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A new species to the genus *Neopheosia* Matsumura, 1920 (Lepidoptera, Notodontidae) from India

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ABSTRACT: A new species of notodontid moth, *Neopheosia melaniata* **sp. nov.** is described with illustration. This new species is closely allied to *N. fasciata* Moore, 1888 (type species) and completely conforms to the characterization of genus *Neopheosia* Matsumura. The wing coloration, distinct discal spot on forewing and genitalic features make it distinct. The taxonomic account of *N. fasicata* Moore is included. © 2024 Association for Advancement of Entomology

KEY WORDS: *Neopheosia melaniata,* taxonomic account, characterization, genitalic features

INTRODUCTION

The genus *Neopheosia* was established as a monotypic genus by Matsumura (1920) with *N. fasciata* Moore, 1888 as its type species. Gaede (1930) added another species *N. albiplaga* under this genus. Kiriakoff (1968) also considered *Neopheosia* Mataumura as a valid genus. Cai (1979) and Wu and Fang (2002) discussed only one species i.e., *N. fasciata* Moore, 1888 from China. Holloway (1983) described *N. fasciata* Moore, 1888 from Borneo. Schintlmeister and Pinratana (2007) and Schintlmeister (2008) described three species i.e., *N. fasciata* Moore, 1888; *N. mandschurica* Oberthur, 1911 and *N. atrifusa* Hampson, 1897 from Thailand and Palaearctic region. Schintlmeister and Pinratana (2007) treated *Hemifentonia* Kiriakoff, 1967 as a junior synonym of *Neopheosia* Matsumura, 1920 on the basis of Y-shaped uncus. Later, Kobayashi and Nonaka (2016) revived genus *Hemifentonia* Kiriakoff, 1967 as a distinct genus on both phenetic and phyletic classification with *mandschurica* Oberthur, 1911 as its type species. They further remarked about distinct genitalic features, particularly the presence of a very unique formation i.e., ventral process at the base of uncus in *Neopheosia fasciata* (Moore, 1888), while it has no ventral process on its base in *Hemifentonia mandschurica* (Oberthür, 1911). Schintlmeister (2008, 2013, 2020) considered five species namely *fasciata* (Moore, 1888); *atrifusa* (Hampson, 1897); *mandschurica* (Oberthür, 1911); *albiplaga* Gaede, 1930 and *mariae* Schintlmeister, 2013 under genus *Neopheosia*. While reporting a new species from China, Zhang *et al*. (2022) followed the same placement. They further placed three species *N. mandschurica* (Oberthür, 1911), *N. atrifusa* (Hampson, 1897) and *N. mariae* Schintlmeister, 2013 under one group on the basis of lack of ventral process at the base of uncus in male genitalia and another three species i.e., *N. fasciata* (Moore, 1888); *N. albiplaga* Gaede, 1930

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and *N. pseudofasciata* Zhang *et al*., 2022 under second group with distinct ventral process at the base of uncus. With the addition of new species i.e., *N. melaniata* from India, presently this genus is represented by seven species from Oriental and Palearctic regions.

MATERIALS AND METHODS

The adult representatives of notodontid moths were collected from different localities in the States of North-West and North-East India by using vertical sheet method. The collected moths were killed, stretched and preserved in Lepidoptera Lab, Punjabi University, Patiala. The external morphological characters were studied from the stretched specimens. The dissections were carried out to explore the male and female genitalic features (Robinson, 1976). The permanent slides of fore and hind wings were prepared to study wing venation (Zimmerman, 1978). The terminology for naming various genitalic parts used by Klots (1970) was followed in the present studies.

