosia versicolor Distant, 1912. This species is morphologically very similar to Neoterpnosia oberthuri n. comb. and is morphologically compatible with the above description of Neoterpnosia n. gen. Here, Terpnosia versicolor is transferred from Terpnosia Distant, 1892 to Neoterpnosia n. gen. to become Neoterpnosia versicolor (Distant, 1912) n. comb. Neoterpnosia n. gen. has been found from China (western part), Vietnam, Myanmar, northeastern India (Arunachal Pradesh), Bhutan, and Nepal.

#### KEY TO THE SPECIES OF NEOTERPNOSIA N. GEN.

1.	M2 derived from u2
—	M2 derived from u3
	Uncus gradually tapering to apex; basal lobe of pygofer without spine-like protrusion subapically
	Head about as wide as base of mesonotum; pronotal collar with lateral margins distinctly concave; basal lobe of pygofer with dull apex; aedeagus moderately slender and moderately protruding
	slightly convex; basal lobe of pygofer with acute and long apex; aedeagus very slender and much protruding

Neoterpnosia oberthuri (Distant, 1912) n. comb. (Figs 1A; 2A; 3A; 4A; 5A; 6A)

Terpnosia oberthuri Distant, 1912: 462-463; 1914: 7; 1916: 10-11. — Schmidt 1932: 129. — Kato 1934: 157. — Hayashi 1978a: 57.

TYPE LOCALITY. — Bhutan.

MATERIAL EXAMINED. — Holotype. 1 of, "Type" (printed round beige label with red border), "BHOUTAN/MARIA BASTI/(Mgr DUREL)/R. OBERTHUR 1898" (printed beige label), "Terpnosia/oberthuri/type Dist." (handwritten beige label), "Distant Coll./1911—383." (printed beige label), "BMNH(E)/#1009550" (printed white label), BMNH.

MEASUREMENTS OF HOLOTYPE (N = 1 MALE). — Median length of body: 18.9. Median length of head and thorax

together: 8.5. Median length of abdomen: 10.4. Width of head including eyes: 5.5. Width of mesonotum: 5.6. Width of posterior margin of abdominal tergite 3: 6.3. Length of fore wing: 24.6. Width of fore wing: 8.4. Wing span: 53.6.

DIAGNOSIS. — Head about as wide as base of mesonotum. Pronotal collar with lateral margins distinctly concave. Fore wing with distinct infuscations. M2 derived from u2. Uncus gradually tapering to apex. Basal lobe of pygofer with dull apex and with dull protrusion subapically. Aedeagus moderately slender and moderately protruding.

DISTRIBUTION. — China (western part), northeastern India, and Bhutan.

# Neoterpnosia donghai n. gen., n. sp. (Figs 1B; 2B; 3B; 4B; 5B; 6B)

Type Material. — **Holotype.** 1  $\sigma$ , "INDIA- Arunachal Pradesh/Monigong, Lungte 1225m/28°36886N, 94°23170E/12v09.G.Bretschneider" (printed white label), MNHN (EH) 16438.

**Paratypes.** 2  $\sigma\sigma$ , 1  $\circ$ , same data as holotype (printed white label), AMS.

ETYMOLOGY. — The species is named for a friend of the first author and an outstanding insect researcher, Dr Dong-Ha Park.

MEASUREMENTS (N = 3 MALES, 1 FEMALE). — Median length of body: male 21.5 (21.3-21.7), female 19.6. Median length of head and thorax together: male 8.8 (8.7-8.9), female 8.4. Median length of abdomen: male 12.7 (12.6-12.8), female 11.2. Width of head including eyes: male 5.9 (5.8-6.1), female 5.8. Width of mesonotum: male 5.7 (5.6-5.8), female 6.2. Width of posterior margin of abdominal tergite 3: male 7.0 (6.8-7.2), female 7.0. Length of fore wing: male 27.7 (27.2-28.1), female 28.2. Width of fore wing: male 8.7 (8.6-8.8), female 8.8. Wing span: male 61.3 (60.0-62.7), female 62.5.