Abbreviations

1A	: First anal vein
2A	: Second anal vein
AED	: Aedeagus
ANT.APO	: Anterior Apophyses
CRN	: Cornuti
CRP.BU	: Corpus Bursae
CU_1	: First cubital vein
CU_2	: Second cubital vein
DU.BU	: Ductus Bursae
GN	: Gnathos
JX	: Juxta
M_1	: First Medial vein
M_2	: Second Medial vein
M_3	: Third Medial vein
R_1	: First Radial vein
R_2	: Second Radial vein
R_3	: Third Radial vein
R_4	: Fourth Radial vein
R_5	: Fifth Radial vein
Rs	: Radial sector
Sc	: Subcosta
$Sc+R_1$	: Subcosta and first radial vein
TG	: Tegumen
UN	: Uncus
VES	: Vesica
VIN	: Vinculum
VLV	: Valva

RESULTS AND DISCUSSION

Genus *Neopheosia* Matsumura

Neopheosia Matsumura, 1920, *Zool. Mag. Tokyo*, 32: 147; Gaede, 1930, *GroBschmett. Erde*, 10: 638; Kiriakoff, 1968, *Genera Insectorum Fasc.*, 217C: 182; Cai, 1979, *Economic Insect Fauna*, 16: 78; Holloway, 1983, *Moths of Borneo*, 4: 69; Wu and Fang, 2002, *Fauna Sinica*, 31: 419; Schintlmeister and Pinratana, 2007, *Moths of Thailand*, 5: 159; Schintlmeister, 2008, *Palaearctic Macrolepidoptera*, 1: 196.

Type species: *Pheosia fasciata* Moore

Distribution: India: North-India; China; Indonesia; Japan; Korea; Myanmar; Nepal; Pakistan; Philippines; Russia; Taiwan; Thailand.

Diagnosis: Medium sized moths; ochreous or greyish in colouration. Labial palpi porrect. Antennae bipectinate, pectination along two-third length of the flagellum. Forewing triangular; vein M_3 from lower angle of cell; M_2 near middle of discocellulars; M_1-R_2 stalked from upper angle of cell; areole absent. Hindwing with fuscous tornus. Legs hairy; fore-tibia having an epiphysis; mid-tibia with one pair of tibial spurs; hind-tibia with two pairs of tibial spurs. Male genitalia with long and bifid uncus; a pair of long and slender projections representing gnathos; valva with sclerotized costal process; aedeagus of moderate length, vesica with

a patch of cornuti. Female genitalia with membranous corpus bursae; signum elongated.

Key to the studied species of genus *Neopheosia* Matsumura:

Forewing pale-ochreous with indistinct fuscous discal spot. Male genitalia with uncus gradually narrowing towards distal end, bifurcated arms shorter; valva with costal process well developed. Female genitalia with pear-shaped corpus bursae ....***Neopheosia fasciata* (Moore)**-

Forewing brown-ochreous with distinct fuscous discal spot. Male genitalia with uncus narrow along entire length, bifurcated arms longer; valva with costal process very small. Female genitalia with globular corpus bursae ....***Neopheosia melaniata* n. sp.**

Neopheosia fasciata (Moore)

(Plate 1, Figs. 1-8)

Pheosia fasciata Moore, 1888, *Proc. Zool. Soc. Lond.*, 1888: 401; Kirby, 1892, *Syn. Cat. Lep. Het.*, 1892: 607; Hampson, 1892, *Moths India*, 1: 160.

Neopheosia fasciata Moore: Matsumura, 1920, *Zool. Mag. Tokyo*, 32: 147; Kiriakoff, 1968, *Genera Insectorum Fasc.*, 217C: 182; Cai, 1979, *Economic Insect Fauna*, 16: 78; Holloway, 1983, *Moths of Borneo*, 4: 69; Wu and Fang, 2002, *Fauna Sinica*, 31: 419; Schintlmeister and Pinratana, 2007, *Moths of Thailand*, 5: 160; Schintlmeister, 2008, *Palaearctic Macrolepidoptera*, 1: 196.