DIAGNOSIS. — Head about as wide as base of mesonotum. Pronotal collar with lateral margins distinctly concave. Fore wing with distinct infuscations. M2 derived from u2. Uncus with widened subapex. Basal lobe of pygofer with dull apex and with spine-like small protrusion subapically. Aedeagus moderately slender and moderately protruding.

## DESCRIPTION OF MALE

#### Head

Head slightly wider than base of mesonotum; brown with the following black marks: median mark scarcely enclosing ocelli, with its anterior end reaching frontoclypeal suture and its lateral ends extended towards eyes; a pair of indistinct spots on anterolateral corners. Distance between lateral ocelli and eyes about 1.5 times as wide as distance between lateral ocelli. Postclypeus moderately swollen; greenish ochraceous with marks indistinct. Anteclypeus ochraceous with a pair of fuscous spots. Rostrum with apex not reaching posterior margin of hind coxae. Lorum ochraceous with fuscous spot along inner margin. Gena brown with small fuscous spot between postclypeus and eye.

#### Thorax

Pronotal collar with lateral margins concave, not dentate; light green with very narrow fascia along posterior margin, broadened laterally. Inner area of pronotum brown with the following marks: a pair of antero-submedian triangular marks; a pair of postero-submedian triangular marks; a pair of large elliptical mark taking almost one fourth of inner area. Mesonotum ochraceous with the following black to fuscous marks: median longitudinal narrow fascia, widened posteriorly; a pair of small roundish spots enclosing scutal depressions; a pair of narrow fasciae along inner parts of parapsidal sutures; a pair of longitudinal fasciae on lateral sigilla, much widened posteriorly and reaching posterolateral corners of mesonotum. Cruciform elevation greenish ochraceous.

#### Wings

Wings hyaline with marginal areas very narrow. Fore wing M2 derived from u2; M4 derived from u3; length between bifurcation point into M and M1 + 2 and bifurcation point into M and M3 + 4 2.0 times or more the length between bifurcation point into M and M3 + 4 and base of M; basal portion of RA2 about one fourth as long as longitudinal portion of RA2; basal portion of RA2 forming an angle of about 135 degrees to longitudinal portion of RA2. Fore wing with infuscations on r, r-m, m, and m-cu and bases of RA2 and M1. Linear infuscation present on each hind margin of RP, M1-4, and CuA1, and CuA2. R + Sc ochraceous

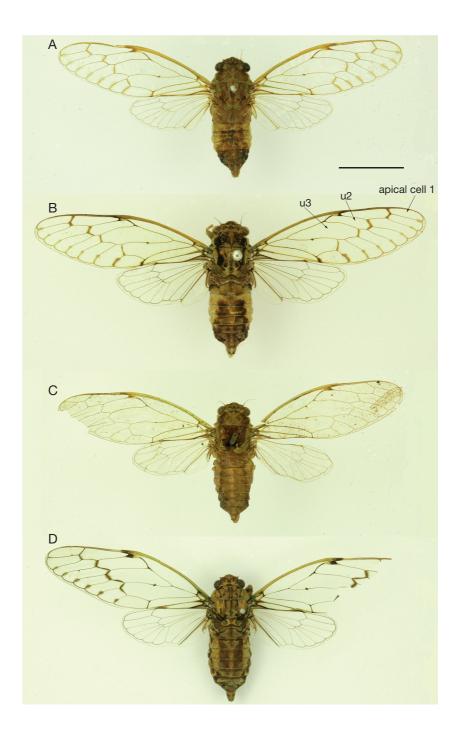


Fig. 1. — Dorsal habitus of the species of *Neoterpnosia* n. gen.: **A**, *Neoterpnosia oberthuri* (Distant, 1912) n. comb., holotype, male, Bhutan; **B**, *Neoterpnosia donghai* n. gen., n. sp., holotype, male, India; **C**, *Neoterpnosia versicolor* (Distant, 1912) n. comb., holotype, male, Myanmar; **D**, *Neoterpnosia personalis* n. gen., n. sp., holotype, male, Vietnam. Abbreviations: see Material and methods. Scale bar: 10 mm.