Type locality: North-West India (Kangra)

Diagnosis: Head with vertex and frons greyish. Labial palpi slight and porrect; dressed with brownish. Antenna bipectinate, pectinations along two-third length of the flagellum; scape covered with greyish scales; flagellum brown. Thorax, collar and tegula clothed with greyish scales; two prominent black spots on thorax; thorax underside fringed with pale and reddish-brown scales. Legs hairy, reddish-brown, fringed creamish scales; fore-tibia with an epiphysis; mid-tibia with one pair of tibial spurs; hind-tibia with two pairs of tibial spurs. Abdomen smoky black; underside paler with a median rufous streak.

Wing maculation: Forewing with ground colour creamish-ochreous, traversed with brownish, rufous and fuscous streaks; basal area fuscous; costa with brown and fuscous streaks; dark brown apical patch; vein endings with darker scales giving banded appearance to outer margin; anal margin black from base to tornus; cilia black and pale ochreous; underside paler, rusty costal margin and near tornus. Hindwing creamish-white, darker scales near anal margin; outer margin banded with distinct tornal spot; underside creamish.

Wing venation: Forewing with discal cell half the length of wing, closed; 1A+2A from base of wing, reaching tornus; 3A absent; Cu_2 beyond two-third of cell; Cu_1 just before lower angle of cell; M_3 from lower angle of cell; M_2 above middle of discocellulars; M_1-R_2 stalked from upper angle of cell; R_1 beyond three-fourth of cell, not reaching apex; Sc from base of wing, not reaching apex. Hindwing with discal cell slightly more than half the length of wing, closed; 1A from base of wing running parallel to anal margin, not reaching tornus; 2A from base of wing, reaching tornus; 3A absent; Cu_2 well before lower angle of cell; Cu_1 slightly before lower angle of cell; M_3 from lower angle of cell; M_2 just above middle of discocellulars; M_1 and Rs stalked from upper angle of cell; Sc+R_1 from base of wing, not reaching apex.

Wing expanse: Male: 54mm; Female: 60mm

Body length: Male: 23mm; Female: 23mm

Male genitalia: Uncus long, narrow at base, gradually broadening towards distal end, distal end broad, bifid, both arms with rounded apices, dorsally setosed; ventral sclerotized narrow, spine-like structure from base of uncus, less than half the length of uncus, tip blunt; a pair of well sclerotized long processes representing gnathos, both walls highly sclerotized giving dentate appearance, slightly upturned with blunt apices; tegumen V-shaped, walls almost of equal breadth, longer than vinculum; vinculum U-shaped, distal half well sclerotized; saccus absent; juxta flap-like, slightly sclerotized. Valva simple, sacculus differentiated, moderately

sclerotized, setosed; costa having flap-like structure extending upto middle of valva without any projections, mideo-ventrally setosed; distal end of valva simple and setosed. Aedeagus of moderate length, well sclerotized; ductus ejaculatorius entering near proximal end; distal half having a large patch of numerous minute spines representing cornuti.

Female genitalia: Corpus bursae of moderate size, pear-shaped, membranous; distinct oblong signum, centrally placed; ductus bursae long, membranous, one-third guarded by moderately sclerotized genital plate, dorso-ventrally flattened; ductus seminalis originating near anterior end of genital plate; anterior apophysis short, gradually tapering; posterior apophysis narrower and almost 2X length of anterior ones, apices of both pairs membranous; papilla analis sclerotized, deltoid, setosed with unequal setae.

Material examined: Arunachal Pradesh: Dirang, 27.3584°N, 92.2409°E, 01.v.2013, 2♂♂; Sangti, 27.4038°N, 92.3047°E, 02.v.2013, 1♂; Lumla, 27.5298°N, 91.7219°E, 13.v.2011. Himachal Pradesh: Gharat, 31.5168°N, 77.7938°E, 26.vi.2014, 1♂; Nichar, 31.5581°N, 77.9467°E, 25.vi.2014, 1♂. Mizoram: Rabung, 23.6833°N, 93.2021°E, 17.ix.2015, 2♂♂18.ix.2015, 1♂. Sikkim: Dodak, 27.3333°N, 88.2500°E, 06.v.2014, 1♂; Yaksum, 27.3724°N, 88.2230°E 02.v.2014, 1♂. Uttarakhand: Sitlakhet, 29.5939°N, 79.5445°E, 17.vi.2015, 1♂, 1♀.