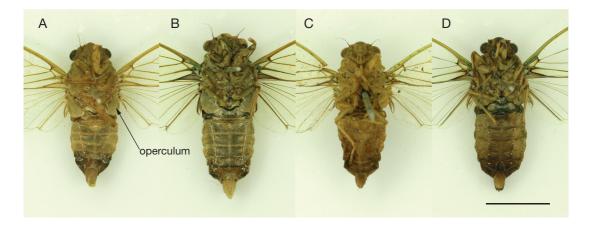


Fig. 2. — Ventral habitus of the species of *Neoterpnosia* n. gen.: **A**, *Neoterpnosia oberthuri* (Distant, 1912) n. comb., holotype, male, Bhutan; **B**, *Neoterpnosia donghai* n. gen., n. sp., holotype, male, India; **C**, *Neoterpnosia versicolor* (Distant, 1912) n. comb., holotype, male, Myanmar; **D**, *Neoterpnosia personalis* n. gen., n. sp., holotype, male, Vietnam. Scale bar: 10 mm.

or greenish ochraceous. Basal membrane and hind wing jugum gray.

# Operculum

Operculum greenish ochraceous without marks; very short, not reaching posterior margin of sternite II, oblique, parallelogram-like, with corners rounded. Opercula apart from each other, with gap about as wide as operculum.

#### Abdomen

Abdomen distinctly longer than head and thorax together. Tergite 4 wider than other tergites. Tergites brown to dark brown with yellowish sublateral and lateral parts on tergites 2, 3, 4, 5, and 6. Timbal fuscous; very small, semicircular. Timbal exposed. Ventral part of abdomen ochraceous to brown.

#### Genitalia

Pygofer narrow, elliptical in ventral view. Distal shoulder angled. Uncus not bifurcate. Uncal lobe simple, with widened subapex and slightly incised apex. Basal lobe of pygofer with dull apex and with spine-like small protrusion subapically. Aedeagus moderately slender and moderately protruding.

Neoterpnosia versicolor (Distant, 1912) n. comb. (Figs 1C; 2C; 3C; 4C; 5C; 6C)

Terpnosia versicolor Distant, 1912: 462; 1914: 7; 1916: 10. — Hayashi 1978b: 190, 191, fig. 41.

TYPE LOCALITY. — Burma; Ruby Mines.

MATERIAL EXAMINED. — Holotype. 1 ♂, "Type" (printed round beige label with red border), "Ruby Mines/Burma/(Doherty)" (handwritten beige label), "Terpnosia/versicolor/type Dist." (handwritten beige label), "Distant Coll./1911—383." (printed beige label), "BMNH(E)/#1009551" (printed white label), BMNH.

MEASUREMENTS OF HOLOTYPE (N = 1 MALE). — Median length of body: 19.1. Median length of head and thorax together: 8.4. Median length of abdomen: 10.7. Width of head including eyes: 5.3. Width of mesonotum: 5.6. Width of posterior margin of abdominal tergite 3: 6.3. Length of fore wing: 24.3. Width of fore wing: 8.4. Wing span: 54.4.

DIAGNOSIS. — Head about as wide as base of mesonotum. Pronotal collar with lateral margins distinctly concave. Fore wing without infuscations. M2 derived from u3. Uncus with widened subapex. Basal lobe of pygofer with dull apex and with spine-like small protrusion subapically. Aedeagus moderately slender and moderately protruding.

DISTRIBUTION. — Myanmar and Nepal.