Distribution: India: North-East and North-West India; China; Indonesia; Japan; Myanmar; Nepal; Pakistan; Philippines; Taiwan; Thailand.

Remarks: This species was originally under genus *Pheosia* Hübner by Moore (1888). Kirby (1892) and Hampson (1892) followed the same nomenclature. Matsumura (1920) erected a new genus *Neopheosia* for its proper placement. Kiriakoff (1968), Cai (1979), Wu and Fang (2002), Schintlmeister and Pinratana (2007), Schintlmeister (2008, 2020), Zhang *et al*. (2022) and in the present studies, its placement in the present genus has been followed.

Neopheosia melaniata sp. nov. Kaleka & Kumar

zoobank.org:act:9E9511F1-D7AC-412F-BD09-1D0ECFBC6A73

(Plate 2, Figs. 9-17)

Diagnosis: Head with vertex and frons grey. Labial palpi straight; dressed with reddish-brown scales. Antenna bipectinate, pectinations along two-third length of the flagellum; scape clothed with creamish scales; flagellum brown. Thorax, collar and tegula grey; underside darker. Legs hairy, reddish-brown, fringed with greyish scales; fore-tibia with an epiphysis; mid-tibia with one pair of tibial spur; hind-tibia with two pairs of tibial spurs. Abdomen fuscous; underside paler, having a rusty medial streak.

Wing maculation: Forewing with ground colour ochreous, with brown and dark brown streaks; costa fuscous interspersed by creamy streaks; a prominent coffee coloured discal spot; a distinct wavy, hazel coloured submarginal line; anal margin coffee coloured; outer margin chequered with light and dark bands; underside with pale and rufous scales. Hindwing filthy white, anal margin fuscous; costal and apical areas darker; fuscous spot on tornus; cilia creamish; underside paler.

Wing venation: Forewing with discal cell less than half the length of wing, closed; 1A+2A from base of wing, reaching tornus; 3A absent; Cu_2 from two-third of cell; Cu_1 just before lower angle of cell; M_3 from lower angle of cell; M_2 above middle of discocellulars; M_1-R_2 well stalked from upper angle of cell; R_1 beyond three-fourth of cell, not reaching apex; Sc from base of wing, not reaching apex. Hindwing with discal cell slightly shorter than half the length of wing, closed; 1A from base of wing, not reaching tornus; 2A from base of wing, reaching tornus; 3A absent; Cu_2 well beyond three-fourths of cell; Cu_1 just before lower angle of cell; M_3 from lower angle of cell; M_2 just above middle of discocellulars; M_1 and Rs stalked from upper angle of cell; Sc+R_1 from base of wing, not reaching apex.

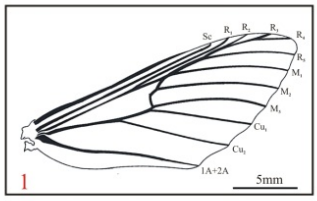
Wing expanse: Male: 50-54mm; Female: 62mm

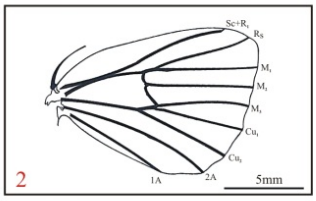
Body length: Male: 22-24 mm Female: 23 mm