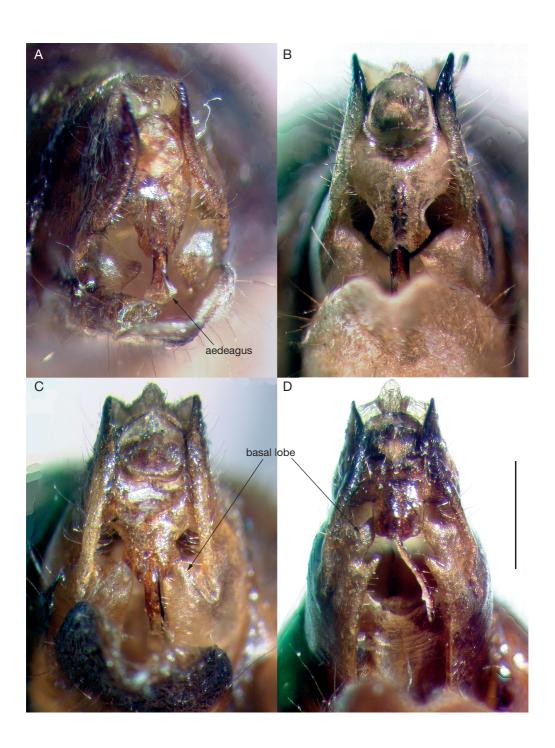


Fig. 3. — Ventral view of the pygofer of the species of *Neoterpnosia* n. gen.: **A**, *Neoterpnosia oberthuri* (Distant, 1912) n. comb., holotype, male, Bhutan; **B**, *Neoterpnosia donghai* n. gen., n. sp., holotype, male, India; **C**, *Neoterpnosia versicolor* (Distant, 1912) n. comb., holotype, male, Myanmar; **D**, *Neoterpnosia personalis* n. gen., n. sp., holotype, male, Vietnam. Scale bar: 1 mm.

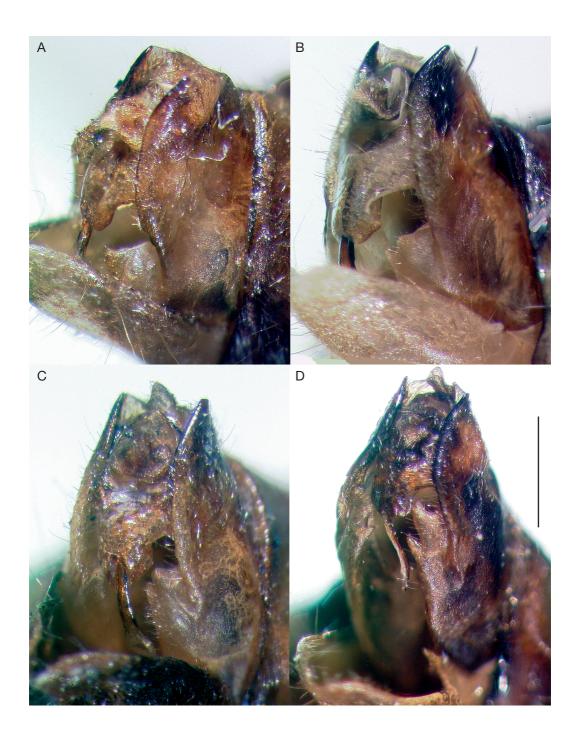


Fig. 4. — Ventrolateral view of the pygofer of the species of *Neoterpnosia* n. gen.: **A**, *Neoterpnosia oberthuri* (Distant, 1912) n. comb., holotype, male, Bhutan; **B**, *Neoterpnosia donghai* n. gen., n. sp., holotype, male, India; **C**, *Neoterpnosia versicolor* (Distant, 1912) n. comb., holotype, male, Myanmar; **D**, *Neoterpnosia personalis* n. gen., n. sp., holotype, male, Vietnam. Scale bar: 1 mm.