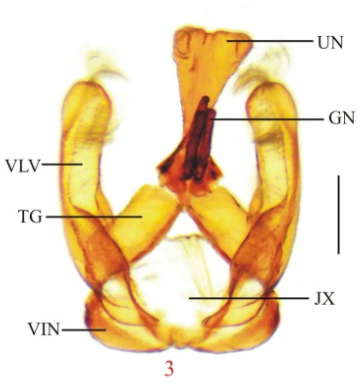
Plate - 1

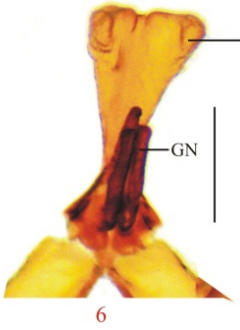
0.88 of Actual Size

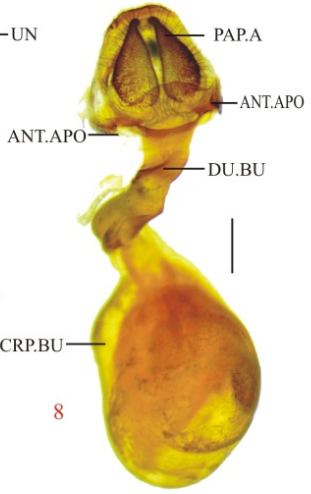
0.9 of Actual Size

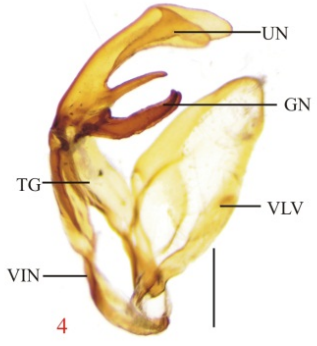


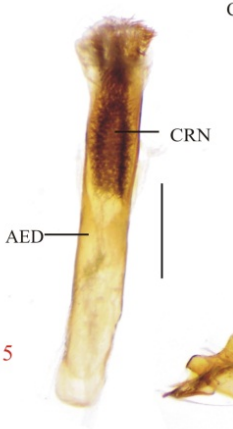












***Neopheosia fasciata* (Moore)**

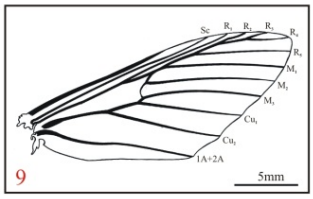
1. Forefwing 2. Hindwing 3. Male genitalia-Dorsal view 4. Lateral view
5. Aedeagus 6. Uncus & Gnathos 7. Valva 8. Female genitalia

(Bar Line = 1mm)

Plate - 2

Actual Size

0.77 of Actual Size



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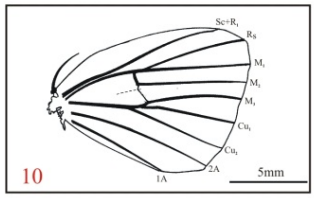

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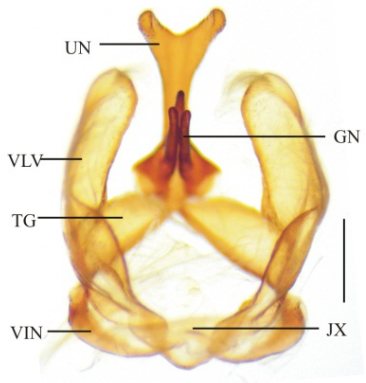

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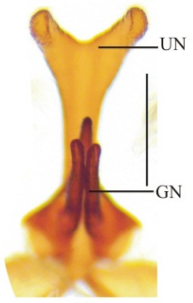

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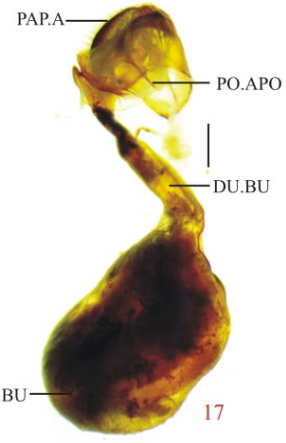

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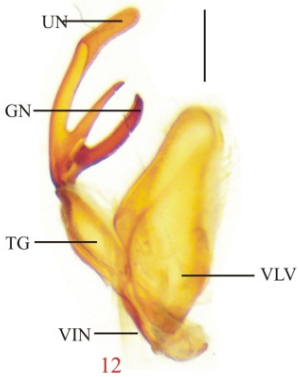

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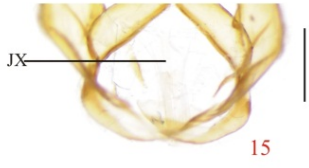

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Neopheosia melaniata n.sp.

9. Forewing 10. Hindwing 11. Male genitalia-Dorsal view 12. Lateral view
13. Aedeagus 14. Uncus & Gnathos 15. Juxta Enlarged 16. Valva 17. Female genitalia

(Bar Line = 1mm)

Male genitalia: Uncus long narrow, well sclerotized, dorsally setosed with short setae, distal end bifid with rounded apices; ventral sclerotized process with basal one-third part broad, remaining narrow ending into slightly beaked apex, more than half the length of uncus; a pair of well sclerotized projections representing gnathos, basal one-third portion bulbous, remaining narrow ending into rounded tips, slightly apart; tegumen sclerotized, broad, as long as vinculum, narrow at both ends; vinculum sclerotized; saccus absent; juxta V-shaped, broad distally, slightly sclerotized. Valva simple, setosed ventrally upto middle; costa with small sclerotized process; sacculus slightly sclerotized; distal end rounded, broad, setosed. Aedeagus of moderate size, well sclerotized; proximal end rounded flap-like; ductus ejaculatorius entering near proximal end; distal half more sclerotized, distal end flap-like; vesica armed with a longitudinal patch of spines representing cornuti.

Female genitalia: Corpus bursae globular, membranous; signum prominent near middle; ductus bursae long, one-third guarded by moderately sclerotized genital plate, dorso-ventrally flattened; ductus seminalis originating near anterior sclerotized part of ductus bursae; anterior apophysis broad at base, short, tapering; posterior apophysis long, 5X than anterior ones, tapering apices; papilla analis sclerotized, hoof-shaped, setosed with equal sized setae.

Material examined:

***Holotype*:** Mizoram: Hmuifang, 23.4488°N, 92.7590°E, 01.x.2013, 1♂

***Allotype*:** Sikkim: Chungthang, 27.6039°N, 88.6464°E, 12.ix.2013, 1♀.

***Paratype*:** Jammu and Kashmir: Uri, 34.0881°N, 74.0340°E, 27.vii.2014, 1♂; Meghalaya**:** Jowai, 25.4509°N, 92.2089°E, 06.ix.14, 1♂; Riatkhwan, 25.2250°N, 91.4720°E, 03.ix.14, 1♂; Mizoram: Hmuifang, 23.4488°N, 92.7590°E, 01.x.2013, 1♂; Hrangchalkawn, 22.8502°N, 92.7942°E, 03.x.2013, 1♂; Rabung, 23.6833°N, 93.2021°E, 17.ix.2015, 2♂♂.

The material has been deposited in Lepidoptera Lab, Department of Zoology & Environmental Sciences, Punjabi University, Patiala.

Distribution: India: Jammu and Kashmir, Meghalaya, Mizoram, Sikkim.

Etymology: The present species has been named due to its darker colouration i.e., melanism.

Remarks: Though the present species under reference is closely allied to the type species *Neopheosia fasciata* (Moore, 1888), but, its darker general colouration, brown-ochreous forewings with distinct fuscous discal spot and the stalking position of M_1 in forewing makes it distinct externally. As far as genitalic features are concerned, the distinct features include the narrow uncus along its entire length with longer bifurcated arms; ventral process from base of uncus with basal one-third part broad ending into slightly beaked apex and more than half the length of uncus; a pair of well sclerotized projections with smooth walls representing gnathos with basal one-third portion bulbous and ending into rounded tips; valva with costal process very small in male genitalia and corpus burse globular and posterior apophysis almost 5X length of anterior ones in female genitalia.

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