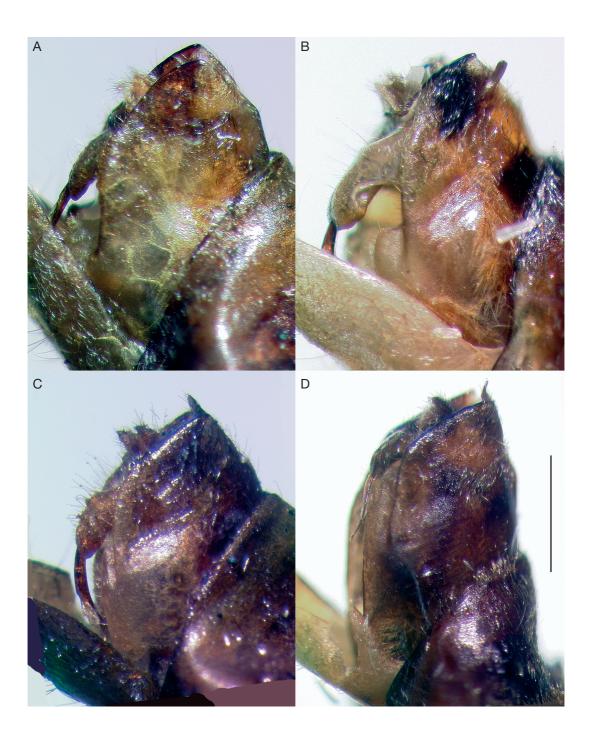


Fig. 5. — Lateral view of the pygofer of the species of *Neoterpnosia* n. gen.: **A**, *Neoterpnosia oberthuri* (Distant, 1912) n. comb., holotype, male, Bhutan; **B**, *Neoterpnosia donghai* n. gen., n. sp., holotype, male, India; **C**, *Neoterpnosia versicolor* (Distant, 1912) n. comb., holotype, male, Myanmar; **D**, *Neoterpnosia personalis* n. gen., n. sp., holotype, male, Vietnam. Scale bar: 1 mm.

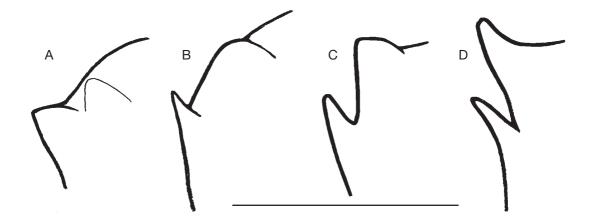


Fig. 6. — Ventral view of the basal lobe of pygofer of the species of *Neoterpnosia* n. gen.: **A**, *Neoterpnosia oberthuri* (Distant, 1912) n. comb., holotype, male, Bhutan; **B**, *Neoterpnosia donghai* n. gen., n. sp., holotype, male, India; **C**, *Neoterpnosia versicolor* (Distant, 1912) n. comb., holotype, male, Myanmar; **D**, *Neoterpnosia personalis* n. gen., n. sp., holotype, male, Vietnam. Scale bar: 1 mm.

# Neoterpnosia personalis n. gen.,n. sp. (Figs 1D; 2D; 3D; 4D; 5D; 6D)

Type Material. — **Holotype**. 1  $\sigma$ , "VIETNAM, Lam Dong Co.,/Bidoup NP, 2000m,/12°06.43N; 108°39.47E,/12-25. V. 2013" (printed white label), MNHN (EH) 16439.

**Paratypes.** 3  $\sigma\sigma$ , 5  $\varphi$ , same data as holotype (printed white label), AMS.

ETYMOLOGY. — The specific name is the Latin adjective meaning "of a mask" in reference to the unusual shape of the male pygofer (especially the basal lobes) of this species, which gives an impression of a grotesque mask.

MEASUREMENTS (N = 4 MALES AND 5 FEMALES). — Median length of body: male 19.9 (19.7-20.2), female 19.1 (18.2-20.0). Median length of head and thorax together: male 8.4 (8.2-8.5), female 8.4 (7.7-9.4). Median length of abdomen: male 11.5 (11.3-11.9), female 10.7 (9.8-11.6). Width of head including eyes: male 5.0 (4.9-5.1), female 5.2 (5.0-5.4). Width of mesonotum: male 5.6 (5.4-5.7), female 6.1 (5.8-6.5). Width of posterior margin of abdominal tergite 3: male 6.7 (6.6-6.8), female 7.0 (6.6-7.2). Length of fore wing: male 26.7 (26.5-26.9), female 29.4 (28.5-30.3). Width of fore wing: male 9.0 (8.6-9.3), female 9.4 (9.0-10.1). Wing span: male 58.0 (56.4-60.2), female 63.7 (60.2-66.2).

DIAGNOSIS. — Head distinctly narrower than base of mesonotum. Pronotal collar with lateral margins straight or slightly convex. Fore wing with distinct infuscations. M2 derived from u3. Uncus gradually tapering to apex.

Basal lobe of pygofer with acute and long apex and with spine-like distinct protrusion subapically. Aedeagus very slender and much protruding.

#### DESCRIPTION OF MALE

#### Head

Head distinctly narrower than base of mesonotum; reddish ochraceous (maybe due to discoloration) with the following black marks: median spot enclosing ocelli, with its anterior end reaching frontoclypeal suture; a pair of longitudinal spots between the median spot and eye; median horizontal spot along posterior margin of head. Distance between lateral ocelli and eyes slightly less than 1.5 times as wide as distance between lateral ocelli. Postclypeus moderately swollen; with black to fuscous fasciae along almost all transverse grooves. Anteclypeus mostly black except anterior and posterior parts. Rostrum with apex reaching posterior margin of hind coxae. Lorum fuscous to dark brown. Gena with fuscous mark between postclypeus and eye.

#### Thorax

Thorax brown to ochraceous with black to fuscous marks. Pronotal collar with lateral margins straight or slightly convex, not dentate; with very narrow fascia along posterior margin. Inner area

of pronotum with the following marks: a pair of narrow median longitudinal fasciae; a pair of small spots between sub-posterior part of paramedian fissure and posterior end of lateral fissure; a pair of fasciae along lateral fissures; a pair of curved fasciae along lateral margins of inner area, but discontinued anteriorly. Mesonotum with the following marks: median longitudinal fascia; a pair of small roundish spots enclosing scutal depressions; a pair of fasciae along inner parts of parapsidal sutures; a pair of short longitudinal fasciae on posterior half of lateral sigilla; a pair of short fasciae along postero-lateral corners of mesonotum. Cruciform elevation with anterior subapical parts black.

## Wings

Wings hyaline with marginal areas extremely narrow. Fore wing M2 derived from u3; M4 derived from u4; length between bifurcation point into M and M1 + 2 and bifurcation point into M and M3 + 4 1.3 times or less the length between bifurcation point into M and M3 + 4 and base of M; basal portion of RA2 one fourth to one third as long as longitudinal portion of RA2; basal portion of RA2 forming an angle of about 135 degrees to longitudinal portion of RA2. Fore wing with infuscations on r, r-m, m, and m-cu and bases of M1-4. Roundish infuscation present on each hind margin of RP, M1-4, and CuA1. R + Sc ochraceous or greenish ochraceous. Basal membrane and hind wing jugum gray.

# **Operculum**

Operculum ochraceous without marks; very short, not reaching posterior margin of sternite II, oblique, parallelogram-like with corners rounded. Opercula apart from each other, with gap about as wide as operculum.

## Abdomen

Abdomen distinctly longer than head and thorax together. Tergite 4 or 5 wider than other tergites. Tergites brown to dark brown with ochraceous sublateral parts on tergites 3, 4, 5, and 6. Timbal very small, semicircular. Timbal completely exposed. Ventral part of abdomen brown to dark brown.

#### Genitalia

Pygofer narrow, elliptical in ventral view. Distal shoulder angled. Uncus not bifurcate. Uncal lobe simple, lobular, slightly incised at apex. Basal lobe of pygofer with acute and long apex and with spine-like protrusion subapically. Aedeagus very slender and much protruding.

# DESCRIPTION OF FEMALE

Operculum ochraceous, lozenge-shaped, with inner corner slightly extended inward and pointed; extending slightly beyond sternite II. Abdominal sternites dark brown. Ovipositor sheath moderately protruding beyond abdominal segment 9. Dorsal beak about one third as long as protruding part of ovipositor sheath.

# Acknowledgements

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